

Melksham Bypass

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Preliminary Environmental Assessment Report Volume 2 Appendices

11/11/21

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Appendices



Appendix A. Air Quality

A.1. Air pollutants and air quality legislation

A.1.1. Air pollutants

In most urban areas in the UK, the main local source of air pollutants is road traffic. Emissions from vehicle exhausts contain a complex mixture of pollutants including oxides of nitrogen (a mixture of NO₂ and nitric oxide (NO) – dominated by the latter), particulate matter (PM), carbon monoxide, and hydrocarbons (including benzene and 1,3 butadiene). The quantities of each pollutant emitted depend upon the vehicle type, quantity and type of fuel used, engine size, speed of the vehicle and abatement equipment fitted. In recent years, the local air pollutants of greatest concern have been NO₂ and particulate matter (PM₁₀ and PM_{2.5}). In addition to these air pollutants, dust may be generated during the construction phase. Further information is provided below.

Nitrogen dioxide

Nitrogen dioxide is generally produced by the oxidation of NO in ambient air (i.e. it is not formed directly and as such is known as a secondary pollutant). NO and NO₂ are collectively termed oxides of nitrogen (NO_x). Almost a third of UK NO_x emissions are from road transport¹. The majority of NO_x emitted from vehicles is in the form of NO, which oxidises rapidly in the presence of ozone (O₃) to form NO₂. In high concentrations NO₂ can affect the respiratory system, whereas NO does not have any observable effect on human health at the range of concentrations found in ambient air.

Particulate matter

Particles with an effective aerodynamic diameter of less than 10 micrometers (µm) are referred to as PM₁₀. Primary PM₁₀ emissions in the UK are derived from combustion sources including road transport, from quarrying and construction activities, and from wind-blown dust. Particulate matter appears to be associated with a range of symptoms of ill health including effects on the respiratory and cardiovascular systems, on asthma and on mortality. Reviews by the World Health Organisation (WHO) and Committee on the Medical Effects of Air Pollutants have suggested exposure to a finer fraction of particles (PM_{2.5} particles with a diameter of less than 2.5 µm, which typically make up around two thirds of PM₁₀ emissions and concentrations) has a significant contributory role in human all-cause mortality and in particular in cardiopulmonary mortality².

Dust

Dust is defined within the Institute of Air Quality Management (IAQM) “Guidance on the assessment of dust from demolition and construction” (IAQM Construction Guidance) as solid particles that are suspended in air, or have settled out onto a surface after having been suspended in air. It includes particles that give rise to soiling (deposited dust) and to human health and ecological effects.

The IAQM Construction Guidance states that there is evidence that major construction sites can lead to an increase in annual mean PM₁₀ concentrations and the number of exceedances of the short term 24-hour objective for PM₁₀. In addition, construction activities have the potential to cause higher than normal levels of dust deposition in the surrounding area. Dust emissions from a construction site may be mechanically generated due to land preparation (e.g. demolition, land clearing and earth moving) or as a result of releases from site plant and from the movement of road vehicles on temporary roads, open ground and haul routes.

A.1.2. Air quality legislation

UK legislation

There are two types of air quality regulations that apply in England:

- The EU (Withdrawal Agreement) Act 2020 which implements the European Union limit values; and

¹ National Atmospheric Emissions Inventory (2021) Pollutant Information. Available at: http://naei.Defra.gov.uk/overview/pollutants?pollutant_id=6

² Air Quality Expert Group (AQEG) Fine Particulate Matter (PM_{2.5}) in the UK (2012), Available at: https://uk-air.defra.gov.uk/assets/documents/reports/cat11/1212141150_AQEG_Fine_Part particulate_Matter_in_the_UK.pdf

- Regulations implementing national air quality objectives: Air Quality (England) Regulations 2000 (SI 2000 No. 928) and Air Quality (England) (Amendment) Regulations 2002 (SI 2002 No. 3043)^{3, 4}.

Limit values

The EU (Withdrawal Agreement) Act 2020 implements the air quality limit values that are included in the EU Directive on ambient air quality and cleaner air for Europe (2008/50/EC)^{5, 6}, and were previously included in air quality regulations (Statutory Instrument (SI) 2010 No. 1001) and as amended (SI 2016 No. 1184). The relevant limit values in the context of this assessment for the protection of human health for NO₂ and fine particulate matter are presented in Table A.1.

Local authorities have no responsibility for achieving the national air quality criteria, although they should contribute to this through local action plans designed to reduce pollution levels in Air Quality Management Areas (AQMAs), and through the recent targeted feasibility studies⁷, including clean air zones where appropriate, to supplement the government's air quality plan for NO₂ in the UK⁸.

National Air Quality Strategy

The 2007 Air Quality Strategy for England, Scotland, Wales and Northern Ireland (AQS) sets out the national air quality standards and objectives for a number of local air pollutants. The standards are set by expert organisations with regard to scientific and medical evidence on the effects of the particular pollutant on health, and define the level of pollution below which health effects are expected to be minimum or low risk even for the most sensitive members of the population. The objectives are targets for air pollution levels to be achieved by a specified timescale, which take account of the costs and benefits of achieving the standard, either without exception or, for certain short-term averaging period standards, with a permitted number of exceedances. Local authorities have a responsibility (under Part IV of the Environment Act 1995, see below) to review and assess local pollution levels against these objectives. These criteria are defined in Regulations SI 2000 No. 928 and SI 2002 No. 3043.

It should be noted that the AQS objectives only apply in locations likely to have 'relevant exposure' i.e. where members of the public are exposed for periods equal to or exceeding the averaging periods set for the standards. For this assessment, locations of relevant exposure including building façades of residential premises, schools, public buildings and medical facilities; places of work (other than certain community facilities) are excluded.

In January 2019, the UK Government published a Clean Air Strategy⁹, which sets out actions to improve air quality by reducing pollution from a wide range of sources. Within the strategy, the Government proposes an ambitious target to reduce the population exposed to concentrations of PM_{2.5} above 10 µg/m³ by 50% by 2025. Relevant air quality criteria for human health are provided in Table A.1 below.

Table A.1 - Statutory air quality criteria

Pollutant	Objective
NO ₂	Hourly mean concentration should not exceed 200 µg/m ³ more than 18 times a year Annual mean concentration should not exceed 40 µg/m ³
PM ₁₀	24-hour mean concentration should not exceed 50 µg/m ³ more than 35 times a year

³ The Air Quality (England) Regulations 2000. Available at:

<http://www.legislation.gov.uk/uksi/2000/928/contents/made>

⁴ The Air Quality (England) (Amendment) Regulations 2002. Available at:

<http://www.legislation.gov.uk/uksi/2002/3043/contents/made>

⁵ The Air Quality Standards Regulations 2010. Available at:

<http://www.legislation.gov.uk/uksi/2010/1001/contents/made>

⁶ The Air Quality Standards (Amendment) Regulations 2016. Available at:

<https://www.legislation.gov.uk/uksi/2016/1184/contents/made>

⁷ DEFRA (2018) Supplement to the UK Plan for Tackling Roadside Nitrogen Dioxide Concentrations: Local Authorities Feasibility Studies. Available at: <https://uk-air.defra.gov.uk/library/no2ten/2018-la-fs-documents>

⁸ DEFRA (2017) UK plan for tackling roadside nitrogen dioxide concentrations, Available at: <https://uk-air.defra.gov.uk/library/no2ten/index>

⁹ DEFRA (2019) Clean Air Strategy 2019. Available at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/770715/clean-air-strategy-2019.pdf

Pollutant	Objective
	Annual mean concentration should not exceed 40 µg/m ³
PM _{2.5}	UK (Except Scotland) annual mean concentration should not exceed 25 µg/m ³ † Exposure reduction [^] (UK urban areas): target of 15% reduction in concentrations at urban background between 2010 and 2020*

† UK AQS objective is 25 µg/m³ to be met by 2020. Limit value is 25 µg/m³ to be met by 2015, with a requirement in urban areas to bring exposure down to below 20 µg/m³ by 2020.

[^] Limit value exposure reduction target of 20% reduction between 2010 and 2020.

* 25 µg/m³ is a cap to be seen in conjunction with 15% reduction.

Local air quality management

Under Part IV of the Environment Act 1995 all local authorities are responsible for Local Air Quality Management (LAQM), the mechanism by which the Government's AQS objectives are to be achieved. As part of this LAQM role, local authorities are required to periodically review air quality in their area and to assess present and likely future air quality against the objectives defined in Regulations. Where a local authority anticipates an objective is expected to be breached within their area, they must designate an Air Quality Management Area (AQMA) and develop an action plan to improve pollution levels and work towards achieving the AQS objectives. Under the current LAQM regime, a local authority is responsible for regular review and assessment of local air quality, reports on which are published following public consultation and review by the Department for Environment, Food and Rural Affairs (DEFRA).

Dust

There are no national standards or guidelines for dust deposition currently set in the UK, or by any international organisation. This is mainly due to the difficulty that any standard set would need to relate to dust being a perceptual problem, rather than being specifically related to health effects. Typically, dust monitoring is undertaken with regards to Site Action Levels (i.e. the level above which mitigation may be required to reduce the likelihood of adverse impacts). In residential areas, the IAQM recommends Site Action Levels for PM₁₀ concentrations of 190 µg/m³ measured as a 1-hour mean, and for dust deposition rates (as measured using a passive 'Frisbee-type' dust deposition gauge) of 200 mg/m²/day or greater.

The statutory nuisance provisions under the Environmental Protection Act 1990 require local authorities to detect and invoke action to prevent statutory nuisance from occurring. In the context of the Scheme, dust emissions from demolition and construction activities could potentially result in a statutory nuisance if not properly controlled. The defence against this is the use of 'Best Practicable Means' (BPM) to mitigate and control dust emissions. This essentially means the managed, diligent application of 'best practice' techniques to minimise emissions in the context of the receiving environment, changing conditions, and cost. If these mitigation measures are correctly implemented, it is not anticipated that a statutory nuisance would result.

A.2. Assessment methodology

A.2.1. Construction

Construction dust

A qualitative assessment of the effects on air quality from construction has been undertaken in line with DMRB LA 105, taking into account the nature of any proposed construction activities that have the potential to generate dust and the location of sensitive receptors.

The air quality study area for assessing potential impacts of construction dust during the construction phase is defined as the area within 200 m of the boundary of the footprint of the Scheme's construction activities.

For construction dust the number of sensitive receptors and their distance from the footprint of the construction works have been considered to determine the risk of potential construction dust impacts.

Construction traffic

The effect of any construction traffic or disruption to traffic during construction will be considered with reference to the duration of construction works and the expected volume of construction vehicles.

An increase in vehicle movements is expected to occur during the construction period, associated with the transport of materials, plant and labour to and from site. However, the number of Heavy Duty Vehicles (HDV)

movements are not anticipated to exceed the DMRB LA 105 traffic screening criteria for quantitative assessment of 200 HDV per day, nor are total vehicle movements anticipated to exceed 1,000 AADT per day. Substantial traffic management or the need to divert existing traffic during the construction phase is not expected to be required. As it is anticipated that the duration of the construction phase will be less than two years, further quantitative assessment has not been undertaken at this stage, in line with DMRB LA 105.

A.2.2. Operation

The air quality assessment has been undertaken following the relevant guidance given in DMRB LA 105, as well as Department for Environment, Food and Rural Affairs (Defra) Local Air Quality Management Technical Guidance (LAQM.TG16).

The assessment has used the latest updated Defra air quality assessment tools and datasets (released 19 August 2020) for NO_x, NO₂, PM₁₀ and PM_{2.5}.

The key scenarios included in the assessment were:

- Base year (2018) – for model verification (NO_x, NO₂, PM₁₀ and PM_{2.5});
- Projected base year (2028) – for long term trends assessment (NO_x, NO₂, PM₁₀ and PM_{2.5}); and
- Opening year (2028) for both without the Scheme (Do Minimum) and with the Scheme (Do Something) (NO_x, NO₂, PM₁₀ and PM_{2.5})

Traffic data have been provided from a Scheme specific traffic model to enable the ARN for the air quality assessment to be determined.

The air quality study area for the operational phase has been defined as the area within 200 m of the roads meeting the traffic screening criteria within DMRB LA 105 (see paragraph 1.3.4). The traffic screening criteria have been applied based on the comparison between 'with Scheme' (Do Something (DS)) and 'without Scheme' (Do Minimum (DM)) traffic data as defined in DMRB LA 105.

The changes are applied to roads, rather than modelled links, and so where relevant are determined under two-way traffic conditions. The AADT and HDV criteria have been applied to two-way traffic data (the sum of the carriageways not individual carriageways). The speed band criteria have been applied to one way traffic data and have considered speeds for all time weekday periods (AM (0700-1000), inter peak (1000-1600), PM (1600-1900) and off-peak (1900-0700)).

A.2.3. Air Quality modelling

The air quality assessment was undertaken using the CERC Atmospheric Dispersion Modelling System (ADMS) roads dispersion modelling software (ADMS Roads version 5.0.0.1).

The hourly emissions data input to the dispersion model have been estimated using the latest version of Defra's EFT (v10.1) and the hourly flows of Light Duty Vehicles (LDV) and HDV - during AM, inter peak, PM and off-peak periods.

In addition, information on road alignment, road width and local meteorological data (taken from Lyneham meteorology station for the base year 2018) have been input into the dispersion model.

Traffic conditions

Traffic conditions vary throughout the course of a day and a 24-hour profile has been applied in the model to improve the estimation of vehicle emissions in each hour of the year, based on AM, inter peak, PM and off peak period traffic flows. The ADMS-Roads model has been set up with a unit emission rate entered into the model for each road link and a time varying emissions file created containing the estimated emissions for each hour.

Background concentrations

The output from the dispersion model has been used to provide estimates of the contribution from road traffic emissions to annual mean concentrations of NO_x, PM₁₀ and PM_{2.5} at discrete receptors. These concentrations must then be combined with estimates of background concentrations, to account for other sources of air pollution, to derive total annual mean concentrations for comparison with air quality thresholds (NO₂, PM₁₀ and PM_{2.5}).

Background concentrations have been derived from Defra's background maps^{Error! Bookmark not defined.} (2018 reference year) and compared with monitored data at background sites within and around the air quality study area for the Scheme, to ensure the mapped estimates are appropriate. The comparison was undertaken for NO₂, and it is shown in Table A.2.

The comparison showed that mapped estimates of annual mean NO₂ were within 30% of the monitored concentrations at all relevant sites, showing systematic underestimates in the comparisons. On that basis, following guidance Defra annual mean NO₂ background concentrations have been taken as suitable to use in the assessment without further adjustment. There are no background sites monitoring PM₁₀ and PM_{2.5} to allow the comparison between mapped and monitored concentrations for these pollutants, therefore, Defra annual mean PM₁₀ and PM_{2.5} background concentrations have also been used unadjusted in the assessment.

Table A.2 - Comparison of annual mean NO₂ pollutant concentrations (µg/m³) for Defra background mapping and urban background monitoring sites

Site Name	Grid Reference	Monitored 2018 Annual Mean NO ₂ Concentration	Monitored 2018 Annual Mean NO ₂ Concentration	%Difference (grid square NO ₂ – monitored NO ₂) / monitored NO ₂ *100)
DT14	419011,169012	11.4	8.6	-25%
DT18	400126,170745	9.9	8.9	-10%
DT26	392468,172054	12.1	9.7	-19%
DT38	381878,160836	8.4	6.5	-22%
DT45	384343,157806	11.4	8.6	-25%
DT51	386577,170652	12.3	9.1	-26%
DT61	414760,130567	19.3	13.9	-28%

NO_x to NO₂ conversion

Annual mean concentrations of NO₂ were derived from modelled NO_x concentrations using the Defra NO_x to NO₂ calculator (version 8.1, August 2020). The traffic mix and local authority data used for the conversion have been selected according to the locations of the receptors.

Comparison with short-term objectives

Commentary on potential exceedances of the 1-hour mean NO₂ AQS objective is possible with reference to Defra's LAQM.TG(16). The guidance suggests that if annual mean concentrations of NO₂ do not exceed 60 µg/m³ then it is unlikely that hourly mean concentrations would exceed the objective for the 1-hour mean.

Defra's LAQM.TG(16) was also used to derive the number of exceedances of the 24-hour mean PM₁₀ AQS objective, of which 35 are permitted. The method is based on the relationship between the number of 24-hour exceedances of 50 µg/m³ and the annual mean concentration derived from UK Automatic Urban Rural Network Sites where. This is described in the equation below:

Equation 5.1 – Calculation of PM₁₀ 24-hour mean exceedances

$$\text{Number of exceedances of 24-hour mean of } 50 \mu\text{g/m}^3 = -18.5 + 0.00145 * a^3 + (206/a)$$

Where 'a' = total annual mean PM₁₀ concentration

Where the total annual mean PM₁₀ concentrations are below 14.5 µg/m³ there is assumed to be no exceedances of the 24-hour mean of 50 µg/m³ and where concentrations are below 31.8 µg/m³ fewer than 35 exceedances of 24-hour mean of 50 µg/m³ are predicted.

Designated habitats assessment

Assessment of potential effects of changes in road NO_x concentrations on nitrogen deposition rates has been undertaken at identified sensitive ecological designations, in accordance with DMRB LA 105. Highways England LTTE6 projection factors have been applied in accordance with DMRB LA 105 to annual mean road NO₂ at ecological receptors.

Background nitrogen deposition rates, critical loads and habitat types at each designated site has been obtained from the APIS website where available. Non-statutory designated ecological sites (LWS, LNR, AW and veteran trees) have been assessed using conservative assumptions where data is not available on APIS. These sites were assessed assuming a woodland habitat, critical load of 10 kg N ha⁻¹ yr⁻¹ and no reduction in background nitrogen deposition rates in future years.

Magnitude of impact classification

Descriptors for magnitude of change in ambient concentrations of NO₂ and PM₁₀ are provided in DMRB LA 105. Only those receptors predicted to exceed relevant air quality thresholds have been considered when determining significance for human health. The changes in magnitude descriptors depend on the change in concentration relative to the air quality thresholds shown in Table A.3. Where the change in concentrations is 1% or less of the objective ($\leq 0.4 \mu\text{g}/\text{m}^3$) this is considered an imperceptible change.

Table A.3 - Magnitude of change criteria for air quality human health receptors

Magnitude of change in concentration	Value of change in annual mean NO ₂ , PM ₁₀ and PM _{2.5} * concentrations
Large (>4 $\mu\text{g}/\text{m}^3$)	Greater than 10% of the air quality objective (4 $\mu\text{g}/\text{m}^3$ – 2.5 $\mu\text{g}/\text{m}^3$ for PM _{2.5})
Medium (>2 $\mu\text{g}/\text{m}^3$)	Greater than 5% of the air quality objective (2 $\mu\text{g}/\text{m}^3$ -1.25 $\mu\text{g}/\text{m}^3$ for PM _{2.5})
Small (>0.4 $\mu\text{g}/\text{m}^3$)	Greater than 1% of the air quality objective (0.4 $\mu\text{g}/\text{m}^3$ – 0.25 $\mu\text{g}/\text{m}^3$ for PM _{2.5})

*It should be noted that the same value of change in annual mean concentrations were used for PM_{2.5}, as there are no change criteria reported in DMRB LA105 for this pollutant.

Significance

Evaluation of the significance of the effect of the Scheme on human health has been undertaken in accordance with DMRB LA 105. The number of receptors that exceed relevant air quality thresholds and fall within the 'small', 'medium' and 'large' magnitude of change categories has been calculated and compared to the guidelines presented in Table A.4.

Significant air quality effects are only identified for receptors where AQS objectives are exceeded with or without the Scheme. Where the changes in concentrations are less than 1% of the AQS objective (i.e. equal to or less than 0.4 $\mu\text{g}/\text{m}^3$ for NO₂ and PM₁₀, and equal to or less than 0.25 $\mu\text{g}/\text{m}^3$ for PM_{2.5}) then the change at these receptors is considered to be 'imperceptible' and can be scoped out of the judgement on significance.

Table A.4 - Guideline band for number of receptors constituting a significant effect for air quality

Magnitude of Change in Annual Average NO ₂ ($\mu\text{g}/\text{m}^3$)	Total Receptors with:	
	Worsening of air quality objective already above objective or creation of new exceedance	Improvement of air quality objective already above objective or the removal of an existing exceedance
Large (>4)	1 to 10	1 to 10
Medium (>2)	10 to 30	10 to 30
Small (>0.4)	30 to 60	30 to 60

Evaluation of the significance of the effect of the Scheme on designated habitats has been undertaken in accordance with DMRB LA 105. Where the lower level of the nitrogen deposition critical load for the relevant habitat is exceeded and the change in nitrogen deposition is expected to be greater than 1% of the lower level of the critical load then the magnitude of change of the nitrogen deposition was considered further and where the change in nitrogen deposition was greater than 0.4kg N/ha/yr then the significance of air quality impacts on designated habitats will be considered for further investigation in collaboration with a competent expert for biodiversity.

At this stage, the overall evaluation of the significance of the effect has been undertaken in accordance with DMRB LA 105 based on a combination of the effects of the Scheme on human health and designated habitats.

A.2.4. Air quality modelling parameters

The dispersion model was set up based on the following key inputs and assumptions:

- Road sources were modelled using the ADMS-Roads source representation tool;
- Ordnance Survey Master Map base mapping was used to define the road geometry;
- A single centreline was entered in the model for modelled roads, with the exception of dual carriageways and motorway links which have a centreline included for both carriageway directions; and

- Road widths have been measured in GIS from Ordnance Survey Master Map data.

Hourly sequential meteorological data for 2018 Lyneham meteorological station was used. The parameters required by the model included: date, time, wind direction (angle wind blowing from), wind speed (at 10 metres above ground level), surface air temperature (degrees Celsius), and cloud cover (oktas – or eighths of sky covered).

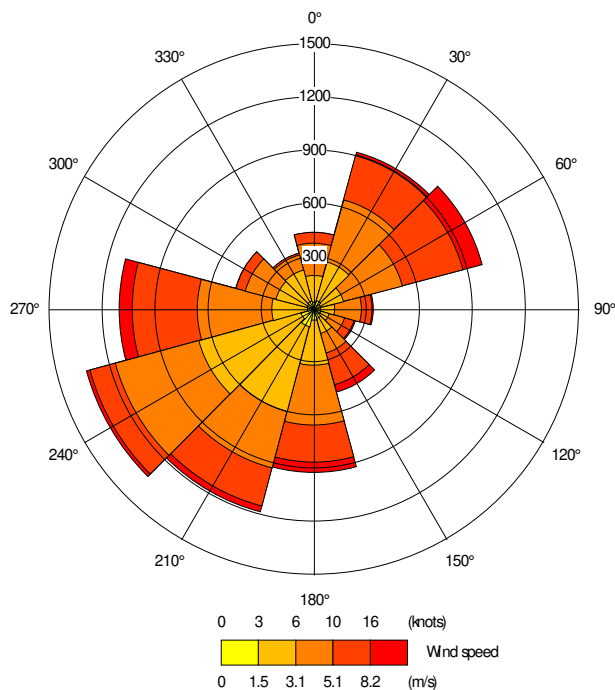
A latitude of 51.4 degrees was selected. This determines times of sunrise and sunset for each day throughout the year, which in turn affects stability calculations.

Surface roughness coefficients have been defined as 0.3 metres (representative of agricultural area max) for the air quality study area and 0.1 metres (representative of root crops) for the meteorological station. The surface roughness is important in the approximation of turbulent conditions within the atmospheric boundary layer and thus in the estimation of pollutant concentrations at receptors.

Minimum Monin-Obukhov length (to reasonably limit the occurrence of very stable atmospheric conditions) has been defined as 10 metres (representative of small towns with a population of less than 10,000) for both the air quality study area and the meteorological station. This parameter limits the occurrence of very stable boundary layer conditions (i.e. when the air is still) to a degree that is appropriate to the general land-use. In general, the potential for very stable conditions is lowest in large urban areas where the ‘heat island’ effect promoting turbulent motion in the boundary layer is strongest.

A wind rose for the Lyneham 2018 met station is shown below in Figure A-1.

Figure A-1 - Wind Rose for Lyneham 2018 Meteorological Station



A.2.5. Receptors

Representative receptors have been selected for the air quality assessment and include those closest to the roads that trigger the traffic change criteria (and therefore likely to be most affected by changes), as well as those likely to experience the highest total concentrations in areas where there is the potential for exceedances of air quality thresholds without and with the Scheme.

Sensitive human health and ecological receptors for the purposes of air quality assessment are defined in DMRB LA 105 as:

- Residential properties, locations of susceptible populations e.g. schools, hospitals and care homes for the elderly, or any other location where a member of the public may be exposed to an air pollutant for the relevant regulated time period; and
- Designated ecological sites with statutory designations (special protection areas (SPA), special areas of conservation (SAC), sites of special scientific interest (SSSI)) and with non statutory designations (local

nature reserves (LNR), local wildlife sites (LWS), nature improvement areas (NIA), ancient woodland (AW) and veteran trees) containing habitats sensitive to nitrogen deposition.

Ecological receptors representing designated sites that contain habitats sensitive to nitrogen deposition have been included in the air quality assessment. There is one ecological site with national statutory designation within the air quality study area, Spye Park SSSI, and a number of ecological sites with non statutory designations (LNR, LWS and AW). A single receptor point modelled at ground level at the closest location to the road has been included for all the modelled ecological sites, representative of the worst case location.

There are a total of 108 human health receptors in the air quality study area. All human health receptors were modelled at a height of 1.5 m above ground and ecological receptors at 0 m above ground to reflect worst case average exposure. Details of the receptors assessed are presented in Table A.5 and Error! Reference source not found. for the modelled human health receptors and the ecological sites respectively. It is noted that the following receptor IDs are not reported as they were no longer within the study area once all model links were georeferenced, R1, R107, R108, ECO4, ECO8, ECO10, and ECO13.

Table A.5 - Modelled human health receptors

Receptor ID	X	Y
R2	400103	161676
R3	399907	161733
R4	399763	161717
R5	399398	161909
R6	398816	161352
R7	398705	162637
R8	397939	162691
R9	397818	164081
R10	397472	161259
R11	397255	165605
R12	396945	166398
R13	396570	167778
R14	396415	168195
R15	396290	168205
R16	395661	168144
R17	395619	165726
R18	395257	162016
R19	394437	164769
R20	393987	167787
R21	393225	167900
R22	393053	166288
R23	392945	162435
R24	392931	166873
R25	392862	168024
R26	392786	164580
R27	392760	162046
R28	392643	164524

Receptor ID	X	Y
R29	392641	168086
R30	392488	164483
R31	392247	164342
R32	392199	163932
R33	392083	164271
R34	392087	163559
R35	392057	165498
R36	392002	161523
R37	391887	162296
R38	391702	164243
R39	391656	162394
R40	391567	168080
R41	391563	164215
R42	391546	168550
R43	391533	168501
R44	391532	168399
R45	391525	162508
R46	391511	165239
R47	391396	168247
R48	391344	166964
R49	391326	162880
R50	391289	164862
R51	391271	161169
R52	391232	164739
R53	391201	162934
R54	391169	162841
R55	391159	163113
R56	391112	163110
R57	391096	169874
R58	391041	170217
R59	391039	164163
R60	390930	163259
R61	390879	164235
R62	390875	162793
R63	390736	166455
R64	390731	164020
R65	390697	163990

Receptor ID	X	Y
R66	390567	162816
R67	390504	163862
R68	390503	163606
R69	390462	163966
R70	390460	163708
R71	390480	163754
R72	390442	161754
R73	390441	162481
R74	390430	166317
R75	390403	164091
R76	390395	166193
R77	390331	159947
R78	390320	162882
R79	390293	160161
R80	390287	162838
R81	390285	160116
R82	390282	165787
R83	390269	164263
R84	390220	164599
R85	390211	162923
R86	390186	164161
R87	390177	164748
R88	390175	164213
R89	390165	165030
R90	390159	165104
R91	390143	164382
R92	390128	165445
R93	390113	164884
R94	390089	171539
R95	390056	164074
R96	390019	164158
R97	389973	163141
R98	389692	160098
R99	389678	173697
R100	389625	172330
R101	389623	172399
R102	389586	172908

Receptor ID	X	Y
R103	388980	158126
R104	388422	159435
R105	388277	157137
R106	388140	159149
R109	387648	158588
R110	387399	158572
R111	391755	162345

Table A.6 - Modelled ecological receptors

Receptor ID	Ecological Site	X	Y
ECO1	Kennet & Avon Canal LWS 1	399366	161527
ECO2	Kennet & Avon Canal LWS 2	399348	161527
ECO3	Wyatts Wood Ancient Woodland	396883	165931
ECO5	Kennet & Avon Canal LWS 3	395533	161915
ECO6	Kennet & Avon Canal LWS 4	395528	161910
ECO7	Ancient Woodland 1	394786	168171
ECO9	Spye Park SSSI	394449	168156
ECO11	Morass Wood LWS	394309	164735
ECO12	Morass Wood Ancient Woodland	393840	164636
ECO14	Briary Wood Ancient Woodland 1	393380	167931
ECO15	Briary Wood Ancient Woodland 2	393108	168028
ECO16	Bristol Avon River LWS 1	392217	168104
ECO17	Bristol Avon River LWS 2	392216	168097
ECO18	Veteran Tree 1	392097	163393
ECO19	Veteran Tree 2	391950	162350
ECO20	Inwood, Lacock LWS	391446	167579
ECO21	Ancient Woodland 2	391414	167369
ECO22	Kennet & Avon Canal LWS 5	390456	160913
ECO23	Kennet & Avon Canal LWS 6	390445	160914
ECO24	Bristol Avon River LWS 3	390381	164144
ECO25	Bristol Avon River LWS 4	390375	164142
ECO26	Bristol Avon River LWS 5	390011	163845
ECO27	Bristol Avon River LWS 6	390003	163845
ECO28	Ancient Woodland 3	389679	173325
ECO29	Smiths Well Wood Ancient Woodland 1	388686	157745
ECO30	Green Lane Wood LNR 1	388686	157743
ECO31	Smiths Well Wood Ancient Woodland 2	388673	157750
ECO32	Green Lane Wood LNR 2	388673	157748

Receptor ID	Ecological Site	X	Y
ECO33	Castle Lodge Wood / Church Plantation Ancient Woodland	388087	156594
ECO34	Biss Wood Ancient Woodland	388026	156632
ECO35	Veteran Tree 3	392330	166940

A.3. Verification

The annual mean NO₂ concentrations for the base year have been verified by means of comparison against available ratified monitoring data. The modelled road NO_x concentrations were adjusted where appropriate, with reference to the methodology set out in Defra's LAQM.TG(16). Once adjusted, the total NO₂ concentrations have been considered to have acceptable model performance in accordance with Defra's LAQM.TG(16).

It was not possible to derive an adjustment factor for PM₁₀ or PM_{2.5} as there is no suitable PM₁₀ monitoring in the air quality study area for the Scheme. The modelled road PM₁₀ and PM_{2.5} concentrations were adjusted using the same factor delivered for NO₂ where appropriate, with reference to the methodology set out in Defra's LAQM.TG(16).

A.3.1. Air quality model verification

Verification for NO₂

It is good practice to compare modelled estimates of pollutant concentrations with real-world monitoring to assess the model's performance for a base year and to inform the interpretation of model results for future years. Verification of the 2018 base year scenario has been undertaken by comparison of the modelled concentration against that measured at the closest monitoring site to the study area.

Model verification was undertaken considering monitoring sites within 200 metres of the roads meeting the DMRB LA 105 traffic screening criteria located at suitable locations. A total of five monitoring sites were taken forward in the model verification.

The annual mean NO₂ concentrations for the 2018 base year were verified by means of comparison against available ratified monitoring data. The modelled road NO_x concentrations were adjusted where appropriate, with reference to the methodology set out in DEFRA's LAQM.TG(16). Where 2018 annual mean NO₂ monitored concentrations were not available, they were estimated from the 2019 values using the adjustment factor derived from the comparison between the monitored 2019 and 2018 annual mean NO₂ concentrations within Wiltshire.

Uncertainty in modelled estimates has been considered by calculating root mean square error (RMSE) and fractional bias statistics. An air quality model can be considered to perform reasonably well where 95% of modelled concentrations are within 25% of monitored concentrations in accordance with Defra's Technical Guidance LAQM.TG(16). The RMSE should ideally be within 10% of the relevant air quality criterion but is acceptable where it is within 25% of the relevant air quality criterion. The Fractional Bias (FB) has an ideal value of 0 but is acceptable in the range between +2 and -2.

Step 1

Firstly, unadjusted modelled estimates of total annual mean NO₂ concentrations have been compared against monitored annual means. Out of 6 comparisons, 2 modelled estimates are within +/- 10% of monitored concentrations without adjustment, as given in Table A.7. Substantial and systematic underestimates of more than 25% are indicated for 4 sites. The Fractional Bias (FB) is above the ideal value of 0, indicating that the model tends to underestimate.

Table A.7 - Comparison of unadjusted modelled and measured NO₂ concentrations

Site Name	Background Annual Mean NO ₂ (µg/m ³)	Monitored Annual Mean Total NO ₂ (µg/m ³)	Modelled Annual Mean Total NO ₂ (µg/m ³)	Modelled NO ₂ Minus Monitored NO ₂ (µg/m ³)	% Difference (unadjusted modelled NO ₂ - monitored NO ₂) / monitored NO ₂ * 100
DT2	8.3	41.7	14.4	-27.3	-65.5
DT3	8.3	43.7	17.9	-25.8	-59.1
DT42	12.1	37.4	25.2	-12.2	-32.6

DT43*	12.1	17.1	16.1	-1.0	-6.1
DT44*	11.7	21.2	15.4	-5.8	-27.3
P18/106	12.1	23.0	22.7	-0.3	-1.1

*2019 Annual Mean NO₂ concentrations annualised to 2018

Table A.8 - Model statistics pre-adjustment

RMSE[i]	FB[ii]	r[iii]
16.3	0.49	0.09

[i] Root Mean Square Error: RMSE is used to define the average error or uncertainty of the model (units = µg/m³). In the case of modelled annual mean NO₂ a value of less than 10 is acceptable and less than 4 is the ideal

[ii] Fractional Bias: FB is used to identify if the model shows a systematic tendency to over or under estimate. Ideal value is 0

[iii] Correlation coefficient: r is used to measure the linear relationship between modelled and observed data. Ideal value is 1

For unadjusted modelled estimates of NO₂ compared to monitored concentrations, the RMSE is 16.3 µg/m³, which is above the target value according to DEFRA's LAQM.TG(16) i.e. ideally less than 4 µg/m³ in relation to the 40 µg/m³ AQS objective for annual mean NO₂ concentrations, but as a minimum not more than 25% of the objective i.e. 10 µg/m³. Overall, the unadjusted model tends to underestimate total concentrations of NO₂, as indicated by a high fractional bias value of 0.49.

Step 2

The second comparison of modelled estimates of road contributed annual mean NO_x with the road NO_x component derived from monitoring data is presented in Table A.9. This analysis requires the estimation of the monitored road NO_x component. This has been undertaken using DEFRA's NO₂ to NO_x calculator (version 8.1).

Modelled road NO_x concentrations can be adjusted by taking the slope of the linear regression line that has been forced through zero. Due to the model performing differently in different areas, and the geographical location of the monitoring sites used, the verification was split into two zones, isolating the area where Devizes AQMA is located and therefore resulting in two different adjustment factors for the full study area.

The results have been used to derive an adjustment factor of 1.66 for Melksham verification zone and 5.16 for Devizes AQMA zone.

Table A.9 - Comparison of unadjusted modelled and measured NO_x concentrations

Site Name	Monitored Annual Mean Road NO _x (µg/m ³)	Modelled Annual Mean Road NO _x (µg/m ³)	Modelled NO _x Minus Monitored NO _x (µg/m ³)	Monitored Road NO _x / Modelled Road NO _x	% Difference (unadjusted modelled NO _x - monitored NO _x) / monitored NO _x * 100
Devizes AQMA verification zone					
DT2	69.0	11.2	-57.8	6.2	-83.8
DT3	73.8	17.8	-56.0	4.1	-75.8
Melksham verification zone					
DT42	51.2	25.1	-26.1	2.0	-51.0
DT43	9.3	7.3	-2.0	1.3	-21.1
DT44	17.8	6.8	-11.0	2.6	-61.7
P18/106	20.7	20.2	-0.5	1.0	-2.5

Step 3

The third comparison of the adjusted modelled estimates of total annual mean NO₂ with monitored concentrations is presented in Table A.10. Out of 6 comparisons, 5 modelled estimates are within +/- 25% of monitored concentrations with 1 site overpredicting (>+ 25%, P18/106) with adjustment.

The model statistics post-adjustment are presented in Table A.11. The overall RMSE calculated for both verification zones is below the threshold value of 25% of the AQS objective (i.e. 10 µg/m³) in both verification zones and is, therefore, considered acceptable. The FB is improved and is closer to the ideal value (0).

Table A.10 - Comparison of modelled and measured NO₂ concentrations after adjustment

Site Name	Background Annual Mean NO ₂ (µg/m ³)	Monitored Annual Mean Total NO ₂ (µg/m ³)	Adjusted Modelled Annual Mean Total NO ₂ (µg/m ³)	Modelled NO ₂ Minus Monitored NO ₂ (µg/m ³)	% Difference (adjusted modelled NO ₂ - monitored NO ₂) / monitored NO ₂ * 100
Devizes AQMA verification zone					
DT2	8.3	41.7	36.8	-4.9	-11.7
DT3	8.3	43.7	50.9	7.2	16.6
Melksham verification zone					
DT42	12.1	37.4	33.1	-4.3	-11.4
DT43	12.1	17.1	18.6	1.5	9.0
DT44	11.7	21.2	17.8	-3.4	-15.9
P18/106	12.1	23.0	29.3	6.3	27.5

Table A.11 - Model Statistics Post-Adjustment

Verification Zone	RMSE[i]	FB[ii]	r[iii]
Devizes AQMA	6.17	-0.03	1.00
Melksham	4.24	0.00	0.83

[i] Root Mean Square Error: RMSE is used to define the average error or uncertainty of the model (units = µg/m³). In the case of modelled annual mean NO₂ a value of less than 10 is acceptable and less than 4 is the ideal

[ii] Fractional Bias: FB is used to identify if the model shows a systematic tendency to over or under estimate. Ideal value is 0

[iii] Correlation coefficient: r is used to measure the linear relationship between modelled and observed data. Ideal value is 1

A.4. Detailed modelling results

A.4.1. Human health impacts

Pollutant concentrations were estimated for the Scheme opening year of 2028 at 108 human health receptors. The NO₂ concentrations were adjusted following verification, details of which are provided in A.3.

Concentrations of NO₂, PM₁₀ and PM_{2.5} were compared with relevant UK AQS objectives to determine whether there were likely to be any exceedances.

Modelling has been undertaken in accordance with DMRB LA 105 using Highways England LTTE6 projection factors to determine the future year concentrations. Details on the derivation of the gap factors at human health receptors are provided in Table A.12.

Annual mean NO₂ results for all receptors included in the air quality model are provided in Table A.13. Annual mean NO₂ results at all receptors, including those exceeding the annual mean NO₂ AQS objective in either the without Scheme (Do Minimum (DM)) or with Scheme (Do Something (DS)) scenario are shown in Figure 4.3, Volume 3.

Table A.12 - Derivation of GAP factor in accordance with Highways England LTTE6 projection factors for human health

Receptor ID	Base 2018 NO ₂ (µg/m ³)	2028 Projected Base NO ₂ (µg/m ³)	2028 Projected Base NO ₂ / Base 2017 NO ₂ (Ratio A)	2028 Long Term Adjustment Factor / 2017 Long Term Adjustment Factor (Ratio B)	Gap Factor (Ratio B / Ratio A)
R2	61.5	27.8	0.5	0.8	1.8
R3	43.3	19.2	0.4	0.8	1.8
R4	58.0	25.5	0.4	0.8	1.8
R5	12.6	7.4	0.6	0.8	1.4

Receptor ID	Base 2018 NO ₂ (µg/m ³)	2028 Projected Base NO ₂ (µg/m ³)	2028 Projected Base NO ₂ / Base 2017 NO ₂ (Ratio A)	2028 Long Term Adjustment Factor / 2017 Long Term Adjustment Factor (Ratio B)	Gap Factor (Ratio B / Ratio A)
R6	14.2	7.7	0.5	0.8	1.5
R7	11.1	6.6	0.6	0.8	1.3
R8	11.3	6.7	0.6	0.8	1.3
R9	10.5	6.4	0.6	0.8	1.3
R10	16.9	8.6	0.5	0.8	1.6
R11	9.6	6.2	0.6	0.8	1.3
R12	14.8	8.0	0.5	0.8	1.5
R13	13.2	7.4	0.6	0.8	1.4
R14	10.9	6.6	0.6	0.8	1.3
R15	8.7	5.7	0.7	0.8	1.2
R16	8.3	5.6	0.7	0.8	1.2
R17	13.4	7.5	0.6	0.8	1.4
R18	13.5	7.9	0.6	0.8	1.4
R19	13.6	7.5	0.5	0.8	1.5
R20	9.1	5.9	0.6	0.8	1.2
R21	8.3	5.6	0.7	0.8	1.2
R22	9.4	6.0	0.6	0.8	1.3
R23	8.5	5.9	0.7	0.8	1.1
R24	8.1	5.6	0.7	0.8	1.2
R25	10.2	6.3	0.6	0.8	1.3
R26	14.0	7.9	0.6	0.8	1.4
R27	13.8	7.7	0.6	0.8	1.4
R28	13.0	7.5	0.6	0.8	1.4
R29	10.6	6.4	0.6	0.8	1.3
R30	15.3	8.3	0.5	0.8	1.5
R31	14.1	7.9	0.6	0.8	1.4
R32	10.7	6.7	0.6	0.8	1.3
R33	11.7	7.1	0.6	0.8	1.3
R34	11.0	6.8	0.6	0.8	1.3
R35	9.3	6.1	0.7	0.8	1.2
R36	7.8	5.5	0.7	0.8	1.1
R37	13.7	8.3	0.6	0.8	1.3
R38	13.0	8.1	0.6	0.8	1.3
R39	17.5	9.6	0.5	0.8	1.5
R40	10.6	6.5	0.6	0.8	1.3
R41	13.8	8.4	0.6	0.8	1.3

Receptor ID	Base 2018 NO ₂ (µg/m ³)	2028 Projected Base NO ₂ (µg/m ³)	2028 Projected Base NO ₂ / Base 2017 NO ₂ (Ratio A)	2028 Long Term Adjustment Factor / 2017 Long Term Adjustment Factor (Ratio B)	Gap Factor (Ratio B / Ratio A)
R42	14.1	7.9	0.6	0.8	1.4
R43	15.0	8.2	0.5	0.8	1.5
R44	15.8	8.5	0.5	0.8	1.5
R45	14.0	8.4	0.6	0.8	1.3
R46	9.8	6.5	0.7	0.8	1.2
R47	13.9	7.6	0.5	0.8	1.5
R48	12.1	7.0	0.6	0.8	1.4
R49	15.4	8.8	0.6	0.8	1.4
R50	13.9	8.5	0.6	0.8	1.3
R51	9.4	6.6	0.7	0.8	1.1
R52	14.8	8.8	0.6	0.8	1.4
R53	15.8	9.0	0.6	0.8	1.4
R54	16.7	9.3	0.6	0.8	1.4
R55	20.0	10.5	0.5	0.8	1.5
R56	14.8	8.7	0.6	0.8	1.4
R57	13.4	7.5	0.6	0.8	1.4
R58	21.2	10.3	0.5	0.8	1.7
R59	15.8	9.1	0.6	0.8	1.4
R60	14.5	9.6	0.7	0.8	1.2
R61	17.8	10.8	0.6	0.8	1.3
R62	23.2	11.7	0.5	0.8	1.6
R63	16.2	8.5	0.5	0.8	1.5
R64	20.9	11.9	0.6	0.8	1.4
R65	25.1	13.4	0.5	0.8	1.5
R66	17.8	9.7	0.5	0.8	1.5
R67	20.8	11.8	0.6	0.8	1.4
R68	17.6	10.7	0.6	0.8	1.3
R69	18.9	11.1	0.6	0.8	1.4
R70	17.8	10.7	0.6	0.8	1.3
R71	21.3	11.9	0.6	0.8	1.4
R72	17.8	10.5	0.6	0.8	1.4
R73	13.9	8.4	0.6	0.8	1.3
R74	22.1	10.5	0.5	0.8	1.7
R75	23.0	12.6	0.5	0.8	1.5
R76	29.7	13.4	0.4	0.8	1.8
R77	10.0	6.2	0.6	0.8	1.3

Receptor ID	Base 2018 NO ₂ (µg/m ³)	2028 Projected Base NO ₂ (µg/m ³)	2028 Projected Base NO ₂ / Base 2017 NO ₂ (Ratio A)	2028 Long Term Adjustment Factor / 2017 Long Term Adjustment Factor (Ratio B)	Gap Factor (Ratio B / Ratio A)
R78	23.3	11.6	0.5	0.8	1.6
R79	17.9	9.2	0.5	0.8	1.6
R80	20.8	10.8	0.5	0.8	1.5
R81	14.6	8.0	0.5	0.8	1.5
R82	21.0	10.3	0.5	0.8	1.6
R83	20.3	11.6	0.6	0.8	1.4
R84	30.7	15.4	0.5	0.8	1.6
R85	29.2	14.6	0.5	0.8	1.6
R86	23.6	12.8	0.5	0.8	1.5
R87	27.8	14.2	0.5	0.8	1.6
R88	20.1	11.5	0.6	0.8	1.4
R89	18.4	9.4	0.5	0.8	1.6
R90	25.7	12.0	0.5	0.8	1.7
R91	26.6	13.7	0.5	0.8	1.6
R92	15.6	8.4	0.5	0.8	1.5
R93	21.1	11.8	0.6	0.8	1.4
R94	13.9	8.1	0.6	0.8	1.4
R95	28.1	14.4	0.5	0.8	1.6
R96	34.7	16.8	0.5	0.8	1.7
R97	19.6	9.8	0.5	0.8	1.6
R98	15.2	8.1	0.5	0.8	1.5
R99	18.6	9.5	0.5	0.8	1.6
R100	17.2	9.1	0.5	0.8	1.5
R101	15.4	8.6	0.6	0.8	1.4
R102	16.9	9.1	0.5	0.8	1.5
R103	18.4	9.0	0.5	0.8	1.6
R104	13.9	7.7	0.6	0.8	1.4
R105	10.4	6.3	0.6	0.8	1.3
R106	12.3	7.2	0.6	0.8	1.4
R109	13.9	8.1	0.6	0.8	1.4
R110	16.2	8.9	0.6	0.8	1.4
R111	14.3	8.5	0.6	0.8	1.4

Table A.13 - Estimated Annual Mean NO₂ Concentrations (µg/m³) for Human Health Receptors

