Regional Investment Programme M25 Junction 10/A3 Wisley Interchange Preliminary Environmental Information Report

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Appendix A. Air Quality

A.1 Planning and policy context

Air Quality Criteria

A.1.1 There are two sets of ambient air quality criteria for the protection of public health: legally binding, mandatory limit values set by the EU; and objectives set out in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland (AQS)[1] which local authorities are required to work towards achieving. Both sets of criteria are implemented in Air Quality Regulations (The Air Quality Standards Regulations 2010 (SI 2010/1001)[2] for EU limit values and the Air Quality (England) Regulations (SI 2000/928)[3] as amended (2002/3043)[4] for AQS objectives). Air quality criteria relevant to the air quality assessment are summarised in Table A.1 for NO_2 and PM_{10}. These are the pollutants of most concern near roads (DMRB HA207/07 paragraph 1.1). In both cases, the criteria are the same for both the EU limit values and the AQS objectives.

Table A.1: Relevant human health air quality criteria

Pollutant	Criteria
NO_2	1-hour 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
	Annual mean concentration should not exceed 40 µg/m^3

Ecological Criteria

A.1.2 The EU Directive sets a critical level for annual mean concentrations of nitrogen oxides (NO_x) to protect sensitive vegetation. This is included in the Air Quality Standards Regulations (SI 2010/1001). Assessment of compliance with this critical level is undertaken at locations more than 20 km from towns with more than 250,000 inhabitants or more than 5 km from other built-up areas, industrial installations or motorways or major roads with traffic counts of more than 50,000 vehicles per day. UK statutory nature conservation agencies' (Natural England) policy is to apply the criterion of 30 µg/m^3, on a precautionary basis, as a benchmark only in all designated conservation sites, including 'Ramsar' sites, SPAs, SACs and SSSIs.

A.1.3 Critical loads for nitrogen deposition have been set by the United Nations Economic Commission for Europe. A critical load is a quantitative estimate of an exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur, according to present knowledge. Critical loads vary by type of habitat and species. The critical

[1] Defra (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. Retrieved 2017, from https://www.gov.uk/government/publications/2010-to-2015-government-policy-environmental-quality/2010-to-2015-government-policy-environmental-quality#appendix-5-international-european-and-national-standards-for-air-quality
[2] The National Archives (2010) The Air Quality Standards Regulations 2010: Retrieved 2017, from http://www.legislation.gov.uk/uksi/2010/1001/contents/made
[3] The National Archives (2000) The Air Quality (England) Regulations 2000: Retrieved 2017, from http://www.legislation.gov.uk/uksi/2000/928/contents/made
[4] The National Archives (2002) The Air Quality (England) (Amended) Regulations 2002: Retrieved 2017, from http://www.legislation.gov.uk/uksi/2002/3043/contents

load for deposition (eutrophication) is given as a range and is quoted in units of kg/ha/year. A single critical load is quoted for acidification, in units of kg/ha/year.

Dust deposition

A.1.4 There are no national standards or guidelines for dust deposition currently set for the UK, nor by the European Union or any international organisation. This is mainly due to the difficulty in setting a standard that needs to relate to dust being a perceptual problem rather than being specifically related to health effects. Typically, assessments use an indicative threshold for the 'likelihood of complaint' for instance, in residential areas a dust deposition flux (as an average measured over a month using a passive deposition gauge) of 200 mg/m^2/day or greater.

National Planning Policy

A.1.5 The National Planning Policy Framework (NPPF)[5] sets out the Government's requirements of the planning system. The NPPF requires LPAs to take account of air quality in plan making, stating at paragraph 124:

> *"Planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas. Planning decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan."*

National Policy Statement for National Networks

A.1.6 The NPSNN[6], prepared by the Department for Transport (DfT), provides policy and guidance relating to the development of NSIPs. It recognises (paragraph 5.3) that increased emissions of pollutants during construction or operation of projects on national networks can contribute to adverse impacts on human health, on protected species and habitats. An Environmental Statement (ES) is required for projects that may have significant air quality effects and this should describe (paragraph 5.7):

- Existing air quality levels;
- Forecasts of air quality at the time of opening, assuming that the Scheme is not built (the future baseline) and taking account of the impact of the Scheme; and
- Any significant air quality effects, their mitigation and any residual effects, distinguishing between the construction and operation stages and taking account of the impact of road traffic generated by the project.

A.1.7 NPSNN requires a judgement to be made as to the risk of a project affecting the UK's ability to comply with the Air Quality Directive; paragraph 5.11 of the NPSNN states:

[5] DCLG (2012) National Planning Policy Framework. Retrieved 2017, from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf
[6] DfT (2014) National Policy Statement for National Networks. Retrieved 2017, from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/387223/npsnn-web.pdf

> *"Air quality considerations are likely to be particularly relevant where schemes are proposed: within or adjacent to AQMAs; roads identified as being above Limit Values or nature conservation sites; and where changes are sufficient to bring about the need for a new AQMA or change the size of an existing AQMA; or bring about changes to exceedances of the Limit Values, or where they may have the potential to impact on nature conservation sites."*

A.1.8 In addition, paragraph 5.12 states:

> *"The Secretary of State must give air quality considerations substantial weight where, after taking into account mitigation, a project would lead to a significant air quality impact in relation to EIA and/or where they lead to a deterioration in air quality in a zone/agglomeration."*

A.1.9 Furthermore, paragraph 5.13 of the NPSNN, states:

> *"The Secretary of State should refuse consent where, after taking into account mitigation, the air quality impacts of the scheme will: result in a zone/agglomeration which is currently reported as being compliant; or affect the ability of a non-compliant area to achieve compliance with the most recent timescales reported to the European Commission at the time of the decision."*

Road Investment Strategy and Strategic Business Plan

A.1.10 The DfT and Highways Agency RIS published in 2015[7] sets out the DfT's aspirations for the SRN over the next 25 years. It states that by 2040 DfT aspires to a network that will be sustainable with "*zero breaches of air quality regulations and major reductions in carbon emissions across the network*".