Receptor ID	Base 2018 NO ₂	2028 DM NO ₂	2028 DS NO ₂	2028 DS-DM	2028 NO ₂ Change Criteria
R2	61.5	52.2	51.6	-0.6	Small decrease
R3	43.3	41.9	36.4	-5.5	Large decrease

Receptor ID	Base 2018 NO ₂	2028 DM NO ₂	2028 DS NO ₂	2028 DS-DM	2028 NO ₂ Change Criteria
R4	58.0	50.9	50.7	-0.2	Imperceptible
R5	12.6	10.2	9.8	-0.4	Imperceptible
R6	14.2	11.9	12.4	0.5	Small increase
R7	11.1	8.9	8.5	-0.4	Imperceptible
R8	11.3	9.1	8.6	-0.5	Small decrease
R9	10.5	8.4	8.1	-0.3	Imperceptible
R10	16.9	14.4	15.0	0.6	Small increase
R11	9.6	7.8	7.5	-0.3	Imperceptible
R12	14.8	12.7	12.4	-0.3	Imperceptible
R13	13.2	11.1	10.6	-0.5	Small decrease
R14	10.9	9.1	8.8	-0.3	Imperceptible
R15	8.7	7.1	7.0	-0.1	Imperceptible
R16	8.3	6.8	6.6	-0.2	Imperceptible
R17	13.4	11.5	11.9	0.4	Imperceptible
R18	13.5	10.8	11.8	1.0	Small increase
R19	13.6	11.7	12.3	0.6	Small increase
R20	9.1	7.6	7.2	-0.4	Imperceptible
R21	8.3	6.8	6.6	-0.2	Imperceptible
R22	9.4	7.8	8.2	0.4	Imperceptible
R23	8.5	6.8	7.4	0.6	Small increase
R24	8.1	6.6	6.6	0.0	Imperceptible
R25	10.2	8.4	7.8	-0.6	Small decrease
R26	14.0	11.9	11.9	0.0	Imperceptible
R27	13.8	11.1	12.7	1.6	Small increase
R28	13.0	11.0	10.6	-0.4	Imperceptible
R29	10.6	8.8	8.1	-0.7	Small decrease
R30	15.3	13.2	12.4	-0.8	Small decrease
R31	14.1	12.1	11.1	-1.0	Small decrease
R32	10.7	8.9	8.4	-0.5	Small decrease
R33	11.7	9.5	9.6	0.1	Imperceptible
R34	11.0	9.3	8.8	-0.5	Small decrease
R35	9.3	7.6	7.2	-0.4	Imperceptible
R36	7.8	6.3	8.9	2.6	Medium increase
R37	13.7	11.1	11.4	0.3	Imperceptible
R38	13.0	10.6	10.7	0.1	Imperceptible
R39	17.5	14.1	13.8	-0.3	Imperceptible
R40	10.6	8.6	9.1	0.5	Small increase

Receptor ID	Base 2018 NO ₂	2028 DM NO ₂	2028 DS NO ₂	2028 DS-DM	2028 NO ₂ Change Criteria
R41	13.8	11.2	11.4	0.2	Imperceptible
R42	14.1	12.0	10.7	-1.3	Small decrease
R43	15.0	12.8	11.2	-1.6	Small decrease
R44	15.8	13.6	11.8	-1.8	Small decrease
R45	14.0	11.3	11.1	-0.2	Imperceptible
R46	9.8	7.9	7.6	-0.3	Imperceptible
R47	13.9	11.4	12.4	1.0	Small increase
R48	12.1	9.8	8.6	-1.2	Small decrease
R49	15.4	13.0	12.1	-0.9	Small decrease
R50	13.9	11.3	10.7	-0.6	Small decrease
R51	9.4	7.6	7.9	0.3	Imperceptible
R52	14.8	12.1	11.5	-0.6	Small decrease
R53	15.8	13.3	12.4	-0.9	Small decrease
R54	16.7	13.9	12.8	-1.1	Small decrease
R55	20.0	16.3	15.4	-0.9	Small decrease
R56	14.8	12.0	11.5	-0.5	Small decrease
R57	13.4	11.0	11.4	0.4	Imperceptible
R58	21.2	17.7	18.7	1.0	Small increase
R59	15.8	12.8	12.4	-0.4	Imperceptible
R60	14.5	11.8	11.4	-0.4	Imperceptible
R61	17.8	14.4	13.9	-0.5	Small decrease
R62	23.2	19.8	16.8	-3.0	Medium decrease
R63	16.2	13.3	10.3	-3.0	Medium decrease
R64	20.9	16.9	16.2	-0.7	Small decrease
R65	25.1	20.3	19.2	-1.1	Small decrease
R66	17.8	14.8	13.2	-1.6	Small decrease
R67	20.8	17.2	16.0	-1.2	Small decrease
R68	17.6	14.6	13.8	-0.8	Small decrease
R69	18.9	15.4	14.5	-0.9	Small decrease
R70	17.8	14.7	14.1	-0.6	Small decrease
R71	21.3	17.9	16.7	-1.2	Small decrease
R72	17.8	14.8	13.4	-1.4	Small decrease
R73	13.9	11.4	10.7	-0.7	Small decrease
R74	22.1	18.4	12.7	-5.7	Large decrease
R75	23.0	18.8	17.6	-1.2	Small decrease
R76	29.7	24.9	15.0	-9.9	Large decrease
R77	10.0	8.3	8.5	0.2	Imperceptible

Receptor ID	Base 2018 NO ₂	2028 DM NO ₂	2028 DS NO ₂	2028 DS-DM	2028 NO ₂ Change Criteria
R78	23.3	19.6	16.6	-3.0	Medium decrease
R79	17.9	15.0	15.2	0.2	Imperceptible
R80	20.8	17.4	15.1	-2.3	Medium decrease
R81	14.6	12.3	12.5	0.2	Imperceptible
R82	21.0	17.4	12.5	-4.9	Large decrease
R83	20.3	16.6	15.6	-1.0	Small decrease
R84	30.7	25.3	19.0	-6.3	Large decrease
R85	29.2	25.0	18.1	-6.9	Large decrease
R86	23.6	19.3	17.8	-1.5	Small decrease
R87	27.8	22.8	17.7	-5.1	Large decrease
R88	20.1	16.6	15.4	-1.2	Small decrease
R89	18.4	15.1	12.4	-2.7	Medium decrease
R90	25.7	21.3	14.4	-6.9	Large decrease
R91	26.6	21.9	18.2	-3.7	Medium decrease
R92	15.6	12.8	10.4	-2.4	Medium decrease
R93	21.1	17.2	14.5	-2.7	Medium decrease
R94	13.9	11.8	12.1	0.3	Imperceptible
R95	28.1	24.7	21.2	-3.5	Medium decrease
R96	34.7	29.7	24.2	-5.5	Large decrease
R97	19.6	16.2	13.8	-2.4	Medium decrease
R98	15.2	12.2	12.5	0.3	Imperceptible
R99	18.6	16.4	16.7	0.3	Imperceptible
R100	17.2	14.6	14.8	0.2	Imperceptible
R101	15.4	12.9	13.1	0.2	Imperceptible
R102	16.9	14.7	14.9	0.2	Imperceptible
R103	18.4	17.5	18.0	0.5	Small increase
R104	13.9	11.2	11.4	0.2	Imperceptible
R105	10.4	8.9	9.0	0.1	Imperceptible
R106	12.3	10.0	10.1	0.1	Imperceptible
R109	13.9	11.3	11.4	0.1	Imperceptible
R110	16.2	13.2	13.4	0.2	Imperceptible
R111	14.3	11.5	11.7	0.2	Imperceptible

Modelled annual mean PM₁₀ for all receptors are provided in Table A.14, while Table A.15 shows the modelled annual mean PM_{2.5} concentrations at the sensitive human health receptors. There are no exceedances of the AQS objectives for PM₁₀ and PM_{2.5} in any of the scenarios assessed. For both pollutants, 'medium' to 'small' decrease are expected to occur at receptors located along the A350 Western way, the 350 Beanacre Road, the A365 Western Way and West Street with the Scheme. Two 'small' increases in both PM₁₀ and PM_{2.5} are reported at receptor R27 and R36 located along Bath Road and the new bypass respectively. Change in modelled PM₁₀ and PM_{2.5} concentrations at the remaining modelled receptors are expected to be imperceptible. Overall the impact of the Scheme is an improvement in air quality for human health receptors and there is not a significant adverse effect due to the Scheme.

Table A.14 – Estimated annual mean PM₁₀ concentrations (µg/m³) for human health receptors

Receptor ID	Base 2018 PM ₁₀	2028 DM PM ₁₀	2028 DS PM ₁₀	2028 DS-DM	2028 PM ₁₀ Change Criteria
R2	23.8	22.6	32.0	9.4	Large increase
R3	18.9	17.7	17.7	<0.1	Imperceptible
R4	24.3	23.4	23.6	0.2	Imperceptible
R5	13.6	12.3	12.1	-0.2	Imperceptible
R6	14.0	12.9	13.0	0.2	Imperceptible
R7	13.9	12.6	12.5	-0.1	Imperceptible
R8	13.2	11.9	11.8	-0.1	Imperceptible
R9	14.7	13.4	13.3	-0.1	Imperceptible
R10	14.1	12.9	13.0	0.1	Imperceptible
R11	14.7	13.4	13.3	-0.1	Imperceptible
R12	15.1	13.9	13.9	-0.1	Imperceptible
R13	14.3	13.1	13.0	-0.1	Imperceptible
R14	13.2	12.0	11.9	-0.1	Imperceptible
R15	12.9	11.7	11.7	-0.1	Imperceptible
R16	13.1	11.9	11.8	-0.1	Imperceptible
R17	13.7	12.5	12.6	0.1	Imperceptible
R18	14.4	13.0	13.2	0.2	Imperceptible
R19	14.4	13.3	13.4	0.1	Imperceptible
R20	13.5	12.3	12.2	-0.2	Imperceptible
R21	13.3	12.1	12.1	-0.1	Imperceptible
R22	13.7	12.5	12.6	0.1	Imperceptible
R23	13.5	12.3	12.6	0.3	Imperceptible
R24	13.2	12.0	12.0	<0.1	Imperceptible
R25	13.6	12.5	12.2	-0.3	Imperceptible
R26	14.1	13.0	12.9	-0.2	Imperceptible
R27	14.6	13.3	13.8	0.5	Small increase
R28	13.9	12.8	12.6	-0.2	Imperceptible
R29	13.7	12.5	12.3	-0.2	Imperceptible
R30	14.4	13.4	13.0	-0.4	Imperceptible
R31	14.0	12.8	12.6	-0.3	Imperceptible
R32	13.7	12.5	12.3	-0.2	Imperceptible
R33	13.6	12.3	12.3	<0.1	Imperceptible
R34	13.8	12.6	12.4	-0.2	Imperceptible
R35	13.1	11.9	11.7	-0.2	Imperceptible
R36	12.7	11.5	12.8	1.3	Small increase
R37	14.5	13.2	13.3	0.1	Imperceptible

Receptor ID	Base 2018 PM ₁₀	2028 DM PM ₁₀	2028 DS PM ₁₀	2028 DS-DM	2028 PM ₁₀ Change Criteria
R38	14.4	13.1	13.2	0.1	Imperceptible
R39	15.3	13.9	13.8	-0.1	Imperceptible
R40	13.4	12.2	12.3	0.1	Imperceptible
R41	14.5	13.2	13.3	0.1	Imperceptible
R42	14.0	12.9	12.5	-0.4	Imperceptible
R43	14.2	13.1	12.6	-0.5	Small decrease
R44	14.3	13.2	12.7	-0.5	Small decrease
R45	14.6	13.3	13.2	-0.1	Imperceptible
R46	13.0	11.8	11.7	-0.1	Imperceptible
R47	14.1	12.8	13.1	0.3	Imperceptible
R48	13.5	12.2	11.7	-0.5	Small decrease
R49	14.8	13.7	13.4	-0.3	Imperceptible
R50	14.5	13.2	13.0	-0.2	Imperceptible
R51	13.6	12.3	12.5	0.1	Imperceptible
R52	14.7	13.4	13.2	-0.2	Imperceptible
R53	14.9	13.7	13.4	-0.3	Imperceptible
R54	15.1	13.9	13.5	-0.4	Imperceptible
R55	15.6	14.2	13.9	-0.3	Imperceptible
R56	14.7	13.4	13.2	-0.1	Imperceptible
R57	14.7	13.5	13.6	0.1	Imperceptible
R58	16.0	14.7	15.0	0.3	Imperceptible
R59	14.9	13.5	13.4	-0.1	Imperceptible
R60	14.4	13.1	13.0	-0.1	Imperceptible
R61	15.2	13.9	13.7	-0.1	Imperceptible
R62	16.6	15.5	14.5	-1.0	Small decrease
R63	14.5	13.3	12.4	-0.9	Small decrease
R64	15.7	14.4	14.2	-0.2	Imperceptible
R65	16.1	14.7	14.4	-0.3	Imperceptible
R66	15.3	14.1	13.6	-0.5	Small decrease
R67	15.5	14.1	13.8	-0.4	Imperceptible
R68	15.0	13.7	13.4	-0.3	Imperceptible
R69	15.2	13.8	13.5	-0.3	Imperceptible
R70	14.9	13.6	13.4	-0.2	Imperceptible
R71	15.4	14.2	13.8	-0.3	Imperceptible
R72	14.9	13.7	13.2	-0.5	Small decrease
R73	14.7	13.4	13.2	-0.3	Imperceptible
R74	15.5	14.2	12.8	-1.4	Small decrease

Receptor ID	Base 2018 PM ₁₀	2028 DM PM ₁₀	2028 DS PM ₁₀	2028 DS-DM	2028 PM ₁₀ Change Criteria
R75	16.2	14.8	14.4	-0.4	Imperceptible
R76	17.0	15.7	13.2	-2.5	Medium decrease
R77	13.1	12.0	12.0	<0.1	Imperceptible
R78	16.3	15.0	14.2	-0.8	Small decrease
R79	14.9	13.7	13.8	0.1	Imperceptible
R80	15.8	14.6	14.0	-0.6	Small decrease
R81	14.3	13.2	13.2	0.1	Imperceptible
R82	15.4	14.1	12.8	-1.3	Small decrease
R83	15.7	14.4	14.0	-0.3	Imperceptible
R84	17.8	16.4	14.4	-2.0	Small decrease
R85	16.9	15.6	14.6	-1.1	Small decrease
R86	16.2	14.8	14.4	-0.5	Small decrease
R87	17.0	15.7	14.1	-1.6	Small decrease
R88	15.6	14.3	14.0	-0.4	Imperceptible
R89	14.9	13.6	12.9	-0.7	Small decrease
R90	16.1	14.7	13.1	-1.7	Small decrease
R91	16.6	15.2	14.2	-1.0	Small decrease
R92	14.5	13.2	12.5	-0.7	Small decrease
R93	15.7	14.4	13.5	-0.8	Small decrease
R94	14.6	13.5	13.6	0.1	Imperceptible
R95	17.1	15.7	14.9	-0.8	Small decrease
R96	18.5	17.1	15.6	-1.5	Small decrease
R97	15.3	14.1	13.2	-0.9	Small decrease
R98	14.4	13.0	13.1	0.1	Imperceptible
R99	16.3	15.4	15.5	0.1	Imperceptible
R100	15.7	14.7	14.8	0.1	Imperceptible
R101	15.4	14.3	14.4	<0.1	Imperceptible
R102	15.9	14.8	14.9	0.1	Imperceptible
R103	14.7	13.9	14.0	0.1	Imperceptible
R104	15.2	13.8	13.9	0.1	Imperceptible
R105	13.5	12.4	12.4	<0.1	Imperceptible
R106	14.8	13.5	13.6	0.1	Imperceptible
R109	15.3	14.0	14.0	0.1	Imperceptible
R110	15.7	14.4	14.5	0.1	Imperceptible
R111	14.6	13.3	13.4	0.1	Imperceptible

Table A.15 - Estimated annual mean PM_{2.5} concentrations (µg/m³) for human health receptors

Receptor ID	Base 2018 PM _{2.5}	2028 DM PM _{2.5}	2028 DS PM _{2.5}	2028 DS-DM	2028 PM _{2.5} Change Criteria
R2	15.3	13.9	13.9	<0.1	Imperceptible
R3	12.2	11.1	11.0	<0.1	Imperceptible
R4	15.3	14.1	14.2	0.1	Imperceptible
R5	9.0	8.0	7.9	-0.1	Imperceptible
R6	9.2	8.2	8.3	0.1	Imperceptible
R7	8.9	7.9	7.8	-0.1	Imperceptible
R8	8.8	7.8	7.7	-0.1	Imperceptible
R9	9.0	8.0	8.0	-0.1	Imperceptible
R10	9.2	8.2	8.2	0.1	Imperceptible
R11	9.0	8.0	8.0	<0.1	Imperceptible
R12	9.4	8.4	8.3	<0.1	Imperceptible
R13	9.0	8.1	8.0	-0.1	Imperceptible
R14	8.6	7.7	7.6	<0.1	Imperceptible
R15	8.5	7.5	7.4	<0.1	Imperceptible
R16	8.5	7.5	7.5	<0.1	Imperceptible
R17	9.0	8.0	8.0	<0.1	Imperceptible
R18	9.8	8.6	8.7	0.1	Imperceptible
R19	9.1	8.2	8.2	0.1	Imperceptible
R20	8.6	7.7	7.6	-0.1	Imperceptible
R21	8.5	7.6	7.5	<0.1	Imperceptible
R22	8.7	7.8	7.8	0.1	Imperceptible
R23	8.8	7.8	7.9	0.1	Imperceptible
R24	8.5	7.5	7.6	<0.1	Imperceptible
R25	8.8	7.8	7.7	-0.1	Imperceptible
R26	9.3	8.4	8.3	-0.1	Imperceptible
R27	9.4	8.3	8.6	0.3	Small increase
R28	9.2	8.3	8.2	-0.1	Imperceptible
R29	8.8	7.8	7.7	-0.1	Imperceptible
R30	9.5	8.6	8.4	-0.2	Imperceptible
R31	9.2	8.3	8.1	-0.2	Imperceptible
R32	8.9	8.0	7.9	-0.1	Imperceptible
R33	9.0	8.0	8.0	<0.1	Imperceptible
R34	9.0	8.0	7.9	-0.1	Imperceptible
R35	8.6	7.7	7.6	-0.1	Imperceptible
R36	8.5	7.5	8.2	0.7	Small increase
R37	9.5	8.5	8.6	0.1	Imperceptible
R38	9.7	8.7	8.7	<0.1	Imperceptible

Receptor ID	Base 2018 PM _{2.5}	2028 DM PM _{2.5}	2028 DS PM _{2.5}	2028 DS-DM	2028 PM _{2.5} Change Criteria
R39	10.0	8.9	8.8	-0.1	Imperceptible
R40	8.8	7.8	7.9	0.1	Imperceptible
R41	9.8	8.8	8.8	<0.1	Imperceptible
R42	9.2	8.2	8.0	-0.2	Imperceptible
R43	9.3	8.3	8.0	-0.3	Small decrease
R44	9.3	8.4	8.1	-0.3	Small decrease
R45	9.6	8.5	8.5	<0.1	Imperceptible
R46	8.7	7.7	7.7	-0.1	Imperceptible
R47	9.2	8.2	8.3	0.2	Imperceptible
R48	8.9	7.9	7.6	-0.3	Small decrease
R49	9.7	8.7	8.6	-0.1	Imperceptible
R50	9.8	8.8	8.7	-0.1	Imperceptible
R51	9.0	8.0	8.1	0.1	Imperceptible
R52	9.9	8.9	8.8	-0.1	Imperceptible
R53	9.8	8.8	8.6	-0.2	Imperceptible
R54	9.9	8.8	8.6	-0.2	Imperceptible
R55	10.4	9.2	9.1	-0.1	Imperceptible
R56	9.8	8.8	8.7	-0.1	Imperceptible
R57	9.3	8.3	8.3	0.1	Imperceptible
R58	10.2	9.1	9.2	0.2	Imperceptible
R59	10.0	8.9	8.9	-0.1	Imperceptible
R60	9.8	8.8	8.7	-0.1	Imperceptible
R61	10.1	9.0	8.9	-0.1	Imperceptible
R62	10.7	9.7	9.2	-0.5	Small decrease
R63	9.4	8.3	7.9	-0.5	Small decrease
R64	10.4	9.3	9.2	-0.1	Imperceptible
R65	10.9	9.7	9.5	-0.2	Imperceptible
R66	10.0	9.0	8.7	-0.3	Small decrease
R67	10.5	9.4	9.2	-0.2	Imperceptible
R68	10.2	9.1	9.0	-0.2	Imperceptible
R69	10.3	9.2	9.0	-0.2	Imperceptible
R70	10.1	9.1	9.0	-0.1	Imperceptible
R71	10.4	9.4	9.2	-0.2	Imperceptible
R72	9.6	8.6	8.3	-0.3	Small decrease
R73	9.6	8.6	8.4	-0.2	Imperceptible
R74	10.0	8.9	8.1	-0.8	Small decrease
R75	10.6	9.5	9.3	-0.2	Imperceptible

Receptor ID	Base 2018 PM _{2.5}	2028 DM PM _{2.5}	2028 DS PM _{2.5}	2028 DS-DM	2028 PM _{2.5} Change Criteria
R76	10.9	9.7	8.3	-1.4	Medium decrease
R77	8.7	7.7	7.7	<0.1	Imperceptible
R78	10.6	9.5	9.0	-0.4	Small decrease
R79	9.7	8.7	8.7	0.1	Imperceptible
R80	10.3	9.2	8.9	-0.3	Small decrease
R81	9.3	8.4	8.4	<0.1	Imperceptible
R82	10.0	8.9	8.2	-0.7	Small decrease
R83	10.3	9.3	9.1	-0.2	Imperceptible
R84	11.6	10.4	9.3	-1.1	Small decrease
R85	11.0	9.8	9.2	-0.6	Small decrease
R86	10.7	9.5	9.3	-0.3	Small decrease
R87	11.2	10.0	9.1	-0.9	Small decrease
R88	10.3	9.2	9.0	-0.2	Imperceptible
R89	9.7	8.6	8.2	-0.4	Small decrease
R90	10.4	9.2	8.3	-0.9	Small decrease
R91	10.9	9.7	9.2	-0.5	Small decrease
R92	9.4	8.4	8.0	-0.4	Small decrease
R93	10.4	9.3	8.8	-0.5	Small decrease
R94	9.3	8.4	8.4	0.1	Imperceptible
R95	11.2	10.0	9.6	-0.5	Small decrease
R96	12.0	10.8	9.9	-0.8	Small decrease
R97	9.9	8.9	8.4	-0.5	Small decrease
R98	9.4	8.4	8.4	0.1	Imperceptible
R99	10.2	9.3	9.4	0.1	Imperceptible
R100	10.0	9.1	9.1	<0.1	Imperceptible
R101	9.8	8.8	8.9	<0.1	Imperceptible
R102	10.0	9.1	9.2	<0.1	Imperceptible
R103	9.7	8.8	8.9	0.1	Imperceptible
R104	9.5	8.5	8.5	<0.1	Imperceptible
R105	8.9	7.9	7.9	<0.1	Imperceptible
R106	9.3	8.3	8.3	<0.1	Imperceptible
R109	9.8	8.8	8.8	<0.1	Imperceptible
R110	10.1	9.0	9.0	<0.1	Imperceptible
R111	9.6	8.5	8.6	<0.1	Imperceptible

A.4.2. Designated habitats impacts

Total nitrogen deposition has been modelled for ecological receptors within relevant ecological sites comprising Spye Park SSSI, two LNRs, and receptor points representative of 17 non-statutory designated ecological sites (LWS, AW and VT).

The change in nitrogen deposition rates for ecological receptors are provided in Table A.16.

DMRB LA 105 provides designated habitat screening criteria for determining the need for further consideration of the impacts of nitrogen deposition. The designated habitat screening criteria are considered to be exceeded where total nitrogen deposition is greater than the lower level of the relevant critical load, and the change in nitrogen deposition is greater than 1% of the lower level of the relevant critical load. Where these criteria are exceeded further consideration was given to the magnitude of the change in nitrogen deposition. Where this is greater than 0.4 kg N/ha/yr then the significance of effect should be assessed by a competent expert for biodiversity.

The change in nitrogen deposition rates with the Scheme are less than the DMRB LA 105 designated habitat screening criteria and the magnitude of change of the nitrogen deposition is less than 0.4 kg N/ha/yr at all relevant statutory designated sites (SSSI and LNR) and the majority of the non-statutory designated sites. The Scheme is therefore not expected to have a significant effect on the designated habitats within these sites.

Given the number of non-statutory designated ecological sites within the air quality study area and the limited information available on designated features within them, detailed habitat identification was not undertaken for all the sites at this stage. Nitrogen deposition rates were therefore calculated for all non-statutory designated ecological site receptors based on “woodland” habitat. Further details on the assessment methodology for designated habitats are provided in A.2.

The DMRB LA 105 designated habitat screening criteria were exceeded and the magnitude of change of the nitrogen deposition was greater than 0.4 kg N/ha/yr at ecological receptor points representative of Kennet and Avon Canal LWS, shown in Figure 4.3, Volume 3. The presence of habitat sensitive to nitrogen deposition rates was assumed at these locations. In accordance with the procedure in DMRB LA 105, a detailed site investigation by a competent biodiversity expert will be required to determine whether there are species that could be adversely affected by increased nitrogen deposition within this site.

Table A.16 - Estimated annual mean NO_x concentrations (µg/m³) and Nitrogen Deposition (kg/N/ha/yr) for ecological receptors, Highways England LTTE6 projection factors

Receptor ID	Annual Mean NO _x (µg/m ³)				Total N Dep (N kg/ha/yr)				Change in N Dep % of Critical Load	Significance
	Base	DM	DS	DS-DM	Base	DM	DS	DS-DM		
ECO1	41.6	31.7	33.9	2.2	43.3	41.9	42.2	0.3	3.5	Not significant
ECO2	31.6	23.7	25.1	1.4	41.9	40.7	40.9	0.2	2.2	Not significant
ECO3	10.5	7.4	7.4	0.0	38.0	37.9	37.9	0.0	0.0	Not significant
ECO5	29.3	20.7	24.5	3.8	41.7	40.4	41.0	0.6	6.3	Potentially significant
ECO6	22.9	16.2	18.6	2.4	40.8	39.8	40.2	0.4	4.0	Potentially significant
ECO7	11.8	8.7	8.1	-0.6	36.4	36.1	36.0	-0.1	-1.0	Not significant
ECO9	9.7	6.9	6.9	-0.1	22.1	22.0	22.0	0.0	-0.1	Not significant
ECO11	24.0	18.8	20.0	1.2	39.1	38.3	38.5	0.2	2.0	Not significant
ECO12	13.8	10.2	10.7	0.5	37.4	37.1	37.2	0.1	0.9	Not significant
ECO14	10.4	7.4	7.3	-0.1	36.1	36.0	36.0	0.0	-0.2	Not significant
ECO15	10.3	7.4	7.3	-0.1	36.1	36.0	36.0	0.0	-0.1	Not significant
ECO16	24.4	18.9	14.9	-4.0	23.2	22.3	21.7	-0.7	-6.6	Not significant
ECO17	21.0	16.0	13.2	-2.8	22.6	21.9	21.4	-0.5	-4.7	Not significant
ECO18	14.0	10.8	9.9	-0.9	37.4	37.1	37.0	-0.2	-1.6	Not significant
ECO19	18.0	12.8	13.3	0.6	37.6	37.1	37.2	0.1	1.0	Not significant
ECO20	14.3	10.2	10.1	0.0	36.5	36.1	36.1	0.0	0.0	Not significant
ECO21	13.8	9.8	9.2	-0.6	36.4	36.1	36.0	-0.1	-1.0	Not significant

Receptor ID	Annual Mean NOx ($\mu\text{g}/\text{m}^3$)				Total N Dep (N kg/ha/yr)				Change in N Dep % of Critical Load	Significance
	Base	DM	DS	DS-DM	Base	DM	DS	DS-DM		
ECO22	76.9	62.7	66.3	3.6	45.9	44.0	44.5	0.5	5.2	Potentially significant
ECO23	54.9	44.1	49.8	5.7	43.1	41.4	42.2	0.9	8.7	Potentially significant
ECO24	59.2	43.0	37.8	-5.3	27.3	24.9	24.1	-0.8	-8.0	Not significant
ECO25	45.8	33.2	29.7	-3.5	25.5	23.6	23.0	-0.5	-5.5	Not significant
ECO26	87.6	65.5	47.5	-18.0	30.9	27.9	25.3	-2.6	-25.9	Not significant
ECO27	71.7	53.4	39.9	-13.5	29.0	26.3	24.3	-2.0	-20.2	Not significant
ECO28	18.4	13.7	13.9	0.2	38.7	38.3	38.3	0.0	0.4	Not significant
ECO29	40.9	37.8	39.6	1.8	41.3	40.7	41.0	0.3	2.9	Not significant
ECO30	37.1	33.8	35.4	1.6	40.7	40.1	40.4	0.2	2.5	Not significant
ECO31	35.8	32.4	33.8	1.5	40.5	39.9	40.2	0.2	2.3	Not significant
ECO32	39.8	36.6	38.3	1.7	41.1	40.5	40.8	0.3	2.7	Not significant
ECO33	37.7	34.4	36.0	1.6	40.9	40.3	40.5	0.3	2.6	Not significant
ECO34	13.7	10.3	10.5	0.2	37.2	36.9	37.0	0.0	0.3	Not significant
ECO35	10.2	7.2	9.3	2.1	36.0	35.9	36.3	0.4	3.7	Not significant

Appendix B. Water Environment

B.1. WFD Screening Report

Melksham Bypass

WC_MBP-ATK-EGN-XX-RP-LW-000004

WFD Screening Report

09/11/21

A1

Notice

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1. Introduction

1.1. The Scheme

- 1.1.1. Wiltshire Council is promoting a scheme for the A350 at Melksham as part of an application to the Large Local Majors (LLM) fund administered by the Department for Transport (DfT).
- 1.1.2. The scheme was one of nine priority schemes identified by the Western Gateway Sub-national Transport Body (STB). In March 2020, the Government awarded funding to further develop the case for the project, having considered an initial Strategic Outline Business Case submission made in July 2019.
- 1.1.3. The Scheme is intended to improve the current and future transport-related problems and issues relating to the A350 at Melksham including journey times and delays, journey time reliability, collisions and severance.
- 1.1.4. An initial sifting process of options has been completed including two non-statutory consultations which has led to one route option alignment (the emerging route) (hereby referred to as the 'Scheme') to be further considered as part of the detailed option selection process. The Scheme will provide a new 9km long bypass to the east of Melksham, Wiltshire, as shown in Figure 1.1 in Annex C.

1.2. Legislative background

- 1.2.1. This document presents a preliminary Water Environment Regulations (WER) assessment (previously known as the Water Framework Directive (WFD) and referred to as such from here onwards) for the Scheme.
- 1.2.2. The purpose of undertaking a preliminary WFD assessment at this stage of a scheme is two-fold:
 - To undertake an initial review of the proposed works against the requirements of the WFD; and
 - To develop a set of principles that will guide later design phases towards compliance with the Directive.
- 1.2.3. This report identifies the surface water features with potential to be impacted by the Scheme. It then provides a high level impact assessment of the Scheme on the Biological, Physico-chemical and Hydromorphological WFD elements for each of the screened in surface water features, finally scoping them in or out of further assessment. Groundwater bodies have also been identified, screened, and scoped for further assessment.
- 1.2.4. This assessment is presented as an appendix to the Water Environment Preliminary Environmental Assessment Report (PEAR) chapter (Chapter 7). A full WFD assessment will be appended to the Environmental Statement (ES).
- 1.2.5. The Water Framework Directive¹ (WFD) came into force in 2000, was transposed into UK law in 2003 and most recently updated in 2017². Its principal aims are to protect and improve the water environment and promote the sustainable use of water. The headline environmental objectives of the WFD and its daughter directives are to:
 - Prevent the deterioration of aquatic ecosystems; and
 - Protect, enhance and restore water bodies to Good Status; which is based on ecology (with its supporting Hydromorphological and Physico-chemical factors) and chemical factors for surface water, and water quantity and Chemical Status for groundwaters.
- 1.2.6. The WFD sets a default objective for all rivers, lakes, estuaries, groundwater and coastal water bodies to achieve Good Status by 2027 at the latest. For natural surface water bodies, Good Status

¹ https://eur-lex.europa.eu/resource.html?uri=cellar:5c835afb-2ec6-4577-bdf8-756d3d694eeb.0004.02/DOC_1&format=PDF

² <https://www.legislation.gov.uk/ukxi/2017/407/contents/made>

is a function of both Good Chemical Status (GCS) and Good Ecological Status (GES). The River Basin Management Plans (RBMP)³ outline the actions required to enable natural water bodies to achieve these objectives. Artificial and Heavily Modified Water Bodies (A/HMWB) are considered unable to attain GES due to the modifications that are necessary to maintain their function for society or their 'human use'. They are, however, required to achieve Good Ecological Potential (GEP), through the implementation of a series of Mitigation Measures outlined in the RBMP. A/HMWBs still need to attain GCS which, along with GEP, will collectively result in Good Status in these water bodies.

- 1.2.7. New activities and schemes that affect the surface water environment may adversely impact Biological, Hydromorphological, Physico-chemical and/or Chemical quality elements (WFD quality elements- Table 1-1) that could lead to a deterioration in water body status relative to the baseline conditions published in the RBMP. Such activities may also preclude the implementation or effectiveness of the proposed improvement measures published in the RBMPs, leading to the water body failing to meet its WFD objectives for GES/GEP. Under the WFD, activities and schemes must not cause deterioration in water body status or prevent a water body from meeting GES/GEP by rendering such improvement measures ineffective.

Table 1-1 - WFD classification elements for rivers, lakes, transitional and coastal WFD water bodies

Water body type	Biological	Physico-chemical and chemical	Hydromorphological
Rivers	Macrophytes Phytobenthos Benthic invertebrates Fish	Thermal conditions Dissolved oxygen Acidification Nutrients Salinity Organic pollutants Pollution by substances being discharged (e.g. phosphate or ammonia) Chemicals e.g. metals, pesticides	Hydrological regime - quantity and dynamics of water flow connection to groundwater bodies River continuity Morphological conditions - river depth and width variation structure and substrate of the river bed Structure of the riparian zone.
Lakes	Macrophytes Phytoplankton Benthic invertebrates Fish	Transparency Thermal conditions Dissolved oxygen Acidification Nutrients Salinity Pollution by substances being discharged Chemicals e.g. metals, pesticides	Hydrological regime - quantity and dynamics of inflows and outflows residence time connection to groundwater bodies Morphological conditions - lake depth variation quantity, structure and substrate of the lake bed structure of the lake shore.
Transitional waters	Phytoplankton Other aquatic flora	Transparency Thermal conditions Dissolved oxygen	Tidal regime - freshwater flow wave exposure

³ There are several regional RBMPs in England. In the context of the Scheme the relevant RBMP is the Severn, available at: [Severn river basin district river basin management plan - GOV.UK \(www.gov.uk\)](http://www.gov.uk)

Water body type	Biological	Physico-chemical and chemical	Hydromorphological
	Benthic invertebrates Fish	Nutrients Salinity Pollution by substances being discharged Chemicals e.g. metals, pesticides	Morphological conditions - depth variation quantity, structure and substrate of the bed structure of the intertidal zone
Coastal waters	Phytoplankton Other aquatic flora Benthic invertebrates	Transparency Thermal conditions Dissolved oxygen Nutrients Salinity Pollution by substances being discharged Chemicals e.g. metals, pesticides	Tidal regime -direction of dominant currents wave exposure Morphological conditions - depth variation structure and substrate of the bed structure of the intertidal zone

- 1.2.8. The overall ecological status of a water body is primarily based on consideration of its biological quality elements and is determined by the lowest scoring of these elements. These biological elements are ‘supported’ by the Physico-chemical (water quality) and Hydromorphological (flow and form (i.e. habitat)) quality elements.
- 1.2.9. In order to achieve GCS, a water body must pass a separate chemical status assessment, relating to pass/fail checks on the concentrations of various identified priority/dangerous substances.
- 1.2.10. For groundwater bodies, good status has a quantitative and a chemical component. Both are measured on a scale of good, moderate or poor, and a confidence rating is assigned to the status assessment of high or low. Together, these provide a single final classification of either good or poor status. There is also a trend objective set for groundwater water bodies where environmentally significant and sustained rising trends in pollutant concentrations need to be identified along with a definition of the starting point (percentage of level or concentration) for trend reversal. Furthermore, the daughter directive of the WFD specifically concerning groundwater (The Groundwater Directive, 2006) also requires the prevention of any input of priority substances and limiting (or control) of the input of all other substances to groundwater to prevent the deterioration of status.

1.3. Overview of the Scheme

- 1.3.1. The Scheme will provide an approximately 9 km long full bypass to the east of Melksham, shown in Figure 1.1 in Annex C. Key components include:
- A priority roundabout (Junction 1) is located at the existing A350, south of Melksham. The roundabout includes a signalised controlled crossing to accommodate walking/cycling communities that use MELW42.
 - A priority roundabout (Junction 2) connects traffic to the A365. The mainline passes through open countryside and has aimed to reduce impacts as far as possible on known waterbodies, ancient woodland, priority roundabouts and archaeological monuments.
 - The alignment runs parallel to Eastern Way and seeks to limit impact to a potential housing site allocation (Gleeson) as part of the emerging plan. A priority roundabout (Junction 3) is located at the A3102. The curvilinear alignment avoids established local businesses and committed planning proposals (Agricultural Dwellings).
 - Significant alterations are required to the Lower Woodrow road; the existing road is diverted north and passes over the new bypass.

- The alignment crosses the Wilts and Berks canal and connectivity of MELW63 is maintained at this location.
- A viaduct spans the River Avon, associated flood zone and Roman Road asset.
- The route ties into the existing A350 by a proposed priority roundabout (Junction 5) at the location of "Melksham Road". Significant alterations are required to the existing A350 alignment in this location.
- A series of ponds are located along the east side of the route which are required to attenuate surface water from the new bypass.
- Consultation with Public Rights of Way (PRoW) officers has lead to a proposed plan of the extinguished/diverted PRoWs across the east of Melksham to reduce the total number of structures required and to optimised the longitudinal profile in order to reduce the earthwork quantities.

1.3.2. To ensure the introduction of the bypass is conducive with the surrounding network the potential need for limited additional highway improvements has been identified. These include:

- Capacity improvements to the Littleton Roundabout on the A350 near Semington, to the south of the bypass route. This is the junction between the A350 and the east-west A365 route.
- Upgrading the existing section of the A350 between the southern A350 / bypass junction and the Littleton Roundabout to dual carriageway. This section is approximately 1.2 kilometres in length and was originally constructed with potential future dualling in mind.
- Signalisation of the A3102 / A342 junction to the east of the bypass route.
- These supplementary improvements are currently included within the Scheme scope but will be subject to review and further assessment as the project develops.

2. Methodology

2.1. Baseline

- 2.1.1. A study area was defined for the WFD assessment as a 1km buffer of the Scheme. This was chosen as large enough to identify the potentially impacted water features.
- 2.1.2. A baseline assessment has been undertaken to determine if any WFD water bodies (surface and groundwater) were situated within the study area (a 1km buffer of Scheme), using the Environment Agency's Catchment Data Explorer website⁴. A further desk based assessment was then conducted using OS MasterMap data to identify other surface water features in the study area. These were then classified as Main River, Ordinary Watercourse and ditches (based on online Environment Agency Main River mapping⁵) and given a unique project ID. While ditches are technically classified as Ordinary Watercourses, for the purpose of this assessment those watercourses that appear to be continuous channels draining into another watercourse, and have some variation in planform have been classified as Ordinary Watercourses. Those that are shorter sections of discontinuous and straight channel has been classified as ditches. The Local Authority are responsible for WFD compliance Ordinary Watercourse.
- 2.1.3. Additional review of publicly available data was conducted to provide further information on the groundwater bodies in the study area. This data review included an Envirocheck report⁶, BGS geological mapping (1:50,000 scale)⁷ and DEFRA's MAGIC mapping database⁸. Other productive groundwater units, primarily superficial deposits which are not designated under the WFD have also been considered.

2.1.4. Screening

- 2.1.5. This stage aims to determine if the project or activity in question has any potential impact pathways to any WFD water bodies. This includes collating available information on the project (in respect of its activities) and the baseline environment of any WFD water bodies which could potentially be impacted. The screening is based on a qualitative assessment utilising expert knowledge to assess potential risks from project activities to WFD objectives. The screening results are then presented in an overview showing the different project activities and the relevant individual water body quality elements that could be impacted. Where there is a high confidence of works associated with the Scheme having no long-term impact on the water features, the works and water features have been screened out from subsequent investigation. Where they are screened in a scoping assessment is then undertaken.
- 2.1.6. For groundwater bodies the screening assessment has comprised a review of available information pertaining to the geology and hydrogeology of the study area, within the context of the identified WFD groundwater bodies. This information has been utilised to determine the potential for impact upon WFD groundwater bodies as a result of the Scheme. This has included identified possible pathways for impact from construction and operation of the Scheme, with respect to both the quality and quantity groundwater within the identified WFD groundwater body.
- 2.1.7. A review of the route design was conducted to assess the elements of the Scheme that have potential to impact on surface and groundwater bodies. Specifically, the plans were reviewed for potential watercourse crossings, floodplain encroachment, new road drainage and works below the existing ground level. Where potential for long term impacts to the water bodies are identified, the water body has been screened in. Where the water body is screened out, a reason has been provided.

⁴ <http://environment.data.gov.uk/catchment-planning/> accessed June 2021

⁵ <https://environment.maps.arcgis.com/apps/webappviewer/index.html?id=17cd53dfc524433980cc333726a56386>, accessed June 2021

⁶ Landmark, Envirocheck Report, 225638308_1_1, November 2019

⁷ British Geological Survey, Opengeoscience online mapping, <https://www.bgs.ac.uk/data/mapViewers/home.html>, accessed June 2021

⁸ DEFRA, Multi Agency Geographic Information for the Countryside (MAGIC), <https://magic.defra.gov.uk>, accessed June 2021

2.1.7.1. Scoping

- 2.1.8. The scoping stage examines more closely whether there is a potential risk to any of the water bodies identified at screening and is undertaken separately for each water body and each activity (or group of activities). This enables regulators and operators to determine the scope of the assessment required and to establish whether an activity will have a non-temporary effect on WFD water status at water body level. Scoping therefore assists in defining which WFD parameters could be affected by a project, and in agreeing an appropriate level of assessment to meet WFD requirements. The scoping process is facilitated by a series of scoping questions that need to be answered before either (i) conclusion that the project/activity is WFD compliant or (ii) progression to an impact assessment.
- 2.1.9. Where the water body has been screened in a scoping exercise has been undertaken. This has involved an assessment of the potential impacts of the Scheme on the Biological, Hydromorphological and Physio-Chemical WFD elements, and outlined which of these elements will require further assessment.

2.2. Design assumptions

- 2.2.1. The following design assumptions have been made:
- Where crossing designs have not currently been included, it is assumed that for the Main River crossings a viaduct spanning the full width of the floodplain will be designed, passing the design flood event (i.e. 1 in 100-year plus 70% climate change)
 - Where crossing designs have not currently been included, crossings on Ordinary Watercourses and ditches are assumed to be culverts and may require localised channel realignments.
 - The design flood event is the 1 in 100-year event including an allowance for climate change. At this stage, it is assumed that 70% is to be used for Main River crossings, 35% for culverts for Ordinary Watercourse / ditch crossings
 - Drainage will be to ponds.
 - End Scheme width has been assumed to be 25m with a construction buffer of 150m of the proposed road.
 - Surface water features and designated sites have the potential to be in hydraulic continuity with groundwater where underlain by permeable deposits
 - Piling will be required for the viaduct foundations, with works below ground level
 - Cuttings may be required at any point along the route options

3. Baseline

3.1. Surface water

3.1.1. The study area is located within the Seven River Basin District, in the Avon Bristol Rural Operational Catchment and the relevant mitigation measures are outlined within the Severn RBMP. The desk study has identified five WFD river water bodies within the study area (Figure 3.1, Annex C):

- Clackers Bk - source to conf R Avon (Brist) (GB109053021920)
- Avon (Brist) conf R Marden to conf Semington Bk (GB109053027440)
- Bydemill Bk - source to conf Rlver Avon (Brist) (GB109053021960)
- Forest Brook (GB109053021940)
- Semington Bk-Milebourne Str to conf R Avon (Brist) (GB109053022200)

3.1.2. Table 2-1 summarises the WFD status and reasons for not attaining Good (RNAG) status (where relevant) for each of these water bodies. None of the water bodies are classified as A/HMWB. A more detailed breakdown of each water body (extracted from the Environment Agency's Catchment Data Explorer) can be found in Annex A.

3.1.3. Within these five WFD water bodies, additional surface water features have been identified from OS mapping. These include seven Main River watercourses (identified from Environment Agency Main Rivers⁵) of which five are the WFD principal watercourses outlined above, the additional Main Rivers are Frog Ditch (MR08) and Berryfield Brook (MR02).

3.1.4. The remaining surface water features (all technically Ordinary Watercourses) have then been classified as Ordinary Watercourse or ditches based on the available OS mapping for the purpose of this assessment. Those that appear to be continuous channels draining into another watercourse and have some variation in planform have been classified as Ordinary Watercourses. Those that are shorter sections of discontinuous and straight channel has been classified as drains. This has identified 25 Ordinary Watercourses and 48 drains in the study area. These water features are outlined in Annex B.1 along with the nature of the water feature and which WFD water body catchment they fall within. Locations of these water features are shown in Figure 1.2, Annex C.

3.1.5. The Old Canal (CN01) and the Kennet and Avon Canal (CN02) have also been identified within the study area. As the Old Canal is no longer active, it has been classified as a drain. The Kennet and Avon Canal is a 'WFD River, Canal and Surface Water Transfer waterbody' and is therefore classified as a canal.

3.1.6. No field assessment has been undertaken as part of this assessment and the clarification of Ordinary Watercourse and ditches may change as more detailed baseline information becomes available. However, a walkover will be undertaken during the production of the ES.

Table 2-1 - WFD surface water bodies identified in the study area and their baseline information

WFD Water body name	Water body ID	Overall water body 2019 Cycle 2 status	Heavily Modified/Artificial Water Body? (HMWB/AWB)	Reason for not reaching good status and reasons for deterioration	Objective
Clackers Bk - source to conf R Avon (Brist)	GB109053021920	Poor	No	Phosphate and Macrophytes and Phytobenthos	Moderate by 2021

WFD Water body name	Water body ID	Overall water body 2019 Cycle 2 status	Heavily Modified/Artificial Water Body? (HMWB/AWB)	Reason for not reaching good status and reasons for deterioration	Objective
Avon (Brist) conf R Marden to conf Semington Bk	GB109053027440	Moderate	No	Phosphate and Macrophytes and Phytobenthos combined	Good by 2027
Bydemill Bk - source to conf R Avon (Brist)	GB109053021960	Moderate	No	Phosphate, Fish and Hydrological Regime	Good by 2027
Forest Brook	GB109053021940	Poor	No	-	Good by 2015
Semington Bk- Milebourne Str to conf R Avon (Brist)	GB109053022200	Moderate	No	Fish and Phosphate	Moderate by 2015

- 3.1.7. There are no WFD lake water bodies in the study area.
- 3.1.8. There are no WFD coastal water bodies within the study area.
- 3.1.9. There are no WFD transitional water bodies within the study area.

3.2. Groundwater

- 3.2.1. Review of publicly available data⁹ indicates that the superficial deposits comprise of River Terrace Deposit (typically comprising sand and gravel), Alluvium (typically comprising clay, silt, sand and gravel) and Head. The Alluvium and River Terrace deposits are concentrated in the north associated with the River Avon. The south of the site is underlain by pockets of Head. The centre of the Scheme is underlain by no superficial deposits.
- 3.2.2. Bedrock in the study area⁹ is predominantly Oxford Clay Formation. The north west and the south west extent of the site is underlain by the Kellaways Formation consisting of sandstone, siltstone and mudstone. There are small pockets of the Cornbrash Formation consisting of limestone in close proximity to the Kellaways Formation in the south west. In the far east of the study area and the far south, the Hazelbury Bryan Formation sandstone is present which extends further east. Further detail on the geology within the study area is presented in Chapter 9 of the PEAR.
- 3.2.3. The superficial deposits, where present, are designated by the Environment Agency¹⁰ as Secondary A and Secondary (undifferentiated) aquifers. The bedrock of the Oxford Clay Formation and the Kellaways Formation are classified as unproductive. Unproductive strata is defined by the Environment Agency¹⁰ as “rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow”. The Cornbrash Formation and the Hazlebury Bryan

⁹ British Geological Survey, Opengeoscience online mapping, <https://www.bgs.ac.uk/data/mapViewers/home.html>, accessed March 2020

¹⁰ DEFRA, Multi Agency Geographic Information for the Countryside (MAGIC), <https://magic.defra.gov.uk>, accessed May 2021

Formation are classified as Secondary A aquifers. A Secondary A Aquifer is defined by the Environment Agency¹⁰ as “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”. Current groundwater levels of the study area are unknown but are planned to be monitored during the Ground Investigation.

- 3.2.4. There are no published SPZs present within the study area¹⁰ and there are no known groundwater dependant terrestrial ecosystems (GWDTEs)¹¹ within the study area. However, directly to the east of the study area Spye Park SSSI that is considered a GWDTE is present and likely to be associated with the Corallian Limestone.
- 3.2.5. The Corallian Limestone (Calne to Swindon) (GB40902G806100) WFD Groundwater body is the only WFD water body present in the study area, consistent with the presence of the Secondary A Aquifer of the Hazelbury Formation part of the Corallian Group. The Oxford Clay Formation and the Kellaways Formation is not attributed to a WFD groundwater body.
- 3.2.6. The location of the WFD groundwater body within the study area is shown on Figure 3.3, Annex C and Table 2-2¹² summarises its WFD status and RNAG status.

Table 2-2 - WFD groundwater water bodies identified in the study area and their baseline information

Water body name (water body ID)	Overall water body 2016 Cycle 2 status (based on chemical and quantitative elements)	Reasons for not attaining good (RNAG) status	Objective
Corallian Limestone (Calne to Swindon) (GB40902G806100)	Good	-	No information

3.3. Protected areas

- 3.3.1. Three of the WFD surface water bodies assessed are designated as protected areas under the Nitrates Directive with one also protected under the Urban Waste Water Treatment Directive. The one WFD groundwater body present is are designated as a Drinking Water Protected Area. These are outlined below in Table 2-3.

Table 2-3 - Protected areas within the WFD water bodies

Water body name (ID)	Protected area code	Protected area type
Avon (Brist) conf R Marden to conf Semington Bk	UKENRI1115	Urban Waste Water Treatment Directive
	S559	Nitrates Directive
	UKENRI77	Urban Waste Water Treatment Directive
	S560	Nitrates Directive
Bydemill Bk - source to conf River Avon (Brist)	S560	Nitrates Directive
	S559	Nitrates Directive

¹¹ Environment Agency, Groundwater Dependant Terrestrial Ecosystems Dataset, Groundwater Dependent Terrestrial Ecosystems (England only) - data.gov.uk, accessed September 2020.

¹² Environment Agency, Catchment Data Explorer, <https://environment.data.gov.uk/catchment-planning>, accessed September 2020.

Water body name (ID)	Protected area code	Protected area type
Semington Bk- Milebourne Str to conf R Avon (Brist)	S565	Nitrates Directive

4. Screening

4.1. Scheme works and interactions

- 4.1.1. The Scheme has been overlain in GIS with the mapped surface water features in order to identify the locations where the Scheme has potential to interact directly with the surface water features (Figure 1.2, Annex C). The current design has information of the proposed locations of channel crossings and floodplain encroachment.
- 4.1.2. Locations of road drainage features have not yet been confirmed so it has been assumed that while direct impacts of the drainage will be within a 150m buffer of the road, indirect impacts could spread to watercourses up to 1km from the road (after which the impacts will be diluted).
- 4.1.3. Impacts from construction works at this stage have also been assumed to fall within a 150m buffer of the Scheme. The potential for indirect impacts on water features (upstream and downstream of the direct impact) have also been considered.
- 4.1.4. The elements of the Scheme identified that have the potential to impact on the surface water features have been identified as:
- Viaducts
 - Bridges
 - Culverts
 - Channel realignment
 - Road drainage (assumed to be within 150m of the road)
 - Construction (assumed to be within 150m of the road)
- 4.1.5. The Scheme components per water body are summarised in Table 4-1.

Table 4-1 - Summary of works in each WFD water body

WFD Water Body Name	ID	Viaduct	Bridges	Culvert	Realignment	Length of Road (km)
Avon (Brist) conf R Marden to conf Semington Bk	GB109053027440	1	1	1	1	2.33
Semington Bk- Milebourne Str to conf R Avon (Brist)	GB109053022200	-	(1)	-	-	2.72
Clackers Bk - source to conf R Avon (Brist)	GB109053021920	-	2	2	-	2.84
Forest Brook	GB109053021940	-	1	1	-	1.5

4.2. Surface water

- 4.2.1. A screening assessment has been undertaken on each of the surface water features in the study area to list all the surface water features within the study area, the WFD water body in which the surface water feature sits and the scheme elements that have potential to impact on that surface water feature as well as a screening outcome for each. Where there is no expected interaction of scheme element and water feature, the water feature has been screened out of further assessment. This is presented in full in Annex B.1 and summarised for each water body below and in Table 4-1.

- 4.2.2. Clackers Bk - source to conf R Avon (Brist) is screened in as the WFD primary water course is directly impacted by a crossing. The water body also has two tributaries in the catchment with the potential to be impacted by crossings.
- 4.2.3. Avon (Brist) conf R Marden to conf Semington Bk is screened in as the WFD primary water course is directly impacted by a crossing. The water body also has several tributaries in the catchment with the potential to be impacted by crossings.
- 4.2.4. Bydemill Bk - source to conf River Avon (Brist) is screened out of further assessment at this time as there are no works proposed on the channel or within its catchment, so no impacts are anticipated.
- 4.2.5. Forest Brook is screened in as the WFD primary water course is directly impacted by a crossing. The water body also has a tributary in the catchment with the potential to be impacted a crossing.
- 4.2.6. Semington Bk-Milebourne Str to conf R Avon (Brist) is screened in for further assessment as the WFD primary water course is directly impacted by a crossing. The water body also has a tributary in the catchment with the potential to be impacted by the crossing.
- 4.2.7. When more design information becomes available during production of the ES the screening exercise will be updated and compliance assessment refined.

4.3. Groundwater

- 4.3.1. A screening assessment has been undertaken on the identified groundwater bodies to screen in those with potential to be impacted by the Scheme and to screen out those that will not require further assessment.
- 4.3.2. The elements of the Scheme that have the potential to impact on the Corallian Limestone (Calne to Swindon) WFD groundwater body have been identified as:
- Drainage of road runoff to groundwater
 - Below ground construction (e.g. cuttings, deep foundations, piling)
 - Dewatering activities associated with below ground works
- 4.3.3. There is potential for the Scheme to impact on the groundwater body however, at this stage there is not sufficient information on the proposed structures to make an informed assessment of impacts. Each of these aspects will need to be considered in detail for the proposed option when additional detail regarding specific structures is available.

5. Scoping

- 5.1.1. A scoping exercise has been undertaken on each of the screened in surface water features for each of the WFD elements (Biology, Physio- chemical and Hydromorphology) and this is presented in full in Annex B.2. This annex outlines the potential impacts of the route and assesses the likely compliance of the with the WFD. It also identifies the need for further assessment as the design develops.
- 5.1.2. The elements of the Scheme and potential impacts are:
- **Viaducts:** Viaduct crossings are proposed across the floodplain and channel of the River Avon, crossed by the Scheme. This has the potential to impact the Biology WFD elements through shading and riparian vegetation loss and to impact on the Hydromorphology elements through change to channel and floodplain interaction.
 - **Bridges:** Bridges are proposed across the floodplain and channel of some Main Rivers and Ordinary Watercourses crossed by the Scheme. This has the potential to impact the Biology WFD elements through shading and riparian vegetation loss and to impact on the Hydromorphology elements through change to channel and floodplain interaction.
 - **Culverts:** Some ordinary Watercourses and ditches will be crossed with culverts. These may result in a potential loss of aquatic habitat and riparian vegetation (Biological elements), as well as potentially altering the flow and sediment transport in the channel (Hydromorphological elements).
 - **Road drainage:** Outfalls to water courses have the potential to impact result in a loss of aquatic habitat and riparian vegetation (Biological elements) at the outfall location, as well as potentially altering the flow and sediment transport in the channel (Hydromorphological elements). The Physio-chemical elements also have the potential to be impacted by the new road drainage network and outfalls.
 - **Construction:** Construction work such as risk of pollution from fuels, concrete and chemicals as well as from the disturbance of soil during earthworks has the potential to alter water chemistry, increase fine sediment entering the channel as well as altering runoff rates. This will impact on the Biological, Hydromorphological and Physio-chemical elements, however they are not expected to have an adverse effect at the water body scale. This assumes that appropriate mitigation can be developed and implemented.
- 5.1.3. Four WFD principal water course (River Avon, Clackers Brook, Semington Brook and Forest Brook) are directly impacted by the Scheme through viaduct and bridge crossings. The Main River, Frog Ditch, will also be impacted by the Scheme through a bridge crossing.
- 5.1.4. Other water features with potential to be impacted by the Scheme are Ordinary Watercourses and drains, of which two fall within the Avon (Brist) conf R Marden to conf Semington Bk catchment, 2 within the Clackers Bk - source to conf R Avon (Brist), one within Semington Bk-Milebourne Str to conf R Avon (Brist) and one within Forest Brook catchment. These will be impacted through the addition of new culverts and bridges.
- 5.1.5. Based on the high-level assessment undertaken and assuming implementation of good practice no deterioration in Ecological status is anticipated in any of these surface water bodies and the Scheme is expected to be compliant however further assessment is required to confirm this.

5.2. Groundwater

- 5.2.1. The potential impacts on the WFD chemical and quantity elements for the WFD groundwater bodies are assessed here. At this stage there is not sufficient information on the proposed structures to make an informed assessment of impacts.
- **Deep foundations:** Deep foundations may form a barrier to groundwater flow, disrupting groundwater flow paths and potentially reducing groundwater contributions to adjacent watercourses and localised groundwater mounding may also occur. Deep foundations may create rapid vertical flow pathways into the groundwater body for potentially contaminated runoff. It is assumed that pilings will be required for viaduct crossings of the River Avon.

- **Earthworks (cuttings, embankments):** May divert groundwater flow, potentially reducing groundwater contributions to any groundwater fed surface water features from permeable superficial deposits.
- **Drainage of road runoff to groundwater:** Increased surface water runoff from the Scheme has the potential to cause deterioration to the water quality of the groundwater body if runoff is contaminated. Potential secondary effects are to groundwater dependent surface water bodies. It is likely that some soakaways will be required, likely resulting in some locations where the highway drainage level will be below local watercourse/ditch level.
- **De-watering:** De-watering has the potential to cause a local decrease in groundwater levels. The current water table level across the Scheme has not been investigated yet. If working within a cutting, filter drains would be provided along all edges to pick up any runoff water.
- **Temporary material and chemical storage:** could result in flushing of stockpiled sediments and chemicals into the underlying aquifers.

5.2.2. No deterioration in status of WFD groundwater body is anticipated based on high-level assessment undertaken and assuming implementation of good practice. There may be a residual effect on surface water features which are reliant on groundwater within superficial deposits, depending on whether there are viable opportunities for local mitigation (if required). However, these aquifers are not designated as groundwater bodies under the WFD and these impacts will be assessed in the ES.

6. Potential mitigation

- 6.1.1. Relevant mitigation measures should be considered as part of this study together with further opportunities to help meet the objective of GES under the WFD. As the project progresses, a site visit will be undertaken to collect a detailed baseline assessment to help identify the potential impacts and identify appropriate mitigation measures and enhancement opportunities however likely mitigation items are discussed below.

6.2. Pollution prevention

- 6.2.1. Sustainable drainage systems (SuDS) are the preferred approach to managing pollution risk associated with road runoff, and should be implemented where technically feasible. All drainage systems would be designed in accordance with industry standards, with particular emphasis on appropriate pollution prevention and control measures.
- 6.2.2. The Highways England Water Risk Assessment Tool (HAWRAT) allows the effect on the water environment of relevant WFD specific pollutants, priority substances and priority hazardous substances generated by road surfaces to be assessed. This tool should be used as the basis for the design of road drainage.
- 6.2.3. All temporary works should follow pollution prevention and construction best practice. Example measures include: incident response planning; temporary site drainage; controlled discharges (generated through construction); and where possible, ensure no increase to flood risk. A Construction Environment Management Plan (CEMP) will also be prepared (as part of the Scheme).

6.3. Water feature and floodplain crossings

- 6.3.1. It is important that any new or modified crossings, especially where culverts are considered, follow best practice guidelines.
- 6.3.2. Clear span bridges are the preferred type of crossing rather than culverts. Bridges have the least impact on the natural fluvial regime, maintaining existing in-stream and bank side habitats. Sediment transport and migration of aquatic species can therefore be retained. If a clear span structure is not technically feasible nor economically viable, a culvert is likely to be required. Key considerations in environmentally sensitive culvert design are:
- Natural bed substrate will be required, so the invert of the culvert will need to be set well below natural bed level at both ends.
 - Minimise length, for instance by incorporating wingwalls into the design.
 - Minimise impact of the structure on natural flow and sediment process during construction and operation. For instance, an open arc structure that avoids disturbing the natural bed of the river is preferred to a box culvert.
 - Do not size on hydraulic (flood) requirements alone. Additional capacity will be required for environmental uses (e.g. mammal shelves and ensuring natural flow / sediment process). Flow rates and depths during normal and low flows will need to be conducive to wildlife requirements such as fish passage.
- 6.3.3. Viaduct foundations should be designed to accommodate lateral and vertical change of the channel position and minimise impact of the structure on natural flow and sediment process for a range of high and low flows.
- 6.3.4. Some key guidance documents that will be used to inform the subsequent design include:
- Chapter 8 of Fluvial Design Guide¹³;
 - Chapter 4 of Culvert design and operation guide¹⁴;

¹³ Environment Agency (2010) Fluvial Design Guide: Chapter 8 – working in the river channel. Available at: <http://evidence.environment-agency.gov.uk/FCERM/en/FluvialDesignGuide/Chapter8.aspx?pagenum=10>

¹⁴ CIRIA (2010) Culvert design and operation guide. CIRIA, London.

- Advice on minimising impact on fish passage in the Fish Pass Manual¹⁵ and
- SEPA's advice on river crossings and position statement on culverting¹⁶. While this is Scottish guidance it is still good practice and relevant for crossings across the UK.

6.4. Channel realignment

- 6.4.1. Realignment of naturally functioning channels is likely to be opposed by regulators (e.g. the EA) because of the risks associated with a loss of a range of river habitats and, by disrupting natural processes, may result in degradation of adjacent hydrologically connected habitat.
- 6.4.2. However, watercourse channels adjacent to roads have often been modified by previous road building or drainage schemes. Hence, in some instances, the realignment of a channel can present an opportunity to restore or enhance channels to a more natural state of ecological function in line with WFD objectives.
- 6.4.3. Where realigning of naturally functioning channels cannot be avoided, modification will need to be carried out in a manner that minimises long term impact. The regulator will need to consent the work and is likely to stipulate the requirement for environmental enhancements elsewhere to mitigate or offset adverse effects on the water environment.
- 6.4.4. Guidance should be sought on any works that result in the modification of a river channel. The guidance section of the River Restoration Centre website¹⁷ is an excellent starting point for developing effective river restoration designs.
- 6.4.5. Key considerations in developing environmentally sensitive modifications to river channels are:
- Avoid modifying a channel that is already functioning naturally.
 - Where channel modification is required, develop a design that works with natural processes, and hence allows the river to function naturally in the long-term.
 - Be aware that a natural river is likely to require space to function properly (e.g. to allow for re-meandering or backwaters). Allow for this space requirement in the design of other components of the Scheme and land purchases / agreements.
 - As a general principal, the length of a realigned channel should exceed or match the length of channel prior to modification.
 - There are designers and contractors who specialise in river restoration. Designs developed by such specialists are more likely to be consented by the regulator.

6.5. Bed and bank reinforcement

- 6.5.1. Hard bed and bank reinforcement will generally be opposed by the regulator, except at locations where it can be demonstrated that it prevents potential loss of life or is necessary to protect critical infrastructure. Bank and bed erosion is part of the natural functioning of a river. Further guidance on the environmental aspects of bank protection is available from numerous sources.
- 6.5.2. Designs that work with natural processes (and hence avoid the need for protection) are preferred. 'Softer', bioengineered solutions will in many cases afford appropriate protection and be a cheaper/more sustainable design. The role of vegetation for channel stability should also not be underestimated and should be assessed at the earliest opportunity
- 6.5.3. Some key documents include:
- Environment Agency guidance on management bank instability and erosion¹⁸.

¹⁵ Environment Agency (2010) Fish Pass Manual. Document – GEHO 0910 BTBP-E-E. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/298053/geho0910btbp-e-e.pdf

¹⁶ SEPA. (2010, 2015). SEPA Position Statement to support the implementation of the Water Environment (Controlled Activities) (Scotland) Regulations 2011. Retrieved from https://www.sepa.org.uk/media/150919/wat_ps_06_02.pdf

¹⁷ RRC. (2014). Guidance. Available at: <https://www.therrc.co.uk/guidance>

¹⁸ Environment Agency (2010) Managing bank instability and erosion. Available at: <http://evidence.environment-agency.gov.uk/FCERM/en/SC060065/MeasuresList/M5/M5T6.aspx?pagenum=4>

- SEPA's good practice guide on bank protection¹⁹.

6.6. Drainage outfalls

- 6.6.1. The headwall extent of any outfalls should be minimised to reduce the impacts on the bed and banks and micro siting should take current channel behaviour into consideration to reduce the risk of damage to any structure. Velocity should also be minimal to reduce the risk of excessive scour to the bed and banks.

6.7. Deep foundation protruding into aquifers

- 6.7.1. Where deep foundations extending beneath the groundwater table are part of the Scheme, these should be designed in accordance with industry standards, taking into account the site-specific water level and flow monitoring data obtained from intrusive ground investigation for the Scheme. A piling risk assessment should be carried out to ensure the selected piling method does not introduce contamination pathways into the aquifer.
- 6.7.2. The potential consequences of unplanned catastrophic incidents should be dealt with via the environmental management and contingency planning process.

6.8. Opportunities and potential enhancements

- 6.8.1. At this stage of the project there is not enough design information available to identify potential enhancements and opportunities to contribute towards the attainment of Good status beyond implementing merely good practice.
- 6.8.2. However opportunities for potential enhancements within the water environment should be developed and discussed as part of the ongoing design for the preferred option and during consultation with the Environment Agency

¹⁹SEPA (2008) Bank Protection: Rivers and Lochs. Engineering in the Water Environment Good Practice Guide. Document reference WAT-SG-23. Scottish Environment Protection Agency, Stirling, 48pp~

7. Conclusions and recommendations

7.1. Summary

- 7.1.1. Four WFD principal water courses (River Avon, Clackers Brook, Semington Brook and Forest Brook) are directly impacted by the Scheme through viaduct and bridge crossings. The Main River, Frog Ditch, will also be impacted by the Scheme through a viaduct crossing. Other water features with potential to be impacted by the Scheme due to crossings are Ordinary Watercourses and drains, of which two fall within the Avon (Brist) conf R Marden to conf Semington Bk catchment, two within the Clackers Bk - source to conf R Avon (Brist), one within Semington Bk-Milebourne Str to conf R Avon (Brist) and one within Forest Brook catchment. These will be impacted through the addition of new culverts and bridges. Based on the high-level assessment undertaken and assuming implementation of good practice no deterioration in Ecological status is anticipated in any of these surface water bodies and the Scheme is expected to be compliant however further assessment is required to confirm this.
- 7.1.2. One groundwater body exists within the study area, this is not expected to be impacted by the Scheme and no further assessment is required. There may be residual effects on local groundwater dependent habitats and surface water features which are reliant on groundwater within superficial deposits, this is dependant on whether there are viable opportunities for local migration. However, these are not classified as groundwater bodies under the WFD, therefore, these impacts will be assessed in the ES. Any risk from deep foundations or risk from pollution will be addressed in the CEMP and Piling Risk Assessment.

7.2. Further investigations and consultation

- 7.2.1. Consultation with the Environment Agency and the LLFA will be required as the proposed project progresses.
- 7.2.2. Broader collaboration with the drainage, flooding and structures teams will be integral to ensure the WFD continues to be complied with both in respect of design and mitigation.
- 7.2.3. A site visit will be required to all those surface water features scoped in, that require further assessment.
- 7.2.4. A ground investigation would be beneficial to gain further knowledge about the geology.

7.3. Conclusion

- 7.3.1. Overall, with the information available, the Scheme is likely to have a limited impact on the water environment if all appropriate mitigation is implemented, and therefore are likely to be compliant with the WFD. However, a further assessment of the impacts on the WFD should be undertaken after consultation with the Environment Agency and a site visit. In particular, more detailed information is needed on the potential new channel crossings, impacts from road runoff and the drainage network to develop a sustainable design and identify specific mitigation measures and enhancement opportunities. Furthermore, a ground investigation is necessary to understand more about the geology in the study area. This additional understanding, in conjunction with an updated WFD assessment, will be presented as an appendix to the ES.

Annex A – Detailed WFD baseline information for surface water bodies

Table A-1 - Baseline WFD information for the Clackers Bk – source to conf R Avon (Brist)

Water body name	Clackers Bk – source to conf R Avon (Brist)	
Water body ID	GB109053021920	
River Basin District	Severn	
Management catchment	Avon Bristol and Somerset North Streams	
Operational catchment	Avon Bristol Rural	
A/HMWB	N/A	
Classification	2019 Cycle 2	Objectives
Overall Water Body	Poor	Moderate
Ecological	Poor	Moderate
Biological quality elements	Poor	Moderate
Macrophytes and Phytobenthos Combined	Poor	Moderate
Invertebrates	Moderate	Good
Hydromorphological Supporting Elements	Supports Good	Supports Good
Hydrological Regime	Supports Good	Does Not Support Good
Morphology	Supports Good	-
Physico-chemical quality elements	Moderate	Good
Ammonia (Phys-Chem)	Good	Good
Dissolved oxygen	Good	Good
pH	High	Good
Phosphate	Moderate	Good
Temperature	High	-
Chemical	Fail	Good
Priority substances	Good	Does not require assessment
Cypermethrin (Priority hazardous)	Good	-
Fluoranthene	Good	-
Other Pollutants	Does not require assessment	Does not require assessment
Priority hazardous substances	Fail	Does not require assessment
Polybrominated diphenyl ethers (PBDE)	Fail	-
Perfluorooctane sulphonate (PFOS)	Good	-
Benzo(a)pyrene	Good	-
Dioxins and dioxin-like compounds	Good	-
Heptachlor and cis-Heptachlor epoxide	Good	-
Hexabromocyclododecane (HBCDD)	Good	-
Hexachlorobenzene	Good	-
Hexachlorobutadiene	Good	-
Mercury and Its Compounds	Fail	-

Table A-2 - Baseline WFD information for Avon (Brist) conf R Marden to conf Semington Bk

Water body name	Avon (Brist) conf R Marden to conf Semington Bk	
Water body ID	GB109053027440	
River Basin District	Severn	
Management catchment	Avon Bristol and Somerset North Streams	
Operational catchment	Avon Bristol Rural	
A/HMWB	N/A	
Classification	2019 Cycle 2	Objectives
Overall Water Body	Moderate	Good
Ecological	Moderate	Good
Biological quality elements	Moderate	Good
Macrophytes and Phytobenthos Combined	Moderate	Good
Fish	High	Good
Invertebrates	Good	Good
Hydromorphological Supporting Elements	Supports Good	Supports Good
Hydrological Regime	Supports Good	Supports Good
Morphology	Supports Good	-
Physico-chemical quality elements	Moderate	Good
Acid Neutralising Capacity	High	-
Ammonia (Phys-Chem)	High	Good
Dissolved oxygen	High	Good
pH	High	Good
Phosphate	Moderate	Good
Temperature	High	-
Specific pollutants	High	High
Chlorothalonil	High	-
Pendimethalin	High	-
Triclosan	High	-
Manganese	High	-
Copper	High	-
Diazinon	High	-
Dimethoate	High	-
Iron	High	-
Zinc	High	-
Chemical	Fail	Good
Priority substances	Good	Does not require assessment
Alachlor	Good	-
Cypermethrin (Priority hazardous)	Good	-
Dichlorvos (Priority)	Good	-
Aclonifen	Good	-
Bifenox	Good	-
Cybutryne (Irgarol®)	Good	-
Terbutryn	Good	-
Fluoranthene	Good	-
Lead and Its Compounds	Good	-

Nickel and Its Compounds	Good	-
Other Pollutants	Does not require assessment	Does not require assessment
Priority hazardous substances	Fail	Good
Polybrominated diphenyl ethers (PBDE)	Fail	-
Perfluorooctane sulphonate (PFOS)	Fail	-
Benzo(a)pyrene	Good	-
Cadmium and Its Compounds	Good	-
Dioxins and dioxin-like compounds	Good	-
Heptachlor and cis-Heptachlor epoxide	Good	-
Hexabromocyclododecane (HBCDD)	Good	-
Quinoxifen	Good	-
Hexachlorobenzene	Good	-
Hexachlorobutadiene	Good	-
Hexachlorocyclohexane	Good	-
Mercury and Its Compounds	Fail	-
Pentachlorobenzene	Good	-

Table A-3 - Baseline WFD information for Bydemill Bk - source to conf Rlver Avon (Brist)

Water body name	Bydemill Bk - source to conf Rlver Avon (Brist)	
Water body ID	GB109053021960	
River Basin District	Severn	
Management catchment	Avon Bristol and Somerset North Streams	
Operational catchment	Avon Bristol Rural	
Classification	2019 Cycle 2	Objectives
Overall Water Body	Moderate	Good
Ecological	Moderate	Good
Biological quality elements	Moderate	Good
Macrophytes and Phytobenthos Combined	Good	Good
Fish	Moderate	Good
Invertebrates	Good	Good
Hydromorphological Supporting Elements	Supports Good	Supports Good
Hydrological Regime	Does Not Support Good	Does Not Support Good
Morphology	Supports Good	-
Physico-chemical quality elements	Moderate	Good
Acid Neutralising Capacity	High	-
Ammonia (Phys-Chem)	High	Good
Dissolved oxygen	High	Good
pH	High	Good
Phosphate	Moderate	Good
Temperature	High	-
Specific pollutants	High	High
Triclosan	High	-
Iron	High	-

Chemical	Fail	Good
Priority substances	Good	Does not require assessment
Cypermethrin (Priority hazardous)	Good	-
Fluoranthene	Good	-
Other Pollutants	Does not require assessment	Does not require assessment
Priority hazardous substances	Fail	Does not require assessment
Polybrominated diphenyl ethers (PBDE)	Fail	-
Perfluorooctane sulphonate (PFOS)	Fail	-
Benzo(a)pyrene	Good	-
Dioxins and dioxin-like compounds	Good	-
Heptachlor and cis-Heptachlor epoxide	Good	-
Hexabromocyclododecane (HBCDD)	Good	-
Hexachlorobenzene	Good	-
Hexachlorobutadiene	Good	-
Mercury and Its Compounds	Fail	-

Table A-4 - Baseline WFD information for Forest Brook

Water body name	Forest Brook	
Water body ID	GB109053021940	
River Basin District	Severn	
Management catchment	Avon Bristol and Somerset North Streams	
Operational catchment	Avon Bristol Rural	
A/HMWB	N/A	
Classification	2019 Cycle 2	Objectives
Overall Water Body	Poor	Good
Ecological	Poor	Good
Biological quality elements	Poor	Not assessed
Macrophytes and Phytobenthos Combined	Poor	-
Invertebrates	High	-
Hydromorphological Supporting Elements	Supports Good	Supports Good
Hydrological Regime	High	Supports Good
Morphology	Supports Good	-
Physico-chemical quality elements	High	Good
Ammonia (Phys-Chem)	High	Good
Dissolved oxygen	High	Good
pH	High	Good
Phosphate	High	Good
Temperature	High	-
Chemical	Fail	Good
Priority substances	Good	Does not require assessment
Cypermethrin (Priority hazardous)	Good	-
Fluoranthene	Good	-

Other Pollutants	Does not require assessment	Does not require assessment
Priority hazardous substances	Fail	Does not require assessment
Polybrominated diphenyl ethers (PBDE)	Fail	-
Perfluorooctane sulphonate (PFOS)	Good	-
Benzo(a)pyrene	Good	-
Dioxins and dioxin-like compounds	Good	-
Heptachlor and cis-Heptachlor epoxide	Good	-
Hexabromocyclododecane (HBCDD)	Good	-
Hexachlorobenzene	Good	-
Hexachlorobutadiene	Good	-
Mercury and Its Compounds	Fail	-

Table A-5 - Baseline WFD information for Semington Bk-Milebourne Str to conf R Avon (Brist)

Water body name	Semington Bk-Milebourne Str to conf R Avon (Brist)	
Water body ID	GB109053022200	
River Basin District	Severn	
Management catchment	Avon Bristol and Somerset North Streams	
Operational catchment	Avon Bristol Rural	
A/HMWB	N/A	
Classification	2019 Cycle 2	Objectives
Overall Water Body	Moderate	Moderate
Ecological	Moderate	Moderate
Biological quality elements	Moderate	Good
Macrophytes and Phytobenthos		Good
Combined	Good	
Fish	Moderate	Good
Invertebrates	High	Good
Hydromorphological Supporting Elements	Supports Good	Supports Good
Hydrological Regime	Supports Good	Supports Good
Morphology	Supports Good	-
Physico-chemical quality elements	Moderate	Moderate
Acid Neutralising Capacity	High	-
Ammonia (Phys-Chem)	High	Good
Dissolved oxygen	High	Good
pH	High	Good
Phosphate	Poor	Good
Temperature	High	-
Chemical	Fail	Good
Priority substances	Good	Does not require assessment
Cypermethrin (Priority hazardous)	Good	-
Fluoranthene	Good	-
Other Pollutants	Does not require assessment	Does not require assessment
Priority hazardous substances	Fail	Does not require assessment

Polybrominated diphenyl ethers (PBDE)	Fail	-
Perfluorooctane sulphonate (PFOS)	Good	-
Benzo(a)pyrene	Good	-
Dioxins and dioxin-like compounds	Good	-
Heptachlor and cis-Heptachlor epoxide	Good	-
Hexabromocyclododecane (HBCDD)	Good	-
Hexachlorobenzene	Good	-
Hexachlorobutadiene	Good	-
Mercury and Its Compounds	Fail	-

Annex B – Scoping and screening assessments

B1- Screening assessment for surface water features

WFD water body ID	WFD water body	Water feature name	Feature ID	Water feature type	Screening decision
Avon (Brist) conf R Marden to conf Semington Bk	GB109053027440	Old Canal	CN01	Canal	Screen out: Scheme not expected to impact water feature
Avon (Brist) conf R Marden to conf Semington Bk	GB109053027440		DR01	Drain	Screened in: Potential for impacts from drainage and potential construction impacts
Avon (Brist) conf R Marden to conf Semington Bk	GB109053027440		DR02	Drain	Screen out: Scheme not expected to impact water feature
Avon (Brist) conf R Marden to conf Semington Bk	GB109053027440		DR05	Drain	Screen out: Scheme not expected to impact water feature
Avon (Brist) conf R Marden to conf Semington Bk	GB109053027440		DR09	Drain	Screen out: Scheme not expected to impact water feature
Avon (Brist) conf R Marden to conf Semington Bk	GB109053027440		DR10	Drain	Screen out: Scheme not expected to impact water feature
Avon (Brist) conf R Marden to conf Semington Bk	GB109053027440		DR11	Drain	Screen out: Scheme not expected to impact water feature
Avon (Brist) conf R Marden to conf Semington Bk	GB109053027440		DR12	Drain	Screen out: Scheme not expected to impact water feature
Avon (Brist) conf R Marden to conf Semington Bk	GB109053027440		DR13	Drain	Screened in: Potential for impacts from drainage and potential construction impacts
Avon (Brist) conf R Marden to conf Semington Bk	GB109053027440		DR14	Drain	Screen out: Scheme not expected to impact water feature
Avon (Brist) conf R Marden to conf Semington Bk	GB109053027440		DR15	Drain	Screen out: Scheme not expected to impact water feature
Avon (Brist) conf R Marden to conf Semington Bk	GB109053027440		DR16	Drain	Screen out: Scheme not expected to impact water feature
Avon (Brist) conf R Marden to conf Semington Bk	GB109053027440		DR17	Drain	Screen out: Scheme not expected to impact water feature
Avon (Brist) conf R Marden to conf Semington Bk	GB109053027440		DR18	Drain	Screen out: Scheme not expected to impact water feature
Avon (Brist) conf R Marden to conf Semington Bk	GB109053027440		DR19	Drain	Screened in: Potential for impacts from drainage and potential construction impacts
Avon (Brist) conf R Marden to conf Semington Bk	GB109053027440		DR20	Drain	Screen out: Scheme not expected to impact water feature
Avon (Brist) conf R Marden to conf Semington Bk	GB109053027440		DR21	Drain	Screen out: Scheme not expected to impact water feature
Avon (Brist) conf R Marden to conf Semington Bk	GB109053027440		DR22	Drain	Screen out: Scheme not expected to impact water feature
Avon (Brist) conf R Marden to conf Semington Bk	GB109053027440		DR23	Drain	Screen out: Scheme not expected to impact water feature
Avon (Brist) conf R Marden to conf Semington Bk	GB109053027440		DR24	Drain	Screen out: Scheme not expected to impact water feature
Avon (Brist) conf R Marden to conf Semington Bk	GB109053027440		DR25	Drain	Screened in: Crossing will have direct impacts on water feature
Avon (Brist) conf R Marden to conf Semington Bk	GB109053027440	Berryfield Brook	MR02	Main River	Screen out: Scheme not expected to impact water feature
Avon (Brist) conf R Marden to conf Semington Bk	GB109053027440	Frog Ditch	MR08	Main River	Screened in: Crossing will have direct impacts on water feature
Avon (Brist) conf R Marden to conf Semington Bk	GB109053027440	River Avon	MR09	Main River, WFD Principle Waterbody	Screened in: Crossing will have direct impacts on water feature
Avon (Brist) conf R Marden to conf Semington Bk	GB109053027440		WC02	Watercourse	Screen out: Scheme not expected to impact water feature
Avon (Brist) conf R Marden to conf Semington Bk	GB109053027440		WC05	Watercourse	Screen out: Scheme not expected to impact water feature

WFD water body ID	WFD water body	Water feature name	Feature ID	Water feature type	Screening decision
Avon (Brist) conf R Marden to conf Semington Bk	GB109053027440		WC16	Watercourse	Screen out: Scheme not expected to impact water feature
Avon (Brist) conf R Marden to conf Semington Bk	GB109053027440		WC20	Watercourse	Screen out: Scheme not expected to impact water feature
Avon (Brist) conf R Marden to conf Semington Bk	GB109053027440		WC21	Watercourse	Screen out: Scheme not expected to impact water feature
Avon (Brist) conf R Marden to conf Semington Bk	GB109053027440		WC22	Watercourse	Screened in: Potential for impacts from drainage and potential construction impacts
Avon (Brist) conf R Marden to conf Semington Bk	GB109053027440		WC23	Watercourse	Screen out: Scheme not expected to impact water feature
Avon (Brist) conf R Marden to conf Semington Bk	GB109053027440		WC24	Watercourse	Screen out: Scheme not expected to impact water feature
Avon (Brist) conf R Marden to conf Semington Bk	GB109053027440		WC39	Watercourse	Screened in: Potential for impacts from drainage and potential construction impacts
Bydemill Bk - source to conf River Avon (Brist)	GB109053021960		DR29	Drain	Screen out: Scheme not expected to impact water feature
Bydemill Bk - source to conf River Avon (Brist)	GB109053021960		DR30	Drain	Screen out: Scheme not expected to impact water feature
Bydemill Bk - source to conf River Avon (Brist)	GB109053021960	Bydemill Brook	MR30	Main River, WFD Principle Waterbody	Screen out: Scheme not expected to impact water feature
Clackers Bk - source to conf R Avon (Brist)	GB109053021920		DR03	Drain	Screen out: Scheme not expected to impact water feature
Clackers Bk - source to conf R Avon (Brist)	GB109053021920		DR04	Drain	Screen out: Scheme not expected to impact water feature
Clackers Bk - source to conf R Avon (Brist)	GB109053021920		DR06	Drain	Screen out: Scheme not expected to impact water feature
Clackers Bk - source to conf R Avon (Brist)	GB109053021920		DR07	Drain	Screen out: Scheme not expected to impact water feature
Clackers Bk - source to conf R Avon (Brist)	GB109053021920		DR08	Drain	Screened in: Crossing will have direct impacts on water feature
Clackers Bk - source to conf R Avon (Brist)	GB109053021920		DR39	Drain	Screened in: Potential for impacts from drainage and potential construction impacts
Clackers Bk - source to conf R Avon (Brist)	GB109053021920	Clackers Brook	MR39	Main River, WFD Principle Waterbody	Screened in: Crossing will have direct impacts on water feature
Clackers Bk - source to conf R Avon (Brist)	GB109053021920		WC07	Watercourse	Screened in: Crossing will have direct impacts on water feature
Clackers Bk - source to conf R Avon (Brist)	GB109053021920		WC17	Watercourse	Screened in: Potential for impacts from drainage and potential construction impacts
Clackers Bk - source to conf R Avon (Brist)	GB109053021920		WC34	Watercourse	Screened in: Potential for impacts from drainage and potential construction impacts
Clackers Bk - source to conf R Avon (Brist)	GB109053021920		WC35	Watercourse	Screened in: Potential for impacts from drainage and potential construction impacts
Forest Brook	GB109053021940		DR26	Drain	Screen out: Scheme not expected to impact water feature
Forest Brook	GB109053021940		DR27	Drain	Screened in: Potential for impacts from drainage and potential construction impacts
Forest Brook	GB109053021940		DR28	Drain	Screen out: Scheme not expected to impact water feature
Forest Brook	GB109053021940	Forest Brook	MR06	Main River, WFD Principle Waterbody	Screened in: Crossing will have direct impacts on water feature
Forest Brook	GB109053021940	Forest Brook	WC06	Watercourse	Screen out: Scheme not expected to impact water feature
Forest Brook	GB109053021940		WC13	Watercourse	Screened in: Potential for impacts from drainage and potential construction impacts
Forest Brook	GB109053021940		WC25	Watercourse	Screen out: Scheme not expected to impact water feature
Forest Brook	GB109053021940		WC26	Watercourse	Screen out: Scheme not expected to impact water feature
Forest Brook	GB109053021940		WC27	Watercourse	Screen out: Scheme not expected to impact water feature
Semington Bk-Milebourne Str to conf R Avon (Brist)	GB109053022200	Kennet and Avon Canal	CN02	Canal	Screened in: Crossing will have direct impacts on water feature
Semington Bk-Milebourne Str to	GB109053022200		DR31	Drain	Screen out: Scheme not expected to impact water feature

WFD water body ID	WFD water body	Water feature name	Feature ID	Water feature type	Screening decision
conf R Avon (Brist)					
Semington Bk-Milebourne Str to conf R Avon (Brist)	GB109053022200		DR32	Drain	Screen out: Scheme not expected to impact water feature
Semington Bk-Milebourne Str to conf R Avon (Brist)	GB109053022200		DR33	Drain	Screen out: Scheme not expected to impact water feature
Semington Bk-Milebourne Str to conf R Avon (Brist)	GB109053022200		DR34	Drain	Screened in: Potential for impacts from drainage and potential construction impacts
Semington Bk-Milebourne Str to conf R Avon (Brist)	GB109053022200		DR35	Drain	Screen out: Scheme not expected to impact water feature
Semington Bk-Milebourne Str to conf R Avon (Brist)	GB109053022200		DR36	Drain	Screen out: Scheme not expected to impact water feature
Semington Bk-Milebourne Str to conf R Avon (Brist)	GB109053022200		DR37	Drain	Screen out: Scheme not expected to impact water feature
Semington Bk-Milebourne Str to conf R Avon (Brist)	GB109053022200		DR38	Drain	Screen out: Scheme not expected to impact water feature
Semington Bk-Milebourne Str to conf R Avon (Brist)	GB109053022200		DR40	Drain	Screen out: Scheme not expected to impact water feature
Semington Bk-Milebourne Str to conf R Avon (Brist)	GB109053022200	Semington Brook	MR11	Main River, WFD Principle Waterbody	Screened in: Crossing will have direct impacts on water feature
Semington Bk-Milebourne Str to conf R Avon (Brist)	GB109053022200	Semington Brook	WC11	Watercourse	Screened in: Crossing will have direct impacts on water feature
Semington Bk-Milebourne Str to conf R Avon (Brist)	GB109053022200		WC28	Watercourse	Screen out: Scheme not expected to impact water feature
Semington Bk-Milebourne Str to conf R Avon (Brist)	GB109053022200		WC29	Watercourse	Screen out: Scheme not expected to impact water feature
Semington Bk-Milebourne Str to conf R Avon (Brist)	GB109053022200		WC36	Watercourse	Screen out: Scheme not expected to impact water feature
Semington Bk-Milebourne Str to conf R Avon (Brist)	GB109053022200		WC38	Watercourse	Screened in: Potential for impacts from drainage and potential construction impacts
Semington Bk-Milebourne Str to conf R Avon (Brist)	GB109053022200		WC40	Watercourse	Screen out: Scheme not expected to impact water feature
Semington Bk-Milebourne Str to conf R Avon (Brist)	GB109053022200		DR41	Drain	Screen out: Scheme not expected to impact water feature
Semington Bk-Milebourne Str to conf R Avon (Brist)	GB109053022200		DR42	Drain	Screen out: Scheme not expected to impact water feature
Semington Bk-Milebourne Str to conf R Avon (Brist)	GB109053022200		DR43	Drain	Screen out: Scheme not expected to impact water feature
Semington Bk-Milebourne Str to conf R Avon (Brist)	GB109053022200		DR44	Drain	Screen out: Scheme not expected to impact water feature
Semington Bk-Milebourne Str to conf R Avon (Brist)	GB109053022200		DR45	Drain	Screen out: Scheme not expected to impact water feature
Semington Bk-Milebourne Str to conf R Avon (Brist)	GB109053022200		DR46	Drain	Screen out: Scheme not expected to impact water feature

WFD water body ID	WFD water body	Water feature name	Feature ID	Water feature type	Screening decision
Semington Bk- Milebourne Str to conf R Avon (Brist)	GB109053022200		DR47	Drain	Screen out: Scheme not expected to impact water feature

B2- Scoping assessment for surface water features

WFD water body (water body ID)	Water feature name	Feature ID	Water feature type	Works	Biological impacts	Physio-chemical Impacts	Hydromorphology Impacts	Scoping outcome
Avon (Brist) conf R Marden to conf Semington Bk		DR13	Drain	Construction Drainage	Potential loss of aquatic habitat associated with a reduction in water quality and proximity of construction work	New road drainage could impact on water quality	Potential for a change in flow and sediment transport and a loss of natural bed and bank from outfalls. Potential increase in fine sediment supply to the channel during construction.	More detailed WFD assessment will be required for this water feature for Biological, Hydromorphological and Physio-chemical elements
Avon (Brist) conf R Marden to conf Semington Bk		DR19	Drain	Construction Drainage	Potential loss of aquatic habitat associated with a reduction in water quality and proximity of construction work	New road drainage could impact on water quality	Potential for a change in flow and sediment transport and a loss of natural bed and bank from outfalls. Potential increase in fine sediment supply to the channel during construction.	More detailed WFD assessment will be required for this water feature for Biological, Hydromorphological and Physio-chemical elements
Avon (Brist) conf R Marden to conf Semington Bk		DR25	Drain	Crossing - Culvert Construction Drainage	Potential permanent loss of watercourse and riparian habitat and additional impacts associated within proximity of construction work	At this stage, there is limited information on the impacts of works on specific pollutants. It is expected that the increase in impermeable surface will increase surface runoff and could result in a reduction in water quality	Potential change in flow and sediment transport into, through and out of the culvert Permanent loss of bank and bed from and material where replaced with culvert Loss of open watercourse channel length Permanent loss of riparian habitat	More detailed WFD assessment will be required for this water feature for Biological, Hydromorphological and Physio-chemical elements
Avon (Brist) conf R Marden to conf Semington Bk	Frog Ditch	MR08	Main River	Crossing - 20m long bridge. Realignment - diverted due to alignment passing over the stream Construction Drainage	Potential for loss of riparian habitat and impacts associated with shading and proximity of construction work	At this stage, there is limited information on the impacts of works on specific pollutants. It is expected that the increase in impermeable surface will increase surface runoff and could result in a reduction in water quality	Potential loss of bank structure and riparian vegetation due to abutments Potential for change in flow and sediment transport dynamics across floodplain due to new piers Potential for changes in channel - floodplain interactions Potential for loss of floodplain storage due to piers in floodplain Potential for loss of bank structure and riparian vegetation due to abutments Potential for limiting natural processes (erosion and channel migration) across the floodplain due to the proximity of the viaduct to meanders	More detailed WFD assessment will be required for this water feature for Biological, Hydromorphological and Physio-chemical elements