A.1.11 The Highways England Delivery Plan 2015-2020[8] identifies Highways England's commitment to investing £75m "in a range of projects to reduce pollution and ensure the air around the network is clean and healthy". The Highways England Delivery Plan 2017-2018[9] sets out indicators that will be used to measure performance, including of relevance to air quality, the number of air quality pilot studies completed.

National Air Quality Plan

A.1.12 The government produced a UK plan for tackling roadside nitrogen dioxide concentrations in July 2017[10] which sets out the approach for meeting the statutory EU limit values for nitrogen dioxide in the shortest possible time.

Local Planning Policy

[7] DfT and Highways Agency (2015) Road Investment Strategy: for the 2015/16 - 2019/20 Road Period, March 2015. Retrieved 2017, from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/408514/ris-for-2015-16-road-period-web-version.pdf
[8] Highways England (2015) Highways England Delivery Plan 2015 - 2020. Retrieved 2017, from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/424467/DSP2036-184_Highways_England_Delivery_Plan_FINAL_low_res_280415.pdf
[9] Highways England (2017) Highways England Deliver Plan 2017-2018. Retrieved 2017, from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/642750/Highways_England_Delivery_Plan_Update_2017-2018.pdf
[10] https://www.gov.uk/government/publications/air-quality-plan-for-nitrogen-dioxide-no2-in-uk-2017

A.1.13 The following policies are of relevance to air quality:

- Policy CS25 Travel and Accessibility within the Elmbridge Core Strategy 2011 states that the council "will seek to mitigate the detrimental environmental effects cause by transport, particularly with regards to heavy goods vehicles (HGVs), through a variety of measures, which may include…improving air quality [inter alia]. Support will be given to schemes that help to meet the commitments contained in the Elmbridge Air Quality Strategy".;
- Policy DM5 Pollution within the Elmbridge Local Plan Development Management Plan 2015 states that "Within designated Air Quality Management Areas, the Council will promote measures to improve air quality and will expect development proposals to avoid introducing additional sources of pollution… Planning permission will not be granted for proposals where there is a significant adverse impact upon the status of the Air Quality Management Area or where air quality may have a harmful effect on the health of future occupiers of the development, taking into account their sensitivity to pollutants, unless the harm can be suitably mitigated".;
- Policy G1 (3) Protection of Amenities Enjoyed by Occupants of Buildings within the Guildford Borough Local Plan 2003 states that "The amenities enjoyed by occupants of buildings are protected from unneighbourly development in terms of [inter alia] pollution, dust and smell". Policy G1 (13) Mixed Use further states that "where appropriate the development incorporates or maintains an existing mix of land uses and activities where: …there is no unacceptable disturbance through traffic, noise, pollution or other adverse effects.";
- Policy DM5: Environmental Pollution within the Woking Development Management Policies Development Plan Document 2016 applies a general principle that "When assessed individually or cumulatively, development proposals should ensure that there will be no unacceptable impacts on air quality [inter alia]". Policy DM6 Air and Water Quality states that "Development that has the potential, either individually or cumulatively, for significant emissions to the detriment of air quality, particularly in designated Air Quality Management Areas … or in areas at risk of becoming an Air Quality Management Area, should include an appropriate scheme of mitigation… Development in designated Air Quality Management Areas should take account of existing air pollution and include measures to mitigate its impact on future occupiers where possible…"; and
- Policy MOV2 - The Movement Implications of Development within the Mole Valley Local Plan 2000 states that "Development will normally only be permitted where it can be demonstrated that it is or can be made compatible with the transport infrastructure and the environmental character in the area…In particular, proposals for major developments will only be permitted where it can be demonstrated that in order to accommodate the traffic generated by that development appropriate measures are made to obviate the environmental impact…".

A.1.14 There are no relevant policies within the Runnymede 2001 Local Plan.

A.1.15 The status of local planning policy will be reviewed again for the ES. It is noted that both GBC and MVDC are in the process of updating their Local Plans.

Local Air Quality Action Plan

A.1.16 Under Part IV of the Environment Act 1995, local authorities are required to regularly review and assess local air quality and identify areas where AQS objectives may be exceeded. Where the authority has declared an AQMA, it is required to prepare an Air Quality Action Plan (AQAP) describing the pollution reduction measures it will put in place. Further information on AQMAs in the air quality study area is provided in the section 5.4 Baseline conditions in Volume 1.

A.1.17 The EBC AQAP[11] identifies road traffic as the primary source of air pollution within the borough and as such includes measures such as improved traffic control, as well as strategic measures including incorporating air quality into the planning regime. Progress on measures are additionally documented in EBC's annual status reports provision of electric vehicles for council use, and provision of electric charging points.

A.1.18 The RBC AQAP[12] also recognises road traffic as the major source of air pollution in the borough. The AQAP incorporates a number of measures for improving air quality both within the AQMAs and the wider local authority area from development control, implementation of mitigation, including redesign and compensation/offsetting measures, proposals for continued air quality monitoring, and identification of a number of infrastructure projects to tackle congestion and benefit air quality, supplemented with actions to promote sustainable transport. The AQAP also references local strategies and policies, including Runnymede's Local Transport Plan 3 and Local Development Framework (now termed Local Development Scheme[13]).

A.1.19 GBC and MVDC have not produced AQAPs as there are no AQMAs within their local authority areas. Measures within the AQAP for WBC are not considered at this stage as the AQMAs within WBC are currently not within the air quality study area as defined at Option Selection stage.

A.2 Methodology

A.2.1 The air quality assessment for the Scheme has been undertaken in line with DMRB HA207/07 and has consisted of:

- Discussion of existing baseline conditions;
- Identification of sensitive receptors and AQMAs, and production of constraints maps;
- Assessment of the likely changes in local air pollutant concentrations and nitrogen deposition rates during operation at a number of receptors;
- Assessment of significance of the air quality effects including an assessment of compliance with the EU Air Quality Directive;
- Assessment of the likely changes in regional emissions during operation; and
- Identification of the need for mitigation measures where appropriate.

[11] EBC (2011) Air Quality Action Plan for Elmbridge Borough Council
[12] RBC (2014) Air Quality Action Plan for Runnymede Borough Council
[13] https://www.runnymede.gov.uk/CHttpHandler.ashx?id=16032&p=0

Existing Air Quality Information

A.2.2 A summary of existing air quality has been provided based on information collated for the PEIR.