WFD water body (water body ID)	Water feature name	Feature ID	Water feature type	Works	Biological impacts	Physio-chemical Impacts	Hydromorphology Impacts	Scoping outcome
Avon (Brist) conf R Marden to conf Semington Bk	River Avon	MR09	Main River, WFD Principle Waterbody	Crossing - Viaduct (350m) across channel and 1 in 100 floodplain Construction Drainage	Potential for loss of riparian habitat and impacts associated with shading and proximity of construction work	At this stage, there is limited information on the impacts of works on specific pollutants. It is expected that the increase in impermeable surface will increase surface runoff and could result in a reduction in water quality	Potential loss of bank structure and riparian vegetation due to abutments Potential for change in flow and sediment transport dynamics across floodplain due to new piers Potential for changes in channel - floodplain interactions Potential for loss of floodplain storage due to piers in floodplain Potential for loss of bank structure and riparian vegetation due to abutments Potential for limiting natural processes (erosion and channel migration) across the floodplain due to the proximity of the viaduct to meanders	More detailed WFD assessment will be required for this water feature for Biological, Hydromorphological and Physio-chemical elements
Avon (Brist) conf R Marden to conf Semington Bk		WC22	Watercourse	Construction Drainage	Potential loss of aquatic habitat associated with a reduction in water quality and proximity of construction work	New road drainage could impact on water quality	Potential for a change in flow and sediment transport and a loss of natural bed and bank from outfalls. Potential increase in fine sediment supply to the channel during construction.	More detailed WFD assessment will be required for this water feature for Biological, Hydromorphological and Physio-chemical elements
Avon (Brist) conf R Marden to conf Semington Bk		WC39	Watercourse	Crossing - Viaduct Construction Drainage	Potential permanent loss of watercourse and riparian habitat and additional impacts associated within proximity of construction work	At this stage, there is limited information on the impacts of works on specific pollutants. It is expected that the increase in impermeable surface will increase surface runoff and could result in a reduction in water quality	Potential change in flow and sediment transport into, through and out of the culvert Permanent loss of bank and bed from and material where replaced with culvert Loss of open watercourse channel length Permanent loss of riparian habitat	More detailed WFD assessment will be required for this water feature for Biological, Hydromorphological and Physio-chemical elements
Clackers Bk - source to conf R Avon (Brist)		DR08	Drain	Crossing - Culvert Construction Drainage	Potential permanent loss of watercourse and riparian habitat and additional impacts associated within proximity of construction work	At this stage, there is limited information on the impacts of works on specific pollutants. It is expected that the increase in impermeable surface will increase surface runoff and could result in a reduction in water quality	Potential change in flow and sediment transport into, through and out of the culvert Permanent loss of bank and bed from and material where replaced with culvert Loss of open watercourse channel length Permanent loss of riparian habitat	More detailed WFD assessment will be required for this water feature for Biological, Hydromorphological and Physio-chemical elements

WFD water body (water body ID)	Water feature name	Feature ID	Water feature type	Works	Biological impacts	Physio-chemical Impacts	Hydromorphology Impacts	Scoping outcome
Clackers Bk - source to conf R Avon (Brist)		DR39	Drain	Construction Drainage	Potential loss of aquatic habitat associated with a reduction in water quality and proximity of construction work	New road drainage could impact on water quality	Potential for a change in flow and sediment transport and a loss of natural bed and bank from outfalls. Potential increase in fine sediment supply to the channel during construction.	More detailed WFD assessment will be required for this water feature for Biological, Hydromorphological and Physio-chemical elements
Clackers Bk - source to conf R Avon (Brist)	Clackers Brook	MR39	Main River, WFD Principle Waterbody	Crossing - 45m long bridge Construction Drainage	Potential for loss of riparian habitat and impacts associated with shading and proximity of construction work	At this stage, there is limited information on the impacts of works on specific pollutants. It is expected that the increase in impermeable surface will increase surface runoff and could result in a reduction in water quality	Potential loss of bank structure and riparian vegetation due to abutments Potential for change in flow and sediment transport dynamics across floodplain due to new piers Potential for changes in channel - floodplain interactions Potential for loss of floodplain storage due to piers in floodplain Potential for loss of bank structure and riparian vegetation due to abutments Potential for limiting natural processes (erosion and channel migration) across the floodplain due to the proximity of the viaduct to meanders	More detailed WFD assessment will be required for this water feature for Biological, Hydromorphological and Physio-chemical elements
Clackers Bk - source to conf R Avon (Brist)		WC07	Watercourse	Crossing - 20m long bridge Construction Drainage	Potential permanent loss of watercourse and riparian habitat and additional impacts associated within proximity of construction work	At this stage, there is limited information on the impacts of works on specific pollutants. It is expected that the increase in impermeable surface will increase surface runoff and could result in a reduction in water quality	Potential change in flow and sediment transport into, through and out of the culvert Permanent loss of bank and bed from and material where replaced with culvert Loss of open watercourse channel length Permanent loss of riparian habitat	More detailed WFD assessment will be required for this water feature for Biological, Hydromorphological and Physio-chemical elements
Clackers Bk - source to conf R Avon (Brist)		WC17	Watercourse	Construction Drainage	Potential loss of aquatic habitat associated with a reduction in water quality and proximity of construction work	New road drainage could impact on water quality	Potential for a change in flow and sediment transport and a loss of natural bed and bank from outfalls. Potential increase in fine sediment supply to the channel during construction.	More detailed WFD assessment will be required for this water feature for Biological, Hydromorphological and Physio-chemical elements
Clackers Bk - source to conf R Avon (Brist)		WC34	Watercourse	Construction Drainage	Potential loss of aquatic habitat associated with a reduction in water quality and proximity of construction work	New road drainage could impact on water quality	Potential for a change in flow and sediment transport and a loss of natural bed and bank from outfalls. Potential increase in fine sediment supply to the channel during construction.	More detailed WFD assessment will be required for this water feature for Biological, Hydromorphological and Physio-chemical elements

WFD water body (water body ID)	Water feature name	Feature ID	Water feature type	Works	Biological impacts	Physio-chemical Impacts	Hydromorphology Impacts	Scoping outcome
								Physio-chemical elements
Clackers Bk - source to conf R Avon (Brist)		WC35	Watercourse	Crossing - Viaduct Construction Drainage	Potential for loss of riparian habitat and impacts associated with shading and proximity of construction work	At this stage, there is limited information on the impacts of works on specific pollutants. It is expected that the increase in impermeable surface will increase surface runoff and could result in a reduction in water quality	Potential loss of bank structure and riparian vegetation due to abutments Potential for change in flow and sediment transport dynamics across floodplain due to new piers Potential for changes in channel - floodplain interactions Potential for loss of floodplain storage due to piers in floodplain Potential for loss of bank structure and riparian vegetation due to abutments Potential for limiting natural processes (erosion and channel migration) across the floodplain due to the proximity of the viaduct to meanders	More detailed WFD assessment will be required for this water feature for Biological, Hydromorphological and Physio-chemical elements
Forest Brook		DR27	Drain	Construction Drainage	Potential loss of aquatic habitat associated with a reduction in water quality and proximity of construction work	New road drainage could impact on water quality	Potential for a change in flow and sediment transport and a loss of natural bed and bank from outfalls. Potential increase in fine sediment supply to the channel during construction.	More detailed WFD assessment will be required for this water feature for Biological, Hydromorphological and Physio-chemical elements

WFD water body (water body ID)	Water feature name	Feature ID	Water feature type	Works	Biological impacts	Physio-chemical Impacts	Hydromorphology Impacts	Scoping outcome
Forest Brook	Forest Brook	MR06	Main River, WFD Principle Waterbody	Crossing - 10m long bridge Construction Drainage	Potential for loss of riparian habitat and impacts associated with shading and proximity of construction work	At this stage, there is limited information on the impacts of works on specific pollutants. It is expected that the increase in impermeable surface will increase surface runoff and could result in a reduction in water quality	Potential loss of bank structure and riparian vegetation due to abutments Potential for change in flow and sediment transport dynamics across floodplain due to new piers Potential for changes in channel - floodplain interactions Potential for loss of floodplain storage due to piers in floodplain Potential for loss of bank structure and riparian vegetation due to abutments Potential for limiting natural processes (erosion and channel migration) across the floodplain due to the proximity of the viaduct to meanders	More detailed WFD assessment will be required for this water feature for Biological, Hydromorphological and Physio-chemical elements
Forest Brook		WC13	Watercourse	Crossing - Culvert Construction Drainage	Potential permanent loss of watercourse and riparian habitat and additional impacts associated within proximity of construction work	At this stage, there is limited information on the impacts of works on specific pollutants. It is expected that the increase in impermeable surface will increase surface runoff and could result in a reduction in water quality	Potential change in flow and sediment transport into, through and out of the culvert Permanent loss of bank and bed from and material where replaced with culvert Loss of open watercourse channel length Permanent loss of riparian habitat	More detailed WFD assessment will be required for this water feature for Biological, Hydromorphological and Physio-chemical elements
Bydemill Bk - source to conf Rlver Avon (Brist)		DR34	Drain	Construction Drainage	Potential loss of aquatic habitat associated with a reduction in water quality and proximity of construction work	New road drainage could impact on water quality	Potential for a change in flow and sediment transport and a loss of natural bed and bank from outfalls. Potential increase in fine sediment supply to the channel during construction.	More detailed WFD assessment will be required for this water feature for Biological, Hydromorphological and Physio-chemical elements
Semington Bk- Milebourne Str to conf R Avon (Brist)		DR1	Drain	Construction Drainage	Potential loss of aquatic habitat associated with a reduction in water quality and proximity of construction work	New road drainage could impact on water quality	Potential for a change in flow and sediment transport and a loss of natural bed and bank from outfalls. Potential increase in fine sediment supply to the channel during construction.	More detailed WFD assessment will be required for this water feature for Biological, Hydromorphological and Physio-chemical elements
Semington Bk- Milebourne Str to conf R Avon (Brist)	Kennet and Avon Canal	CN02	Canal	Construction Drainage	Potential loss of aquatic habitat associated with a reduction in water quality and proximity of construction work	New road drainage could impact on water quality	Potential for a change in flow and sediment transport. Potential increase in fine sediment supply to the channel during construction.	More detailed WFD assessment will be required for this water feature for Biological, Hydromorphological and

WFD water body (water body ID)	Water feature name	Feature ID	Water feature type	Works	Biological impacts	Physio-chemical Impacts	Hydromorphology Impacts	Scoping outcome
								Physio-chemical elements
Semington Bk- Milebourne Str to conf R Avon (Brist)		WC38	Watercourse	Construction Drainage	Potential loss of aquatic habitat associated with a reduction in water quality and proximity of construction work	New road drainage could impact on water quality	Potential for a change in flow and sediment transport and a loss of natural bed and bank from outfalls. Potential increase in fine sediment supply to the channel during construction.	More detailed WFD assessment will be required for this water feature for Biological, Hydromorphological and Physio-chemical elements
Semington Bk- Milebourne Str to conf R Avon (Brist)	Semington Brook	MR11	Main River, WFD Principle Waterbody	Crossing – bridge widening Construction Drainage	Potential for loss of riparian habitat and impacts associated with shading and proximity of construction work	At this stage, there is limited information on the impacts of works on specific pollutants. It is expected that the increase in impermeable surface will increase surface runoff and could result in a reduction in water quality	Potential loss of bank structure and riparian vegetation due to abutments Potential for change in flow and sediment transport dynamics across floodplain due to new piers Potential for changes in channel - floodplain interactions Potential for loss of floodplain storage due to piers in floodplain Potential for loss of bank structure and riparian vegetation due to abutments Potential for limiting natural processes (erosion and channel migration) across the floodplain due to the proximity of the viaduct to meanders	More detailed WFD assessment will be required for this water feature for Biological, Hydromorphological and Physio-chemical elements
Semington Bk- Milebourne Str to conf R Avon (Brist)	Semington Brook	WC11	Watercourse	Crossing – bridge widening Construction Drainage	Potential for loss of riparian habitat and impacts associated with shading and proximity of construction work	At this stage, there is limited information on the impacts of works on specific pollutants. It is expected that the increase in impermeable surface will increase surface runoff and could result in a reduction in water quality	Potential loss of bank structure and riparian vegetation due to abutments Potential for change in flow and sediment transport dynamics across floodplain due to new piers Potential for changes in channel - floodplain interactions Potential for loss of floodplain storage due to piers in floodplain Potential for loss of bank structure and riparian vegetation due to abutments Potential for limiting natural processes (erosion and channel migration) across the floodplain	More detailed WFD assessment will be required for this water feature for Biological, Hydromorphological and Physio-chemical elements

WFD water body (water body ID)	Water feature name	Feature ID	Water feature type	Works	Biological impacts	Physio-chemical Impacts	Hydromorphology Impacts	Scoping outcome
							due to the proximity of the viaduct to meanders	

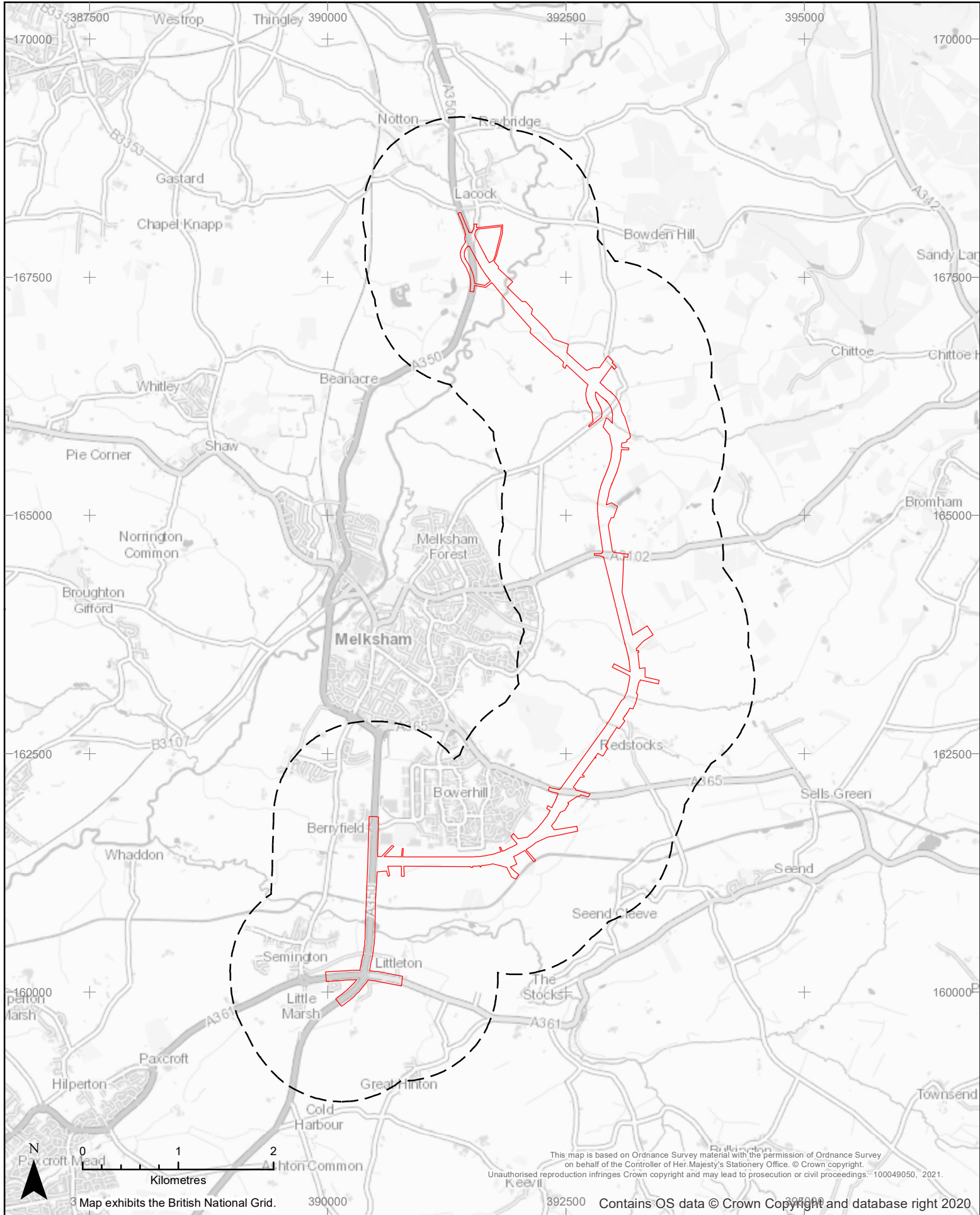
Annex C – Figures

Figure 1.1 Proposed Melksham Bypass Scheme

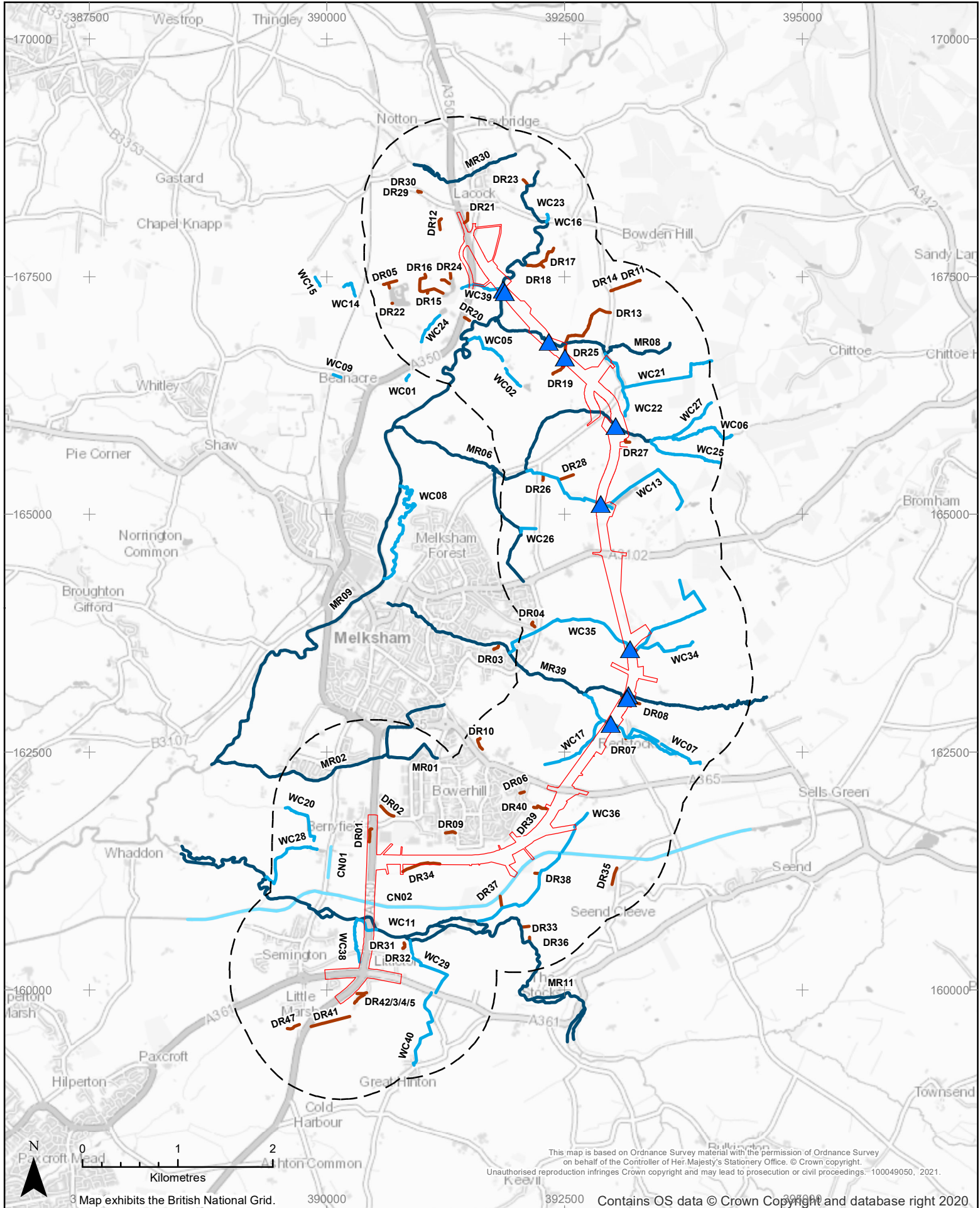
Figure 1.2 Proposed Melksham Bypass Scheme water features and crossings

Figure 3.1 WFD Surface Waterbodies

Figure 3.2 WFD Groundwater Bodies



Proposed Scheme Boundary Buffer to Proposed Scheme (1km)	Client		Project	
			A350 MELKSHAM BY-PASS Drawing Title Figure 1.1 Proposed Melksham Bypass scheme	
Description		Drawing Suitability		Status
Status S0 Revision P02 Drawn FM Checked RT Reviewed AR Authorised AM Issue Date 08/11/21		WORK IN PROGRESS		S0
Description		Drawing Number		
Status S0 Revision P01 Drawn JH Checked RT Reviewed AR Authorised AM Issue Date 15/10/21		WC_MBP_ATK_EGN_XX_GS_LW_000004 <small>Project Originator Volume Location Type Role Number</small>		
		Original Size: A4	Scale: 1:50,000	Project Ref. No: 5197936
		Sheet: 1 of 1		Rev: P02



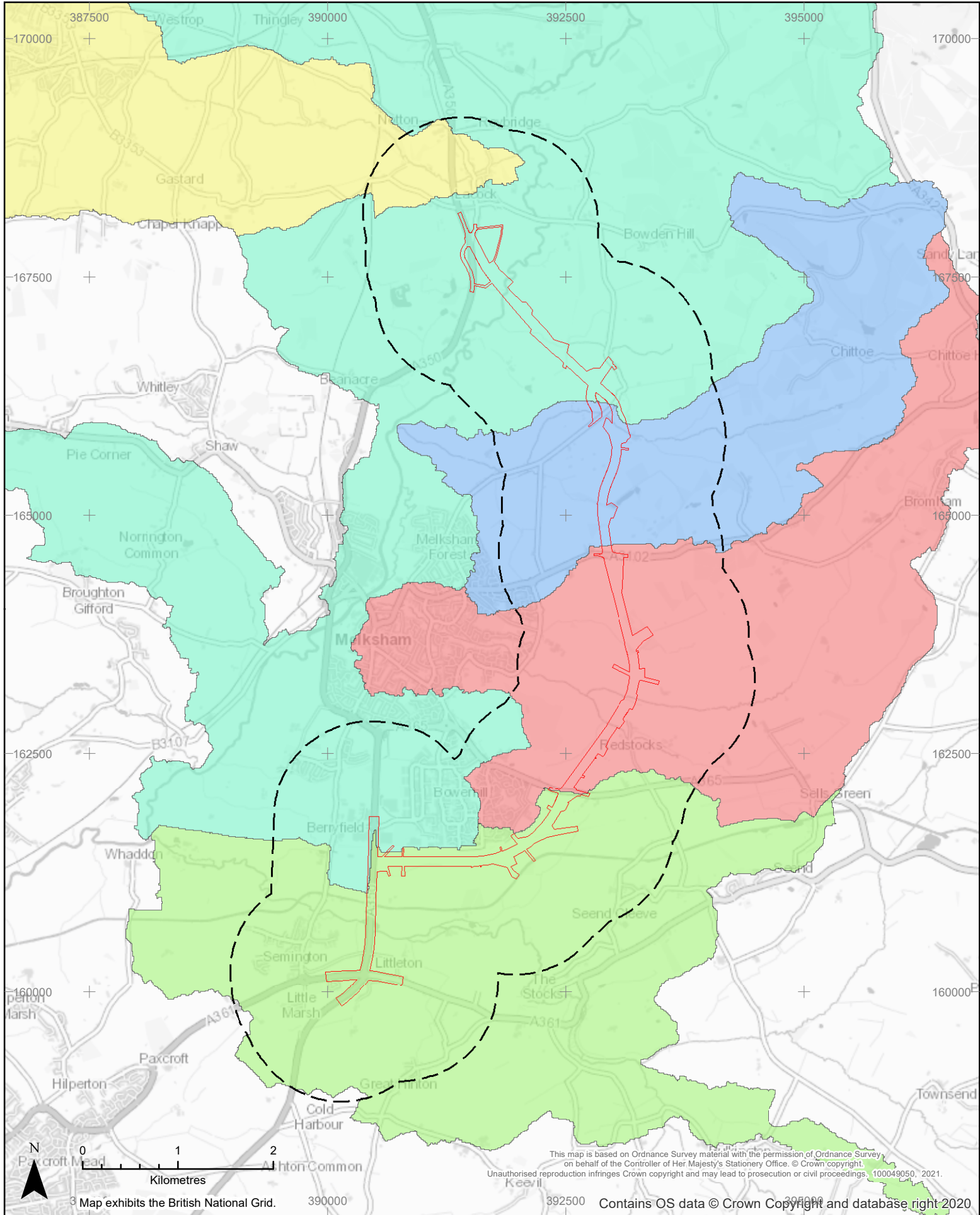
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Proposed Scheme Boundary	Drain
1km Buffer	
Crossings	
Main River	
Watercourse	
Canal	

Client		Project	
		A350 MELKSHAM BY-PASS	
Description		Drawing Title	
		Figure 1.2 Proposed Melksham Bypass scheme, water features and crossings	
Status	Revision	Drawn	Checked
S0	P02	FM	RT
Reviewed	Authorised	Issue Date	
AR	AM	08/11/21	
Description		Drawing Suitability	
		WORK IN PROGRESS	
Status	Revision	Drawn	Checked
S0	P01	JH	RT
Reviewed	Authorised	Issue Date	
AR	AM	15/10/21	

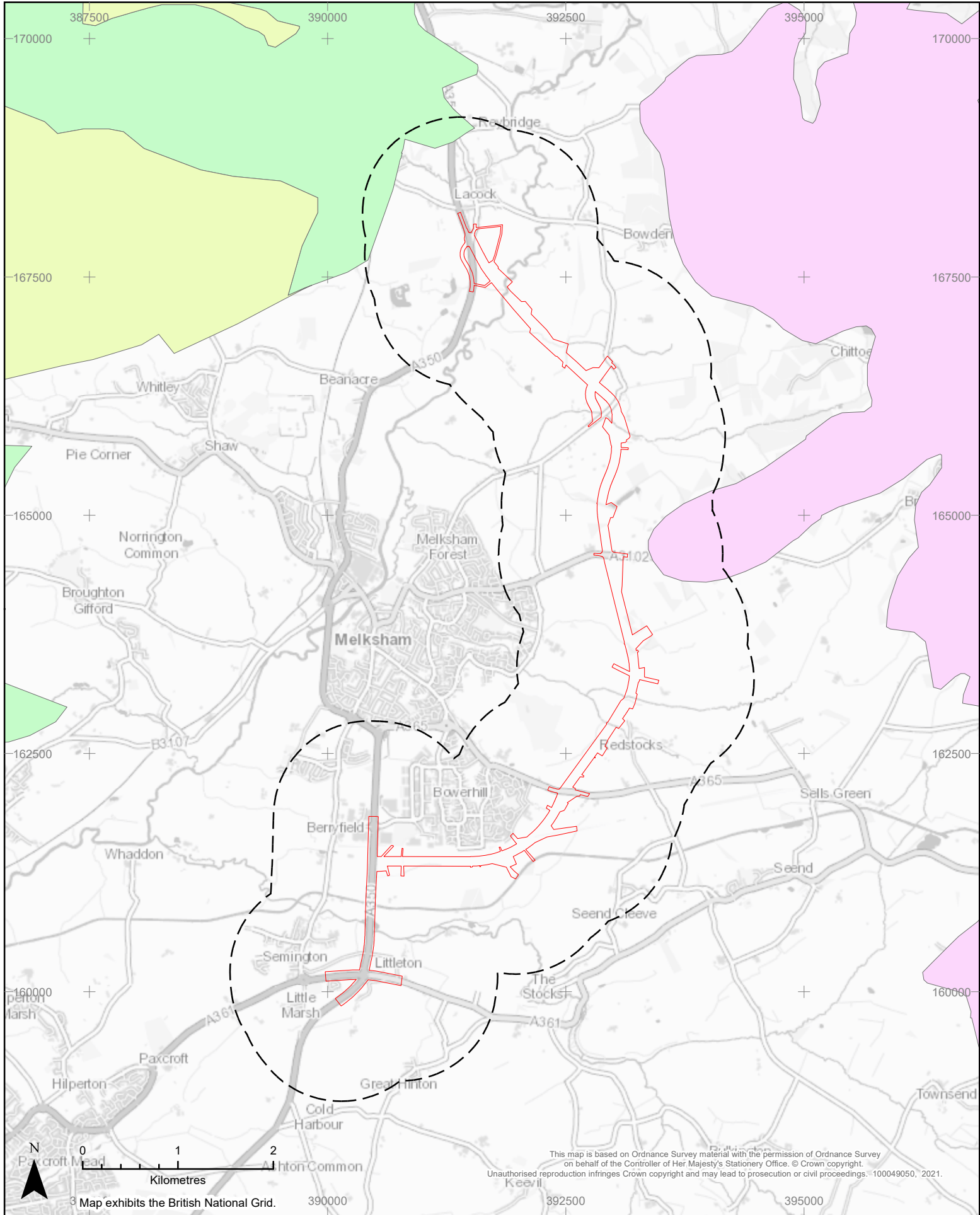
Drawing Number		Status	
WC_MBP_ATK_EGN_XX_GS_LW_000005		S0	
Project Originator Volume Location Type Role Number			
Original Size:	Scale:	Project Ref. No.:	Sheet:
A4	1:50,000	5197936	1 of 1
			Rev.:
			P02



Proposed Scheme Boundary	WFD Surface Waterbodies
Buffer to Proposed Scheme (1km)	GB109053021920
	GB109053021940
	GB109053021960
	GB109053022200
	GB109053027440

Client						
Description						
Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date
S0	P01	JH	RT	AR	AM	15/10/21

Project						
A350 MELKSHAM BY-PASS						
Drawing Title						
Figure 3.1 WFD Surface Waterbodies						
Drawing Suitability	Status					
WORK IN PROGRESS	S0					
Drawing Number						
WC_MBP_ATK_EGN_XX_GS_LW_000006						
Project	Originator	Volume	Location	Type	Role	Number
Original Size:	Scale:	Project Ref. No.:	Sheet:	Rev.:		
A4	1:50,000	5197936	1 of 1	P01		



Proposed Scheme Boundary	WFD Ground Waterbodies
Buffer to Proposed Scheme (1km)	GB40901G806000
	GB40902G302900
	GB40902G806100

Client						
Description						
Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date
S0	P01	JH	RT	AR	AM	15/10/21

Project			
A350 MELKSHAM BY-PASS			
Drawing Title			
Figure 3.2 WFD Ground Waterbodies			
Drawing Suitability			Status
WORK IN PROGRESS			S0
Drawing Number			
WC_MBP_ATK_EGN_XX_GS_LW_000008			
Project	Originator	Volume	Location
Project Ref. No:	5197936	Sheet:	1 of 1
Original Size:	A4	Scale:	1:50,000
Rev:	P01		

3rd Floor, County Gate,
County Way, Trowbridge BA14 7FJ

Appendix C. Population and Human Health

C.1. Legislation, policy and guidance

Table C.1: National policy relevant to population and human health

Policy	Description of key policies relevant to the assessment
The National Planning Policy Framework 2021 (NPPF)	<p>The National Planning Policy Framework (NPPF) provides the policy framework for plan-making and decision taking on a national basis. The following is a list of the key relevant policies from the NPPF, with key extracts.</p> <p><u>Policy 2: Achieving sustainable development</u></p> <ul style="list-style-type: none"> • Paragraph 7 – Sustainable development – the purpose of the planning system is to meet the needs of the present without compromising the ability of future generations to meet their own needs; • Paragraph 10 – Presumption in favour of sustainable development; and • Paragraph 11 – Application of the presumption in favour of sustainable development - development proposals that accord with an up-to-date development plan should be approved, without delay. <p><u>Policy 4: Decision making</u></p> <ul style="list-style-type: none"> • Paragraph 47 - Applications for planning permission should be determined in accordance with the development plan, unless material considerations indicate otherwise <p><u>Policy 6 - Building a strong, competitive economy</u></p> <ul style="list-style-type: none"> • Paragraph 81 – Supporting businesses and economic growth – planning policies and decisions should help create the conditions in which businesses can invest, expand and adapt; • Paragraph 82 – Enabling economic growth – planning policies should seek to address potential barriers to investment, such as inadequate infrastructure; and <p><u>Policy 8 - Promoting healthy communities</u></p> <ul style="list-style-type: none"> • Paragraph 92 – Planning policies and decisions should aim to achieve healthy, inclusive, and safe places, such as layouts that allow for easy WCH connections; and • Paragraph 99- Existing open space, sports and recreational buildings and land, including playing fields, should not be built on unless a justification can be made that the facility is surplus to requirements or the development is for alternative provision which will provide greater benefits. • Paragraph 100 – PRow and access should be protected and enhanced <p><u>Policy 9: Promoting sustainable transport</u></p> <ul style="list-style-type: none"> • Paragraph 104 – Transport issues should be considered from the earliest stages of development proposals, so that the potential effects on transport networks can be addressed, opportunities for new transport infrastructure can be accommodated, opportunities to promote WCH and public transport can be pursued and the environmental impacts of traffic and transport infrastructure can be taken into account; • Paragraph 106 c) – Identifies and protects sites and routes which could be critical for developing infrastructure to wider transport choice and realise opportunities for large scale development; • Paragraph 106 e) – Provides for the infrastructure necessary to support wider large-scale transport facilities; and • Paragraph 112 c) – Seeks to provide safe and secure access for all – which minimise the scope of conflicts between pedestrians, cyclists and vehicles, whilst responding to local character and design standards. <p><u>Policy 11: Making effective use of land</u></p> <ul style="list-style-type: none"> • Paragraph 119 - Planning policies and decisions should promote an effective use of land in meeting development needs, while safeguarding and improving the environment and ensuring safe and healthy living conditions

Policy	Description of key policies relevant to the assessment
	<p><u>Policy 12: Achieving well designed places</u></p> <ul style="list-style-type: none"> <li>• Paragraph 130 – Planning policies and decisions should ensure that developments will function well and add to the overall quality of the area, be visually attractive with appropriate landscaping, and be sympathetic to local character and history; <li>• Paragraph 132 – Focuses on design quality and early discussions with the local planning authority and local community to clarify expectations and recognise local need <p><u>Policy 13: Protecting Green Belt land</u></p> <ul style="list-style-type: none"> <li>• Paragraph 137 – The fundamental aim of Green Belt policy is to prevent urban sprawl by keeping land permanently open. The essential characteristics of Green Belts are their openness and permanence; <li>• Paragraph 147 – Inappropriate development that is harmful to the Green Belt, should not be approved unless in very special circumstances; <li>• Paragraph 148 – ‘Very special circumstances’ will not exist unless the potential harm to the Green Belt by reason of inappropriateness, is clearly outweighed by other decisions; and <li>• Paragraph 150 – Certain forms of development are not inappropriate in the Green belt provided they preserve its openness and do not conflict with the purposes of including land within it. This includes under part c) local transport infrastructure which can demonstrate a requirement for a Green Belt location <p><u>Policy 14: Meeting the challenge of climate change, flooding and coastal change</u></p> <ul style="list-style-type: none"> <li>• Paragraph 152 – The Planning system should support the transition to a low carbon future in a changing climate, taking full account of flood risk; <li>• Paragraph 154 – New development should be planned for in ways that avoid increased vulnerability to the range of effects arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken that risks can be managed through suitable mitigation; <li>• Paragraph 159 – Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk. Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere; <li>• Paragraph 167 – Development should only be allowed in areas at risk of flooding where, in light of a Flood Risk Assessment, it can be demonstrated that the development is appropriately flood resistant and resilient, it incorporates sustainable drainage systems, unless there is clear evidence this would be inappropriate, and any residual risk can be safely managed. <p><u>Policy 15: Conserving and enhancing the natural environment</u></p> <ul style="list-style-type: none"> <li>• Paragraph 174 – Planning policies and decisions should protect and enhance valued landscapes, sites of biodiversity or geological value and soils; recognise the value of the countryside, including the economic benefits of best and most versatile agricultural land; minimise impacts on and provide opportunities for biodiversity net gain; and prevent new and existing developments from contributing to, or being put at risk from unacceptable levels of soil, air, water or noise pollution or land instability; <li>• Paragraph 180 – If significant harm to biodiversity 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; <li>• Paragraph 183 – A site should be suitable for its proposed use, taking account of ground conditions, land stability and any contamination; <li>• Paragraph 185 – New development should be appropriate to its location, taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment. Developments should mitigate and reduce to a minimum potential adverse effect, noise from the development and void noise giving rise to significant adverse effects on health and the quality of life, and limit the impact of light pollution on local amenity, dark landscapes and nature conservation; <li>• Paragraph 186 – Opportunities to improve air quality or mitigate impacts should be identified;

Policy	Description of key policies relevant to the assessment
	Paragraph 187 – Existing businesses and facilities should not have unreasonable restrictions placed upon them by new development.
National Planning Practice Guidance (NPPG)	<p>The NPPG Air Quality chapter seeks to manage and improve air quality. The Guidance sets out that consideration of the acceptability of a development proposal should include new sources of air pollution, and the exposure of neighbouring uses and biodiversity to existing sources of air pollution (Paragraph - 005, Reference ID - 32-005-20191101, Revision Date – November 2019).</p> <p>The Healthy and Safe Communities chapter notes that planning and health need to be considered together in order to create environments that support and encourage healthy lifestyles (Paragraph - 005 Reference, ID:53-001-20190722, Revision Date – 22nd July 2019).</p> <p>The Natural Environment chapter stipulates that development should achieve net gains for nature, in line with the NPPF.</p>

Policy	Description of key policies relevant to the assessment
Wiltshire Core Strategy (2015)	<p>One of the six key challenges is to ensure adequate services and infrastructure provision to meet the needs of Wiltshire’s growing population and economy, are brought forward in a timely and responsive manner alongside new development proposals.</p> <p>The Spatial Vision for Market towns, such as Melksham, is to become more self-contained and supported by the necessary infrastructure, with a consequent reduction in the need to travel. In all settlements there will be an improvement in accessibility to local services, a greater feeling of security and the enhancement of a sense of community and place. This pattern of development, with a more sustainable approach towards transport will help to tackle climate change.</p> <p>A series of strategic objectives have been developed to deliver the vision for Wiltshire. These objectives are:</p> <ul style="list-style-type: none"> • Strategic objective 1: delivering a thriving economy • Strategic objective 2: addressing climate change • Strategic objective 3: providing everyone with access to a decent, affordable home • Strategic objective 4: helping to build resilient communities • Strategic objective 5: protecting and enhancing the natural, historic, and built environment • Strategic objective 6: ensuring that adequate infrastructure is in place to support our communities <p>Key outcomes for Strategic outcome 6 includes the following:</p> <ul style="list-style-type: none"> • the provision of new or improved infrastructure will have been positively supported provided there is no detrimental environmental impact; • Measures will be implemented to reduce traffic delays and disruption, and improve journey time reliability on key routes; • Safety for all road users will have been improved, the number of casualties on Wiltshire’s roads reduced and the impact of traffic speeds in towns and villages mitigated; and • Access to local jobs and services will have been improved. <p>Core Policy 1 ‘Settlement Strategy’ states Market Towns (such as Melksham) have the potential for significant development that will increase the jobs and homes in order to help sustain and where necessary enhance their services and facilities and promote better levels of self-containment and viable sustainable communities.</p> <p>Core Policy 2 ‘Delivery Strategy’ - in order to direct development at a strategic level to the most suitable, sustainable locations and at appropriate times, the area strategies contain an indicative housing requirement for each Community Area. For Melksham town, the inductive requirement is 2.240 new dwellings, with 130 in the remainder of Melksham.</p> <p>Core Policy 3 ‘Infrastructure Requirements’ requires the timely delivery of infrastructure to support development proposals.</p>

Policy	Description of key policies relevant to the assessment
	<p>Chapter 5 of the Core Strategy presents a series of area strategies for each of the Community Areas of Wiltshire, setting out how that area is expected to change by 2026 and how this change will be delivered. Core Policy 15 ‘Spatial Strategy: Melksham Community Area’ sets out that over the plan period (2006 to 2026) six hectares of new employment land will be delivered, including up to six hectares at Hampton Business Park. As stated above, 2,370 new homes will be provided.</p> <p>Under Core Policy 16 ‘Melksham link project’, the proposed route for the Melksham link canal, as identified on the proposals map, will be safeguarded from inappropriate development.</p> <p>Core Policy 45 sets out the strategy for meeting Wiltshire’s housing needs, whilst Core Policy 46 supports specialist accommodation for older people in sustainable locations, with good access to services and facilities.</p> <p>Core Policy 48 ‘Supporting rural life’ states that proposals which will improve accessibility between towns and villages, helping to reduce social isolation, such as transport and infrastructure improvements, will be supported where the development will not be detrimental to the local environment or local residents.</p> <p>Core Policy 50 ‘Biodiversity and geodiversity’ requires development proposals to protect features of nature conservation and geological value as part of the design rationale. Similarly, Core Policy 51 ‘Landscape’ requires development to protect, conserve and where possible enhance landscape character.</p> <p>Core Policy 51 ‘Landscape’ requires new development to ‘protect, conserve and where possible enhance landscape character’, as well as mitigate as many negative impacts as possible ‘through design and landscape measures’.</p> <p>Core Policy 55 ‘Air Quality’ and Core Policy 56 ‘Contaminated land’ state development proposals will need to demonstrate that measures can be put in place to mitigate the effects of emissions and land contaminated land on public health and amenity.</p> <p>Core Policy 62 ‘Development impacts on the transport network’ requires development to ‘provide appropriate mitigating measures to offset any adverse impacts on the transport network at both the construction and operation phases’.</p> <p>Core Policy 63 ‘Transport Strategies’ states that Transport strategies may be developed for other urban areas (excluding Chippenham, Trowbridge and Salisbury).</p> <p>Under Core Policy 65 ‘Movement of Goods, the Council and its partners will seek to achieve a sustainable freight distribution system, that makes efficient use of the roads, particularly those roads where a minimum of community and environmental impact will occur.</p> <p>The informative text for Core Policy 66 ‘Strategic transport network’ notes a number of sections of the A350 carry the highest volume of traffic and HGV movements on the county’s non-trunk road primary routes. Because of its strategic importance, and the locally significant traffic growth which has occurred in the last ten years, the route will be selectively improved under Core Policy 66 to maintain and enhance journey time reliability. The proposed improvements to the A350 primary route will provide significant relief and environmental benefits, particularly for local residents, and the improved standard of provision of the road will aid economic growth.</p> <p>Core Policy 67 ‘Flood Risk’ requires new developments to include measures to reduce the rate of rainwater run-off and improve rainwater infiltration to soil and ground.</p>
<p>Saved Policies of the West Wiltshire District Plan</p>	<p>Only a small amount of policies from the West Wiltshire District Plan have been saved. This includes Policy E1B which is for the new employment land allocation south and west of Bowerhill Industrial estate in Melksham (34.5ha), Policy S2 which is land allocated for new or extensions to primary schools at Bowerhill and east of Melksham (1.84ha), Policy CF8 which allocates land adjacent to Melksham Hospital for the development of community health care facilities, Policy CF10 which identifies the need for new cemeteries in Melksham,</p>

C.2. Assessment methodology

Table C.2: Receptor sensitivity criteria

Receptor type	Receptor value (sensitivity)	Description
Private property and housing	Very High	<ol style="list-style-type: none"> 1) existing private property or land allocated for housing located in a local authority area where the number of households are expected to increase by >25% by 2041 (ONS data); and/or 2) existing housing and land allocated for housing (e.g. strategic housing sites) covering >5ha and / or >150 houses.
	High	<ol style="list-style-type: none"> 1) private property or land allocated for housing located in a local planning authority area where the number of households are expected to increase by 16-25% by 2041 (ONS data); and/or 2) existing housing and land allocated for housing (e.g. strategic housing sites) covering >1-5ha and / or >30-150 houses
	Medium	<ol style="list-style-type: none"> 1) houses or land allocated for housing located in a local authority area where the number of households are expected to increase by >6-15% by 2041 (ONS data); and/or 2) existing housing and land allocated for housing (e.g. strategic housing sites) covering
	Low	proposed development on unallocated sites providing housing with planning permission/in the planning process
	Negligible	N/A
Community land and assets	Very high	<ol style="list-style-type: none"> 1) complete severance between communities and their land/assets, with little/no accessibility provision; 2) alternatives are only available outside the local planning authority area; 3) the level of use is very frequent (daily); and 4) the land and assets are used by the majority ($\geq 50\%$) of the community
	High	<ol style="list-style-type: none"> 1) there is substantial severance between community and assets, with limited accessibility provision; 2) alternative facilities are only available in the wider local planning authority area; 3) the level of use is frequent (weekly); and 4) the land and assets are used by the majority ($\geq 50\%$) of the community
	Medium	<ol style="list-style-type: none"> 1) there is severance between communities and their land/assets but with existing accessibility provision; 2) limited alternative facilities are available at a local level within adjacent communities; 3) the level of use is reasonably frequent (monthly); and 4) the land and assets are used by the majority ($\geq 50\%$) of the community
	Low	<ol style="list-style-type: none"> 1) limited existing severance between community and assets, with existing full Disability Discrimination Act (DDA) DDA 1995 [Ref 2.N] compliant accessibility provision; 2) alternative facilities are available at a local level within the wider community; 3) the level of use is infrequent (monthly or less frequent); and 4) the land and assets are used by the minority ($\geq 50\%$) of the community.
	Negligible	<ol style="list-style-type: none"> 1) no or limited severance or accessibility issues; 2) alternative facilities are available within the same community;

Receptor type	Receptor value (sensitivity)	Description
		3) the level of use is very infrequent (a few occasions yearly); and 4) the land and assets are used by the minority (>=50%) of the community
Development land and businesses	Very High	existing employment sites (excluding agriculture) and land allocated for employment (e.g. strategic employment sites) covering >5ha.
	High	existing employment sites (excluding agriculture) and land allocated for employment (e.g. strategic employment sites) covering >1 - 5ha
	Medium	existing employment sites (excluding agriculture) and land allocated for employment (e.g. strategic employment sites) covering <1ha
	Low	proposed development on unallocated sites providing employment with planning permission/in the planning process
	Negligible	N/A
Agricultural land holdings	Very High	1) areas of land in which the enterprise is wholly reliant on the spatial relationship of land to key agricultural infrastructure; and 2) access between land and key agricultural infrastructure is required on a frequent basis (daily)
	High	1) areas of land in which the enterprise is dependent on the spatial relationship of land to key agricultural infrastructure; and 2) access between land and key agricultural infrastructure is required on a frequent basis (weekly).
	Medium	1) areas of land in which the enterprise is partially dependent on the spatial relationship of land to key agricultural infrastructure; and 2) access between land and key agricultural infrastructure is required on a reasonably frequent basis (monthly)
	Low	1) areas of land which the enterprise is not dependent on the spatial relationship of land to key agricultural infrastructure; and 2) access between land and key agricultural infrastructure is required on an infrequent basis (monthly or less frequent).
	Negligible	areas of land which are infrequently used on a non-commercial basis.
WCH	Very High	1) national trails and routes likely to be used for both commuting and recreation that record frequent (daily) use. Such routes connect communities with employment land uses and other services with a direct and convenient WCH route. Little / no potential for substitution. 2) routes regularly used by vulnerable travellers such as the elderly, school children and people with disabilities, who could be disproportionately affected by small changes in the baseline due to potentially different needs. 3) rights of way for WCH crossing roads at grade with >16,000 vehicles per day.
	High	1) regional trails and routes (e.g. promoted circular walks) likely to be used for recreation and to a lesser extent commuting, that record frequent (daily) use. Limited potential for substitution; and/or 2) rights of way for WCH crossing roads at grade with >8,000 - 16,000 vehicles per day
	Medium	1) public rights of way and other routes close to communities which are used for recreational purposes (e.g. dog walking), but for which alternative routes can be taken. These routes are likely to link to a wider network of routes to provide options for longer, recreational journeys, and / or

Receptor type	Receptor value (sensitivity)	Description
		2) rights of way for WCH crossing roads at grade with >4000 – 8000 vehicles per day
	Low	1) routes which have fallen into disuse through past severance or which are scarcely used because they do not currently offer a meaningful route for either utility or recreational purposes, and/or 2) rights of way for WCH crossing roads at grade with <4000 vehicles per day
	Negligible	N/A

Table C.3: Magnitude of Impact criteria

Receptor type	Magnitude of impact (change)	Typical description
Private property and housing, community land and assets, development land and businesses, agricultural land holdings	Major	1) loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements. e.g. direct acquisition and demolition of buildings and direct development of land to accommodate highway assets; and/or 2) introduction (adverse) or removal (beneficial) of complete severance with no/full accessibility provision
WCH		>500m increase (adverse) / decrease (beneficial) in WCH journey length
Private property and housing, community land and assets, development land and businesses, agricultural land holdings	Moderate	1) partial loss of/damage to key characteristics, features or elements, e.g. partial removal or substantial amendment to access or acquisition of land compromising viability of property, businesses, community assets or agricultural holdings; and/or 2) introduction (adverse) or removal (beneficial) of severe severance with limited / moderate accessibility provision
WCH		>250m - 500m increase (adverse) or decrease (beneficial) in WCH journey length
Private property and housing, community land and assets, development land and businesses, agricultural land holdings	Minor	1) a discernible change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements, e.g. amendment to access or acquisition of land resulting in changes to operating conditions that do not compromise overall viability of property, businesses, community assets or agricultural holdings; and/or 2) introduction (adverse) or removal (beneficial) of severance with adequate accessibility provision.
WCH		>50m - 250m increase (adverse) or decrease (beneficial) in WCH journey length
Private property and housing, community land and assets, development land and businesses, agricultural land holdings	Negligible	1) very minor loss or detrimental alteration to one or more characteristics, features or elements. e.g. acquisition of non-operational land or buildings not directly affecting the viability of property, businesses, community assets or agricultural holdings; and/or 2) very minor introduction (adverse) or removal (beneficial) of severance with ample accessibility provision

Receptor type	Magnitude of impact (change)	Typical description
WCH		<50m increase (adverse) or decrease (beneficial) in WCH journey length
All	No change	No loss or alteration of characteristics, features, elements, or accessibility; no observable impact in either direction

Table C.4: Significance of Effects criteria

		Impact Magnitude				
		Major	Moderate	Minor	Negligible	No change
Receptor Sensitivity	Very high	Very large	Large or very large	Moderate or large	Slight	Neutral
	High	Large or very large	Moderate or large	Slight or moderate	Slight	Neutral
	Medium	Moderate or large	Moderate	Slight	Neutral or slight	Neutral
	Low	Slight or moderate	Slight	Neutral or slight	Neutral or slight	Neutral
	Negligible	Slight	Neutral or slight	Neutral or slight	Neutral	Neutral

Table C.5: Location, general profile and characteristics of vulnerable groups present in the study areas

Receptor type	Facility type	Approximate number of Receptors and general proximity to the red-line boundary
Wider groups – adults/usual residents/working people	Construction workers working on the Scheme, residents living in houses, operators and users of community land and facilities, owners and users of local businesses, users of footpaths and PRow, users of open space, recreation and leisure facilities, public transport users	<p>The baseline study identifies a large number of workers and a large resident population in the Melksham Community Area (30,867 residents).</p> <p>The key current challenge to the physical health, mental and social wellbeing of the local resident population arises from increased traffic flows and congestion on roads, road traffic collisions, physical barriers to housing and access to services, the need to diversify the existing employment base, and those linked to environmental conditions.</p> <p>Workers at the Scheme, residents of properties in the core study area, walkers and cyclists, local businesses, users of community land and assets, users of open space/ greenspace, and public transport users are likely to be most exposed to potential amenity, accessibility and health impacts.</p>
Sensitive group – families with children and adolescents (pregnant women, babies, children and adolescents)	Residential houses, community services and facilities, open space/ greenspace and recreational facilities, PRow and local footpaths, public transport, bus stops	The baseline study estimates there are approximately 6.482 children and adolescents (0-17 years) in Melksham Community Area. Amongst this population group, there is a lower than Wiltshire proportion of young people that achieve the expected standard in reading, writing and mathematics at the end of primary school, a lower average Attainment 8 score and a higher proportion of pupils with an Education, Health and Care Plan or Special Education Needs. In addition, 11% of 0-19 year olds in Melksham Community Area are thought to be living in poverty.