Constraints Map

A.2.3 An air quality constraints map for the Scheme air quality study area has been produced, based on the latest available information and is shown in Figure 5.1 in Volume 3. The constraints map includes: affected roads, 200 m boundary from affected roads, sensitive receptors, AQMA boundaries, designated ecological site boundaries, and exceedance areas of air quality criteria without and with the Scheme where known.

Effects on Air Quality during Construction

A.2.4 An assessment of impacts on air quality during construction has not yet been undertaken due to the limited information currently available. Figure 5.2 in Volume 3 shows the areas and receptors that could potentially be affected by construction dust.

Effects on Air Quality during Operation

A.2.5 An air quality assessment has been undertaken principally following the guidance given in the DMRB HA207/07 and associated IANs. Due to the complexity of the Scheme and the potential for significant effects, a detailed local air quality assessment was undertaken to determine NO_2 and PM_{10} concentrations at selected human health receptors, and NO_x concentrations and nitrogen deposition at designated ecological sites in the Scheme opening year. A simple level of assessment was undertaken for regional emissions of NO_x, PM_{10} and carbon dioxide (CO_2) for the opening and design years.

A.2.6 The key scenarios included in the assessment were:

- Base year (2015) - for model verification;
- Projected base year (2022) - for long term trends assessment;
- Opening year (2022) for both the without (DM) and with Scheme (DS) - local and regional assessments; and
- Design year (2037) DM and DS - regional assessment only.

A.2.7 Traffic data was provided from the strategic SATURN traffic model (provided by Atkins transport planners) for the air quality assessment at Option Selection Stage to enable the ARN for the local and regional air quality assessments to be determined.

A.2.8 An affected road for the purposes of a local air quality assessment is defined in DMRB HA 207/07 (paragraph 3.12) as a road that meets any of the following criteria:

- Road alignment will change by 5 m or more; or
- Daily traffic flows will change by 1,000 annual average daily traffic (AADT) or more; or

- Heavy Duty Vehicle (HDV)[14] flows will change by 200 AADT or more; or
- Daily average speed will change by 10 km/hr or more; or
- Peak hour speed will change by 20 km/hr or more.

A.2.9 An affected road for the purposes of a regional air quality assessment is defined in DMRB HA 207/07 (Para 3.20) as a road that meets any of the following criteria:

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

A.2.10 The changes are applied to roads, rather than modelled links, and so where relevant are determined under two-way traffic conditions.

Local Air Quality

A.2.11 The local air quality assessment was undertaken using the atmospheric dispersion modelling software, ADMS Roads. Representative receptors were selected for the local air quality assessment and included those closest to the ARN. Sensitive human health receptors for the purposes of air quality assessment are defined in HA 207/07 (paragraph 3.13) and include 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. Sensitive ecological receptors for the purposes of air quality assessment include designated species or habitats within a Designated Site (including the following: SACs, SPAs, SSSIs and Ramsar sites)

A.2.12 The traffic data required for input into the dispersion model includes: AADT, the percentage of HDV, and speeds which will be input as a speed category, as determined in accordance with IAN 185/15[15] on speed banding. Data was provided for the am, pm, inter and off-peak periods. Other information required for input included the road geometry including orientation, length and width of links, and meteorological data.

A.2.13 The output from the dispersion model was used to provide estimates of the contribution from road traffic emissions to annual mean concentrations of NO_x and PM_{10} at discrete receptors. These incremental concentrations were combined with estimates of background concentrations, to account for other sources of air pollution, to derive total annual mean concentrations. Background concentrations were derived from the Department for Environment, Food and Rural Affairs (Defra's) background maps[16], and were checked with monitored data at background sites in the area where available, to ensure the mapped estimates are appropriate. No adjustment was considered necessary at Option Selection Stage.

A.2.14 Concentrations of NO_2 were derived from NO_x concentrations using Defra's NO_x to NO_2 calculator version 5.1, June 2016. The estimated total annual mean NO_2 concentrations were verified with comparison against available ratified

[14] Vehicles with a gross vehicle weight above 3.5 tonnes
[15] http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian185.pdf
[16] https://uk-air.defra.gov.uk/data/laqm-background-home

monitoring data and the model outputs adjusted where appropriate, with reference to Defra's Local Air Quality Management Technical Guidance (LAQM.TG)(16)[17]. No verification of PM_{10} was undertaken as there were no monitoring sites within the air quality study area.

A.2.15 In addition, an assessment was undertaken in accordance with IAN 170/12 v3[18] on the assessment of future NO_x and NO_2 projections on long term trends, to account for future year uncertainties in emissions.

A.2.16 Evaluation of compliance with EU limit values was undertaken in accordance with IAN 175/13[19].

A.2.17 Assessment of changes in NO_x concentrations and nitrogen deposition rates was undertaken at identified sensitive ecological receptors, in accordance with Annex F of the DMRB HA 207/07.

A.2.18 Evaluation of the significance of the effect of the Scheme on local air quality was undertaken in accordance with IAN 174/13[20].

Regional Emissions

A.2.19 An assessment of regional emissions of NO_x, PM_{10} and CO_2 was undertaken in accordance with DMRB HA 207/07 to determine the annual pollutant emissions for the same ARN as determined for the local air quality assessment. Emissions calculations were undertaken using emission rates derived from IAN 185/15 on speed banding. The key scenarios for assessment were:

- Base year (2015);
- Opening year (2022), for both the without (DM) and with Scheme (DS) cases; and
- Design year (2037), for both the DM and DS cases.

Vulnerability to major accidents and disasters

A.2.20 Major accidents and disasters which could potentially affect air quality receptors include: events which could affect traffic in the area such as major road traffic accidents, terrorist attacks or plane/rail crashes; and other events such as fires or chemical explosions or releases which emit air pollutants. The potential for change in significance on air quality receptors has not yet been included in the air quality assessment. However, it should be noted that any effect would be temporary and considered unlikely to significantly affect local air quality findings in the context of the determination of significance using IAN 174/13.