Receptor type	Facility type	Approximate number of Receptors and general proximity to the red-line boundary
		<p>Children and adolescents generally constitute a sensitive population group due partly to their need to be able to move around freely to and from school, open space/ greenspace and recreational activities, whilst they lack the experience and judgement displayed by adults when moving around in traffic and public spaces¹⁰ and when using public transport. Hence, children and adolescents as pedestrians¹¹ and cyclists are at elevated risk from danger on the roads. Children and adolescents are also more prone to trespass on land and construction sites.</p> <p>Children are also more sensitive than adults to air pollution¹², noise¹³, odour¹⁴ and other environmental factors and their bodies and minds are less able to deal with them. Particularly susceptible children are identified as those from low-income¹⁵ and/or black and minority ethnic (BME) backgrounds¹⁶ and/or living in the more deprived areas.</p>
<p>Sensitive group – People who are physically or mentally disadvantaged (elderly people, people with physical disabilities, people with other health problems or impairments)</p>	<p>Residential houses, community services and facilities – particularly care homes and healthcare, open space, PRow and local footpaths, public transport, bus stops</p>	<p>The baseline study estimates there are approximately 7.099 residents aged over 65 in the Melksham Community Area. There is a higher than Wiltshire proportion of older people (65+) admitted to hospital because of falls and slightly lower proportion supported to live independently.</p> <p>Elderly people constitute a sensitive group as they are more sensitive than young and middle-aged adults. Generally, the older people are, the slower their movement and reactions and the poorer their hearing¹⁷. They can be more at risk from injury and may fear falls, lack of safe crossing points and short crossing times at roads. Elderly people are susceptible to environmental impacts, particularly exposure to pollutants.</p> <p>Chronically ill persons, for example, people with impaired lung function, can be more adversely affected by air pollution¹⁸. The same is true of hypersensitive individuals such as asthmatics¹⁹.</p> <p>Noise can cause hypertension and cardio-vascular problems²⁰. Those who already have these conditions can be more troubled by noise than others.</p> <p>People with existing physical and mental illnesses, including sleep disturbance, anxiety and depression, are likely to be more sensitive to changes to the local environment.</p>

¹⁰ World Health Organisation (2018, December) Adolescents: health risks and solutions (<https://www.who.int/news-room/factsheets/detail/adolescents-health-risks-and-solutions>)

¹¹ Child Accident Prevention Trust (2013) Child death from road traffic accidents (<http://makingthelink.net/child-deaths-road-traffic-accidents/>)

¹² World Health Organisation (2018) Air pollution and child health: prescribing clean air (<https://www.who.int/ceh/publications/air-pollution-child-health/en/>)

¹³ World Health Organisation Data and statistics (<http://www.euro.who.int/en/health-topics/environment-and-health/noise/data-and-statistics>)

¹⁴ Agency for Toxic Substances and Disease Registry (2015, October) (<https://www.atsdr.cdc.gov/odors/faqs.html>)

¹⁵ British Medical Journals, Wickham. S, Anwar. E, Barr.B, Law. C, Taylor-Robinson.D (2016, July) Poverty and child health in the UK: using evidence for action (<https://adc.bmj.com/content/101/8/759>)

¹⁶ Parliamentary Office of Science and Technology (2007, January) (<https://www.parliament.uk/documents/post/postpn276.pdf>)

¹⁷ Transport for London (2013, April) Older Pedestrians and Road Safety, Research Debrief (<http://content.tfl.gov.uk/older-pedestrians-research-report.pdf>)

¹⁸ DEFRA UK AIR, Air Information Resource, Effects of air pollution (<https://uk-air.defra.gov.uk/air-pollution/effects>)

¹⁹ Asthma UK (<https://www.asthma.org.uk/advice/triggers/pollution/>)

²⁰ Munzel T, Schmidt FP, Steven S, Herzog J, Daiber A, Sorensen M. Environmental Noise and the Cardiovascular System. J Am Coll Cardiol. 2018;71(6):688-97 (Extract from Journal of the American College of Cardiology 2018; <http://www.intuition-physician.com/wp-content/uploads/2018/05/Environmental-Noise-and-Cardiovascular-Health.pdf>)

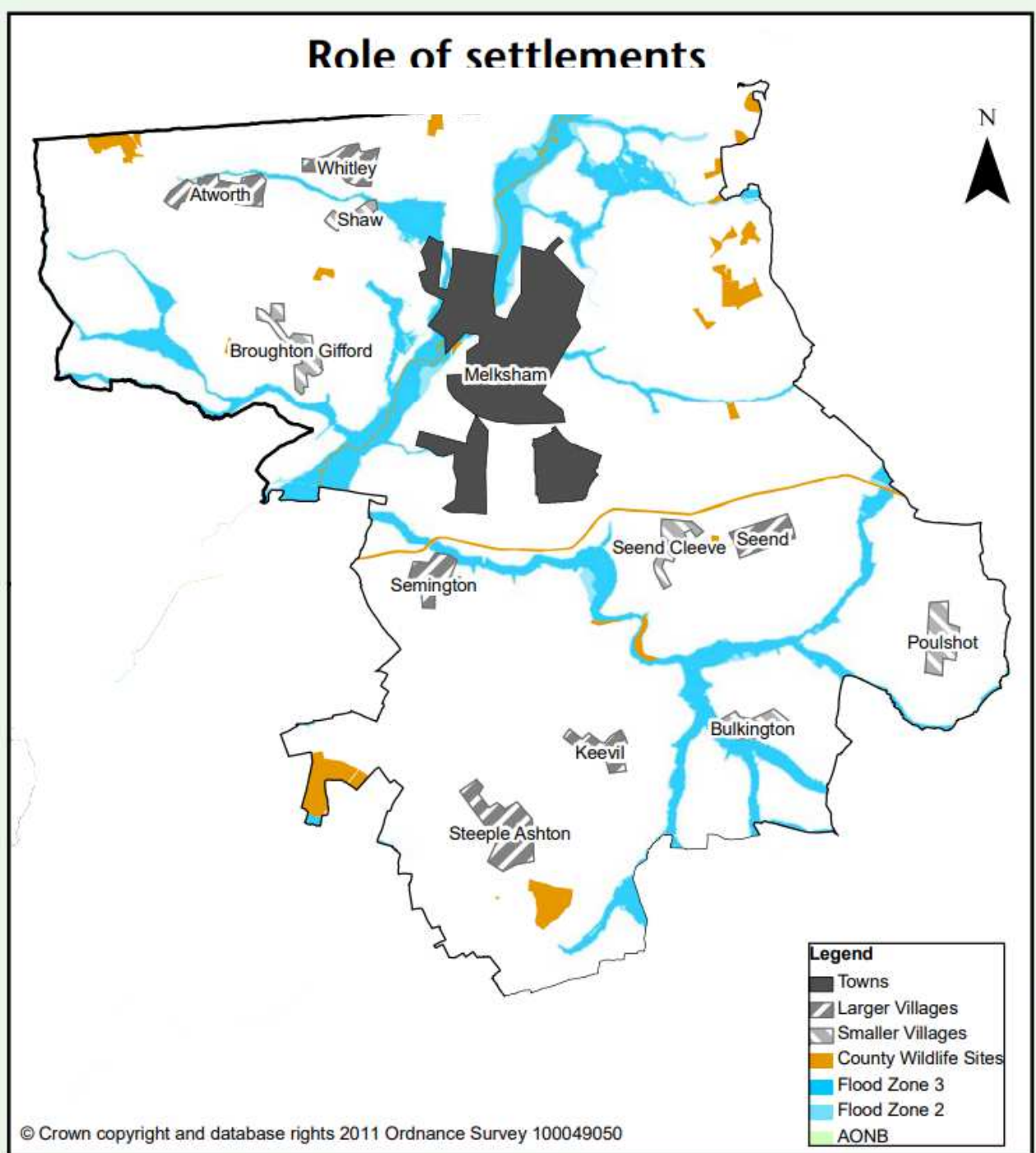
Receptor type	Facility type	Approximate number of Receptors and general proximity to the red-line boundary
Sensitive group – (low income, no car, unemployed)	Residential houses, community services and facilities, local businesses, open space, greenspace and recreational facilities, PRow, local footpaths and cycleways, public transport, bus stops	<p>The baseline study estimates that 11% of the Melksham Community Area population live in the most deprived areas. There are also issues in the ward with house prices and identified barriers to housing and access to services.</p> <p>People on low incomes (living in deprived areas is a proxy measure for low income) constitute a sensitive group as they tend to suffer the most from road traffic incidents (deaths and injuries), noise and air pollution, as well as other environmental impacts. This group is generally more likely to already have reduced access to health and social care²¹ as well as reduced access to other services and amenities.</p> <p>This group may also have increased stress levels due to the factors above. In addition, this group is more sensitive to food insecurity²², which has an access dimension.</p> <p>Barriers to housing and access to services is a major issue in the local area for all income groups, however those on lower incomes will be more disproportionately affected.</p>

21 Cookson. R, Propper. C, Asaria. M, Raine. R (2016) Socio-economic Inequalities in Health Care in England (source: Wiley Online Library, <https://onlinelibrary.wiley.com/doi/epdf/10.1111/j.1475-5890.2016.12109>)

22 FRAC Food Research & Action Center (<http://frac.org/obesity-health/low-income-food-insecure-people-vulnerable-poor-nutrition-obesity>)

C.3. Maps

Map 1 - Melksham Community Area



Appendix D. HRA Stage 1 Screening

Melksham Bypass

WC_MBP-ATK-EBD-XX-RP-LE-000002

Habitats Regulations Assessment (HRA): Initial Screening Assessment

10/11/21

A1

Notice

This document and its contents have been prepared and are intended solely as information for Wiltshire Council Highway Term Consultancy contract and use in relation to the Melksham Bypass. Wiltshire holds no responsibility to any other party in respect of or arising out of or in connection with this document and/or its contents.

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1. Introduction

Terms of Reference

- 1.1. Atkins, member of the SNC-Lavalin Group, has been appointed by Wiltshire Council to provide information to inform Habitats Regulations Assessment (HRA) in relation to the proposed Melksham Bypass (the 'Scheme'). The proposals involve building a new 9 km off-line bypass to the east of Melksham in Wiltshire.
- 1.2. This assessment has been undertaken following guidance in the Design Manual for Roads and Bridges (DMRB) LA 115 Habitats Regulations Assessment¹.
- 1.3. This report presents the results of an initial HRA screening assessment undertaken to identify any effect path ways that would trigger the need for Appropriate Assessment ('HRA stage 2'). This HRA Screening report has been produced prior to detailed design and ecological survey being undertaken for the Scheme. This report may be updated following completion of the detailed survey and design work.
- 1.4. European sites refer to sites protected in the UK for the habitats and/or species they contain that are of European or international importance. These include Special Protection Areas (SPAs) and Special Areas of Conservation (SACs) created under the EC Birds Directive and Habitats Directive, respectively. In addition, in accordance with UK policy² Wetlands of International Importance are included, which form part of a global network of protected sites created under the Ramsar Convention (also referred to as Ramsar sites). A HRA is also required, as a matter of UK Government policy, for potential SPAs (pSPAs), candidate SACs (cSAC), Sites of Community Importance³ (SCIs) and proposed Ramsar sites (pRamsar sites) for the purposes of considering plans and projects which may affect them.
- 1.5. The Conservation of Habitats and Species Regulations 2017 are now amended by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019. In this designation, the above mentioned designations are still referred to as 'European sites'.

¹ Design Manual for Roads and Bridges. (January 2020) Sustainability & Environment Appraisal LA115 Habitats Regulations assessment (formerly HD 44/09) Revision 1.

² Ministry of Housing Communities & Local Government (2021) National Planning Policy Framework

³ Sites of Community Importance (SCIs) are sites that have been adopted by the European Commission but not yet fully designated by the government of each country.

Scheme

- 1.6. The proposed Scheme option will provide a 9 km long bypass to the east of Melksham.
- 1.7. Future traffic growth in the A350 corridor, linked to new housing and economic activity, is likely to exacerbate many of the transport problems in the area (for example, journey times and delays, poor journey time reliability, collisions and severance). Traffic model forecast data predicts average peak period journey times on the A350 through Melksham to increase by approximately 10% to 13% between 2018 and 2036 (equating to approximately 1 to 2 minutes additional journey time per vehicle). Without intervention, this suggests that by 2036 all through-traffic on the A350 at Melksham would incur a total additional 55,000 vehicle hours of journey time on this section over the course of a year.
- 1.8. The current Scheme design includes:
- A roundabout (Junction 1) to be located at the existing A350, south of Melksham. The roundabout will include a signalised controlled crossing to accommodate walking/cycling communities that use MELW42;
 - A roundabout (Junction 2) connecting traffic to the A365. The mainline will pass through open countryside and is aimed to reduce impacts as far as possible on known waterbodies, ancient woodland, priority roundabouts and archaeological monuments;
 - The alignment will run parallel to Eastern Way and will seek to limit impact to a potential housing site allocation (Gleeson) as part of the emerging plan. A roundabout (Junction 3) will be located at the A3102. The curvilinear alignment will avoid established local businesses and committed planning proposals (agricultural dwellings);
 - Significant alterations will be required to the Lower Woodrow road; the existing road will be diverted north and pass over the new bypass;
 - The alignment will cross the Wilts and Berks Canal and connectivity of MELW63 will be maintained at this location;
 - A viaduct will span the River Avon, associated flood zone and Roman Road asset;
 - The route will tie into the existing A350 by a proposed roundabout (Junction 5) at the location of "Melksham Road". Significant alterations will be required to the existing A350 alignment in this location;
 - A series of ponds will be located along the east side of the route which are required to attenuate surface water from the new bypass; and
 - Consultation with Public Rights of Way (PRoW) officers has led to a proposed plan of the extinguished/diverted PRoWs across the east of Melksham to reduce the total number of structures required and to optimise the longitudinal profile in order to reduce the earthwork quantities.
- 1.9. Construction of the Scheme is assumed to start in 2026 with the Scheme open to traffic in 2028. At this early stage of design development, much of the construction methodology of the Scheme is currently unknown and assumptions are required for the assessment to understand the construction effects. The general assumptions are outlined below:
- Construction activities that affect the existing A350 will avoid peak times to minimise congestion and therefore disruption during construction.
 - Where new junctions are proposed that affect other roads such as the A3102 Sandridge Hill and A365 Bath Road, temporary routes will be put in place for local residents and other users to continue to use the route. The duration of these temporary measures will be kept to a minimum to reduce disruption as far as possible. The duration of junction construction will depend on the construction stages of the whole project, but in isolation it may vary from 2 to 4 months.
 - Access will be maintained to all properties for the duration of the Scheme.
 - Night works will be limited as far as possible and only used when the existing network requires closing for tie in works or road surfacing.
 - PRoW will be kept open as long as it is safe to do so during construction, with closures forecasted and advertised in advance of works occurring, with suitable diversions put in place.
 - Temporary light pollution is expected to be kept to minimum, only when required for safe working/operations.

- Modular construction methods are going to be incorporated in the design to optimise programme, reduce impact on the environment and reduce safety risks.
- Noise levels are expected to be kept to a minimum, especially in proximity to residential areas.

Background to HRA

- 1.10. An HRA is required by Regulation 63 of the Habitat Regulations for all plans and projects which may have a Likely Significant Effect (LSE) on, and which are not directly connected with or necessary to the management of, a European site. The Scheme is not directly connected with, or necessary to, the nature conservation management of any European site.
- 1.11. The stages of HRA process are:
- **Stage 1 – Screening:** To test whether a plan or project either alone or in combination with other plans and projects is likely to have a significant effect on a European site;
 - **Stage 2 – Appropriate Assessment:** To determine whether the plan or project (either alone or in combination with other projects and plans) would have an adverse effect (or risk of this) on the integrity of the site with respect to the site conservation objectives. If adverse impacts are anticipated, potential mitigation measures to alleviate impacts should be proposed and assessed;
 - **Stage 3 – Assessment of alternative solutions:** Where a plan is assessed as having an adverse impact (or risk of this) on the integrity of a European site, there should be an examination of alternatives (e.g. alternative locations and designs of development); and,
 - **Stage 4 – Assessment where no alternative solutions remain and where adverse impacts remain:** In exceptional circumstance (e.g. where there are imperative reasons of overriding public interest), compensatory measures should be put in place to offset negative impacts.
- 1.12. This report comprises Stage 1 – Screening of the project (Scheme).

2. Methodology

The Project

- 2.1. All available information about the Scheme was gathered in order to assess whether the Scheme is likely to have a LSE on any European sites.

Determination of European sites included in the HRA

- 2.2. With regards to determining the European sites to include in the screening assessment ('Scoping'), the guidance in LA 115 states that as a general guide, subject to professional judgement about potential effect pathways, consideration should be given to any European site if the Scheme:
- Is less than 2 km from any European site;
 - Is less than 30 km from any SAC, pSAC or cSAC where bats are one of the qualifying features;
 - Crosses or lies adjacent to, upstream of, or downstream of, a watercourse which is designated in part, or wholly, as a European site;
 - Has a potential hydrological or hydrogeological linkage to a European site containing a groundwater dependant terrestrial ecosystem (GWDTE) which triggers assessment in accordance with LA 113⁴; or,
 - Has an affected road network which triggers the air quality criteria for assessment of European sites within LA 105⁵. This approach is further confirmed in recent Natural England guidance⁶ which states that protected sites falling within 200 m of the edge of a road affected by a plan or project need to be considered within HRA.
- 2.3. The search for European sites was undertaken using the Multi-Agency Geographic Information for the Countryside (MAGIC) website⁷.

Obtaining information on the European sites with the potential to be affected

- 2.4. Information on the qualifying features, conservation objectives and supplementary advice on conservation objectives were obtained from the following sources:
- Joint Nature Conservation Committee (JNCC) Natura 2000 Standard Data Forms⁸;
 - Natural England Designated Site Information⁹.
- 2.5. A review was also undertaken of the Bat SAC Planning Guidance for Wiltshire¹⁰ which identifies "core areas" for the four qualifying feature bat species based on locations of known roosting sites and core sustenance zones for each species. In addition to this document, updated details of core areas (data obtained since the publication of this document) was also provided by the local record centre (Wiltshire and Swindon Biological Record Centre in July 2021).

Obtaining information on other projects and plans

- 2.6. The Habitats Regulations requires assessment of the potential for LSE of the project 'in combination' with other projects and plans.
- 2.7. The effects of this project in-combination with other plans and projects are the cumulative effects which will, or might, result from the addition of the effects of other relevant plans or projects to the effects of this project.

⁴ LA 113 Road drainage and the water environment. Available from: <<https://www.standardsforhighways.co.uk/dmrb/>>.

⁵ LA 105 Air quality. Available from: <https://www.standardsforhighways.co.uk/dmrb/search/10191621-07df-44a3-892e-c1d5c7a28d90>.

⁶ NE Internal Guidance – Approach to Advising Competent Authorities on Road Traffic Emissions and HRAs V1.4 Final – June 2018.

⁷ Available from <http://magic.defra.gov.uk> (accessed October 2021).

⁸ Available from <<http://jncc.defra.gov.uk>> (accessed May 2021).

⁹ Available from <<https://designatedsites.naturalengland.org.uk/SiteSearch.aspx>> (accessed May 2021)

¹⁰ Bat SAC Planning Guidance for Wiltshire. Available from <https://www.wiltshire.gov.uk/media/992/Bat-S-A-C-developers-guidance-inc-Bath-Bradford-on-Avon-Chilmark-and-Mottisfont-pdf/Bath-and-bradford-on-avon-september-2015-bat-sac-guidance.pdf?m=637298262862270000>

- 2.8. The Habitats Regulations Handbook¹¹ advises that any plans or projects at the following stages may be relevant to an in-combination assessment:
- Applications lodged but not yet determined;
 - Projects subject to periodic review e.g. annual licences, during the time that their renewal is under consideration;
 - Refusals subject to appeal procedures and not yet determined;
 - Projects authorised but not yet started;
 - Projects started but not yet completed;
 - Known projects that do not require external authorisation;
 - Proposals in adopted plans; and
 - Proposals in finalised draft plans formally published or submitted for final consultation, examination or adoption.
- 2.9. A search was undertaken of the following planning authority websites for relevant planning applications and consents, as well as a review of allocated and proposed sites in the Wiltshire Housing Site Allocations Plan, Draft Joint Melksham Neighbourhood Plan (2020-2026) and Emerging Wiltshire Local Plan Review (2016-2036):
- Planning Inspectorate
 - Wiltshire Council
 - Gloucestershire County Council
 - South Gloucestershire Council
 - Bath & North East Somerset Council
 - Swindon Borough Council
 - West Berkshire Council

Assessing LSE

- 2.10. A critical part of the HRA Screening process is determining whether or not the proposals are likely to have a significant effect on European sites and, therefore, if they will require an Appropriate Assessment. The concept of 'likely significant effect' as embodied in Article 6(3) of the Habitats Directive and Regulation 61(1) is central to their operation. Its interpretation is well established in law and guidance and embraces the precautionary principle.
- 2.11. The European Court Waddenzee judgement¹² provides clarification regarding the term 'likely'. It concludes that: "any plan or project not directly connected with or necessary to the management of the site is to be subject to an Appropriate Assessment of its implications for the site in view of the site's conservation objectives if it cannot be excluded, on the basis of objective information, that it will have a significant effect on that site, either individually or in combination with other plans or projects."
- 2.12. Clarification has also been provided through case law on the meaning of 'likely' in relation to Bagmoor Wind Ltd. v The Scottish Ministers¹³: "the word 'likely' in the regulation is not to be construed as an expression of probability, in a legal sense, but as a description of the existence of a risk (or possibility)." Consequently, if the possibility of a significant effect cannot be excluded based on objective information, an Appropriate Assessment will be required.
- 2.13. The European Court Waddenzee judgement also provides further clarification regarding the term 'significant': "where a plan or project not directly connected with or necessary to the management of a site is likely to undermine the site's conservation objectives, it must be considered likely to have a significant effect on that site. The assessment of that risk must be made in the light inter alia of the

¹¹ Tyldesley, D., and Chapman, C., (2013) The Habitats Regulations Assessment Handbook, January 2018 edition UK: DTA Publications Limited www.dtapublications.co.uk.

¹² Case C – 127/02 Waddenzee, reference for a preliminary ruling from the Raad van State: Landelijke Vereniging tot Behoud van de Waddenzee, Nederlandse Vereniging tot Bescherming van Vogels v Staatssecretaris van Landbouw, Natuurbeheer en Visserij, 7th September 2004.

¹³ Bagmoor Wind Limited v The Scottish Ministers, Court of Sessions [2012] CSIH 93.

characteristics and specific environmental conditions of the site concerned by such a plan or project.”

- 2.14. The Bagmoor Wind case also provides guidance on the term ‘objective.’ It states: “objective, in this context, means information based on clear verifiable fact rather than subjective opinion.” The Habitats Regulations Handbook¹⁴ states: “it will not normally be sufficient for an applicant merely to assert that the plan or project will not have an adverse effect on a site, nor will it be appropriate for a competent authority to rely on reassurances based on supposition or speculation. On the other hand, there should be credible evidence to show that there is a real rather than a hypothetical risk of effects that could undermine the site’s conservation objectives. Any serious possibility of a risk that the conservation objectives could be undermined should trigger an ‘appropriate assessment’.”
- 2.15. The test for likelihood of significant effects requires that consideration is given to potential causes and potential effects (i.e. any potential impact pathways). To do this, information on the Scheme is needed to identify the potential causes of effects and information on the European site is needed to identify any potential implications related to these effects. In the absence of a credible impact pathway, it can be concluded that no LSE would arise. Relevant aspects (effects) of the Scheme have been checked against all features of the relevant European sites (i.e. screened) to determine whether a LSE may arise.
- 2.16. The judgement as to whether a significant effect is likely needs to be based on the best readily available information. Sources of information may include evidence from projects where similar operations have affected sites with similar qualifying features and conservation objectives and the judgement of relevant specialists that an effect is likely, as well as survey data collected to date for a particular project. In line with the precautionary principle, where there is uncertainty and/or information is lacking in relation to the capacity of the effect to undermine the site’s conservation objectives, it must be assumed that there will be an effect, unless further information can be made available to eliminate any areas of doubt.
- 2.17. The implication of the Court of Justice of the European Union (CJEU) judgement referred to as People Over Wind (Peter Sweetman v Coillte Teoranta, Case C-323/17) is that competent authorities cannot take account of any “measures that are intended to avoid or reduce the harmful effects of the envisaged project on the site concerned”, when considering at the HRA screening stage whether the plan or project is likely to have an adverse effect on a European site. The effect of this is that the screening stage must be undertaken on a precautionary basis with no regard to any proposed integrated or additional avoidance or reduction measures. Where the likelihood of significant effects cannot be excluded on the basis of objective information, the competent authority must proceed to carry out an Appropriate Assessment to establish whether the plan or project will affect the integrity of the European site, which can include at that stage consideration of the effectiveness of the proposed avoidance or reduction measures.
- 2.18. Case law in 2017 referred to as the ‘Wealden Judgement’¹⁵ prompted Natural England to make their internal guidance on assessing the effects of road traffic emissions on European sites public¹⁶. The guidance provides further information on the in-combination assessment at screening stage with regard to air quality effects following the Wealden Judgement.

¹⁴ Tyldesley, D., and Chapman, C., (2013) The Habitats Regulations Assessment Handbook, January 2018 edition UK: DTA Publications Limited www.dtapublications.co.uk .

¹⁵ Case no: CO/3943/2016 – Between Wealden District Council and Secretary of State for Communities and Local Government, Lewes District Council and South Downs National Park Authority and Natural England.

¹⁶ NE Internal Guidance – Approach to advising Competent Authorities on Road Traffic Emissions and HRAs V1.4 Final – June 2018.

3. Results

Identification of European sites

- 3.1. Four European sites have been identified that meet one or more of the scoping criteria set out in Section 2.2 of this report:
- Bath and Bradford-on-Avon Bats SAC – Located 7.3 km north-west of the Scheme;
 - Mells Valley SAC – Located 19.4 km south-west of the Scheme (bats are a qualifying feature);
 - Chilmark Quarries SAC – Located 29.8 km south of the Scheme (bats are a qualifying feature);
 - Severn Estuary SPA/SAC/Ramsar – Located 40 km north west of the Scheme ('as the crow flies'), and approximately 70 km following the watercourses);
- 3.2. The locations of these European Sites are shown in Appendix A.1.
- 3.3. No other sites were identified under the criteria listed in Section 2.2.

Screening

- 3.4. The information collected during the screening exercise for Bath and Bradford-on-Avon bats SAC, Mells Valley SAC, Chilmark Quarries SAC and Severn Estuary SPA, SAC, and Ramsar are presented in the form of Screening Matrices, using the template in LA 115. Screening Matrices for each site are provided in Appendix B of this document.

The European sites

Bath and Bradford-on-Avon Bats SAC

- 3.5. This site comprises a complex of four component Sites of Special Scientific Interest (SSSIs), the closest location to the Scheme of which is Box Mine SSSI. The SAC has a combined total area of approximately 107 ha and supports the following Annex II hibernating bat species that are a primary reason for selection of this site as a SAC:
- Greater horseshoe bat (*Rhinolophus ferrumequinum*); and
 - Bechstein's bat (*Myotis bechsteini*).
- 3.6. This site also has lesser horseshoe (*Rhinolophus hipposideros*) present that are an Annex II bat species that is present as a qualifying feature, but not a primary reason for the site's selection as a SAC.

Mells Valley SAC

- 3.7. This site comprises a complex of three component SSSIs, the closest of which is Vallis Vale SSSI. The SAC has a combined total area of approximately 28 ha and supports the following qualifying features:
- Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), (note that this includes the priority feature 'important orchid rich sites');
 - Caves not open to the public; and
 - Greater horseshoe bat.

Chilmark Quarries SAC

- 3.8. This site comprises a complex of two component SSSIs, the closest of which is Fonthill Grottoes SSSI. The SAC has a combined total area of approximately 10 ha and supports the following qualifying species:
- Lesser horseshoe bat;
 - Greater horseshoe bat;
 - Barbastelle bat (*Barbastella barbastellus*); and
 - Bechstein's bat.

Severn Estuary SPA/SAC/Ramsar

- 3.9. The Severn Estuary is designated as an SAC, SPA, and Ramsar. It has a total area of approx. 73,714 ha¹⁷.
- 3.10. Qualifying features of the SAC are¹⁸:
- 1130 Estuaries – one of the best areas in the UK;
 - 1140 Mudflats and sandflats not covered by seawater at low tide – one of the best areas in the UK;
 - 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) – one of the best areas in the UK;
 - 1110 Sandbanks which are slightly covered by seawater all the time – the site is thought to support a significant presence of this habitat;
 - 1170 Reefs – the site is thought to support a significant presence of this habitat;
 - 1095 Sea lamprey (*Petromyzon marinus*) – one of the best areas in the UK;
 - 1099 River lamprey (*Lampetra fluviatilis*) – one of the best areas in the UK; and
 - 1103 Twaite shad (*Alosa fallax*) – one of the best areas in the UK.
- 3.11. Qualifying features of the SPA are¹⁹:
- This site qualifies under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive;
 - Wintering Bewick's swan (*Cygnus columbianus bewickii*) – 280 individuals representing at least 4.0% of the wintering population in Great Britain (5 year peak mean 1991/2 - 1995/6);
 - The site also qualifies under Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species;
 - Passage population of ringed plover (*Charadrius hiaticula*) – 655 individuals representing at least 1.3% of the Europe/Northern Africa wintering population (5 year peak mean 1991/2 - 1995/6);
 - Wintering population of curlew (*Numenius arquata*) – 3,903 individuals representing at least 1.1% of the wintering Europe population -breeding population (5 year peak mean 1991/2 - 1995/6);
 - Wintering population of dunlin (*Calidris alpina alpina*) – 44,624 representing at least 3.2% of the wintering Northern Siberia/Europe/Western Africa population (5 year peak mean 1991/2 - 1995/6);
 - Wintering population of pintail (*Anas acuta*) – 599 individuals representing at least 1.0% of the wintering Northwestern Europe population (5 year peak mean 1991/2 - 1995/6);
 - Wintering population of redshank (*Tringa totanus*) – 2,330 individuals representing at least 1.6% of the wintering Eastern Atlantic - wintering population (5 year peak mean 1991/2 - 1995/6);
 - Wintering population of shelduck (*Tadorna tadorna*) – 3,330 individuals representing at least 1.1% of the wintering Northwestern Europe population (5 year peak mean 1991/2 - 1995/6); and
 - Over winter, the area regularly supports 93,986 individual waterfowl (5 year peak mean 1991/2 - 1995/6) including: Gadwall (*Anas strepera*), shelduck, pintail, dunlin, curlew, redshank, Bewick's swan, wigeon (*Anas penelope*), lapwing (*Vanellus vanellus*), teal (*Anas crecca*), mallard (*Anas platyrhynchos*), shoveler (*Anas clypeata*), pochard (*Aythya farina*), tufted duck (*Aythya fuligula*), grey plover (*Pluvialis squatarola*), white-fronted goose (*Anser albifrons albifrons*) and whimbrel (*Numenius phaeopus*). Qualifying features of the Ramsar include²⁰:

¹⁷ This is a total area of these sites, however please note that the boundary of the Ramsar is slightly different to the SAC and SPA, see Appendix B for individual site areas.

¹⁸ <https://sac.jncc.gov.uk/site/UK0013030>

¹⁹ Stroud, D.A., Chambers, D., Cook, S., Buxton, N., Fraser, B., Clement, P., Lewis, P., McLean, I., Baker, H. & Whitehead, S. (eds). 2001. The UK SPA network: its scope and content. JNCC, Peterborough.

²⁰ <https://jncc.gov.uk/jncc-assets/RIS/UK11081.pdf>

- 3.12. Ramsar criterion features are²¹:
- Estuarine habitats (Ramsar Criteria 1 and 3);
 - Migratory fish (Ramsar Criteria 4 and 8) including: Atlantic salmon (*Salmo salar*), sea trout (*Salmo trutta*), sea lamprey, river lamprey, allis shad (*Alosa alosa*), twaite shad and European eel (*Anguilla anguilla*);
 - The fish of the whole estuarine and river system is one of the most diverse in Britain, with over 110 species recorded. Atlantic salmon, sea trout, sea lamprey, river lamprey, allis shad, twaite shad and European eel use the Severn Estuary as a key migration route to their spawning grounds in the many tributaries that flow into the estuary. The site is important as a feeding and nursery ground for many fish species particularly allis shad and twaite shad. In addition, the Severn Estuary has the largest European eel run in Great Britain²²;
 - Internationally important populations of wintering birds (Ramsar Criterion 6) including: Bewick's swan, white fronted-goose, shelduck, gadwall, dunlin and redshank;
 - Wintering waterfowl assemblage of international importance (Ramsar Criterion 5); and
 - Breeding lesser black-backed gull (*Larus fuscus graellsii*) was identified subsequent to designation for possible future consideration under Ramsar Criterion 6 - 4167 apparently occupied nests representing an average of 2.8% of the western Europe/Mediterranean/west African breeding population (Seabird 2000 Census).

Results of Stage 1 – Screening Scheme Alone

Bath and Bradford-on-Avon Bats SAC

- 3.13. The information collected during the screening exercise is presented in the form of a Screening Matrix, using the template provided in LA 115. This completed Screening Matrix is provided in Appendix B of this document.
- 3.14. Bath and Bradford-on-Avon bats SAC lies 7.3 km north-west of the Scheme at it's closest point. It lies outside the 200 m ARN buffer requiring air quality assessment (the location of the ARN is shown in Appendix A.3). The site is also not hydrologically linked to the Scheme (as shown on Ordnance Survey (OS) maps).
- 3.15. The closest part of the SAC is 7.3 km from the Scheme. However, based on data provided by the local record centre (Wilshire and Swindon Biological Record Centre)²³, there are a number of core roosts²⁴ associated with the functional integrity of the SAC, that are not located within the SAC themselves. The closest core roost to the Scheme, a maternity lesser horseshoe roost, is located 13.5 km at its closest point from the SAC, and is located 1.8 km from the Scheme, which is defined to be within the 'core area'²⁵ of this lesser horseshoe core roost.
- 3.16. Core roosts, and their associated core areas, associated with the SAC need to be protected to maintain the integrity of the SAC, by protecting the network of 'sensitive features' (i.e. core bat roosts, core areas, commuting corridors and foraging sites). The location of this lesser horseshoe roost and its core area are shown in Appendix A.2.
- 3.17. Other than the lesser horseshoe roost detailed above, no further overlaps with the Scheme and any other qualifying bat species' core roost, core area or core sustenance zone (csz)²⁶, associated with the SAC occur. Therefore no LSE have been identified for the Bath and Bradford-on-Avon Bats

²¹ Information Sheet on Ramsar Wetlands (RIS) Available from <https://jncc.gov.uk/jncc-assets/RIS/UK11081.pdf> (accessed November 2021)

²² Natural England and the Countryside Council for Wales (2009). The Severn Estuary/Mor Hafren European Marine Site

²³ Please note that this data is more up-to-date than the known roost data that is provided within the Bat Special Areas of Conservation (SAC) Planning Guidance for Wiltshire document received in July 2021.

²⁴ Core Roosts must support qualifying species and meet the relevant SSSI criteria as follows: • breeding or winter roosts containing 50+ adult greater horseshoe bats; and/or, • breeding roosts containing 100+, or winter roosts containing 50+ adult lesser horseshoe bats; and/or, • any traditional breeding roosts of barbastelle and Bechstein's bats. In addition to the above criteria, a Core Roost must: a) be a component site of an SAC designation; or, b) have an established demographic connection with a SAC population; or, c) be judged as having a likely demographic connection with a SAC population based on proximity, landscape connectivity and expert opinion.

²⁵ Core area is defined as the landscape surrounding core roosts regularly used for foraging and commuting, deemed to be 2 km from lesser horseshoe core roosts of the SAC, as detailed within the Bat SAC Planning Guidance for Wiltshire.

²⁶ CSZ defined as "the area surrounding a communal bat roost within which habitat availability and quality will have a significant influence on the resilience and conservation status of the colony using the roost".

SAC in regard to greater horseshoe or Bechstein's bats and they are not detailed again within this report in relation to this SAC.

Potential impacts on lesser horseshoe bats associated with the Bath and Bradford-on-Avon Bats SAC

- 3.18. Potential impacts to lesser horseshoe bats include habitat loss, fragmentation of functionally linked habitat, disturbance from noise, vibration and lighting, and increased mortality/injury from collisions with traffic during the operational phase.
- 3.19. The SAC is designated for hibernating populations of bats including lesser horseshoe. Although the SAC is designated for hibernating populations, it is considered appropriate to take into consideration potential impacts to this species at all stages of this bat's life cycle, given that impacts during, for example the breeding period, may adversely affect the bat population at the hibernation sites.
- 3.20. Radio-tracking research studies have revealed that lesser horseshoe bats forage principally in forested habitats, and to a lesser extent along hedges and tree lines²⁷. The majority of the habitats overlapping the core area and Scheme (arable and improved grassland, as shown in Appendix A.4 and OS maps) are not considered likely to represent important foraging habitat for this bat species, however there are several hedgerows that could be used as commuting route by bats. The pockets of woodland (including priority habitat deciduous woodland) along the remaining Scheme route (well connected to other suitable habitats via hedgerows, shown in Appendix A.4), may also provide suitable foraging habitat for lesser horseshoe bats, including those located within the core roost of the SAC, located 1.8 km south east of the Scheme (as shown in Appendix A.2).
- 3.21. Lesser horseshoe bats have been found to be highly sensitive to lighting²⁸ with artificial lighting above 0.5 lux causing disruption to commuting behaviour. The introduction of artificial light in proximity to habitat features used by commuting or foraging bats could result in disruption of flight lines. Disruption to regular flight lines could force the bat to find an alternative route, potentially incurring additional energetic costs or, in extreme cases where alternative routes are not available, could lead to isolation and/ or fragmentation of the local population from key foraging areas or roosts. Additional impacts from lighting include attracting key prey species (such as moths) towards light sources and therefore potentially reducing the availability of prey to certain bats²⁹.
- 3.22. The proposed construction works are expected to result in temporary increases in noise and vibration levels during the construction phase which could arise from ground-breaking, earth works, excavation, planning, material handling, demolition or cutting, and disturbance caused by activity by personnel undertaking construction.
- 3.23. The duration of the proposed construction works is anticipated to be 22 months. Works will take place throughout the year, including during the maternity period when this maternity core roost of lesser horseshoe bats will potentially be located within the core area that overlaps with the Scheme (as shown in Appendix A.2).
- 3.24. Habitat loss, severance impacts and disturbance of bats will remain throughout the operational phase, as well as the increased risk of injury/mortality from collision with traffic.
- 3.25. LSE from the Scheme at construction and operational phase cannot be ruled out at screening stage on lesser horseshoe bats associated with the SAC. Impact pathways for lesser horseshoe bats associated with the SAC include potential:
- Habitat loss (including foraging and/or commuting routes from the loss of hedgerows within their core area);
 - Fragmentation of bat roosts from functionally linked habitats, i.e. the pockets of woodland east of Melksham (as shown on OS data);
 - Disturbance of these bats (including via lighting); and

²⁷ Bontadina, F., Schofield, H.W. & Naef-Daenzer, B. (1999) Habitat preferences in lesser horseshoe bats as revealed by radio-tracking. *Bat Research News*, 40, 110–111 and Bontadina, F., Schofield, H.W. & Naef-Daenzer, B. (2002) Radio-tracking reveals that lesser horseshoe bats forage in woodland. *Journal of Zoology*, London, 258, 281–290.

²⁸ Rowse, E.G., Lewanzik, D., Stone, E.L., Harris, S. and Jones, G., 2016. Dark matters: the effects of artificial lighting on bats. In *Bats in the Anthropocene: Conservation of bats in a changing world* (pp. 187-213). Springer, Cham.

²⁹ Wakefield, A., Stone, E.L., Jones, G. and Harris, S., 2015. Light-emitting diode street lights reduce last-ditch evasive manoeuvres by moths to bat echolocation calls. *Royal Society open science*, 2(8), p.150291

- Increased mortality/injury from collisions with traffic during the operational phase.

- 3.26. These impacts are specifically related to the bat maternity period³⁰ as it is a maternity lesser horseshoe core roost associated with the SAC that is located 1.8 km from the Scheme.
- 3.27. Future survey work planned as part of the development of the Scheme design will include bat activity surveys, that will include targeted surveys for lesser horseshoe bats. These will serve to inform the Stage 2 of the HRA assessment for this project in relation to impacts on lesser horseshoe bats associated with the integrity of this SAC.

Mells Valley SAC

- 3.28. The information collected during the screening exercise is presented in the form of a Screening Matrix, using the template in LA 115. This Screening Matrix is provided in Appendix B of this document.
- 3.29. Mells Valley SAC lies 19.4 km south-west of the Scheme. It lies outside the 200 m ARN buffer requiring air quality assessment (as shown in Appendix A.3) and is not hydrologically linked to the Scheme (as shown on OS maps). The SAC lies adjacent to Mells Stream and Egford Brook which flow into Mells River and the River Frome and eventually the River Avon, which the Scheme crosses. However, due to the over 42 km hydrological link from the SAC to the proposed Scheme, no impacts on hydrology local to the SAC are anticipated.
- 3.30. Given the distance of the SAC from the Scheme and that it is separated by built up areas and the A303 and A361, as well as the absence of connecting watercourses, it is considered that the qualifying habitat features of the SAC can be screened out, as there is no credible impact pathway for a LSE on them.
- 3.31. It is considered that there is no significant functional linkage between the Scheme and the qualifying bat populations, given that they are 19.4 km apart. CSZ and core areas have been assessed for the qualifying bat species and they do not overlap with the Scheme. Therefore, no LSE have been identified for the SAC.