Assumptions and limitations

[17] Defra (2016) Local Air Quality Management Technical Guidance LAQM.TG(16). Retrieved 2017, from https://laqm.defra.gov.uk/documents/LAQM-TG16-April-16-v1.pdf
[18] DfT (2013) IAN 170/12 v3 Updated air quality advice on the assessment of future NOx and NO_2 projections for users of DMRB Volume 11, Section 3, Part 1 'Air Quality'. Retrieved 2017, from http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian170v3.pdf
[19] DfT (2013) IAN 175/13 Updated advice on risk assessment related to compliance with the EU Directive on ambient air quality and on the production of Scheme Air Quality Action Plans for users of DMRB Volume 11, Section 3, Part 1 'Air Quality' (HA 207/07). Retrieved 2017, from http://www.standardsforhighways.co.uk/ha/standards/ians/index.htm
[20] DfT (2014) IAN 174/13 Updated advice for evaluating significant local air quality effects for users of DMRB Volume 11, Section 3, Part 1 'Air Quality'. Retrieved 2017, from http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian174.pdf

A.2.21 The process of dispersion modelling has inherent areas of uncertainty, including:

- The traffic data used in the dispersion model;
- The suitability of emissions data, including future projections;
- Simplifications in model algorithms and empirical relationships that are used to simulate complex physical and chemical processes in the atmosphere;
- The suitability of background concentrations, including future projections; and
- The suitability of meteorological data.

A.2.22 Uncertainty associated with traffic data for the Preliminary Design Stage will be minimised by using a validated traffic model.

A.2.23 Uncertainties associated with emissions data will be minimised by using the most up to date speed-band emission factors available and by applying IAN 170/12 v3 for long term trends.

A.2.24 Uncertainties associated with model algorithms and empirical relationships have been minimised by using a widely used dispersion model that has been independently validated and judged as fit for purpose.

A.2.25 In line with Defra's technical guidance, the meteorological data used in the model will be for the same base year as the traffic data, background pollution and emissions data. The same meteorological data will be used in future year modelling to allow any base year model adjustments to be applied to future scenarios.

A.3 Air quality monitoring results

Table A.2: Annual Mean NOx Results (µg/m^3) for Ecological Receptors

Receptor ID	Description	2015	2022		
		Base	DM	DS	Change
R19	Ockham & Wisley Commons_5m South	168.8	122.6	131.2	8.6
R20	Ockham & Wisley Commons_10m South	142.4	103.6	110.4	6.8
R21	Ockham & Wisley Commons_25m South	103.5	75.2	79.5	4.3
R22	Ockham & Wisley Commons_50m South	77.9	56.4	58.9	2.5
R23	Ockham & Wisley Commons_75m South	66.0	47.5	49.4	1.9
R24	Ockham & Wisley Commons_100m South	59.0	42.3	43.8	1.5
R25	Ockham & Wisley Commons_150m South	51.1	36.5	37.5	1.0
R18	Ockham & Wisley Commons_200m South	46.7	33.2	34.0	0.8
R33	Ockham & Wisley Commons_5m North	199.9	145.4	154.3	8.9
R26	Ockham & Wisley Commons_10m North	170.6	124.5	131.9	7.4
R29	Ockham & Wisley Commons_25m North	125.7	91.8	96.7	4.9
R27	Ockham & Wisley Commons_50m North	95.2	69.2	72.4	3.2
R28	Ockham & Wisley Commons_75m North	80.6	58.4	60.8	2.4
R30	Ockham & Wisley Commons_100m North	71.9	51.9	53.8	1.9
R31	Ockham & Wisley Commons_150m North	62.0	44.6	45.9	1.3
R32	Ockham & Wisley Commons_200m North	56.5	40.5	41.5	1.0
R34	Epsom & Ashtead Commons_5m East	91.7	67.8	70.3	2.5
R35	Epsom & Ashtead Commons_10m East	77.3	56.6	58.5	1.9

Receptor ID	Description	2015	2022		
		Base	DM	DS	Change
R36	Epsom & Ashtead Commons_25m East	58.5	42.3	43.4	1.1
R37	Epsom & Ashtead Commons_50m East	47.6	34.1	34.8	0.7
R38	Epsom & Ashtead Commons_75m East	42.9	30.6	31.1	0.5
R39	Epsom & Ashtead Commons_100m East	40.3	28.7	29.1	0.4
R40	Epsom & Ashtead Commons_150m East	37.4	26.5	26.8	0.3
R41	Epsom & Ashtead Commons_200m East	35.7	25.3	25.5	0.2
R49	Esher Commons_5m North	127.8	95.2	98.5	3.3
R48	Esher Commons_10m North	112.1	83.2	85.9	2.7
R47	Esher Commons_25m North	86.3	63.6	65.3	1.7
R46	Esher Commons_50m North	67.3	49.2	50.3	1.1
R45	Esher Commons_75m North	58.1	42.2	43.0	0.8
R44	Esher Commons_100m North	52.6	38.0	38.7	0.7
R43	Esher Commons_150m North	46.2	33.1	33.6	0.5
R42	Esher Commons_200m North	42.6	30.4	30.8	0.4
R50	Esher Commons_5m South	99.2	73.8	75.1	1.3
R51	Esher Commons_10m South	86.5	64.0	65.1	1.1
R52	Esher Commons_25m South	64.0	46.9	47.8	0.9
R53	Esher Commons_50m South	50.5	36.6	37.2	0.6
R54	Esher Commons_75m South	44.1	31.8	32.3	0.5
R55	Esher Commons_100m South	40.5	29.0	29.4	0.4
R56	Esher Commons_150m South	36.3	25.9	26.2	0.3
R57	Esher Commons_200m South	34.1	24.2	24.5	0.3