Chilmark Quarries SAC

- 3.32. The information collected during the screening exercise is presented in the form of a Screening Matrix, using the template in LA 115. This Screening Matrix is provided in Appendix B of this document.
- 3.33. Chilmark Quarries SAC lies 29.8 km south of the Scheme. It lies outside the 200 m ARN buffer requiring air quality assessment (as shown in Appendix A.3) and is not hydrologically linked to the Scheme (as shown on OS maps).
- 3.34. At a distance of 29.8 km, it is considered that there is no significant functional linkage between the Scheme and the qualifying bat populations. CSZ and core areas have been assessed for the qualifying bat species and they do not overlap with Scheme. Therefore, no LSE have been identified for the SAC.

Severn Estuary SAC/SPA/Ramsar

- 3.35. The information collected during the screening exercise is presented in the form of Screening Matrices, using the template in LA 115. A separate Screening Matrix is provided for each designation of this site in Appendix B of this document.

Direct hydrological link

- 3.36. Although there is a direct hydrological connection between the Scheme route and the Severn Estuary SAC/SPA/Ramsar, the distance from the European Site to the Scheme via this watercourse connection is approximately 70 km. It is therefore considered that the potential for direct impacts via release of pollutants from the Scheme will be eliminated by dilution. Therefore, no LSE have been identified for habitats of the SAC/SPA/Ramsar.

³⁰ Usually taken to be May to August

Sea and river lamprey

- 3.37. There is potential for functional linkage between the Scheme and the SAC qualifying feature populations of sea lamprey and river lamprey, as these species can migrate upstream where there are no barriers such as weirs or waterfalls³¹. However areas of lamprey larval production usually only occur 40-50 km from the river mouth⁴¹. As the Scheme is a distance of 70 km (via hydrological connection), it is considered unlikely that there are any important spawning sites for qualifying features of the Severn Estuary SAC/Ramsar close to³² or upstream of the Scheme.
- 3.38. A review of Environment Agency (EA) fish monitoring sites within 2 km of the Scheme found one site (Site ID: 10534³³), located on the River Avon, approximately 1.5 km (hydrologically linked, rather than as the crow flies) upstream from the Scheme. Although there is a record of lamprey from this EA site, the record was deemed to be brook lamprey and not river or sea lamprey (due to the distance from the river mouth). Brook lamprey is not a species associated with the SAC designation and it is a species that is exclusively river based; as opposed to sea and river lamprey that migrate from the sea to freshwater.
- 3.39. On this basis, it is not considered that sea or river lamprey are located within the 2 km of the Scheme, and as impacts from the Scheme are not likely to propagate further than 2 km downstream, no LSE on these species (and subsequently the integrity of the SAC) are considered likely as a result of the Scheme.

Allis shad and twaite shad

- 3.40. There is also potential for functional linkage between the Scheme and the SAC qualifying feature population of the twaite shad and the SAC and Ramsar qualifying feature population of allis shad, as these species can both migrate upstream where there are no barriers such as weirs or waterfalls³⁴.
- 3.41. Twaite and allis shad are known to travel hundreds of kilometres upstream to spawning grounds⁴². Despite no EA records of allis or twaite shad up or down stream of the Scheme³⁵ in any part of the River Avon, the absence of records does not confirm an absence of these species within 2 km of the Scheme.
- 3.42. Therefore, in the absence of fish survey data for the Scheme, LSE to species within the designated SAC (twaite shad) and Ramsar (allis and twaite shad) while migrating upstream cannot be ruled out, which may inadvertently impact the SAC fish populations.

European eel, Atlantic salmon and sea trout

- 3.43. There is also potential for functional linkage between the Scheme and the Ramsar qualifying feature populations of European eel, Atlantic salmon and sea trout, as these species migrate upstream to freshwater habitats.
- 3.44. The EA fish monitoring site (Site ID: 10534) located approximately 1.5 km upstream from the Scheme) also recorded European eel. Therefore, as European eel are known to be present within 2 km of the Scheme, LSE to this species cannot be ruled out at this stage.
- 3.45. Atlantic salmon can travel hundreds of miles upstream to spawning grounds³⁶. Despite there being no EA records of this species up or down stream of the Scheme³⁷ along the River Avon, the absence of records does not confirm an absence of these species within 2 km of the Scheme. Therefore, as Atlantic salmon could be present within 2 km of the Scheme, LSE to this species cannot be ruled out at this stage.
- 3.46. Sea trout can migrate upstream and have been recorded at the Melksham EA fish monitoring site (Site ID: 30103) located approximately 4 km downstream from the Scheme. Therefore, as sea trout

³¹ Maitland, P.S. (2003). Ecology of the River, Brook and Sea Lamprey. Conserving Natura 2000 Rivers Ecology Series No. 5. English Nature, Peterborough.

^{32,32} Defined to be within 2km

³³ EA (2021) Freshwater Fish Counts all Species all Areas and all Years. Online: <https://data.gov.uk/dataset/f49b8e4b-8673-498e-bead-98e6847831c6/freshwater-fish-counts-for-all-species-all-areas-and-all-years> (accessed October 2021)

³⁴ Maitland, P.S. & Hatton-Ellis, T.W. (2003). Ecology of the Allis and Twaite Shad. Conserving Natura 2000 Rivers Ecology Series No. 3. English Nature, Peterborough.

³⁵ EA (2021) Freshwater Fish Counts all Species all Areas and all Years. Online: <https://environment.data.gov.uk/ecology/explorer/> (accessed October 2021).

³⁶ Online: https://www.fws.gov/fisheries/fishmigration/atlantic_salmon.html (accessed October 2021).

³⁷ EA (2021) Freshwater Fish Counts all Species all Areas and all Years. Online: <https://environment.data.gov.uk/ecology/explorer/> (accessed October 2021).

are likely to be present within 2 km of the Scheme, LSE to this species cannot be ruled out at this stage.

- 3.47. These three species are associated with the Severn Estuary Ramsar designation, and migrate upstream to freshwater. Therefore, adverse impacts to these species that are assumed to be within 2 km of the Scheme, may inadvertently affect the population of these species within the designated Ramsar site.

Bird species associated with the SPA/Ramsar

- 3.48. The Scheme would not have a significant effect on functionally linked bird habitats, as the abundance of similar agricultural habitats in the Severn Vale, including substantial areas that are closer to the SPA/Ramsar site, means that the bird populations associated with the SPA/Ramsar site are highly unlikely to depend upon habitats that would be affected by the Scheme. It is therefore considered no LSE on bird species associated with the Severn Estuary SPA or Ramsar sites.

Construction and operational effects

- 3.49. Desk study data has confirmed the likely presence of twaite and allis shad, European eel, Atlantic salmon and sea trout, all features of the Severn Estuary Ramsar, and twaite shad are also a feature of the SAC. As such, there is potential for impacts to these species within or surrounding the Scheme as a result of fragmentation/barrier effects during construction, potential habitat loss from the construction and operation phase of the Scheme from the erection of a new road bridge over the River Avon, and impacts to migratory fish (twaite and allis shad, European eel, Atlantic salmon and sea trout) a result of a pollution event, noise or vibration.
- 3.50. Design work is still ongoing, but it is assumed that piling will be required in the construction of the bridge over the River Avon. In addition, a temporary River Avon crossing may be required during construction. Disturbance during construction could result in habitat fragmentation/barrier effects, where twaite and allis shad, European eel, Atlantic salmon and sea trout are unable to disperse or move along the River Avon as a result of such disturbance.
- 3.51. Although there is a direct hydrological connection between the Scheme and the Severn Estuary SAC/SPA/Ramsar, at such a distance, it is considered that the potential for direct impacts via release of pollutants from the Scheme would be eliminated by dilution. DMRB guidance LA 113 states that “for assessment of impacts associated with soluble pollutants, outfalls within 1 km (measured along the watercourse) shall be aggregated for the purposes of cumulative assessment³⁸”. It therefore follows that soluble pollutants are considered to be sufficiently diluted beyond 1 km.
- 3.52. Although not relied upon for the screening conclusions, pollution prevention methods will be in place including standard water protection measures to avoid chemical or sediment pollution of any watercourses. Works are anticipated to follow standard good practice working methods for environmental protection, such as the Guidance for Pollution Prevention (GPPs)³⁹ and the Construction Industry Research and Information Association⁴⁰ (CIRIA) C715 Environmental good practice.
- 3.53. The drainage strategy will incorporate sustainable urban drainage systems (SuDS) to mitigate the pollution risk associated with road runoff as well as accidental spills.
- 3.54. However, given the relatively small size of the proposed works in comparison with the distance, size and mixing of the receptor designations, risks of significant spillage of chemical contaminant or silt pollution could be discounted from any LSE on the site’s habitats themselves even without any additional pollution controls.
- 3.55. There is however the potential for impacts to fish, particularly twaite and allis shad, European eel, Atlantic salmon and sea trout, from the Scheme as a result of a pollution event during construction and operation. Such impacts could arise through changes to water quality as a result of mobilisation of suspended sediments leading to silt laden run-off entering watercourses; and potential for accidental contamination associated with the spillage or leakage of fuels, lubricants and other

³⁸ Highways England (2020). Design Manual for Roads and Bridges LA 113 Road drainage and the water environment.

³⁹ <https://www.netregs.org.uk/environmental-topics/guidance-for-pollution-prevention-gpp-documents/guidance-for-pollution-prevention-gpps-full-list/>

⁴⁰ CIRIA (2006), CIRIA C648 Control of water pollution from linear construction projects Technical guidance. London.

chemicals required for construction. In particular, such impacts could occur during the construction of the new bridge over the River Avon.

- 3.56. LSE from the Scheme at construction and operational phase cannot be ruled out for twaite and allis shad, European eel, Atlantic salmon and sea trout associated with the Severn Estuary Ramsar site, with the twaite shad also being associated with the SAC.
- 3.57. LSE identified for these species associated with the Ramsar and SAC include potential:
- Fragmentation/barrier effects, disturbance on migratory fish during construction of the River Avon bridge;
 - Potential habitat loss from the construction and operation phase of the Scheme from the construction of the River Avon bridge;
 - Impacts to migratory fish (twaite and allis shad, European eel, Atlantic salmon and sea trout), from the Scheme as a result of a pollution event including noise and vibration; and
- 3.58. Future survey work planned as part of the development of the Scheme design will include fish surveys. These will serve to inform the Stage 2 of the HRA assessment for this project in relation to impacts on twaite and allis shad, European eel, Atlantic salmon and sea trout associated with the integrity of this Ramsar and SAC.

Results of Stage 1 – Screening Scheme In-combination

- 3.59. The following projects and plans have been identified which have gone through or are going through the HRA process, and which were considered to have the potential to cause LSE (Stage 1 Screening) or adverse effects on the integrity (Stage 2 – Appropriate Assessment) on the Bath and Bradford-on-Avon Bats SAC, Mells Valley SAC, Chilmark Quarries SAC and Severn Estuary SAC/SPA/Ramsar.
- 3.60. Every reasonable effort has been made to obtain information on potentially relevant other plans and projects, and to find out further details of named projects that could act in-combination with the project to create LSE on these European sites.

Table 3-1 - Assessment of in-combination effects

Document Title	Authority	Summary of report details	Summary of risks to the European sites ⁴¹ from the proposed project/plan that may have an LSE	In-combination effect?
Wiltshire Local Plan Review Habitats Regulations Assessment Scoping Report ⁴²	Wiltshire Council	HRA scoping report of Wiltshire Council Local Plan Review	<p>The scoping report identified potential LSE to Bath and Bradford-on-Avon Bats SAC as a result of physical damage/loss of habitat, non-physical disturbance, non-toxic contamination and impacts of recreation.</p> <p>Mells Valley SAC was scoped in for assessment at the screening stage as a result of impacts of recreation. However, this pathway of recreational pressure on this SAC was not identified from this screening process as a result of the Scheme. Therefore there is no overlap of LSE on this SAC with this plan and the Scheme.</p> <p>The report is at scoping stage and requires further information on the qualifying features and how they could be affected.</p>	Yes, the impacts on the Bath and Bradford on Avon Bats SAC as a result loss of habitat could have an in-combination affect with the Scheme
Habitats Regulations Assessment for an application under the Planning Act 2008: A303 Amesbury to Berwick Down ('A303 Stonehenge') ⁴³	Highways England	HRA was in relation to the A303 Amesbury to Berwick Down project which proposes to construct a new section of dual carriageway to address problems	At screening stage it was concluded that for Mells Valley SAC and Chilmark Quarries SAC there would be no LSE.	No

⁴¹ This table only details European sites that have been included within this Scheme's HRA screening assessment

⁴² LUC (January 2021). Available from https://www.wiltshire.gov.uk/media/5720/Wiltshire-Local-Plan-Review-Habitats-Regulations-Assessment-Scoping-Report/pdf/LPR_HRA_Wiltshire_HRA_Scoping.pdf?m=637460563180270000

⁴³ (12 November 2020). Available from <https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR010025/TR010025-002178-STON%20%E2%80%93%20HRA%20Report.pdf>

Document Title	Authority	Summary of report details	Summary of risks to the European sites ⁴¹ from the proposed project/plan that may have an LSE	In-combination effect?
		associated with the single carriageway section of the A303 between Amesbury's Countess roundabout and the dual carriageway section to the west of Winterbourne Stoke. The project has since been subject to a successful legal challenge.		
Wiltshire Housing Site Allocations Plan. Assessment under the Habitats Regulations ⁴⁴	Wiltshire Council	HRA relating to Wiltshire Housing Site Allocations Plan. The Plan comprises policies for the allocation of land for housing development. It does not include allocations for other forms of development and does not include policies for the general control of development.	The HRA identified the following LSE of the plan that were subject to appropriate assessment: Bath and Bradford on Avon Bats SAC – habitat loss/deterioration and recreational pressure. Conclusions of the AA on the SAC were no adverse effects subject to compliance and implementation of stated strategies and plans.	Yes, the loss/deterioration of functionally linked habitat identified for the Bath and Bradford on Avon Bats SAC could have an in-combination affect with the Scheme
Draft Joint Melksham Neighbourhood Plan (NP) (2020-2030) Habitats Regulations Assessment ⁴⁵	Wiltshire Council	HRA relating to the Draft Joint Melksham Neighbourhood Plan 2020-2030	The HRA concluded that the Submission Draft of the Joint Melksham NP will not result in a LSE on any European site.	No
Wiltshire Local Transport Plan 2011 – 2026 Habitat Regulations Assessment Screening ⁴⁶	Wiltshire Council	Setting out of the council's transport objective, plans and indicators for Wiltshire.	The HRA identified no LSE on European sites that have been identified as part of the screening process for this Scheme.	No

⁴⁴ Wiltshire Council (February 2020) Available from https://www.wiltshire.gov.uk/media/4541/Habitats-Regulations-Assessment-February-2020/pdf/Habitats_Regulations_Assessment_February_2020.pdf?m=637347432760070000

⁴⁵ Draft Joint Melksham Neighbourhood Plan (2020-2026) [Joint Melksham NP Reg 16 Submission Draft HRA Screening V3 11.01.2021.pdf \(wiltshire.gov.uk\)](https://www.wiltshire.gov.uk/media/4541/Habitats-Regulations-Assessment-February-2020/pdf/Habitats_Regulations_Assessment_February_2020.pdf?m=637347432760070000)

⁴⁶ ENVIRON (October 2010) (updated in Jan 2011 by Wiltshire Council) Available from [t/p3-habitats-regulation-assessment.pdf \(wiltshire.gov.uk\)](https://www.wiltshire.gov.uk/media/4541/Habitats-Regulations-Assessment-February-2020/pdf/Habitats_Regulations_Assessment_February_2020.pdf?m=637347432760070000)

Document Title	Authority	Summary of report details	Summary of risks to the European sites ⁴¹ from the proposed project/plan that may have an LSE	In-combination effect?
Wiltshire & Swindon Aggregate Minerals Site Allocations DPD Pre-Submission Habitats Regulations Assessment Screening Report ⁴⁷	Wiltshire Council	Setting out spatial vision, key objectives and overall principles for development covering minerals provision.	The HRA for three proposed extraction sites, identified nine European sites in close proximity , including Bath and Bradford on Avon Bats SAC and Chilmark Quarries SAC. A detailed assessment concluded that these sites would not have a LSE alone or in combination with other plans on these designated sites but it was recommended that individual extraction sites should undergo project level HRA.	No
Habitats Regulations Assessment of the Wiltshire and Swindon Minerals and Waste Development Framework ⁴⁸	Wiltshire Council	HRA for Wiltshire and Swindon's Waste Site Allocations Development Plan Document (DPD). The purpose of the Waste Site Allocations DPD is to provide detailed local expression to the adopted Waste Core Strategy in terms of the identification of sites that the Councils consider will be required in order to meet the forecasts of demand for new waste management capacity.	The HRA at screening stage for two waste sites identified six European sites with potential LSE, including the Bradford on Avon Bats SAC. It was considered that appropriate site level mitigation is available to mitigate these LSE, including management plans and planning condition to restrict operations to daylight hours. The assessment therefore concluded that the two sites will not have LSE on the identified European sites, either alone or in combination.	No
West Berkshire Council (2010) Habitat Regulations	West Berkshire Council	The Core Strategy forms the first part of West Berkshire's Local Development	The HRA identified no LSE on European sites that have been	No

⁴⁷ Enfusion / C4S (November 2012) [post-examination-hearings-stage-sustainability-report-addendum-nov-2012 \(wiltshire.gov.uk\)](http://post-examination-hearings-stage-sustainability-report-addendum-nov-2012 (wiltshire.gov.uk))

⁴⁸ Enfusion / C4S (December 2011) Available from [Microsoft Word - HRA Screening Report for Waste Site Allocations Submission DPD Jan 2012 \(wiltshire.gov.uk\)](http://Microsoft Word - HRA Screening Report for Waste Site Allocations Submission DPD Jan 2012 (wiltshire.gov.uk))

Document Title	Authority	Summary of report details	Summary of risks to the European sites ⁴¹ from the proposed project/plan that may have an LSE	In-combination effect?
Assessment of West Berkshire Core Strategy ⁴⁹		Framework (LDF). It sets out a long-term vision for West Berkshire to 2026 and translates this into spatial terms, setting out proposals for where development will go, and how this development will be built.	identified as part of the screening process for this Scheme.	
West Berkshire Council (2016) West Berkshire Local Plan Housing Site Allocations Development Plan Document Submission Habitat Regulations Assessment Screening Report ⁵⁰	West Berkshire Council	The Housing Site Allocations DPD forms part of the Local Plan alongside the Core Strategy, policies of the West Berkshire District Local Plan 1991-2006 and the Minerals and Waste DPD. It will allocate the remainder of the 'at least' 10,500 housing figure identified in the Core Strategy.	The HRA identified no LSE on European sites that have been identified as part of the screening process for this Scheme.	No
Hinkley Point C Connection project: Habitats Regulations Assessment ⁵¹	Secretary of State	The scheme is a Nationally Significant Infrastructure Project involving the connection of a new nuclear power station at Hinkley Point, Somerset (Hinkley Point C power station) to the high voltage electricity transmission system.	The HRA assessed the potential for LSE on both Bath and Bradford-on-Avon Bats SAC and Mells Valley SAC. Both were screened in for appropriate assessment due to potential impacts to greater horseshoe bats. However, this species was not considered to be at	No

⁴⁹ [https://citizen.westberks.gov.uk/media/36470/West-Berkshire-Habitat-Regulations-Assessment-Core-Strategy-/pdf/West_Berkshire_Habitat_Regulations_Assessment_\(Core_Strategy\).pdf?m=637007820906330000](https://citizen.westberks.gov.uk/media/36470/West-Berkshire-Habitat-Regulations-Assessment-Core-Strategy-/pdf/West_Berkshire_Habitat_Regulations_Assessment_(Core_Strategy).pdf?m=637007820906330000)

⁵⁰ <http://info.westberks.gov.uk/CHttpHandler.ashx?id=40250&p=>

⁵¹ Hinkley Point C Connection project: Habitats Regulations Assessment . Available from [https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN020001/EN020001-000002-Hinkley%20C%20Connection%20HRA%20\(Final\).pdf](https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN020001/EN020001-000002-Hinkley%20C%20Connection%20HRA%20(Final).pdf) (accessed May 2021)

Document Title	Authority	Summary of report details	Summary of risks to the European sites ⁴¹ from the proposed project/plan that may have an LSE	In-combination effect?
			risk of LSE within the screening assessment of this Scheme, therefore there is no overlap of LSE on these SACs.	
Portishead Branch Line (MetroWest Phase 1) Report to Inform Habitats Regulations Assessment, CH2M, September 2020 ⁵²	Secretary of State	Proposed Scheme to rebuild a section of disused railway line between Portishead and Pill, plus associated development (stations, car parks etc.) to allow reintroduction of passenger services along the Portishead Branch.	<p>The HRA assessed the potential for LSE on Bath and Bradford-on-Avon Bats SAC, Mells Valley SAC and Severn Estuary SAC/SPA/Ramsar.</p> <ul style="list-style-type: none"> • The Bradford-on-Avon Bats SAC, Severn Estuary SAC and Mells Valley SAC were all screened out from LSE; • The Severn Estuary SPA was screened in for LSE in-combination only; and • The Severn Estuary Ramsar was screened in for LSE, in-combination only, regarding effects of disturbance. 	Yes, the Severn Estuary Ramsar and SPA was screened in for in-combination LSE regarding effects of disturbance.
Planning application 19/05832/FUL Leafy Lane Woodland ⁵³	Wiltshire Council	Proposed use of land as natural burial site; associated access track and landscaping. A small number of trees are proposed to be removed as part of the project.	The county ecologist has requested a HRA screening due to the proximity to Bath and Bradford-on-Avon Bats SAC.	Yes, until the HRA screening report is conducted in-combination LSE cannot be ruled out on the Bath and Bradford-on-Avon SAC
Planning application 18/09884/OUT. Land South of Westwells road, between	Wiltshire Council	Residential development for up to 81 dwellings, that includes eight self-build	A HRA was carried out which concluded that the project would not give rise to any LSE on the integrity	No

⁵² Available from <https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR040011/TR040011-000472-6.25%20ES%20Volume%204%20Appendix%209.12%20Report%20to%20inform%20Habitats%20Regulations%20Assessment.pdf> (accessed November 2021)

⁵³ <https://unidoc.wiltshire.gov.uk/UniDoc/Document/Search/DSA,900985> (accessed November 2021)

Document Title	Authority	Summary of report details	Summary of risks to the European sites ⁴¹ from the proposed project/plan that may have an LSE	In-combination effect?
Rowan Lane & Jaggards Lane ⁵⁴		dwellings, roads, footpaths, balancing areas and open space.	of the Bath and Bradford-on-Avon SAC when the development proposals are considered either alone or in combination with other plans or projects.	

⁵⁴ Bat Impact Assessment Report. Available from <https://development.wiltshire.gov.uk/pr/s/planning-application/a0i3z000014erYAAI/1809884out?tabset-8903c=2>, [Ecology 20.09.19.html](#) (Accessed November 2021)

4. Habitat Regulations Assessment Stage 1 Screening Findings

- 4.1. The Scheme is not directly connected with, or necessary to, the nature conservation management of any European sites, and thus a HRA is required.
- 4.2. Four European sites are present within the study area: Bath and Bradford-on-Avon bats SAC, Mells Valley SAC, Chilmark Quarries SAC and Severn Estuary SAC/SPA/Ramsar.

Screening Scheme alone

Bath and Bradford on Avon Bats SAC

- 4.3. Impact pathways from habitat fragmentation and severance, potential loss of functionally linked habitat and disturbance from noise and vibrations and lighting, as well as injury/mortality from the operational phase, were identified on the Bath and Bradford on Avon Bats SAC.
- 4.4. Although the SAC is designated for hibernating bats, it is considered appropriate to take into consideration potential impacts to these species at all stages of their life cycle, given that impacts during the breeding period may adversely affect the bat population at the hibernation sites.
- 4.5. A lesser horseshoe maternity core roost is located within 1.8 km of the Scheme, making the Scheme within this roost's core area. Therefore, LSEs as a result of the construction and operational phases of the Scheme could not be discounted for this SAC.

Severn Estuary SAC

- 4.6. Due to the distance from the Scheme to the SAC, there would be no LSE on the habitats or species within the designated site itself..
- 4.7. Impact pathways from habitat fragmentation/barrier effect, potential loss of functionally linked habitat, impacts to fish as a result of a pollution event during construction and operational phases and disturbance from noise and vibrations and lighting were identified on twaite shad, which is a qualifying feature of the Severn Estuary SAC.
- 4.8. LSEs as a result of the construction and operational phases of the Scheme could not therefore be discounted for this SAC.

Severn Estuary Ramsar

- 4.9. Due to the distance from the Scheme to the Ramsar, there would be no LSE on the habitats or species within the designated site itself. Additionally, no impact pathways on bird species associated with the Ramsar were identified.
- 4.10. Impact pathways from habitat fragmentation/barrier effect, potential loss of functionally linked habitat, impacts to fish as a result of a pollution event during construction and operational phases and disturbance from noise and vibrations and lighting were identified on twaite and allis shad, Atlantic salmon, sea trout and European eel, which are species associated with the Severn Estuary Ramsar.
- 4.11. LSEs as a result of the construction and operational phases of the Scheme could not therefore be discounted for this Ramsar.

Remaining European Sites

- 4.12. As discussed above, LSEs on the remaining Mells Valley SAC, Chilmark Quarries SAC and the Severn Estuary SPA have been screened out.

In-combination effects

- 4.13. The majority of plans or projects were not found to have LSEs in-combination with the Scheme on any European sites. However, the Wiltshire Local Plan Review Habitats Regulations Assessment

Scoping Report, the Wiltshire Housing Site Allocations Plan and the Leafy Lane natural burial proposal identified potential / unidentified impacts to Bath and Bradford-on-Avon Bats SAC. Additionally, the Portishead Branch Line re-opening of a section of disused railway may have disturbance impacts on the Severn Estuary Ramsar and SPA in-combination with this Scheme. Therefore, there is potential for the Scheme to have LSEs on these sites in-combination with these plans/projects.

Screening conclusions

- 4.14. We have identified potential alone and in-combination LSEs on the Bath and Bradford-on-Avon Bats SAC and the Seven Estuary SAC and Ramsar at screening stage.

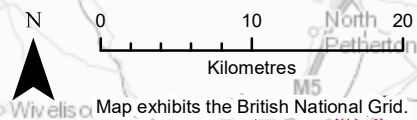
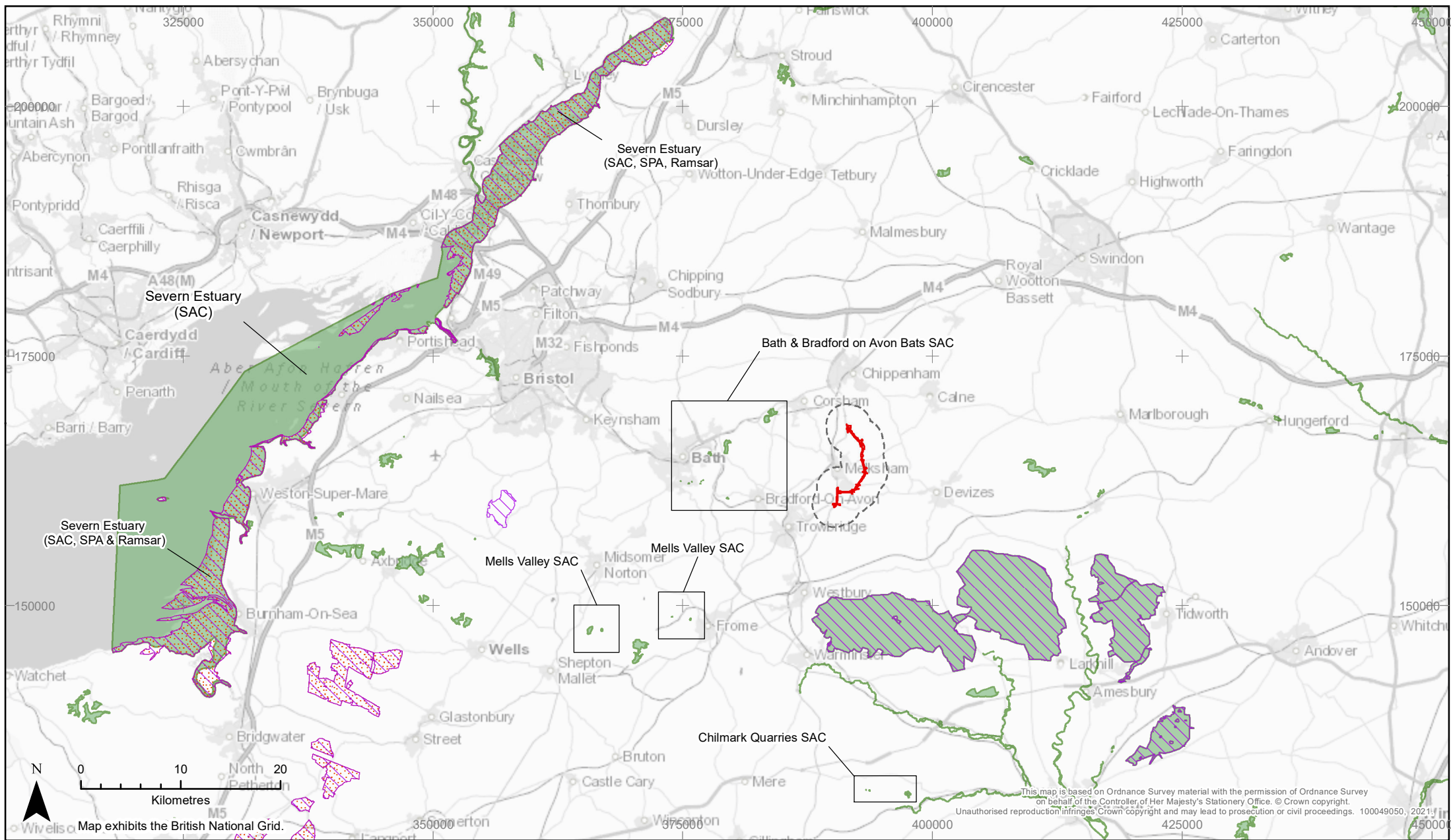
5. Next Steps

- 5.1. This HRA has been produced prior to detailed survey and design work being undertaken for the Scheme. The next steps are as follows:

- Include mitigation by design as far as possible (e.g. viaduct over the River Avon and bat culvert structures suitable for lesser horseshoe bats);
- Carry out further ecological survey, specifically for lesser horseshoe bats and migratory fish (twaite and allis shad, Atlantic salmon, sea trout and European eel) within the River Avon (which flows into the Severn Estuary);
- Develop other mitigation, including for the construction phase;
- Consult with Natural England and the Wiltshire County Ecologist on this Stage 1 screening document;
- Consult with Natural England, Wiltshire County Ecologist and other local groups regarding survey effort, assessment, design and mitigation; and
- Produce a report to inform Stage 2: Appropriate Assessment.

Appendix A. Figures

A.1. Location of European sites in relation to the Scheme figure



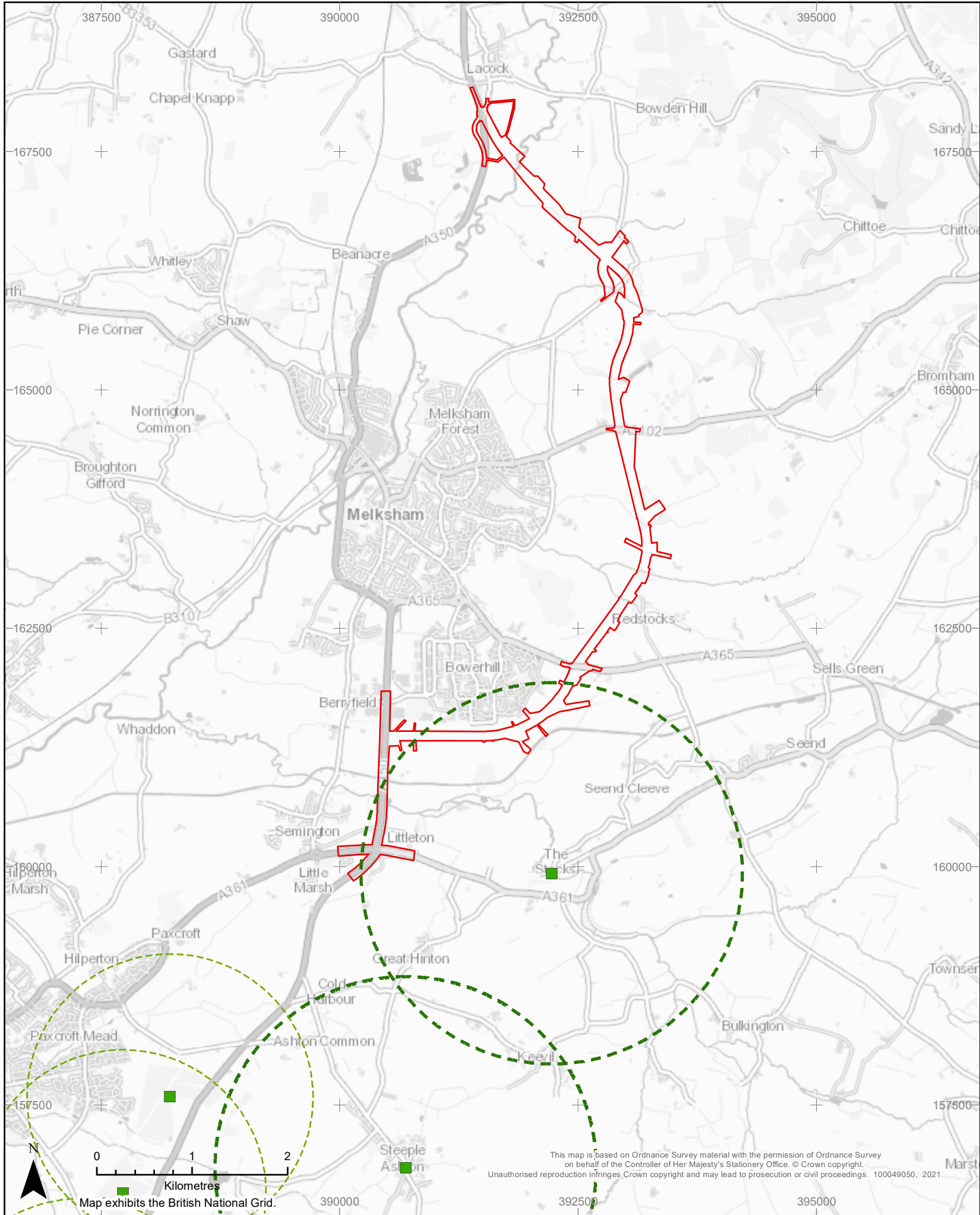
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- Proposed Scheme Boundary
- Scheme Area Buffer (2km)
- Special Areas of Conservation (SAC)
- Special Protected Areas (SPA)
- Ramsar

Wiltshire Council <small>SNC-LAVALLIN</small> ATKINS <small>Her Majesty's Stationery Office</small>						
Description						
Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date
S0	P01	FM	MB	AR	AM	12/11/21

Project		A350 MELKSHAM BY-PASS	
Drawing Title		HRA Figure 1 EUROPEAN SITES	
Drawing Suitability		WORK IN PROGRESS	Status S0
Drawing Number		WC_MBP-ATK-EBD-XX-GS-LE-000001	
Project Originator Volume Location Type Role Number			
Original Size:	A4	Scale	1:500,000
Project Ref. No:	5197936	Sheet:	1 of 1
Rev:	P01		

A.2. Scheme's overlap of the core area of a lesser horseshoe roost figure

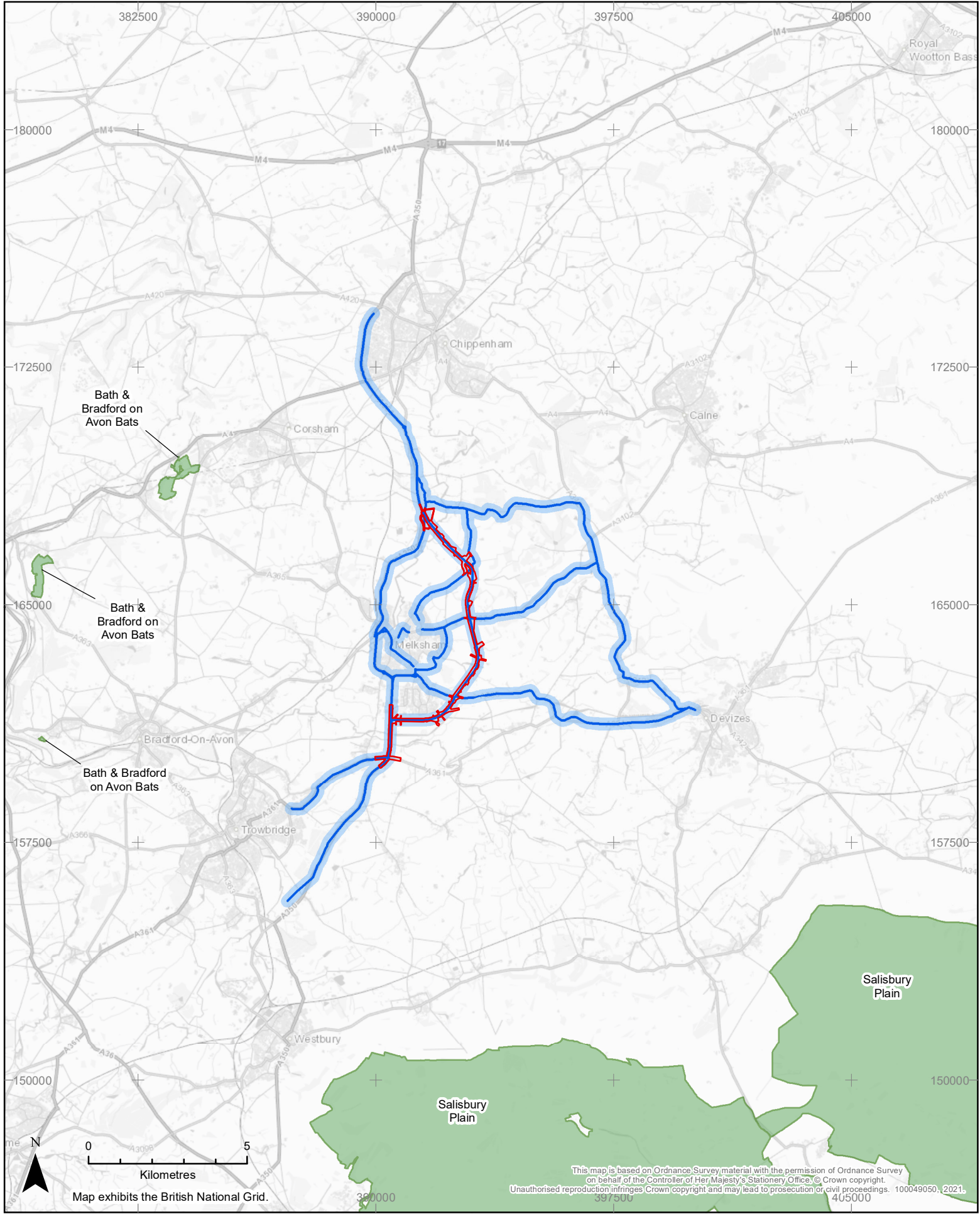


- Proposed Scheme Boundary
- Core Roost
- LHS Core Roost Buffer (2km)
- Bechstein's Core Roost Buffer (1.5km)

Client						
Wiltshire Council			SNC-LAVALIN		ATKINS	
Description						
Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date
S0	P01	FM	AM	AR	AM	11/11/21

Project			
A350 MELKSHAM BY-PASS			
Drawing Title			
HRA Figure 2 CORE ROOSTS & CORE AREAS ASSOCIATED WITH THE BATH AND BRADFORD ON AVON BATS SAC			
Drawing Suitability			Status
WORK IN PROGRESS			S0
Drawing Number			
WC_MBP-ATK-EBD-XX-GS-LE-000003			
Project	Originator	Volume	Location
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Original Size:	A4	Scale:	1:50,000
Project Ref. No:	5197936	Issue Date:	11/11/21
Rev:	P01	Role:	

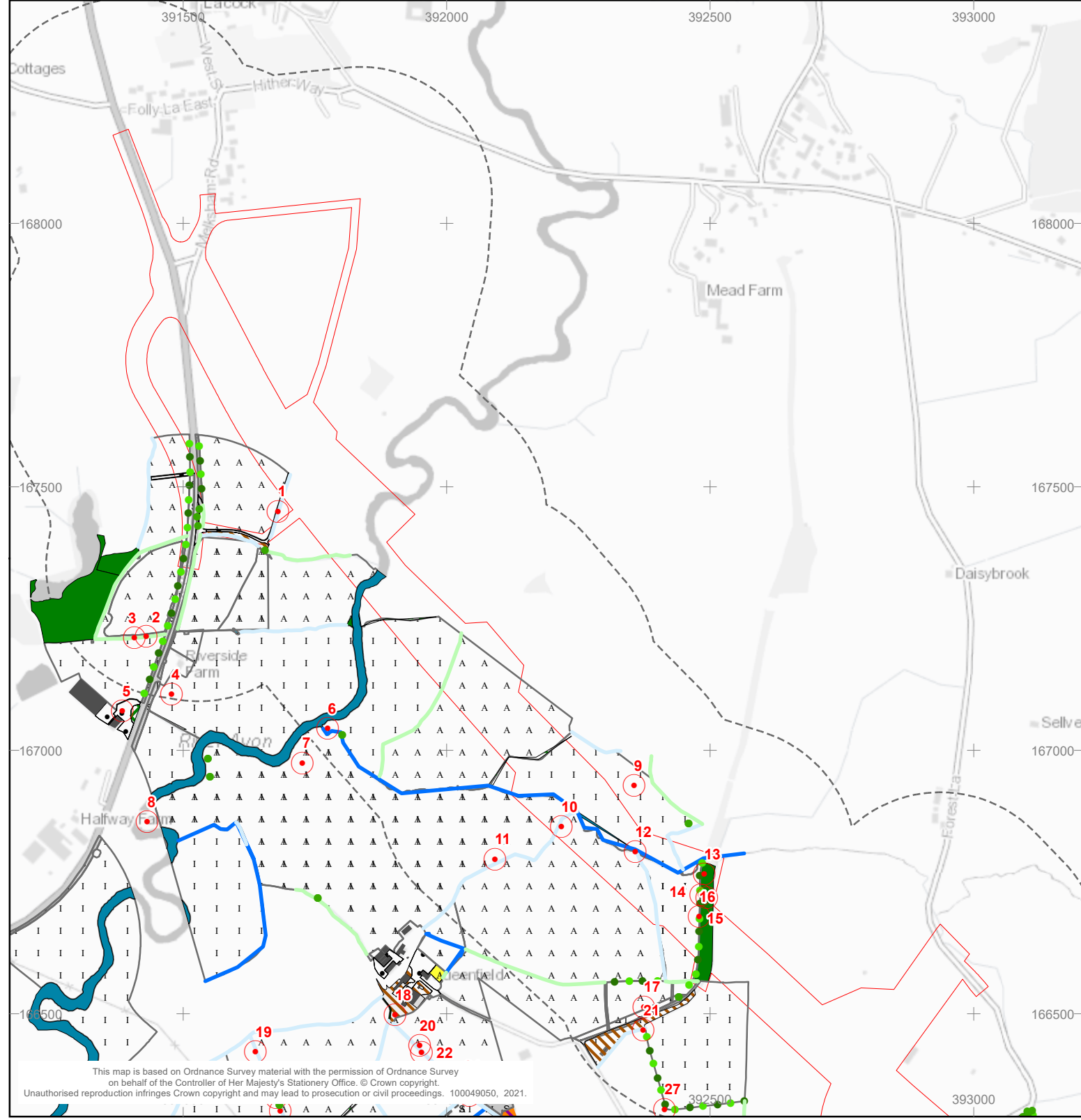
A.3. Affected Road Network (ARN) figure



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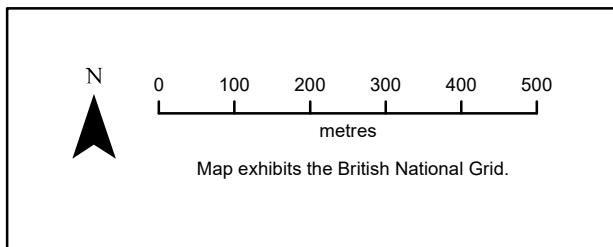
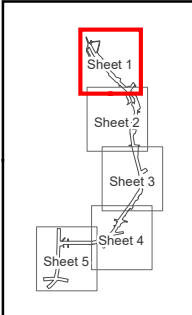
<ul style="list-style-type: none"> Proposed Scheme Boundary ARN (Affected Road Network) ARN Buffer (200m) Special Areas of Conservation (SAC) 	Client		Project														
			A350 MELKSHAM BY-PASS														
	Description		Drawing Title														
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Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date											
S0	P01	FM	AM	AR	AM	11/11/21											
Description		Drawing Suitability		Status													
		WORK IN PROGRESS		S0													
Description		Drawing Number															
		WC_MBP-ATK-EBD-XX-GS-LE-000002															
		Project Originator Volume Location Type Role Number															
		Original Size: A4	Scale: 1:150,000	Project Ref. No: 5197936	Sheet: 1 of 1	Rev: P01											

A.4. Phase 1 Habitat Scheme figure



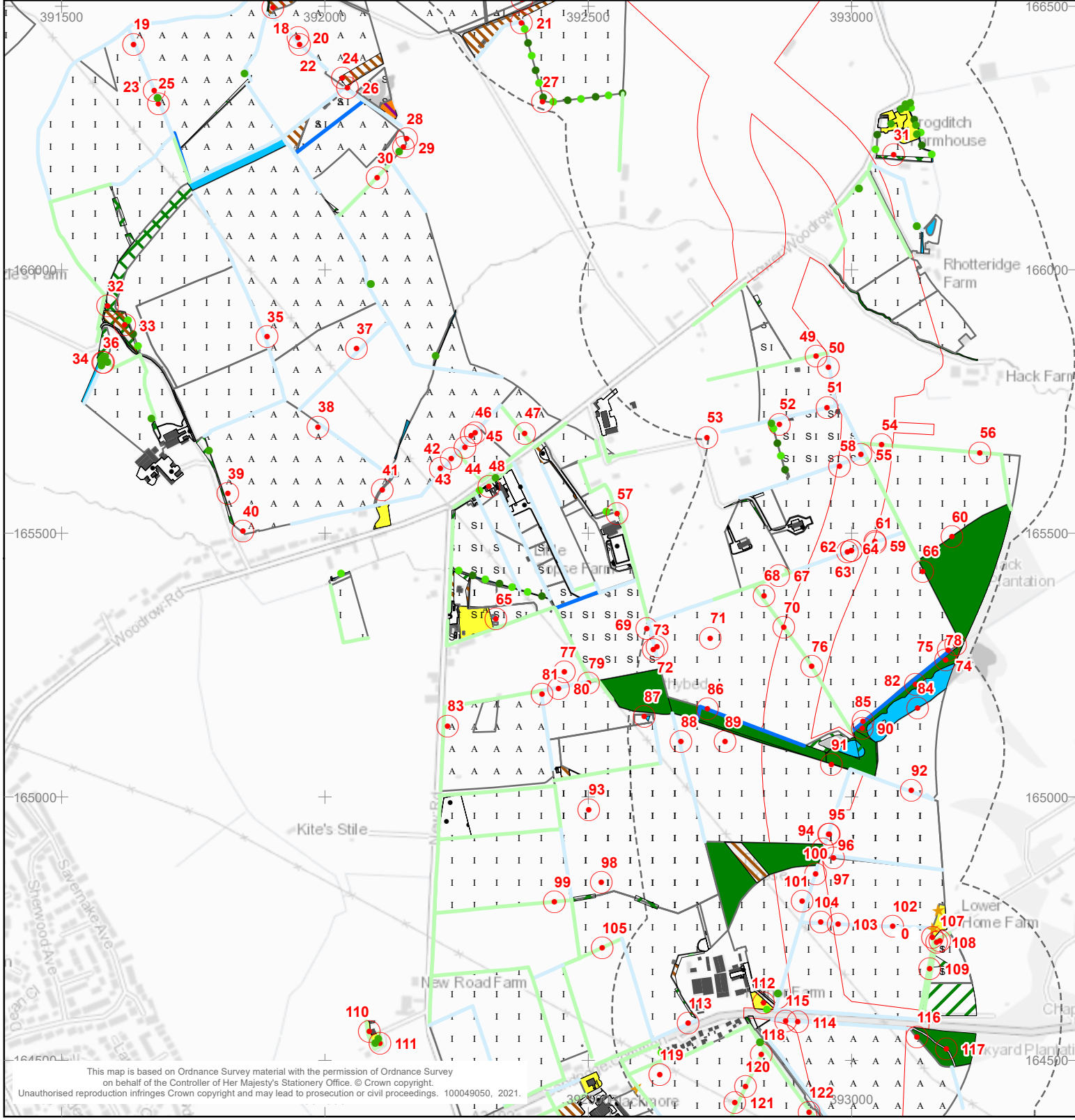
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Proposed Scheme Boundary	Intact hedgerow - species-poor	Poor semi-improved grassland	Cultivated/disturbed land - amenity grassland
Buffer to Proposed Scheme (250m)	Running water	Other tall herb and fern - ruderal	Defunct hedgerow - species-poor
Target Notes	Broadleaved woodland - semi-natural	Standing water	Wall
Scattered Trees	Scrub - dense/continuous	Running water	Buildings
Line of Trees	Improved grassland	Cultivated/disturbed land - arable	Bare ground
Intact hedgerow - native species-rich	Marsh/marshy grassland		



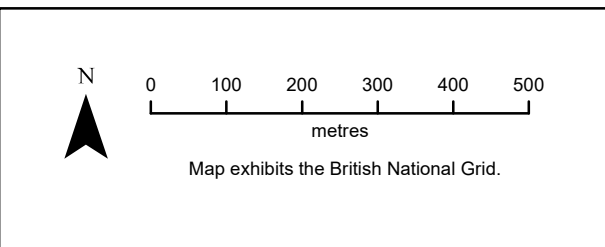
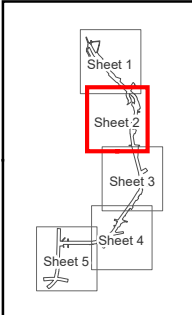
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		A350 MELKSHAM BY-PASS	
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Status	Revision	Drawn	Checked
S0	P02	PD	GH
Reviewed	Authorised	Issue Date	
AR	AM	11/11/21	
Description			
FIRST ISSUE			
Status	Revision	Drawn	Checked
S0	P01	PD	GH
Reviewed	Authorised	Issue Date	
AR	AM	15/10/21	

Drawing Suitability		Status	
WORK IN PROGRESS		S0	
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Rev.:			
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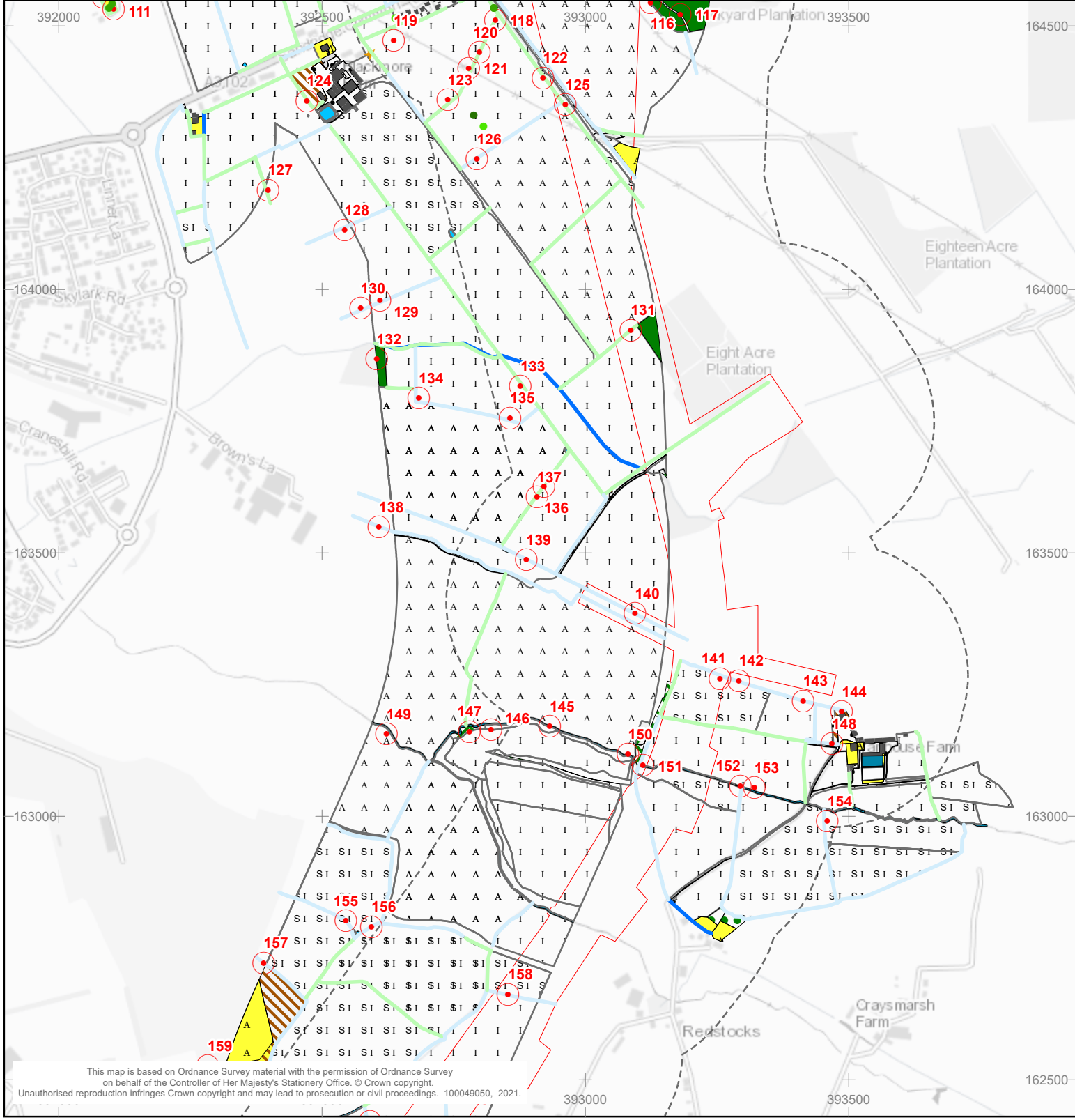


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Proposed Scheme Boundary	Intact hedgerow - species-poor	Marsh/marshy grassland	Cultivated/disturbed land - amenity grassland
Buffer to Proposed Scheme (250m)	Running water	Poor semi-improved grassland	Defunct hedgerow - species-poor
Target Notes	Broadleaved woodland - semi-natural	Other tall herb and fern - ruderal	Hedge with trees - species-poor
Scattered Trees	Broadleaved woodland - plantation	Standing water	Earth bank
Line of Trees	Mixed woodland - plantation	Running water	Buildings
Ornamental Non-Native	Scrub - dense/continuous	Cultivated/disturbed land - arable	Bare ground
Intact hedgerow - native species-rich	Improved grassland		

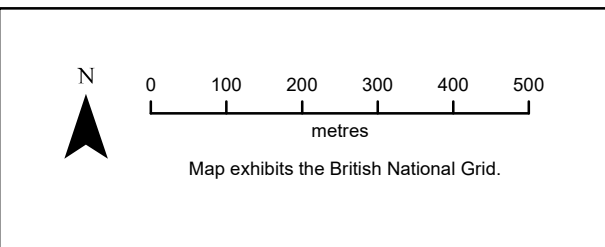
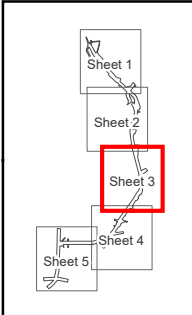


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Reviewed AR	Authorised AM	Issue Date 11/11/21	Status S0
Description FIRST ISSUE		Drawing Suitability WORK IN PROGRESS	
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Reviewed AR	Authorised AM	Issue Date 15/10/21	Drawing Number WC-MBP-ATK-EGN-XX-GS-LE-000006
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			Rev: P02

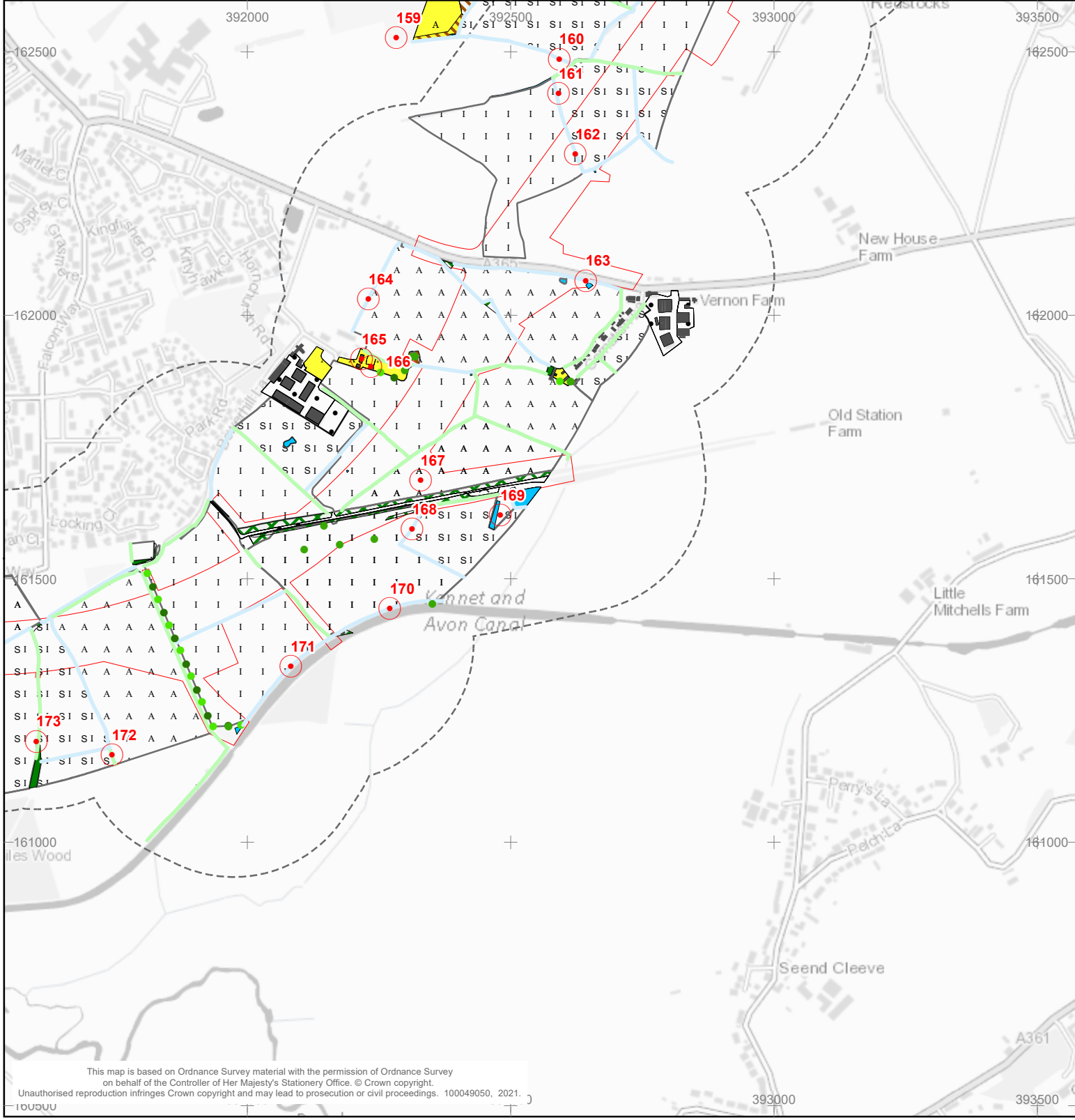


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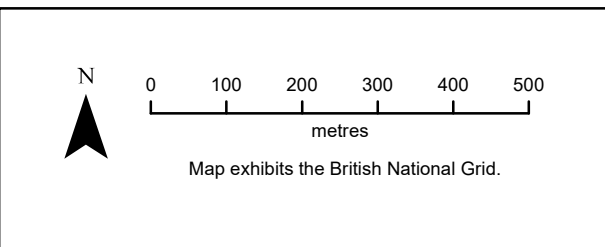
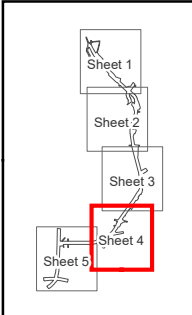
Proposed Scheme Boundary	Intact hedgerow - native species-rich	Broadleaved parkland/scattered trees	Standing water - eutrophic
Buffer to Proposed Scheme (250m)	Intact hedgerow - species-poor	Improved grassland	Running water
Target Notes	Running water	Poor semi-improved grassland	Cultivated/disturbed land - arable
Scattered Trees	Broadleaved woodland - semi-natural	Other tall herb and fern - ruderal	Cultivated/disturbed land - amenity grassland
Line of Trees	Scrub - dense/continuous	Standing water	Buildings
Ornamental Non-Native			Bare ground



Client Wiltshire Council		Project A350 MELKSHAM BY-PASS	
Description FIGURE NUMBER CHANGE SCHEME BUFFER CHANGED LEGEND ADJUSTED		Drawing Title Figure 4 PHASE 1 SURVEY	
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Reviewed AR	Authorised AM	Issue Date 11/11/21	Status S0
Description FIRST ISSUE		Drawing Suitability WORK IN PROGRESS	
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			Rev: P02

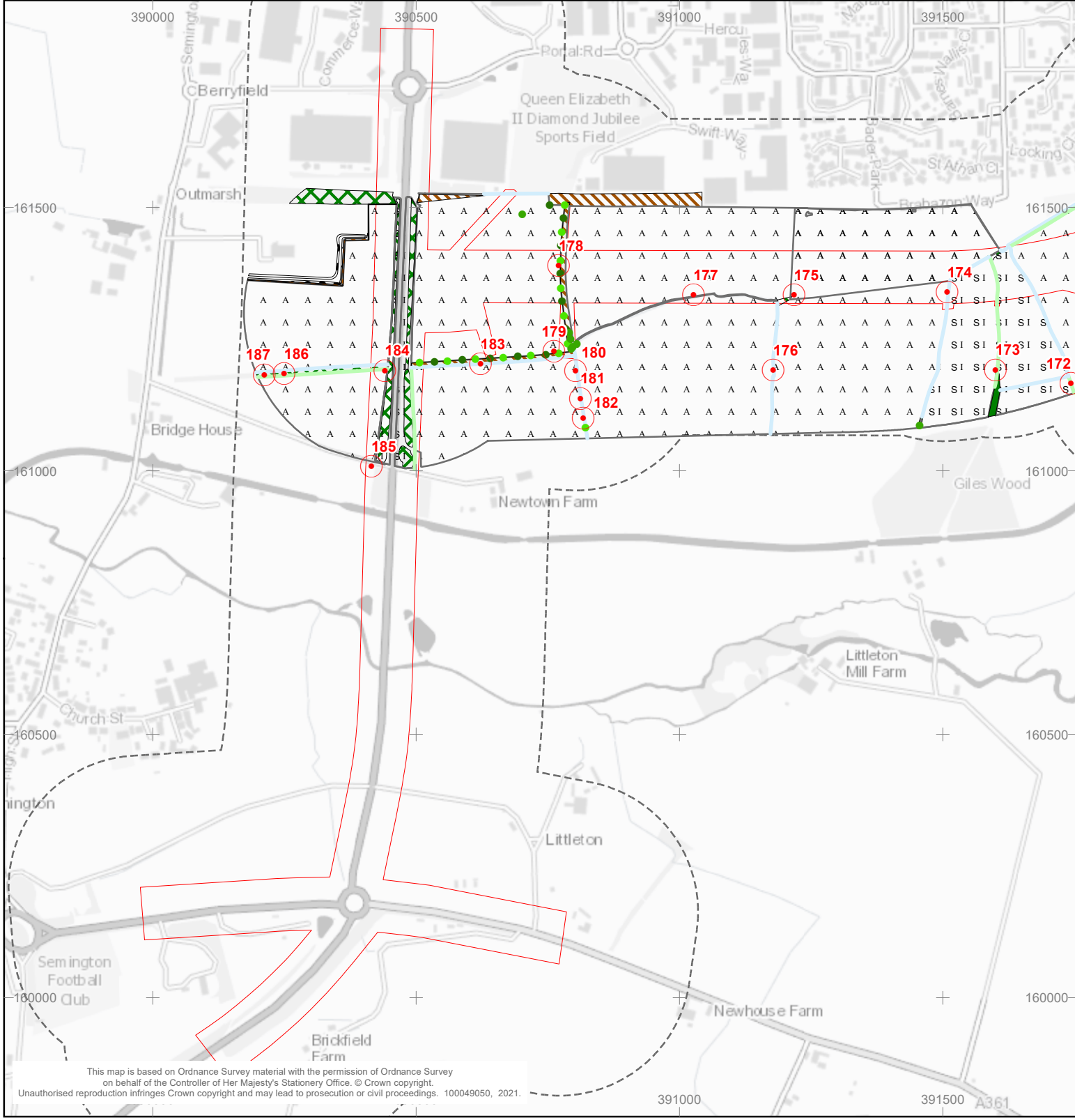


Proposed Scheme Boundary	Intact hedgerow - species-poor	Poor semi-improved grassland	Cultivated/disturbed land - amenity grassland
Buffer to Proposed Scheme (250m)	Broadleaved woodland - semi-natural	Other tall herb and fern - ruderal	Cultivated/disturbed land - ephemeral/short perennial
Target Notes	Broadleaved woodland - plantation	Standing water	Defunct hedgerow - species-poor
Scattered Trees	Scrub - dense/continuous	Standing water - eutrophic	Buildings
Line of Trees	Scrub - scattered	Running water	Bare ground
Intact hedgerow - native species-rich	Improved grassland	Cultivated/disturbed land - arable	



Client		Project	
		A350 MELKSHAM BY-PASS	
Description		Drawing Title	
FIGURE NUMBER CHANGE SCHEME BUFFER CHANGED LEGEND ADJUSTED		Figure 4 PHASE 1 SURVEY	
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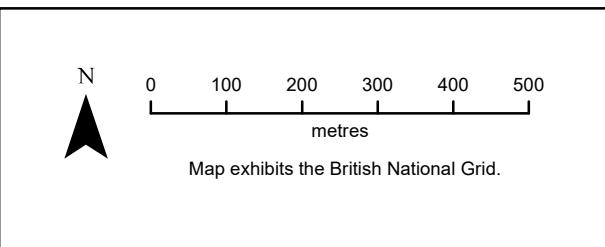
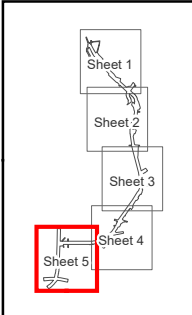
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A4	1:10,000	5197936
Sheet:	4 of 5	Rev:
		P02



- Proposed Scheme Boundary
- Buffer to Proposed Scheme (250m)
- Target Notes
- Scattered Trees
- Line of Trees

- Intact hedgerow - native species-rich
- Intact hedgerow - species-poor
- Broadleaved woodland - semi-natural
- Scrub - dense/continuous
- S I S Poor semi-improved grassland

- Other tall herb and fern - ruderal
- A A Cultivated/disturbed land - arable
- Hedge with trees - native species-rich
- Earth bank



Client Wiltshire Council						
Description FIGURE NUMBER CHANGE SCHEME BUFFER CHANGED LEGEND ADJUSTED						
Status S0	Revision P02	Drawn PD	Checked GH	Reviewed AR	Authorised AM	Issue Date 11/11/21
Description FIRST ISSUE						
Status S0	Revision P01	Drawn PD	Checked GH	Reviewed AR	Authorised AM	Issue Date 15/10/21

Project A350 MELKSHAM BY-PASS		
Drawing Title Figure 4 PHASE 1 SURVEY		
Drawing Suitability WORK IN PROGRESS	Status S0	
Drawing Number WC-MBP-ATK-EGN-XX-GS-LE-000006		
Original Size: A4	Scale: 1:10,000	Project Ref. No: 5197936
Sheet: 5 of 5	Rev: P02	

Appendix B. Screening Matrices

Bath and Bradford-on-Avon Bats SAC Screening Matrix

Project:		Melksham Bypass
European site under consideration:		Bath and Bradford-on-Avon Bats SAC
Date:	Author (Name/Organisation):	Verified (Name/Organisation):
Nov 2021	Senior Ecologist (Atkins Ltd)	Associate Director (Atkins Ltd)
Description of Project		
Describe any likely direct, indirect or secondary impacts of the project (either alone or in combination with other plans or projects) on the European site by virtue of:		
<i>Size and scale (road type and probable traffic volume)</i>	<p>The proposed Scheme option will provide a 9 km long full bypass to the east of Melksham. The key components of the works include construction of three priority roundabouts, significant alternations to existing roads including Lower Woodrow road and A350, crossings over Wilts and Berks canal, a viaduct over the river Avon, a series of attenuation ponds and extinction or diversion of various PRow.</p> <p>Construction of the Scheme is assumed to start in 2026 with the Scheme open to traffic in 2028. At this early stage of design development, much of the construction methodology of the Scheme is currently unknown and assumptions are required for the assessment to understand the construction effects. Some general assumptions include construction activities that affect the existing A350 will avoid peak times to minimise congestion and therefore disruption during construction; night works will be limited as far as and possible; PRow will be kept open as long as it is safe to do so during construction; temporary light pollution is expected to be kept to minimum, only when required for safe working/operations; modular construction methods are going to be incorporated in the design to optimise programme, reduce impact on the environment and reduce safety risks; noise levels are expected to be kept to minimal, especially in proximity to residential areas.</p>	
Land-take	No land take within the SAC is required for this Scheme.	
<i>Distance from the European site or key features of the site (from edge of the project assessment corridor)</i>	<p>The SAC is located 7.3 km north-west of the Scheme. However, based on data provided by the local record centre, there are a number of core roosts that are functionally linked with the SAC. The closest core roost, a maternity lesser horseshoe roost, is located 13.5 km at its closet point from the SAC, and is located 1.8 km from the Scheme, which is defined to be within the 'core area' of this lesser horseshoe core roost (see further details within the main report).</p> <p>The location of this lesser horseshoe roost and its core area are shown in Appendix A.2.</p>	
<i>Resource requirements (from the European site or from areas in proximity to the site, where of relevance to consideration of impacts)</i>	No resources from the SAC are required in relation to the Scheme.	

Emissions (<i>e.g. polluted surface water runoff – both soluble and insoluble pollutants, atmospheric pollution</i>)	HE methodology for air quality assessment (Design Manual for Roads and Bridges, Roads and Bridges, LA105) requires assessment of air quality effects only on European sites within 200 m of any road affected by the Scheme. Given that the Scheme is located more than 200 m from the ARN, no further assessment of air quality is required (shown in Appendix A.3).
Excavation requirements (<i>e.g. impacts of local hydrogeology</i>)	Excavations will be required to facilitate the Scheme construction. However, details of these are not yet available.
Transportation requirements	Site access and compounds have not yet been determined.
Duration of construction, operation, etc.	Construction work is set to begin in March 2026, for a period of 22 months, completion anticipated in January 2028.
Other	N/A
Description of avoidance and/or mitigation measures	
Describe any assumed (plainly established and uncontroversial) mitigation measures, including information on:	
<i>Nature of proposals</i>	Mitigation measures for the Scheme are not yet confirmed.
<i>Location</i>	N/A
Evidence for effectiveness	N/A
<i>Mechanism for delivery (legal conditions, restrictions or other legally enforceable obligations)</i>	Mitigation measures for the Scheme are not yet confirmed.
Characteristics of European site(s)	
A brief description of the European site:	
Name of European site and its EU code	Bath and Bradford-on-Avon Bats SAC (UK0012584)
Location and distance of the European site from the proposed works	Bath and Bradford-on-Avon Bats SAC is comprised of four SSSIs, the closest of which is Box Mine SSSI located 7.3km north-west of the Scheme. Central grid reference for the SAC is ST 816 675. However, the Scheme is within 1.8 km (the core area) of a lesser horseshoe core roost associated with this SAC, as shown in Appendix A.2.
European site size	107 ha
Key features of the European site including the primary reasons for selection and any other qualifying interests	Annex II species that are the primary reason for selection: <u>1304 Greater horseshoe bat</u> This site in southern England includes the hibernation sites associated with 15% of the UK greater horseshoe bat population and is selected on the basis of the importance of this exceptionally large overwintering population. <u>1323 Bechstein's bat</u> Small numbers of Bechstein's bat have been recorded hibernating in abandoned mines in the area though maternity sites remain unknown.

	Other Annex II species present as a qualifying feature: <u>1303 Lesser horseshoe bat</u>
Vulnerability of the European site – any information available from the standard data forms on potential effect pathways	<p>The Natura 2000 data sheet⁵⁵ for the SAC lists the following threats:</p> <ul style="list-style-type: none"> • Outdoor sports and leisure activities, recreational activities (inside the SAC); • Other ecosystem modifications (both within and outside the SAC); • Unknown threat or pressure (outside the SAC); • Other urbanisation, industrial and similar activities (both within and outside the SAC); • Modification of cultivation practices (inside the SAC). <p>The Site Improvement Plan for the SAC⁵⁶ lists the following pressures and threats:</p> <ol style="list-style-type: none"> 1. Pressure/Threat: Planning permission general; 2. Threat: Change in land management; 3. Threat: Direct impact from third party 4. Threat: Feature location / extent / condition unknown; 5. Threat: Offsite habitat availability / management; 6. Pressure/Threat: Public access / Disturbance; 7. Pressure/Threat: Change to site conditions; 8. Threat: Inappropriate designation boundary.
European site conservation objectives – where these are readily available	<p>Natural England's conservation objectives⁵⁷ for the SAC are as follows:</p> <p><i>'Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;</i></p> <ul style="list-style-type: none"> • <i>The extent and distribution of the habitats of qualifying species;</i> • <i>The structure and function of the habitats of qualifying species;</i> • <i>The supporting processes on which the habitats of qualifying species rely;</i> • <i>The populations of qualifying species; and</i> • <i>The distribution of qualifying species within the site.'</i>
Assessment Criteria	
Describe the individual elements of the project (either alone or in combination with other plans or projects) likely to give rise to impacts on the European site.	
<p><u>Impacts of the Scheme alone</u></p> <p>Impacts on the lesser horseshoe maternity core roost located 1.8 km from the Scheme could include:</p> <ul style="list-style-type: none"> • Habitat loss from the creation of the new road (including foraging and/or commuting routes within their core area); 	

⁵⁵ Natural England (2016). Natura 2000 – Standard Data Form, Bath and Bradford-on-Avon bats SAC. Available from <https://jncc.gov.uk/jncc-assets/SAC-N2K/UK0012584.pdf> (accessed May 2021)

⁵⁶ Natural England (2016). Improvement Programme for England's Natura 2000 Sites (IPENS), Site Improvement Plan for Bath and Bradford-on-Avon bats SAC. Available from <http://publications.naturalengland.org.uk/publication/4564119772463104?category=5755515191689216> (accessed May 2021)

⁵⁷ Natural England (2018). European site Conservation Objectives for Bath and Bradford-on-Avon bats SAC (UK0012584). Available from <http://publications.naturalengland.org.uk/publication/6279810384920576?category=5374002071601152> (accessed May 2021)

- The creation of the new road could cut off the maternity roost from key foraging areas, leading to fragmentation of these bats from functionally linked habitats, i.e. the pockets of woodland east of Melksham (as shown on OS data);
- The construction works as well as the operation stage of the Scheme could lead to additional lighting, noise and vibration that may disturb these bats, specifically during the maternity period; and
- The operational phase of the Scheme may sever commuting routes and lead to direct mortality/injury from collisions with traffic.

In-Combination Impacts

The majority of plans or projects were not found to have LSEs in-combination with the Scheme on this European site. However, the Wiltshire Local Plan Review Habitats Regulations Assessment Scoping Report, the Wiltshire Housing Site Allocations Plan and the Leafy Lane natural burial site identified potential impacts to Bath and Bradford-on-Avon Bats SAC. Therefore there is potential for in-combination effects for this site also.

Initial Assessment

The key characteristics of the site and the details of the European site should be considered in identifying potential impacts.

Describe any likely changes to the site arising as a result of:

Reduction of habitat area	The majority of the habitats that overlap with the core area of the core bat roost and the Scheme are arable and improved grassland (shown in Appendix A.2 and A.4), these habitat types are not considered likely to represent important foraging habitat for the lesser horseshoe bats, however the hedgerows that border these habitats may provide key commuting routes. Additionally, the small pockets of woodland (including priority habitat deciduous woodland) east of Melksham (well connected to other suitable habitats via hedgerows, shown in Appendix A.4) may provide suitable foraging habitat (although these are outside of the defined arbitrary 2 km core area of this lesser horseshoe core roost). Four pockets of deciduous woodland are to be lost or severed as a result of the Scheme (all outside of the core area of this core roost) and approximately 60 hedgerows are to be lost (some within the lesser horseshoe roost's core area).
Disturbance to key species	A lesser horseshoe roost associated with the SAC is located within 1.8 km of the Scheme, which is deemed to be within the roost's core area. The majority of the habitats within the core area that overlap with the Scheme are not considered optimal for foraging and commuting bats, however the pockets of woodland further north of the core area may provide some foraging habitat.
Habitat or species fragmentation	The Scheme involves the construction of a new bypass, therefore habitat fragmentation and severance has been identified as a LSE. The construction of the road itself and associated lighting has the potential to impact the SAC qualifying bat species (lesser horseshoe bats) foraging and commuting habitat.
Reduction in species density	No areas within the SAC will be affected.
Changes in key indicators of conservation value (water quality, etc)	The Scheme is not considered to lead to significant changes in the air, water quality or water resources at the site as a result of the works.
Climate change	Climate change is not listed as a threat or pressure in relation to this site.

Describe any likely impacts on the European site as a whole in terms of:	
Interference with the key relationships that define the structure of the site	No interference is anticipated as a result of the Scheme.
Interference with key relationships that define the function of the site	No interference is anticipated with key relationships that define the function of the Site.
Indicate the significance as a result of the identification of impacts set out above in terms of:	
Reduction of habitat area	There is currently uncertainty and unless further survey work demonstrates otherwise, it is assumed that the impact is significant.
Disturbance to key species	There is currently uncertainty and unless further survey work demonstrates otherwise, it is assumed that the impact is significant.
Habitat or species fragmentation	There is currently uncertainty and unless further survey work demonstrates otherwise, it is assumed that the impact is significant.
Fragmentation	There is currently uncertainty and unless further survey work demonstrates otherwise, it is assumed that the impact is significant.
Disruption	There is currently uncertainty and unless further survey work demonstrates otherwise, it is assumed that the impact is significant.
Disturbance	There is currently uncertainty and unless further survey work demonstrates otherwise, it is assumed that the impact is significant.
Change to key elements of the site (e.g. water quality, hydrological regime etc)	Not significant
Describe from the above those elements of the project, or combination of elements, where the above impacts are likely to be significant or where the scale or magnitude of impacts is not known.	
<p>Impacts on the lesser horseshoe maternity core roost located 1.8 km from the Scheme could include:</p> <ul style="list-style-type: none"> • Habitat loss / reduction from the creation of the new road (including foraging and/or commuting routes within their core area); • The creation of the new road could cut off the maternity roost from key foraging areas, leading to fragmentation of these bats from functionally linked habitats, i.e. the pockets of woodland east of Melksham (as shown on OS data); • The construction works as well as the operation stage of the Scheme could lead to additional lighting, noise and vibration that may disturb/disrupt these bats, specifically during the maternity period; and • The operational phase of the Scheme may sever commuting routes and lead to direct mortality/injury from collisions with traffic. 	
Outcome of screening stage (delete as appropriate).	Potential for a LSE.

<p><i>Are the appropriate statutory environmental bodies in agreement with this conclusion (delete as appropriate and attach relevant correspondence).</i></p>	<p>Not been consulted with yet, this document will form part of the consultation. This document will be updated following stake holder consultation.</p>
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Mells Valley SAC Screening Matrix

Project:		Melksham Bypass
European site under consideration:		Mells Valley SAC
Date:	Author (Name/Organisation):	Verified (Name/Organisation):
Nov 2021	Senior Ecologist (Atkins Ltd)	Associate Director (Atkins Ltd)
Description of Project		
Describe any likely direct, indirect or secondary impacts of the project (either alone or in combination with other plans or projects) on the European site by virtue of:		
Size and scale (<i>road type and probable traffic volume</i>)	<p>The proposed Scheme option will provide a 9 km long full bypass to the east of Melksham. The key components of the works include construction of three priority roundabouts, significant alternations to existing roads including Lower Woodrow road and A350, crossings over Wilts and Berks canal, a viaduct over the river Avon, a series of attenuation ponds and extinction or diversion of various PRow.</p> <p>Construction of the Scheme is assumed to start in 2026 with the Scheme open to traffic in 2028. At this early stage of design development, much of the construction methodology of the Scheme is currently unknown and assumptions are required for the assessment to understand the construction effects. Some general assumptions include construction activities that affect the existing A350 will avoid peak times to minimise congestion and therefore disruption during construction; night works will be limited as far as and possible; PRow will be kept open as long as it is safe to do so during construction; temporary light pollution is expected to be kept to minimum, only when required for safe working/operations; modular construction methods are going to be incorporated in the design to optimise programme, reduce impact on the environment and reduce safety risks; noise levels are expected to be kept to minimal, especially in proximity to residential areas.</p>	
Land-take	No land take within the SAC is required for this Scheme.	
Distance from the European site or key features of the site (<i>from edge of the project assessment corridor</i>)	The SAC is located 19.4 km south-west of the Scheme.	
Resource requirements (<i>from the European site or from areas in proximity to the site, where of relevance to consideration of impacts</i>)	No resources from the SAC are required in relation to the Scheme.	
Emissions (<i>e.g. polluted surface water runoff – both soluble and insoluble pollutants, atmospheric pollution</i>)	<p>HE methodology for air quality assessment (Design Manual for Roads and Bridges, Roads and Bridges, LA105) requires assessment of air quality effects only on European sites within 200 m of any road affected by the Scheme. Given that the Scheme is located 19.4 km from the SAC, and is not within 200 m of the ARN (see Appendix A.3), no further assessment of air quality is required.</p> <p>Road traffic is a source of pollutants that can enter watercourses through dissolved particulates from highway</p>	

	runoff. The SAC lies adjacent to Mells Stream and Egford Brook which flow into Mells River and River Frome and eventually the River Avon which the Scheme crosses. However, due to the large distance from the SAC to the proposed Scheme no impacts on hydrology local to the SAC are anticipated.
Excavation requirements (<i>e.g. impacts of local hydrogeology</i>)	At a distance of at least 19.4 km, excavation works associated with the Scheme will not impact the local hydrogeology of the SAC.
Transportation requirements	Construction traffic will not be routed in the vicinity of the SAC.
Duration of construction, operation, etc.	Construction work is set to begin in March 2026, for a period of 22 months, completion anticipated in January 2028.
Other	N/A
Description of avoidance and/or mitigation measures	
Describe any assumed (plainly established and uncontroversial) mitigation measures, including information on:	
<i>Nature of proposals</i>	Mitigation measures for the Scheme are not yet confirmed.
<i>Location</i>	N/A
Evidence for effectiveness	N/A
<i>Mechanism for delivery (legal conditions, restrictions or other legally enforceable obligations)</i>	Mitigation measures for the Scheme are not yet confirmed.
Characteristics of European site(s)	
A brief description of the European site:	
Name of European site and its EU code	Mells Valley SAC (UK0012658)
Location and distance of the European site from the proposed works	Mells Valley SAC is comprised of three SSSIs, the closest of which is Vallis Vale SSSI located 19.4km south-west of the Scheme. Central grid reference ST 657 476.
European site size	28.77 ha
Key features of the European site including the primary reasons for selection and any other qualifying interests	Annex I habitats present as a qualifying feature but not the primary reason for selection of this site: 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>) (important orchid sites) 8310 Caves not open to the public Annex II species that are the primary reason for selection: 1304 Greater horseshoe bat Mells Valley in southern England is selected on the basis of the size of its exceptional breeding population. It contains the maternity site associated with a population comprising about 12% of the UK greater horseshoe bat population. A proportion of the population also hibernates at the site, though other hibernation sites remain unknown.

<p>Vulnerability of the European site – any information available from the standard data forms on potential effect pathways</p>	<p>The Natura 2000 data sheet⁵⁸ for the SAC lists the following threats:</p> <ul style="list-style-type: none"> • Unknown threat or pressure (outside the SAC); • Other human intrusions and disturbances (inside the SAC); • Outdoor sports and leisure activities, recreational activities (inside the SAC); • Grazing (inside the SAC). <p>The Site Improvement Plan for the SAC⁵⁹ lists the following pressures and threats:</p> <ol style="list-style-type: none"> 1. Threat: Public access/disturbance 2. Threat: Wildfire/arson 3. Pressure: Direct impact from third party 4. Pressure: Undergrazing 5. Pressure: Inappropriate designation boundary 6. Pressure: Air pollution: impact of atmospheric nitrogen deposition.
<p>European site conservation objectives – where these are readily available</p>	<p>Natural England’s conservation objectives⁶⁰ for the SAC are as follows:</p> <p><i>‘Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;</i></p> <ul style="list-style-type: none"> • <i>The extent and distribution of qualifying natural habitats and habitats of qualifying species;</i> • <i>The structure and function (including typical species) of qualifying natural habitats;</i> • <i>The structure and function of the habitats of qualifying species;</i> • <i>The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely;</i> • <i>The populations of qualifying species; and</i> • <i>The distribution of qualifying species within the site.’</i>
<p>Assessment Criteria</p>	
<p>Describe the individual elements of the project (either alone or in combination with other plans or projects) likely to give rise to impacts on the European site.</p>	
<p>No impacts are anticipated as a result of the Scheme on the qualifying habitats or species for the SAC given the distance of the designated site from the Scheme, presence of built-up areas and the A303 and A361 separating them, as well as the absence of connecting watercourses.</p>	
<p>Initial Assessment</p>	
<p>The key characteristics of the site and the details of the European site should be considered in identifying potential impacts.</p>	

⁵⁸ Natural England (2015). Natura 2000 – Standard Data Form, Mells Valley SAC. Available from <https://jncc.gov.uk/jncc-assets/SAC-N2K/UK0012658.pdf> (accessed May 2021)

⁵⁹ Natural England (2016). Improvement Programme for England's Natura 2000 Sites (IPENS), Site Improvement Plan for Mells Valley SAC. Available from <http://publications.naturalengland.org.uk/publication/4665580590202880?category=5755515191689216> (accessed May 2021)

⁶⁰ Natural England (2014). European site Conservation Objectives for Mells Valley SAC (UK0012658). Available from : <http://publications.naturalengland.org.uk/publication/6056443799142400?category=5374002071601152> (accessed May 2021)

Describe any likely changes to the site arising as a result of:	
Reduction of habitat area	<p>The majority of the habitats within the proposed Scheme are arable and improved grassland (shown in Appendix A.4), these habitat types are not considered to represent important foraging habitat for the qualifying SAC bat species however the small pockets of woodland (including priority habitat deciduous woodland) along the route and hedgerows, as shown in Appendix A.4) may provide suitable foraging / commuting habitat. Four pockets of deciduous woodland are to be lost or severed as a result of the Scheme and 58 hedgerows are to be lost, some trees and ponds are also to be lost.</p> <p>At a distance of 19.4 km from the Scheme to the SAC, there is no significant functional linkage between the Scheme and the qualifying bat populations as the Scheme is outside of the core areas and CSZ of the core roosts. Therefore any loss of habitat as a result of the Scheme is highly unlikely to have a significant detrimental effect on the populations of bats associated with the SAC.</p>
Disturbance to key species	There is no significant functional linkage between the Scheme and the qualifying bat populations due to the fact the Scheme is 19.4 km from the qualifying populations and therefore outside the bat core zones of sustenance.
Habitat or species fragmentation	There is no significant functional linkage between the Scheme and the qualifying bat populations due to the fact the Scheme is 19.4 km from the qualifying populations and therefore outside the bat core zones of sustenance
Reduction in species density	No areas within the SAC will be affected.
Changes in key indicators of conservation value (water quality, etc)	The Scheme is not considered to lead to significant changes in the air, water quality or water resources as a result of the works.
Climate change	Climate change is not listed as a threat or pressure in relation to this site.
Describe any likely impacts on the European site as a whole in terms of:	
Interference with the key relationships that define the structure of the site	No interference is anticipated as a result of the Scheme.
Interference with key relationships that define the function of the site	No interference is anticipated with key relationships that define the function of the Site.
Indicate the significance as a result of the identification of impacts set out above in terms of:	
Reduction of habitat area	Not significant
Disturbance to key species	Not significant
Habitat or species fragmentation	Not significant
Loss	Not significant
Fragmentation	Not significant

Disruption	Not significant
Disturbance	Not significant
Change to key elements of the site <i>(e.g. water quality, hydrological regime etc)</i>	Not significant
Describe from the above those elements of the project, or combination of elements, where the above impacts are likely to be significant or where the scale or magnitude of impacts is not known.	
No significant impacts on the SAC are anticipated.	
<i>Outcome of screening stage (delete as appropriate).</i>	No LSE anticipated
<i>Are the appropriate statutory environmental bodies in agreement with this conclusion (delete as appropriate and attach relevant correspondence).</i>	Not been consulted with yet, this document will form part of the consultation. This document will be updated following stake holder consultation.

Chillmark Quarries SAC Screening Matrix

Project:		Melksham Bypass
European site under consideration:		Chillmark Quarries SAC
Date:	Author (Name/Organisation):	Verified (Name/Organisation):
Nov 2021	Senior Ecologist (Atkins Ltd)	Associate Director (Atkins Ltd)
Description of Project		
Describe any likely direct, indirect or secondary impacts of the project (either alone or in combination with other plans or projects) on the European site by virtue of:		
Size and scale (<i>road type and probable traffic volume</i>)	<p>The proposed Scheme option will provide a 9 km long full bypass to the east of Melksham. The key components of the works include construction of three priority roundabouts, significant alternations to existing roads including Lower Woodrow road and A350, crossings over Wilts and Berks canal, a viaduct over the river Avon, a series of attenuation ponds and extinction or diversion of various PRow.</p> <p>Construction of the Scheme is assumed to start in 2026 with the Scheme open to traffic in 2028. At this early stage of design development, much of the construction methodology of the Scheme is currently unknown and assumptions are required for the assessment to understand the construction effects. Some general assumptions include construction activities that affect the existing A350 will avoid peak times to minimise congestion and therefore disruption during construction; night works will be limited as far as and possible; PRow will be kept open as long as it is safe to do so during construction; temporary light pollution is expected to be kept to minimum, only when required for safe working/operations; modular construction methods are going to be incorporated in the design to optimise programme, reduce impact on the environment and reduce safety risks; noise levels are expected to be kept to minimal, especially in proximity to residential areas.</p>	
Land-take	No land take within the SAC is required for this Scheme.	
Distance from the European site or key features of the site (<i>from edge of the project assessment corridor</i>)	The SAC is located 29.8 km south of the Scheme.	
Resource requirements (<i>from the European site or from areas in proximity to the site, where of relevance to consideration of impacts</i>)	No resources from the SAC are required in relation to the Scheme.	
Emissions (<i>e.g. polluted surface water runoff – both soluble and insoluble pollutants, atmospheric pollution</i>)	HE methodology for air quality assessment (Design Manual for Roads and Bridges, Roads and Bridges, LA105) requires assessment of air quality effects only on European sites within 200 m of any road affected by the Scheme. Given that the Scheme is located 29.8km from the SAC, no further assessment of air quality is required.	

Excavation requirements (<i>e.g. impacts of local hydrogeology</i>)	At a distance of at least 29.8 km, excavation works associated with the Scheme will not impact the local hydrogeology of the SAC.
Transportation requirements	Construction traffic will not be routed in the vicinity of the SAC.
Duration of construction, operation, etc.	Construction work is set to begin in March 2026, for a period of 22 months, completion anticipated in January 2028.
Other	
Description of avoidance and/or mitigation measures	
Describe any assumed (plainly established and uncontroversial) mitigation measures, including information on:	
<i>Nature of proposals</i>	Mitigation measures for the Scheme are not yet confirmed.
<i>Location</i>	Good practice to avoid pollution, minimise damage to habitats and disturbance to wildlife will be implemented along the entire Scheme.
Evidence for effectiveness	The standard pollution prevention measures to be implemented are proven to be effective in minimising the risk of pollution. Other proposed mitigation measures are also plainly established and uncontroversial and follow relevant best practice guidelines.
<i>Mechanism for delivery (legal conditions, restrictions or other legally enforceable obligations)</i>	Mitigation measures for the Scheme are not yet confirmed.
Characteristics of European site(s)	
A brief description of the European site:	
Name of European site and its EU code	Chilmark Quarries SAC (UK0016373)
Location and distance of the European site from the proposed works	Chilmark Quarries SAC is comprised of 2 SSSIs, the closest of which is Fonthill Grottoes SSSI 29.8km south of the Scheme. Central grid reference for the SAC is ST 974 310. Located 29.8km south of the Scheme. This site The SAC has a combined total area of approx. 10 ha and supports the following qualifying species: <ul style="list-style-type: none"> • Lesser horseshoe bat • Greater horseshoe bat • Barbastelle bat • Bechstein's bat
European site size	10.16 ha
Key features of the European site including the primary reasons for selection and any other qualifying interests	Annex II species that are the primary reason for selection: <u>1304 Greater horseshoe bat</u> This complex of abandoned stone mines provides suitable hibernation conditions for a range of bat species and has a long history of usage by greater horseshoe bats.