Receptor ID	Description	2015	2022		
		Base	DM	DS	Change
R66	Papercourt_5m West	31.2	22.4	23.6	1.2
R67	Papercourt_10m West	29.9	21.5	22.4	0.9
R68	Papercourt_25m West	28.0	19.9	20.5	0.6
R69	Papercourt_50m West	26.7	18.9	19.3	0.4
R70	Papercourt_75m West	26.1	18.4	18.7	0.3
R71	Papercourt_100m West	25.7	18.1	18.4	0.3
R72	Papercourt_150m West	25.3	17.8	18.1	0.3
R73	Papercourt_200m West	25.1	17.7	17.9	0.2
R74	Bookham Commons_5m East	28.5	20.6	21.5	0.9
R76	Bookham Commons_10m East	27.0	19.4	20.1	0.7
R77	Bookham Commons_25m East	24.7	17.6	18.0	0.4
R78	Bookham Commons_50m East	23.3	16.5	16.8	0.3
R79	Bookham Commons_75m East	22.7	16.0	16.2	0.2
R80	Bookham Commons_100m East	22.3	15.7	15.9	0.2
R81	Bookham Commons_150m East	21.9	15.3	15.5	0.2
R75	Bookham Commons_200m East	21.7	15.1	15.3	0.2
R89	Bookham Commons_5m West	33.9	24.1	25.2	1.1
R88	Bookham Commons_10m West	31.7	22.5	23.4	0.9
R87	Bookham Commons_25m West	28.4	20.1	20.7	0.6
R86	Bookham Commons_50m West	26.3	18.5	18.9	0.4
R85	Bookham Commons_75m West	25.4	17.9	18.2	0.3
R84	Bookham Commons_100m West	24.4	17.2	17.5	0.3

Receptor ID	Description	2015	2022		
		Base	DM	DS	Change
R83	Bookham Commons_150m West	23.9	16.8	17.0	0.2
R82	Bookham Commons_200m West	23.6	16.6	16.8	0.2
R90	Esher Commons_5m East	28.2	19.9	20.5	0.6
R91	Esher Commons_10m East	27.1	19.1	19.6	0.5
R92	Esher Commons_25m East	25.4	17.9	18.2	0.3
R93	Esher Commons_50m East	24.3	17.1	17.3	0.2
R94	Esher Commons_75m East	23.8	16.7	16.9	0.2
R95	Esher Commons_100m East	23.5	16.5	16.7	0.2
R96	Esher Commons_150m East	23.2	16.3	16.4	0.1
R97	Esher Commons_200m East	23.0	16.2	16.3	0.1
R98	Esher Commons_5m West	38.1	27.4	26.5	-0.9
R99	Esher Commons_10m West	36.8	26.4	25.7	-0.7
R100	Esher Commons_25m West	34.9	24.9	24.6	-0.3
R101	Esher Commons_50m West	33.7	24.0	23.9	-0.1
R102	Esher Commons_75m West	33.3	23.6	23.6	0.0
R103	Esher Commons_100m West	33.1	23.4	23.5	0.1
R104	Esher Commons_150m West	32.9	23.3	23.4	0.1
R105	Esher Commons_200m West	32.9	23.3	23.4	0.1
R106	J10 Ockham & Wisley Commons_5m North	36.4	26.5	25.7	-0.8
R107	J10 Ockham & Wisley Commons_10m North	35.4	25.6	25.0	-0.6
R108	J10 Ockham & Wisley Commons_25m North	33.9	24.2	24.0	-0.2
R109	J10 Ockham & Wisley Commons_50m North	33.0	23.4	23.4	0.0

Receptor ID	Description	2015	2022		
		Base	DM	DS	Change
R114	J10 Ockham & Wisley Commons_75m North	32.5	23.0	23.1	0.1
R116	J10 Ockham & Wisley Commons_100m North	32.2	22.8	22.9	0.1
R117	J10 Ockham & Wisley Commons_150m North	31.9	22.5	22.6	0.1
R118	J10 Ockham & Wisley Commons_200m North	31.6	22.3	22.4	0.1
R110	J10 Ockham & Wisley Commons_5m South	129.8	91.1	76.6	-14.5
R111	J10 Ockham & Wisley Commons_10m South	116.6	82.2	78.9	-3.3
R112	J10 Ockham & Wisley Commons_25m South	94.5	67.3	107.9	40.6
R113	J10 Ockham & Wisley Commons_50m South	75.3	54.0	72.9	18.9
R115	J10 Ockham & Wisley Commons_75m South	65.3	46.9	53.8	6.9
R119	J10 Ockham & Wisley Commons_100m South	58.9	42.3	45.8	3.5
R120	J10 Ockham & Wisley Commons_150m South	51.4	36.8	38.3	1.5
R121	J10 Ockham & Wisley Commons_200m South	42.3	30.3	31.1	0.8

Table A.3: Nitrogen Deposition Results (kg N $ha^{-1}yr^{-1}$) for Ecological Receptor

Receptor ID	Description	Base	DM	DS	Change	Total DS % of critical load	Change as % of critical load
R19	Ockham & Wisley Commons_5m South	19.7	16.5	16.8	0.31	168	3.1
R20	Ockham & Wisley Commons_10m South	18.9	15.9	16.1	0.26	161	2.6
R21	Ockham & Wisley Commons_25m South	17.5	14.8	15.0	0.19	150	1.9
R22	Ockham & Wisley Commons_50m South	16.5	14.0	14.1	0.13	141	1.3
R23	Ockham & Wisley Commons_75m South	16.0	13.6	13.7	0.1	137	1
R24	Ockham & Wisley Commons_100m South	15.7	13.3	13.4	0.08	134	0.8

Receptor ID	Description	Base	DM	DS	Change	Total DS % of critical load	Change as % of critical load
R25	Ockham & Wisley Commons_150m South	15.3	13.0	13.1	0.05	131	0.5
R18	Ockham & Wisley Commons_200 South	15.1	12.8	12.9	0.04	129	0.4
R33	Ockham & Wisley Commons_5m North	20.7	17.3	17.6	0.3	176	3
R26	Ockham & Wisley Commons_10m North	19.8	16.6	16.9	0.26	169	2.6
R29	Ockham & Wisley Commons_25m North	18.3	15.4	15.6	0.2	156	2
R27	Ockham & Wisley Commons_50m North	17.2	14.5	14.7	0.15	147	1.5
R28	Ockham & Wisley Commons_75m North	16.6	14.1	14.2	0.12	142	1.2
R30	Ockham & Wisley Commons_100m North	16.2	13.8	13.9	0.09	139	0.9
R31	Ockham & Wisley Commons_150m North	15.8	13.4	13.5	0.07	135	0.7
R32	Ockham & Wisley Commons_200m North	15.6	13.2	13.3	0.05	133	0.5
R34	Epsom & Ashtead Commons_5m East	28.2	24.1	24.2	0.11	242	1.1
R35	Epsom & Ashtead Commons_10m East	27.7	23.6	23.7	0.09	237	0.9
R36	Epsom & Ashtead Commons_25m East	26.9	23.0	23.0	0.06	230	0.6
R37	Epsom & Ashtead Commons_50m East	26.4	22.6	22.6	0.03	226	0.3
R38	Epsom & Ashtead Commons_75m East	26.2	22.4	22.4	0.02	224	0.2
R39	Epsom & Ashtead Commons_100m East	26.1	22.3	22.3	0.01	223	0.1
R40	Epsom & Ashtead Commons_150m East	25.9	22.2	22.2	0.01	222	0.1
R41	Epsom & Ashtead Commons_200m East	25.8	22.1	22.1	0.02	221	0.2
R49	Esher Commons_5m North	15.7	13.3	13.4	0.12	134	1.2
R48	Esher Commons_10m North	15.2	12.8	12.9	0.11	129	1.1
R47	Esher Commons_25m North	14.2	12.0	12.1	0.08	121	0.8
R46	Esher Commons_50m North	13.4	11.4	11.4	0.06	114	0.6

Receptor ID	Description	Base	DM	DS	Change	Total DS % of critical load	Change as % of critical load
R45	Esher Commons_75m North	13.1	11.1	11.1	0.04	111	0.4
R44	Esher Commons_100m North	12.8	10.9	10.9	0.03	109	0.3
R43	Esher Commons_150m North	12.5	10.6	10.6	0.03	106	0.3
R42	Esher Commons_200m North	12.3	10.5	10.5	0.02	105	0.2
R50	Esher Commons_5m South	14.7	12.4	12.5	0.06	125	0.6
R51	Esher Commons_10m South	14.2	12.0	12.1	0.05	121	0.5
R52	Esher Commons_25m South	13.3	11.3	11.3	0.04	113	0.4
R53	Esher Commons_50m South	12.7	10.8	10.8	0.03	108	0.3
R54	Esher Commons_75m South	12.4	10.5	10.5	0.03	105	0.3
R55	Esher Commons_100m South	12.2	10.4	10.4	0.02	104	0.2
R56	Esher Commons_150m South	12.0	10.2	10.2	0.02	102	0.2
R57	Esher Commons_200m South	11.9	10.1	10.1	0.02	101	0.2
R106	J10 Ockham & Wisley Commons_5m North	14.8	15.4	14.8	-0.61	148	-6.1
R107	J10 Ockham & Wisley Commons_10m North	14.7	15.0	14.9	-0.14	149	-1.4
R108	J10 Ockham & Wisley Commons_25m North	14.6	14.4	16.2	1.73	162	17.3
R109	J10 Ockham & Wisley Commons_50m North	14.5	13.9	14.7	0.88	147	8.8
R114	J10 Ockham & Wisley Commons_75m North	14.5	13.5	13.9	0.33	139	3.3
R116	J10 Ockham & Wisley Commons_100m North	14.5	13.3	13.5	0.17	135	1.7
R117	J10 Ockham & Wisley Commons_150m North	14.4	13.0	13.1	0.07	131	0.7
R118	J10 Ockham & Wisley Commons_200m North	14.4	12.6	12.7	0.04	127	0.4
R110	J10 Ockham & Wisley Commons_5m South	24.9	14.6	15.4	0.79	154	7.9
R111	J10 Ockham & Wisley Commons_10m South	24.8	14.3	15.7	1.37	157	13.7

Receptor ID	Description	Base	DM	DS	Change	Total DS % of critical load	Change as % of critical load
R112	J10 Ockham & Wisley Commons_25m South	24.6	13.8	15.2	1.38	152	13.8
R113	J10 Ockham & Wisley Commons_50m South	24.5	13.4	13.8	0.46	138	4.6
R115	J10 Ockham & Wisley Commons_75m South	24.5	13.1	13.3	0.18	133	1.8
R119	J10 Ockham & Wisley Commons_100m South	24.4	13.0	13.1	0.08	131	0.8
R120	J10 Ockham & Wisley Commons_150m South	24.4	12.8	12.8	0.04	128	0.4
R121	J10 Ockham & Wisley Commons_200m South	24.4	12.3	12.3	0.02	123	0.2

Appendix B. Noise and Vibration

B.1 Planning and policy context

B.1.1 Current noise policy in England is based on the Noise Policy Statement for England (NPSE)[21], which through the effective management and control of environmental noise within the context of Government policy on sustainable development, aims to:

- avoid significant adverse impacts on health and quality of life;
- mitigate and minimise other adverse impacts on health and quality of life; and
- contribute to improvements to health and quality of life, where possible.

B.1.2 These aims are reflective of those contained in the National Planning Policy Framework (NPPF) and are further echoed in the National Policy Statement for National Networks (NPSNN[22])and Planning Practice Guidance (PPG) concerning noise[23].

B.1.3 The Explanatory Note to the NPSE assists in the definition of significant adverse and adverse with the following concepts:

- NOEL - no observed effect level. This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise;
- LOAEL - lowest observed adverse effect level. This is the level above which adverse effects on health and quality of life can be detected; and
- SOAEL - significant observed adverse effect level. This is the level above which significant adverse effects on health and quality of life occur.

B.1.4 The Government policy and guidance do not state values for the NOEL, LOAEL and SOAEL, rather, it considers that they are different for different noise sources, for different receptors and at different times and should be defined on a strategic or project basis taking into account the specific features of that area, source or project.

B.1.5 In line with this, the DfT and Highways England RIS for the 2015/16 - 2019/20 Road Period, aspires to the target that by 2040 over 90% fewer people are impacted by noise from the SRN. The target for the first Road Period 2015 - 2020, is to mitigate at least 1,150 NIAs expecting to reduce the number of people severely affected by noise from the SRN by at least 250,000.

B.1.6 The legislation and policies considered in undertaking this noise assessment are detailed in Table B.1 and Table B.2 for construction and operation respectively.