	<p><u>1308 Barbastelle</u></p> <p>This complex of abandoned mines in central-southern England is regularly used by small numbers of barbastelle as a hibernation site. The site also contains an important assemblage of other bat species, including 1323 Bechstein's bat for which this site has also been selected, indicating that conditions at this site are particularly favourable for the survival of these bat species.</p> <p><u>1323 Bechstein's bat</u></p> <p>This complex of abandoned mines in central-southern England is regularly used as a hibernation site by small numbers of Bechstein's bat. The site also contains a nationally important assemblage of other bats, including 1308 barbastelle, for which this site has also been selected, indicating that conditions are particularly favourable for the survival of these bat species.</p> <p>Annex II species present as a qualifying feature:</p> <p><u>1303 Lesser horseshoe bat</u></p>
<p>Vulnerability of the European site – any information available from the standard data forms on potential effect pathways</p>	<p>The Natura 2000 data sheet⁶¹ for the SAC lists the following threats:</p> <ul style="list-style-type: none"> • Air pollution, air borne pollutants (both within and outside the SAC); • Changes in biotic conditions (both within and outside the SAC); • Outdoor sports and leisure activities, recreational activities (inside the SAC); • Other urbanisation, industrial and similar activities (both within and outside the SAC); • Abiotic (slow) natural processes (within the SAC). <p>The Site Improvement Plan for the SAC⁶² lists the following pressures and threats:</p> <ol style="list-style-type: none"> 1. Threat: Public access / disturbance; 2. Pressure/Threat: Natural changes to site conditions; 3. Threat: Offsite habitat availability/ management; 4. Pressure/Threat: Planning permission general; 5. Pressure: Air pollution: impact of atmospheric nitrogen deposition.
<p>European site conservation objectives – where these are readily available</p>	<p>Natural England's conservation objectives⁶³ for the SAC are as follows:</p> <p><i>'Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;</i></p> <ul style="list-style-type: none"> • The extent and distribution of the habitats of qualifying species;

⁶¹ Natural England (2016). Natura 2000 – Standard Data Form, Chilmark Quarries SAC. Available from <https://jncc.gov.uk/jncc-assets/SAC-N2K/UK0016373.pdf> (accessed May 2021)

⁶² Natural England (2016). Improvement Programme for England's Natura 2000 Sites (IPENS), Site Improvement Plan for Chilmark Quarries SAC. Available from <http://publications.naturalengland.org.uk/publication/5962539112333312?category=5755515191689216> (accessed May 2021)

⁶³ Natural England (2018). European site Conservation Objectives for Chilmark Quarries SAC (UK0016373). Available from: <http://publications.naturalengland.org.uk/publication/4553200514367488?category=5374002071601152> (accessed May 2021)

	<ul style="list-style-type: none"> • The structure and function of the habitats of qualifying species; • The supporting processes on which the habitats of qualifying species rely; • The populations of qualifying species; and • The distribution of qualifying species within the site.'
Assessment Criteria	
Describe the individual elements of the project (either alone or in combination with other plans or projects) likely to give rise to impacts on the European site.	
<u>Impacts of the Scheme alone</u> No impacts are anticipated as a result of the Scheme on the qualifying species for the SAC.	
<u>In-Combination Impacts</u> No plans or projects were not found to have LSEs in-combination with the Scheme on this European site.	
Initial Assessment	
The key characteristics of the site and the details of the European site should be considered in identifying potential impacts.	
Describe any likely changes to the site arising as a result of:	
Reduction of habitat area	<p>The majority of the habitats within the proposed Scheme are arable and improved grassland (shown in Appendix A.4), these habitat types are not considered to represent important foraging habitat for the qualifying SAC bat species however the small pockets of woodland (including priority habitat deciduous woodland) along the route and hedgerows, as shown in Appendix A.4) may provide suitable foraging / commuting habitat. Four pockets of deciduous woodland are to be lost or severed as a result of the Scheme and 58 hedgerows are to be lost, some trees and ponds are also to be lost.</p> <p>However, at a distance of 29.8 km from the Scheme to the SAC, there is no significant functional linkage between the Scheme and the qualifying bat populations, therefore any loss of habitat as a result of the Scheme is highly unlikely to have a significant detrimental effect on the populations of bats associated with the SAC.</p>
Disturbance to key species	At a distance of 19.4 km from the Scheme to the SAC, there is no significant functional linkage between the Scheme and the qualifying bat populations, therefore any disturbance to populations of bats as a result of the proposed works are not likely to impact populations associated with the SAC.
Habitat or species fragmentation	At a distance of 19.4 km from the Scheme to the SAC, there is no significant functional linkage between the Scheme and the qualifying bat populations, therefore any disturbance to populations of bats as a result of the proposed works are not likely to impact populations associated with the SAC.
Reduction in species density	No areas within the SAC will be affected.
Changes in key indicators of conservation value (water quality, etc)	The Scheme is not considered to lead to significant changes in the air, water quality or water resources as a result of the works.

Climate change	Climate change is not listed as a threat or pressure in relation to this site.
Describe any likely impacts on the European site as a whole in terms of:	
Interference with the key relationships that define the structure of the site	No interference is anticipated as a result of the Scheme.
Interference with key relationships that define the function of the site	No interference is anticipated with key relationships that define the function of the Site.
Indicate the significance as a result of the identification of impacts set out above in terms of:	
Reduction of habitat area	Not significant
Disturbance to key species	Not significant
Habitat or species fragmentation	Not significant
Loss	Not significant
Fragmentation	Not significant
Disruption	Not significant
Disturbance	Not significant
Change to key elements of the site (e.g. water quality, hydrological regime etc)	Not significant
Describe from the above those elements of the project, or combination of elements, where the above impacts are likely to be significant or where the scale or magnitude of impacts is not known.	
No significant impacts as a result of the Scheme are anticipated on the SAC.	
<i>Outcome of screening stage (delete as appropriate).</i>	No LSE anticipated
<i>Are the appropriate statutory environmental bodies in agreement with this conclusion (delete as appropriate and attach relevant correspondence).</i>	Not been consulted with yet, this document will form part of the consultation. This document will be updated following stake holder consultation.

Severn Estuary SAC Screening Matrix

Project:		Melksham Bypass
European site under consideration:		Severn Estuary SAC
Date:	Author (Name/Organisation):	Verified (Name/Organisation):
Nov 2021	Ecologist (Atkins Ltd.)	Associate Director (Atkins Ltd.)
Description of Project		
Describe any likely direct, indirect or secondary impacts of the project (either alone or in combination with other plans or projects) on the European site by virtue of:		
Size and scale (<i>road type and probable traffic volume</i>)	<p>The proposed Scheme option will provide a 9 km long full bypass to the east of Melksham. The key components of the works include construction of three priority roundabouts, significant alternations to existing roads including Lower Woodrow road and A350, crossings over Wilts and Berks canal, a viaduct over the river Avon, a series of attenuation ponds and extinction or diversion of various PRow.</p> <p>Construction of the Scheme is assumed to start in 2026 with the Scheme open to traffic in 2028. At this early stage of design development, much of the construction methodology of the Scheme is currently unknown and assumptions are required for the assessment to understand the construction effects. Some general assumptions include construction activities that affect the existing A350 will avoid peak times to minimise congestion and therefore disruption during construction; night works will be limited as far as and possible; PRow will be kept open as long as it is safe to do so during construction; temporary light pollution is expected to be kept to minimum, only when required for safe working/operations; modular construction methods are going to be incorporated in the design to optimise programme, reduce impact on the environment and reduce safety risks; noise levels are expected to be kept to minimal, especially in proximity to residential areas.</p>	
Land-take	No land take within the SAC is required for this Scheme	
Distance from the European site or key features of the site (<i>from edge of the project assessment corridor</i>)	The SAC is located 40 km north west of the Scheme at the closest point. However, the distance from this site to the Scheme via this watercourse connection is approximately 70 km.	
Resource requirements (<i>from the European site or from areas in proximity to the site, where of relevance to consideration of impacts</i>)	No resources from the SAC are required in relation to this Scheme.	
Emissions (<i>e.g. polluted surface water runoff – both soluble and insoluble pollutants, atmospheric pollution</i>)	HE methodology for air quality assessment (Design Manual for Roads and Bridges, Roads and Bridges, LA105) requires assessment of air quality effects only on European sites within 200 m of any road affected by the Scheme. Given that the Scheme is located 40 km from the SAC, and is not within 200 m of the ARN (see Appendix A.3), no further assessment of air quality is required.	

Excavation requirements (<i>e.g. impacts of local hydrogeology</i>)	At a distance of at least 40 km, excavation works associated with the Scheme will not impact the local hydrogeology of the SAC.
Transportation requirements	Construction traffic will not be routed in the vicinity of the SAC.
Duration of construction, operation, etc.	Construction work is set to begin in March 2026, for a period of 22 months, completion anticipated in January 2028.
Other	
Description of avoidance and/or mitigation measures	
<i>Nature of proposals</i>	Mitigation measures for the Scheme are not yet confirmed.
<i>Location</i>	Good practice to avoid pollution, minimise damage to habitats and disturbance to wildlife will be implemented along the entire Scheme.
Evidence for effectiveness	The standard pollution prevention measures to be implemented are proven to be effective in minimising the risk of pollution. Other proposed mitigation measures are also plainly established and uncontroversial and follow relevant best practice guidelines.
<i>Mechanism for delivery (legal conditions, restrictions or other legally enforceable obligations)</i>	Mitigation measures for the Scheme are not yet confirmed.
Characteristics of European site(s)	
A brief description of the European site:	
Name of European site and its EU code	Severn Estuary SAC (UK0013030)
Location and distance of the European site from the proposed works	The SAC is located approximately 40 km north west of the Scheme, or approximately 70 km downstream by hydrological connection
European site size	73,714.11 ha
Key features of the European site including the primary reasons for selection and any other qualifying interests	<p><u>Annex I habitats that are a primary reason for selection of this site:</u></p> <ul style="list-style-type: none"> • 1130 Estuaries; • 1140 Mudflats and sandflats not covered by seawater at low tide; • 1330 Atlantic salt meadows; • Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site; • 1110 Sandbanks which are slightly covered by sea water all the time; and • 1170 Reefs. <p><u>Annex II species that are a primary reason for selection of this site:</u></p> <ul style="list-style-type: none"> • 1095 Sea lamprey • 1099 River lamprey and

	<ul style="list-style-type: none"> • 1103 Twaite shad
Vulnerability of the European site – any information available from the standard data forms on potential effect pathways	<p>Principal threats and pressures comprise:</p> <ul style="list-style-type: none"> • Other urbanisation, industrial and similar activities; • Changes in abiotic conditions; • Human induced changes in hydraulic conditions; • Outdoor sports and leisure activities; and • Modification of cultivation practices.
European site conservation objectives – where these are readily available	<p>Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:</p> <ul style="list-style-type: none"> • The extent and distribution of qualifying habitats and habitats of qualifying species; • The structure and function (including typical species) of qualifying natural habitats; • The structure and function of the habitats of qualifying species; • The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely; • The populations of qualifying species; and • The distribution of qualifying species within the site.
Assessment Criteria	
Describe the individual elements of the project (either alone or in combination with other plans or projects) likely to give rise to impacts on the European site.	
The Scheme is located approximately 40 km from the SAC at its closest point or 70 km via the shortest hydrological connection. The potential impact pathways that have been identified are via this hydrological connection. The assessment below discusses these potential impact pathways in more detail.	
Initial Assessment	
The key characteristics of the site and the details of the European site should be considered in identifying potential impacts.	
Describe any likely changes to the site arising as a result of:	
Reduction of habitat area	<p>The Scheme would not result in a reduction in habitat area from within the SAC itself.</p> <p>As the design of the River Avon bridge is still in progress, it could not be ruled out that the Scheme would have a significant effect on functionally linked habitats of the qualifying feature fish population of twaite shad associated with the SAC.</p>
Disturbance to key species	<p>The Scheme is a considerable distance from the SAC. However, as it cannot be ruled out that twaite shad are within the River Avon where the Scheme crosses it, and as a precautionary approach it must be assumed that there could be a disturbance of qualifying feature fish populations of twaite shad within functionally linked habitats of the SAC.</p>
Habitat or species fragmentation	<p>The Scheme is a considerable distance from the SAC. However, as it cannot be ruled out that twaite shad the River Avon where the Scheme crosses it, and as a precautionary approach it must</p>

	be assumed that species fragmentation could occur on a permanent (operational stage) or temporary (construction stage) to qualifying feature fish populations of twaite shad within functionally linked habitats of the SAC.
Reduction in species density	As it cannot be ruled out that twaite shad could be impacted by the Scheme, as a precautionary approach it must be assumed that there could be a reduction in species density within the SAC as a result of the Scheme.
Changes in key indicators of conservation value (water quality, etc)	<p>Although there is a direct hydrological connection between the Scheme and the Severn Estuary SAC, at such a distance (70 km), it is considered that the potential for direct impacts via release of pollutants from the Scheme would be eliminated by dilution. DMRB guidance LA 113 states that “for assessment of impacts associated with soluble pollutants, outfalls within 1 km (measured along the watercourse) shall be aggregated for the purposes of cumulative assessment⁶⁴”. It therefore follows that soluble pollutants are considered to be sufficiently diluted beyond 1 km.</p> <p>However, as fish populations of twaite shad that may be present in the River Avon that is crossed by the Scheme, risks of significant spillage of chemical contaminant or silt pollution could affect functionally linked habitats of this fish and therefore also the designated site.</p>
Climate change	Climate change is not listed as a threat or pressure in relation to this site.
<i>Describe any likely impacts on the European site as a whole in terms of:</i>	
Interference with the key relationships that define the structure of the site	No LSE on the structure (i.e. the distribution and abundance of habitats) of the SAC are anticipated as a result of the Scheme alone or in combination with other plans or projects.
Interference with key relationships that define the function of the site	No LSE on the function (i.e. the capacity of the SAC to support the qualifying features) of the SAC are anticipated as a result of the Scheme alone or in combination with other plans or projects.
<i>Indicate the significance as a result of the identification of impacts set out above in terms of:</i>	
Reduction of habitat area	There is currently uncertainty and unless further survey work demonstrates otherwise, it is assumed that the impact is significant on twaite shad.
Disturbance to key species	There is currently uncertainty and unless further survey work demonstrates otherwise, it is assumed that the impact is significant on twaite shad.
Habitat or species fragmentation	There is currently uncertainty and unless further survey work demonstrates otherwise, it is assumed that the impact is significant on twaite shad.
Loss	There is currently uncertainty and unless further survey work demonstrates otherwise, it is assumed that the impact is significant on twaite shad.

⁶⁴ Highways England (2020). Design Manual for Roads and Bridges LA 113 Road drainage and the water environment.

Fragmentation	There is currently uncertainty and unless further survey work demonstrates otherwise, it is assumed that the impact is significant on twaite shad.
Disruption	There is currently uncertainty and unless further survey work demonstrates otherwise, it is assumed that the impact is significant on twaite shad.
Disturbance	There is currently uncertainty and unless further survey work demonstrates otherwise, it is assumed that the impact is significant on twaite shad.
Change to key elements of the site (e.g. water quality, hydrological regime etc)	Not significant
Describe from the above those elements of the project, or combination of elements, where the above impacts are likely to be significant or where the scale or magnitude of impacts is not known.	
NA	
<i>Outcome of screening stage (delete as appropriate).</i>	<p>LSE from the Scheme at construction and operational phase cannot be ruled out for twaite shad associated with the SAC. Impact pathways identified for this species include :</p> <ul style="list-style-type: none"> • Fragmentation/barrier effects, disturbance during construction of the River Avon bridge; • Potential habitat loss from the construction of the River Avon bridge; and • Pollution events during construction and operational phases of the Scheme. <p>Future survey work planned as part of the development of the Scheme design will include fish surveys. These will serve to inform the Stage 2 of the HRA for this project in relation to impacts on twaite shad.</p>
<i>Are the appropriate statutory environmental bodies in agreement with this conclusion (delete as appropriate and attach relevant correspondence).</i>	Not been consulted with yet, this document will form part of the consultation. This document will be updated following stake holder consultation.

Severn Estuary SPA Screening Matrix

Project:		Melksham Bypass
European site under consideration:		Severn Estuary SPA
Date:	Author (Name/Organisation):	Verified (Name/Organisation):
June 2021	Senior Ecologist (Atkins Ltd)	Associate Director (Atkins Ltd)
Description of Project		
Describe any likely direct, indirect or secondary impacts of the project (either alone or in combination with other plans or projects) on the European site by virtue of:		
Size and scale (<i>road type and probable traffic volume</i>)	<p>The proposed Scheme option will provide a 9 km long full bypass to the east of Melksham. The key components of the works include construction of three priority roundabouts, significant alternations to existing roads including Lower Woodrow road and A350, crossings over Wilts and Berks canal, a viaduct over the river Avon, a series of attenuation ponds and extinction or diversion of various PRow.</p> <p>Construction of the Scheme is assumed to start in 2026 with the Scheme open to traffic in 2028. At this early stage of design development, much of the construction methodology of the Scheme is currently unknown and assumptions are required for the assessment to understand the construction effects. Some general assumptions include construction activities that affect the existing A350 will avoid peak times to minimise congestion and therefore disruption during construction; night works will be limited as far as and possible; PRow will be kept open as long as it is safe to do so during construction; temporary light pollution is expected to be kept to minimum, only when required for safe working/operations; modular construction methods are going to be incorporated in the design to optimise programme, reduce impact on the environment and reduce safety risks; noise levels are expected to be kept to minimal, especially in proximity to residential areas.</p>	
Land-take	No land take within the SPA is required for this Scheme	
Distance from the European site or key features of the site (<i>from edge of the project assessment corridor</i>)	The SAC is located 40 km north west of the Scheme at the closest point, however the distance from this site to the Scheme via this watercourse connection is approximately 70 km	
Resource requirements (<i>from the European site or from areas in proximity to the site, where of relevance to consideration of impacts</i>)	No resources from the SPA are required in relation to this Scheme.	
Emissions (<i>e.g. polluted surface water runoff – both soluble and insoluble pollutants, atmospheric pollution</i>)	HE methodology for air quality assessment (Design Manual for Roads and Bridges, Roads and Bridges, LA105) requires assessment of air quality effects only on European sites within 200 m of any road affected by the Scheme. Given that the Scheme is located 40 km from the SPA, no further assessment of air quality is required.	

Excavation requirements (<i>e.g. impacts of local hydrogeology</i>)	At a distance of at least 40 km (as the crow flies), excavation works associated with the Scheme will not impact the local hydrogeology of the SPA.
Transportation requirements	Construction traffic will not be routed in the vicinity of the SPA.
Duration of construction, operation, etc.	Construction work is set to begin in March 2026, for a period of 22 months, completion anticipated in January 2028.
Other	
Description of avoidance and/or mitigation measures	
<i>Nature of proposals</i>	Mitigation measures for the Scheme are not yet confirmed.
<i>Location</i>	Good practice to avoid pollution, minimise damage to habitats and disturbance to wildlife will be implemented along the entire Scheme.
Evidence for effectiveness	The standard pollution prevention measures to be implemented are proven to be effective in minimising the risk of pollution. Other proposed mitigation measures are also plainly established and uncontroversial and follow relevant best practice guidelines.
<i>Mechanism for delivery (legal conditions, restrictions or other legally enforceable obligations)</i>	N/A
Characteristics of European site(s)	
A brief description of the European site:	
Name of European site and its EU code	Severn Estuary SPA (UK9015022)
Location and distance of the European site from the proposed works	The SPA is located approximately 40 km north west of the Scheme, or 70 km via hydrological connection
European site size	24,700.91 ha
Key features of the European site including the primary reasons for selection and any other qualifying interests	<p>This site qualifies under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive:</p> <p>Over winter; Bewick's swan, 280 individuals representing at least 4.0% of the wintering population in Great Britain (5 year peak mean 1991/2 - 1995/6).</p> <p>This site also qualifies under Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species:</p> <p>On passage; Ringed plover, 655 individuals representing at least 1.3% of the Europe/Northern Africa - wintering population (5 year peak mean 1991/2 - 1995/6).</p> <p>Over winter; Curlew, 3,903 individuals representing at least 1.1% of the wintering Europe - breeding population (5 year peak mean 1991/2 - 1995/6);</p>

	<p>Over winter; Dunlin, 44,624 individuals representing at least 3.2% of the wintering Northern Siberia/Europe/Western Africa population (5 year peak mean 1991/2 - 1995/6);</p> <p>Over winter; Pintail, 599 individuals representing at least 1.0% of the wintering Northwestern Europe population (5 year peak mean 1991/2 - 1995/6);</p> <p>Over winter; Redshank, 2,330 individuals representing at least 1.6% of the wintering Eastern Atlantic - wintering population (5 year peak mean 1991/2 - 1995/6); and</p> <p>Over winter; Shelduck, 3,330 individuals representing at least 1.1% of the wintering Northwestern Europe population (5 year peak mean 1991/2 - 1995/6).</p> <p>Assemblage qualification: A wetland of international importance.</p> <p>The area qualifies under Article 4.2 of the Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl.</p> <p>Over winter, the area regularly supports 93,986 individual waterfowl (5 year peak mean 1991/2 - 1995/6) including: Gadwall, shelduck, pintail, dunlin, curlew, redshank, Bewick's swan, wigeon, lapwing, teal, mallard, shoveler, pochard, tufted duck, grey plover, white-fronted goose and whimbrel.</p>
<p>Vulnerability of the European site – any information available from the standard data forms on potential effect pathways</p>	<p>Principal threats and pressures comprise:</p> <ul style="list-style-type: none"> • Outdoor sports and leisure activities; • Other urbanisation, industrial and similar activities; • Modification of cultivation practices; • Changes in abiotic conditions; and • Human induced changes in hydraulic conditions.
<p>European site conservation objectives – where these are readily available</p>	<ul style="list-style-type: none"> • Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring: • The extent and distribution of the habitats of the qualifying features; • The structure and function of the habitats of the qualifying features; • The supporting processes on which the habitats of the qualifying features rely; • The population of each of the qualifying features; and • The distribution of the qualifying features within the site.
<p>Assessment Criteria</p>	
<p>Describe the individual elements of the project (either alone or in combination with other plans or projects) likely to give rise to impacts on the European site.</p>	
<p><u>Impacts of the Scheme alone</u> No impacts are anticipated as a result of the Scheme on the qualifying species for the SPA.</p> <p><u>In-Combination Impacts</u> No plans or projects were not found to have LSEs in-combination with the Scheme on this European site</p>	
<p>Initial Assessment</p>	

<p>The key characteristics of the site and the details of the European site should be considered in identifying potential impacts.</p> <p>Describe any likely changes to the site arising as a result of:</p>	
Reduction of habitat area	<p>The Scheme would not result in a direct reduction in habitat from within the SPA.</p> <p>The Scheme would not have a significant effect on functionally linked habitats either, as the abundance of similar agricultural habitats in the Severn Vale, including substantial areas that are closer to the SPA, means that the qualifying feature populations associated with the SPA are highly unlikely to depend upon habitats that would be affected by the Scheme.</p>
Disturbance to key species	<p>The Scheme is 40 km from the SPA, suggesting no direct risk of disturbance.</p> <p>The Scheme would not result in disturbance of qualifying feature populations within functionally linked habitats either, as there is not considered to be a significant functional linkage between the Scheme and the qualifying feature populations (see above).</p>
Habitat or species fragmentation	<p>The Scheme would not result in fragmentation of the SPA or any significant functionally linked habitats.</p>
Reduction in species density	<p>The Scheme would not result in a reduction in species density within the SPA.</p>
Changes in key indicators of conservation value (water quality, etc)	<p>The Scheme would not result in any changes in any key indicators of conservation value. If any pollutants were to be discharged from the Scheme into the River Avon, these would be diluted to a negligible level by the time they reached the SPA, almost 70 km downstream.</p>
Climate change	<p>Climate change is not listed as a threat or pressure in relation to this site.</p>
<p>Describe any likely impacts on the European site as a whole in terms of:</p>	
Interference with the key relationships that define the structure of the site	<p>No LSE on the structure (i.e. the distribution and abundance of habitats) of the SPA are anticipated as a result of the Scheme alone or in combination with other plans or projects.</p>
Interference with key relationships that define the function of the site	<p>No LSE on the function (i.e. the capacity of the SPA to support the qualifying features) of the SPA are anticipated as a result of the Scheme alone or in combination with other plans or projects.</p>
<p>Indicate the significance as a result of the identification of impacts set out above in terms of:</p>	
Reduction of habitat area	Not significant
Disturbance to key species	Not significant
Habitat or species fragmentation	Not significant
Loss	N/A
Fragmentation	N/A
Disruption	N/A

Disturbance	N/A
Change to key elements of the site <i>(e.g. water quality, hydrological regime etc)</i>	Not significant
Describe from the above those elements of the project, or combination of elements, where the above impacts are likely to be significant or where the scale or magnitude of impacts is not known.	
N/A	
<i>Outcome of screening stage (delete as appropriate).</i>	No LSE anticipated
<i>Are the appropriate statutory environmental bodies in agreement with this conclusion (delete as appropriate and attach relevant correspondence).</i>	Not been consulted with yet, this document will form part of the consultation. This document will be updated following stake holder consultation.

Severn Estuary Ramsar Screening Matrix

Project:		Melksham Bypass
European site under consideration:		Severn Estuary Ramsar
Date:	Author (Name/Organisation):	Verified (Name/Organisation):
Nov 2021	Senior Ecologist (Atkins Ltd)	Associate Director (Atkins Ltd)
Description of Project		
Describe any likely direct, indirect or secondary impacts of the project (either alone or in combination with other plans or projects) on the European site by virtue of:		
Size and scale (<i>road type and probable traffic volume</i>)	<p>The proposed Scheme option will provide a 9 km long full bypass to the east of Melksham. The key components of the works include construction of three priority roundabouts, significant alternations to existing roads including Lower Woodrow road and A350, crossings over Wilts and Berks canal, a viaduct over the river Avon, a series of attenuation ponds and extinction or diversion of various PRow.</p> <p>Construction of the Scheme is assumed to start in 2026 with the Scheme open to traffic in 2028. At this early stage of design development, much of the construction methodology of the Scheme is currently unknown and assumptions are required for the assessment to understand the construction effects. Some general assumptions include construction activities that affect the existing A350 will avoid peak times to minimise congestion and therefore disruption during construction; night works will be limited as far as and possible; PRow will be kept open as long as it is safe to do so during construction; temporary light pollution is expected to be kept to minimum, only when required for safe working/operations; modular construction methods are going to be incorporated in the design to optimise programme, reduce impact on the environment and reduce safety risks; noise levels are expected to be kept to minimal, especially in proximity to residential areas.</p>	
Land-take	No land take within the Ramsar is required for this Scheme.	
Distance from the European site or key features of the site (<i>from edge of the project assessment corridor</i>)	The Ramsar is located 40 km north west of the Scheme at the closest point, however the distance from this site to the Scheme via this watercourse connection is approximately 70 km	
Resource requirements (<i>from the European site or from areas in proximity to the site, where of relevance to consideration of impacts</i>)	No resources from the Ramsar are required in relation to this Scheme.	
Emissions (<i>e.g. polluted surface water runoff – both soluble and insoluble pollutants, atmospheric pollution</i>)	HE methodology for air quality assessment (Design Manual for Roads and Bridges, Roads and Bridges, LA105) requires assessment of air quality effects only on European sites within 200 m of any road affected by the Scheme. Given that the Scheme is located 40 km from the Ramsar, no further assessment of air quality is required.	

Excavation requirements (<i>e.g. impacts of local hydrogeology</i>)	At a distance of at least 40 km (as the crow flies), excavation works associated with the Scheme will not impact the local hydrogeology of the Ramsar.
Transportation requirements	Construction traffic will not be routed in the vicinity of the Ramsar.
Duration of construction, operation, etc.	Construction work is set to begin in March 2026, for a period of 22 months, completion anticipated in January 2028.
Other	N/A
Description of avoidance and/or mitigation measures	
<i>Nature of proposals</i>	Mitigation measures for the Scheme are not yet confirmed.
<i>Location</i>	Good practice to avoid pollution, minimise damage to habitats and disturbance to wildlife will be implemented along the entire Scheme.
Evidence for effectiveness	The standard pollution prevention measures to be implemented are proven to be effective in minimising the risk of pollution. Other proposed mitigation measures are also plainly established and uncontroversial and follow relevant best practice guidelines.
<i>Mechanism for delivery (legal conditions, restrictions or other legally enforceable obligations)</i>	Mitigation measures for the Scheme are not yet confirmed.
Characteristics of European site(s)	
A brief description of the European site:	
Name of European site and its EU code	Severn Estuary Ramsar (UK11081)
Location and distance of the European site from the proposed works	The Ramsar is located 40 km north west of the Scheme at the closest point, or approximately 70 km by the nearest hydrological connection.
European site size	24,662.98 ha
Key features of the European site including the primary reasons for selection and any other qualifying interests	<p>Ramsar criterion 1: Due to immense tidal range (second-largest in world), this affects both the physical environment and biological communities.</p> <p>Habitats Directive Annex I features present on the SAC include:</p> <ul style="list-style-type: none"> • H1110 Sandbanks which are slightly covered by sea water all the time; • H1130 Estuaries; • H1140 Mudflats and sandflats not covered by seawater at low tide; and • H1330 Atlantic salt meadows. <p>Ramsar criterion 3: Due to unusual estuarine communities, reduced diversity and high productivity.</p>

	<p>Ramsar criterion 4: This site is important for the run of migratory fish between sea and river via estuary. Species include salmon, sea trout, sea lamprey, river lamprey, allis shad, twaite shad, and eel. It is also of particular importance for migratory birds during spring and autumn.</p> <p>Ramsar criterion 8: The fish assemblage of the whole estuarine and river system is one of the most diverse in Britain, with over 110 species recorded. Atlantic salmon, sea trout, sea lamprey, river lamprey, allis shad, twaite shad and eel use the Severn Estuary as a key migration route to their spawning grounds in the many tributaries that flow into the estuary. The site is important as a feeding and nursery ground for many fish species, particularly allis shad and twaite shad, which feed on mysid shrimps in the salt wedge.</p> <p>Ramsar criterion 5: Assemblages of international importance: Peak counts in winter: 70,919 waterfowl (5 year peak mean 1998/99-2002/03)</p> <p>Ramsar criterion 6 – species/populations occurring at levels of international importance: Qualifying species/populations (as identified at designation): Species with peak counts in winter:</p> <ul style="list-style-type: none"> • Bewick’s swan, NW Europe -229 individuals, representing an average of 2.8% of the GB population (5 year peak mean 1998/9-2002/3); • White-fronted goose, NW Europe – 2,076 individuals, representing an average of 35.8% of the GB population (5 year peak mean for 1996/7-2000/01); • Common shelduck, NW Europe – 3,223 individuals, representing an average of 1% of the population (5 year peak mean 1998/9-2002/3); • Gadwall, NW Europe - 241 individuals, representing an average of 1.4% of the GB population (5 year peak mean 1998/9-2002/3); • Dunlin, W Siberia/W Europe – 25,082 individuals, representing an average of 1.8% of the population (5 year peak mean 1998/9-2002/3); and • Common redshank - 2,616 individuals, representing an average of 1% of the population (5 year peak mean 1998/9-2002/3). • Species/populations identified subsequent to designation for possible future consideration under criterion 6: • Species regularly supported during the breeding season: • Lesser black-backed gull, W Europe/Mediterranean/W Africa – 4,167 apparently occupied nests, representing an average of 2.8% of the breeding population (Seabird 2000 Census). • Species with peak counts in spring/autumn: • Ringed plover, Europe/Northwest Africa - 740 individuals, representing an average of 1% of the population (5 year peak mean 1998/9-2002/3). <p>Species with peak counts in winter:</p>
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	<ul style="list-style-type: none"> • Eurasian teal, NW Europe – 4,456 individuals, representing an average of 1.1% of the population (5 year peak mean 1998/9-2002/3); and • Northern pintail (<i>Anas acuta</i>), NW Europe - 756 individuals, representing an average of 1.2% of the population (5 year peak mean 1998/9-2002/3).
Vulnerability of the European site – any information available from the standard data forms on potential effect pathways	<p>Factors (past, present or potential) adversely affecting the site's ecological character:</p> <ul style="list-style-type: none"> • Dredging; • Erosion; and • Recreational/tourism disturbance.
European site conservation objectives – where these are readily available	<p>No specific conservation objectives found</p> <p>The overarching objective of the Ramsar Convention is to stem the loss and progressive encroachment on wetlands now and in the future.</p>
Assessment Criteria	
Describe the individual elements of the project (either alone or in combination with other plans or projects) likely to give rise to impacts on the European site.	
<p>The Scheme is located approx. 40 km from the Ramsar site or 70 km via hydrological connection. LSE from the Scheme at construction and operational phase cannot be ruled out at screening stage on twaite and allis shad, European eel, Atlantic salmon and sea trout associated with the Ramsar. Impact pathways for these species associated with the Ramsar include potential:</p> <ul style="list-style-type: none"> • Fragmentation/barrier effects, disturbance during construction of the River Avon bridge; • Potential habitat loss from the construction and operation phase of the Scheme from the construction of the River Avon bridge; and • Impacts to fish (particularly twaite and allis shad, European eel, Atlantic salmon and sea trout), from the Scheme as a result of a pollution event during construction and operational phases of the Scheme. <p>The assessment below discusses these potential impact pathways in more detail.</p>	
Initial Assessment	
<p>The key characteristics of the site and the details of the European site should be considered in identifying potential impacts.</p> <p>Describe any likely changes to the site arising as a result of:</p>	
Reduction of habitat area	<p>The Scheme would not result in a reduction in habitat area from within the Ramsar site.</p> <p>The Scheme would not have a significant effect on functionally linked bird habitats, as the abundance of similar agricultural habitats in the Severn Vale, including substantial areas that are closer to the Ramsar site, means that the bird populations associated with the Ramsar site are highly unlikely to depend upon habitats that would be affected by the Scheme.</p> <p>The Scheme would be minimal in the context of the wider Severn catchment network. However, migratory fish that are functionally linked to the Ramsar (it cannot be ruled out that European eel, sea and river lamprey, Atlantic salmon and allis and twaite shad) could be present in the vicinity of the Scheme within the River Avon. As such, there is the potential for impacts to these species,</p>

	and functionally linked habitat within or surrounding the Scheme as a result of a pollution event during construction. Such impacts could arise through changes to water quality as a result of mobilisation of suspended sediments leading to silt laden run-off entering watercourses; and potential for accidental contamination associated with the spillage or leakage of fuels, lubricants and other chemicals required for construction. In particular, such impacts could occur during the construction of the new bridge over the River Avon.
Disturbance to key species	<p>The Scheme is too far from the Ramsar for there to be any direct disturbance.</p> <p>The Scheme is too far from the Ramsar site for there to be any direct disturbance. The Scheme would not result in disturbance of associated bird populations within functionally linked habitats either, as there is not considered to be a significant functional linkage between the Scheme and the qualifying feature populations (see above).</p> <p>It cannot currently be ruled out that European eel, sea and river lamprey, Atlantic salmon and allis and twaite shad are present in the vicinity of the Scheme within the River Avon. As such, there is potential for short-term impacts to these species within or surrounding the Scheme as a result of noise or vibration disturbance during construction of the new Link Road, in particular the construction of the new bridge over the River Avon.</p>
Habitat or species fragmentation	Although the Scheme would not result in a physical barrier to fish migration, the disturbance impacts described above could potentially result in habitat fragmentation/barrier effects on fish.
Reduction in species density	The Scheme would not result in a reduction in species density within the Ramsar site.
Changes in key indicators of conservation value (water quality, etc)	<p>The Scheme would not result in any changes in any key indicators of conservation value. If any pollutants were to be discharged from the Scheme into the adjacent hydrological network, these would be diluted to a negligible level by the time they reached the Ramsar site, over 70 km downstream.</p> <p>However, as fish populations associated with the Ramsar may be present in the River Avon that is crossed by the Scheme, risks of significant spillage of chemical contaminant or silt pollution could affect functionally linked habitats of these fish and therefore also the designated site.</p>
Climate change	Climate change is not listed as a threat or pressure in relation to this site.
<i>Describe any likely impacts on the European site as a whole in terms of:</i>	
Interference with the key relationships that define the structure of the site	No LSE on the structure (i.e. the distribution and abundance of habitats) of the Ramsar site are anticipated as a result of the Scheme alone or in combination with other plans or projects.
Interference with key relationships that define the function of the site	No LSE on the function (i.e. the capacity of the Ramsar site to support the qualifying features) of the Ramsar site are anticipated as a result of the Scheme alone or in combination with other plans or projects.
<i>Indicate the significance as a result of the identification of impacts set out above in terms of:</i>	

Reduction of habitat area	There is currently uncertainty and unless further survey work demonstrates otherwise, it is assumed that the impact is significant within the River Avon.
Disturbance to key species	There is currently uncertainty and unless further survey work demonstrates otherwise, it is assumed that the impact is significant within the River Avon.
Habitat or species fragmentation	There is currently uncertainty and unless further survey work demonstrates otherwise, it is assumed that the impact is significant within the River Avon.
Loss	There is currently uncertainty and unless further survey work demonstrates otherwise, it is assumed that the impact is significant within the River Avon.
Fragmentation	There is currently uncertainty and unless further survey work demonstrates otherwise, it is assumed that the impact is significant within the River Avon.
Disruption	There is currently uncertainty and unless further survey work demonstrates otherwise, it is assumed that the impact is significant within the River Avon.
Disturbance	There is currently uncertainty and unless further survey work demonstrates otherwise, it is assumed that the impact is significant within the River Avon.
Change to key elements of the site (e.g. water quality, hydrological regime etc)	Not significant
Describe from the above those elements of the project, or combination of elements, where the above impacts are likely to be significant or where the scale or magnitude of impacts is not known.	
<i>Outcome of screening stage (delete as appropriate).</i>	<p>LSE from the Scheme at construction and operational phase cannot be ruled out at screening stage on fish species including twaite and allis shad, European eel, Atlantic salmon and sea trout associated with the Ramsar. Impact pathways for these species associated with the Ramsar include potential:</p> <ul style="list-style-type: none"> • Fragmentation/barrier effects, disturbance during construction; • Potential habitat loss from the construction and operation phase of the Scheme; and • Impacts to fish (particularly twaite and allis shad, European eel, Atlantic salmon and sea trout), from the Scheme as a result of a pollution event during construction and operational phases of the Scheme. <p>Future survey work planned as part of the development of the Scheme design will include fish and bird surveys. These will serve to inform the Stage 2 of the HRA assessment for this project in relation to impacts on birds and fish species including twaite and allis shad, European eel, Atlantic salmon and sea trout associated with the integrity of this Ramsar.</p>

<p><i>Are the appropriate statutory environmental bodies in agreement with this conclusion (delete as appropriate and attach relevant correspondence).</i></p>	<p>Not been consulted with yet, this document will form part of the consultation. This document will be updated following stake holder consultation.</p>
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Appendix C. Finding of No Significant Effects Report Matrix (Screening)

Mells Valley SAC Finding of No Significant Effects Report Matrix (Screening)		
Project Name	Melksham Bypass	
Natura 2000 Site under Consideration	Mells Valley SAC	
Date:	Author (Name/Organisation):	Verified (Name/Organisation):
June 2021	Senior Ecologist (Atkins Ltd)	Associate Director (Atkins Ltd)
Name and location of European site	Mells Valley SAC - comprised of three SSSIs, the closest of which is Vallis Vale SSSI located 19.4km south-west of the Scheme. Central grid reference ST 657 476.	
Description of the project	<p>The proposed Scheme option will provide a 9 km long full bypass to the east of Melksham. The key components of the works include construction of three priority roundabouts, significant alternations to existing roads including Lower Woodrow road and A350, crossings over Wilts and Berks canal, a viaduct over the river Avon, a series of attenuation ponds and extinction or diversion of various PRoW.</p> <p>Construction of the Scheme is assumed to start in 2026 with the Scheme open to traffic in 2028. At this early stage of design development, much of the construction methodology of the Scheme is currently unknown and assumptions are required for the assessment to understand the construction effects. Some general assumptions include construction activities that affect the existing A350 will avoid peak times to minimise congestion and therefore disruption during construction; night works will be limited as far as and possible; PRoW will be kept open as long as it is safe to do so during construction; temporary light pollution is expected to be kept to minimum, only when required for safe working/operations; modular construction methods are going to be incorporated in the design to optimise programme, reduce impact on the environment and reduce safety risks; noise levels are expected to be kept to minimal, especially in proximity to residential areas.</p>	
Is the project directly connected with or necessary to the management of the site (provide details)?	No	
Are there other projects or plans that together with the project being assessed could affect the site (provide details)?	No	
Assessment of Significance of Effects		
Describe how the project (alone or in combination) is likely to affect the European site	No LSE alone or in-combination	
Explain why these effects are not considered significant	At a distance of 19.4 km, the Scheme is not significantly functionally linked to populations of bats associated with the SAC.	
List of agencies consulted: provide contact name and telephone or e-mail address	Not yet consulted	

Mells Valley SAC Finding of No Significant Effects Report Matrix (Screening)			
Response to consultation	N/A		
Data Collected to Carry out the Assessment			
Who carried out the assessment?	Sources of data	Level of assessment completed	Where can the full results of the assessment be accessed and viewed
	Natura 2000 Standard Data Form Natural England Designated Site details Bat SAC Planning Guidance for Wiltshire	Screening in accordance with DMRB (LA 115)	See main text of report

Chilmark Quarries SAC Finding of No Significant Effects Report Matrix (Screening)		
Project Name	Melksham Bypass	
Natura 2000 Site under Consideration	Chilmark Quarries SAC	
Date:	Author (Name/Organisation):	Verified (Name/Organisation):
June 2021	Senior Ecologist (Atkins Ltd)	Associate Director (Atkins Ltd)
Name and location of European site	Chilmark Quarries SAC - comprised of two SSSIs, the closest of which is Fonthill Grottoes SSSI 29.8km south of the Scheme. Central grid reference for the SAC is ST 974 310.	
Description of the project	<p>The proposed Scheme option will provide a 9 km long full bypass to the east of Melksham. The key components of the works include construction of three priority roundabouts, significant alternations to existing roads including Lower Woodrow road and A350, crossings over Wilts and Berks canal, a viaduct over the river Avon, a series of attenuation ponds and extinction or diversion of various PRoW.</p> <p>Construction of the Scheme is assumed to start in 2026 with the Scheme open to traffic in 2028. At this early stage of design development, much of the construction methodology of the Scheme is currently unknown and assumptions are required for the assessment to understand the construction effects. Some general assumptions include construction activities that affect the existing A350 will avoid peak times to minimise congestion and therefore disruption during construction; night works will be limited as far as and possible; PRoW will be kept open as long as it is safe to do so during construction; temporary light pollution is expected to be kept to minimum, only when required for safe working/operations; modular construction methods are going to be incorporated in the design to optimise programme, reduce impact on the environment and reduce safety risks; noise levels are expected to be kept to minimal, especially in proximity to residential areas.</p>	
Is the project directly connected with or necessary to the management of the site (provide details)?	No	
Are there other projects or plans that together with the project being assessed could affect the site (provide details)?	No	

Chilmark Quarries SAC Finding of No Significant Effects Report Matrix (Screening)			
Assessment of Significance of Effects			
Describe how the project (alone or in combination) is likely to affect the European site	No LSE alone or in-combination		
Explain why these effects are not considered significant	At a distance of 29.8 km, the Scheme is not significantly functionally linked to the SAC.		
List of agencies consulted: provide contact name and telephone or e-mail address	N/A		
Response to consultation	N/A		
Data Collected to Carry out the Assessment			
Who carried out the assessment?	Sources of data	Level of assessment completed	Where can the full results of the assessment be accessed and viewed
	Natura 2000 Standard Data Form Natural England Designated Site details Bat SAC Planning Guidance for Wiltshire	Screening in accordance with DMRB (LA 115)	See main text of report

Severn Estuary SPA Finding of No Significant Effects Report Matrix (Screening)		
Project Name	Melksham Bypass	
Natura 2000 Site under Consideration	Severn Estuary SPA	
Date:	Author (Name/Organisation):	Verified (Name/Organisation):
June 2021	Senior Ecologist (Atkins Ltd)	Associate Director (Atkins Ltd)
Name and location of European site	Severn Estuary SPA. The SPA is located approximately 40 km north west of the Scheme, or approximately 70 km downstream by the shortest hydrological connection.	
Description of the project	<p>The proposed Scheme option will provide a 9 km long full bypass to the east of Melksham. The key components of the works include construction of three priority roundabouts, significant alternations to existing roads including Lower Woodrow road and A350, crossings over Wilts and Berks canal, a viaduct over the river Avon, a series of attenuation ponds and extinction or diversion of various PRoW.</p> <p>Construction of the Scheme is assumed to start in 2026 with the Scheme open to traffic in 2028. At this early stage of design development, much of the construction methodology of the Scheme is currently unknown and assumptions are required for the assessment to understand the construction effects. Some general assumptions include construction activities that affect the existing A350 will avoid peak times to minimise congestion and therefore disruption during construction; night works will be limited as far as and possible; PRoW will be kept open as long as it is safe to do so during construction; temporary light pollution is expected to be kept to minimum, only when required for safe working/operations; modular construction methods are going to be incorporated in the design to optimise programme, reduce impact on the environment and reduce</p>	

Severn Estuary SPA Finding of No Significant Effects Report Matrix (Screening)			
	safety risks; noise levels are expected to be kept to minimal, especially in proximity to residential areas.		
Is the project directly connected with or necessary to the management of the site (provide details)?	No		
Are there other projects or plans that together with the project being assessed could affect the site (provide details)?	No		
Assessment of Significance of Effects			
Describe how the project (alone or in combination) is likely to affect the European site	No LSE alone or in-combination		
Explain why these effects are not considered significant	The Scheme would not result in a direct reduction in habitat from within the SPA as the site is approximately 40 km north west of the Scheme, or approximately 70 km downstream by the shortest hydrological connection. The Scheme would also not have a significant effect on functionally linked habitats either, as the abundance of similar agricultural habitats in the Severn Vale, including substantial areas that are closer to the SPA, means that the qualifying bird populations associated with the SPA are highly unlikely to depend upon habitats that would be affected by the Scheme.		
List of agencies consulted: provide contact name and telephone or e-mail address	N/A		
Response to consultation	N/A		
Data Collected to Carry out the Assessment			
Who carried out the assessment?	Sources of data	Level of assessment completed	Where can the full results of the assessment be accessed and viewed
	Natura 2000 Standard Data Form Natural England Designated Site details	Screening in accordance with LA 115	See main text of report

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