Table B.1: Regulatory and policy framework for construction noise and vibration

Regulation/policy	Summary of requirements
NPSE NPPF PPG Noise to NPPF NPSNN	Within the context of Government policy on sustainable development: • Avoid significant adverse effects as a result of the Scheme;

[21] Defra (2010). Noise policy statement for England (NPSE)
[22] DfT (2014). National Policy Statement for National Networks
[23] DCLG, Planning Practice Guidance (http://planningguidance.planningportal.gov.uk/)

Regulation/policy	Summary of requirements
	• Mitigate and minimise adverse effects as a result of the Scheme; and • Contribute to the enhancement of the acoustic environment.
Control of Pollution Act 1974 (as amended)	Section 60 - Control of noise on construction sites. Section 61 - Prior consent for work on construction sites. Section 71 - Codes of practice for minimising noise. Section 72 - Best practicable means.
Environmental Protection Act 1990 (as amended)	Section 79 (1) (ga) noise that is prejudicial to health or a nuisance and is emitted from or caused by a vehicle, machinery or equipment in a street is a statutory nuisance; (NB if so should be inspected by the local authority) (9) interpretation of “best practicable means”
The Control of Noise (Code of Practice for Construction and Open Sites) (England) Order 2015	Approves BS 5228:2009+A1:2014 Part 1 Noise and Part 2 Vibration for the purpose of giving guidance on appropriate methods for minimising noise and vibration.
Noise Insulation Regulations 1975 (as amended)	Regulation 5 provides relevant authorities with discretionary powers to undertake or make a grant in respect of the cost of undertaking noise insulation work in or to eligible buildings with respect to construction noise. This is subject to meeting certain criteria given in the Regulation.

Table B.2: Regulatory and policy framework for operational noise and vibration

Regulation/policy	Summary of requirements
Environmental Noise (England) Regulations 2006	Take into account Noise Action Plans.
NPSE NPPF PPG Noise to NPPF NPSNN	Within the context of Government policy on sustainable development: • Avoid significant adverse effects as a result of the Scheme; • Mitigate and minimise adverse effects as a result of the Scheme; and • Contribute to the enhancement of the acoustic environment.
Land Compensation Act 1973	Part I Compensation for depreciation caused by use of public works.
Noise Insulation Regulations 1975 (as amended)	Regulation 3 imposes a duty on authorities to undertake or make a grant in respect of the cost of undertaking noise insulation work in or to eligible buildings. This is subject to meeting certain criteria given in the Regulation. Regulation 4 provides authorities with discretionary powers to undertake or make a grant in respect of the cost of undertaking noise insulation work in or to eligible buildings, subject to meeting certain criteria given in the Regulation.
The Highways Noise Payments and Movable Homes (England) Regulations 2000	Provide highway authorities with a discretionary power to provide a noise payment where new roads are to be constructed or existing ones altered. The relevant Regulations set out the criteria which should be applied in assessing eligibility for making such payments.

B.2 Methodology

B.2.1 Baseline noise surveys will be undertaken at a number of noise sensitive receptors within the study area to establish the current noise climate. This will include monitoring positions at Painshill and Elm Corner, where the majority of residential buildings in the project area are located, as well as sparsely populated locations between Junction 10 and Ockham. The locations for baseline noise monitoring will be confirmed once suitable and accessible sites have been identified.

B.2.2 A construction noise and vibration assessment will be completed in accordance with the prediction methodology described in BS5228:2009 +A1:2014 Code of practice for noise and vibration control on construction and open sites. The predictions will be based on plants lists and equipment usage patterns for the main construction activities and phases indicated on the construction schedule. Threshold levels from BS5228 Part 1 and Part 2 will be used to determine whether a significant effect has the potential to occur at receptors, which will be influenced by the existing baseline conditions. Impact significance and the need for mitigation will be determined by taking into account the predicted impact levels, existing conditions, guidance within BS5228, and the duration of the construction activities.

B.2.3 Road traffic noise modelling has been previously undertaken for an earlier version of the Scheme (Option 14B) during the Option Selection Stage and the results of this assessment are discussed in section 6.4 Baseline conditions in Volume 1. Further noise modelling will be undertaken for the baseline conditions and for the Scheme using updated traffic data, to permit an assessment in line with a “detailed” level of assessment as defined within the DMRB, which consists of the following elements:

- Prediction of daytime (LA10,18h) noise levels in the short-term (Scheme opening) and the long-term (future assessment year);
- Prediction of night-time noise levels in the long-term;
- Noise contour plots showing the predicted changes in noise level throughout the study area;
- Assessment of noise levels at traffic links located in the wider area; and
- Assessment of traffic nuisance impacts.

B.2.4 Ordnance Survey base mapping and Addressbase data will be used to establish the relevant noise sensitive receptors within the appropriate calculation area. This will include residential noise sensitive receptors and non-residential noise sensitive receptors, such as schools, hospitals and places of worship. As ecological receptors have also been identified within the Thames Basin Heath SPA that are sensitive to noise, prediction points will be included in the noise modelling to determine how the Scheme will change noise levels within the Thames Basin Heath SPA. The impacts at the Thames Basin Heath SPA will be discussed in more detail in Chapter 7 Biodiversity.

B.2.5 In terms of road traffic noise, a recognised formal methodology has not yet been developed to establish impact significance. This is recognised in the DMRB HD 213/11 and an alternate approach is stated:

> "In terms of road traffic noise, a methodology has not yet been developed to assign a significance according to both the value of a resource and the magnitude of an impact. However, the magnitude of traffic noise impact from a road project should be classified into levels of impact in order to assist with the interpretation of the road project. Therefore, for the assessment of traffic noise that is covered by this document, a classification is provided for the magnitude of impact."

B.2.6 In absence of a formal methodology for establishing impact significance, the magnitude of the impact will be reported in accordance with the DMRB HD 213/11, detailing the number of noise sensitive receptors predicted to experience given changes in noise levels in both the short-term, and long-term periods. The magnitude of a noise change is perceived differently dependent on whether it is a sudden change, or a change over a longer period of time. In the short-term (e.g. on Scheme opening) a change in road traffic noise of 1dB $L_{A10,18h}$ is the smallest that is considered to cause a minor impact and is the smallest change that is considered to be perceptible. In the long-term, a 3dB $L_{A10,18h}$ change is considered the minimum required to cause a minor impact and is considered to be the lowest perceptible change in the long term.

B.2.7 The impact magnitudes defined in the DMRB as shown in Table B.3. The sensitivity of all noise sensitive receptors in the study area is assumed to be high.

Table B.3: Classification of magnitude of noise impacts

Short-term Noise Change $L_{A10,18h}$	Long-term Noise Change $L_{A10,18h}$	Magnitude of Impact (Adverse or Beneficial)
0	0	No Change
0.1 - 0.9	0.1 - 2.9	Negligible
1 - 2.9	3 - 4.9	Minor
3 - 4.9	5 - 9.9	Moderate
5+	10+	Major

B.2.8 Furthermore, the absolute noise levels predicted at noise sensitive receptors in the opening year and future assessment year of the Scheme will be compared with the SOAEL and the LOAEL. The thresholds assigned to the LOAEL and the SOAEL will be set based upon prevailing guidance for environmental noise assessments and noise thresholds associated impacts to human health, including the World Health Organisation Community Noise Guidelines, the DfT TAG, the Noise Insulation Regulations and other appropriate guidance.

B.2.9 The previous assessment phase of the Scheme, the results of which are reported in section 6.4 Baseline conditions in Volume 1, used the thresholds for adverse effects and significant adverse effects shown in Table B.4 and Table B.5.

Table B.4: Operational noise levels of significance at residential receptors (Daytime)

Effect Level	Free-field dB $L_{Aeq,16h}$	Facade dB $L_{A10,18h}$
Adverse effects (LOAEL)	≥ 45	≥ 50

Effect Level	Free-field dB $L_{Aeq,16h}$	Facade dB $L_{A10,18h}$
Significant effects (SOAEL)	≥ 63	≥ 68

Table B.5: Operational noise levels of significance at non-residential receptors (Daytime)

Effect level	Free-field DB $L_{Aeq,16h}$	Facade DB $L_{A10,18h}$
Adverse effects (LOAEL)	≥ 46	≥ 51
Significant effects (SOAEL)	≥ 63	≥ 68

B.2.10 The assessment of absolute noise levels will establish the following:

- Locations where the LOAEL is exceeded;
- Locations where the existing road traffic noise levels are below the SOAEL and are predicted to exceed the SOAEL as a result of the Scheme; and
- Locations where existing road traffic noise levels are above the SOAEL and are increased by at least 1dB $L_{A10,18h}$ due to the Scheme.

B.2.11 Potential locations requiring noise mitigation based on the findings of previous assessments will be reviewed at an early stage in this Preliminary Design Stage to allow mitigation measures to be incorporated in the design of the Scheme. Noise mitigation may be required under the following conditions:

- Noise sensitive receptors that are predicted to experience noise increases as a result of the Scheme;
- To mitigate noise levels in areas with existing high noise levels, such as NIAs, which is a stated objective of the overarching RIS programme, and
- To avoid adverse effects at ecologically sensitive areas.

B.2.12 Detailed noise modelling will be undertaken with potential noise mitigation in place, based on traffic projections from appropriate strategic traffic modelling to permit the degree of accuracy as would be required for such detailed mitigation design. This will include any existing noise mitigation measures that will be retained or replaced by the Scheme. The proposed mitigation measures will be reviewed based on the results of the detailed noise modelling.

Appendix C. Biodiversity

C.1 Planning and policy context

National Policy Statement for National Networks

C.1.1 The National Policy Statement of National Networks (NPSNN)[24] sets out the government policies for nationally significant infrastructure rail and road projects for England. Within Chapter 5 of the NPSNN is a section on 'Biodiversity and ecological conservation'.

C.1.2 The key relevant paragraphs within the Biodiversity and ecological conservation section are summarised below:

C.1.3 The most important sites for biodiversity are those identified through international conventions and European Directives (Paragraph 5.27; relevant paragraphs also include 4.22 onwards relating to Habitat Regulations Assessments). The Habitats Directive provides statutory protection for European Sites and equivalent policy protection is afforded to Ramsar sites[25].

C.1.4 Where a proposed development is likely to have a significant impact on a Site of Special Scientific Interest (SSSI), development consent should not normally be granted (Paragraph 5.29). Where an adverse effect on a site's notified special interest features is likely, an exception should be made only where the benefits of the development at this site clearly outweigh both the impacts that it is likely to have on the features of the site that make it of special scientific interest, and any broader impacts on the wider network of SSSIs. The Secretary of State should ensure that the applicant's proposals to mitigate the harmful aspects of the development and, where possible, to ensure the conservation and enhancement of the site's biodiversity or geological interest, are acceptable.

C.1.5 Sites of regional and local biodiversity have a fundamental role to play in meeting overall national biodiversity targets, in contributing to the quality of life and the well-being of the community, and in supporting research and education (Paragraph 5.31). The Secretary of State should give due consideration to such regional or local designations. However, given the need for new infrastructure, these designations should not be used in themselves to refuse development consent.

C.1.6 Ancient woodland once lost cannot be recreated (Paragraph 5.32). The Secretary of State should not grant development consent for any development that would result in the loss or risk of deterioration of irreplaceable habitats including ancient woodland and the loss of aged or veteran trees found outside ancient woodland, unless the national need for and benefits of the development, in that location, clearly outweigh the loss.

C.1.7 When considering proposals, the Secretary of State should consider whether the applicant has maximised opportunities for building in beneficial biodiversity features in and around other developments (Paragraph 5.33).

C.1.8 The Secretary of State should ensure that applicants have taken measures to ensure that statutory protected species, and species and habitats identified as

[24] Department for Transport (December 2014). National Policy Statement for National Networks.
[25] SACs and SPAs, as well as Sites of Community Importance, cSACs, pSPAs, Ramsars, pRamsars and sites identified, or required, as compensatory measures for adverse effects on any of these European Sites.

being of principle importance for the conservation of biodiversity in England[26], are protected from adverse effects of development (Paragraph 5.35). The Secretary of State should refuse consent where harm to the habitats or species and their habitats would result, unless the benefits of the development (including need) clearly outweigh that harm.

C.1.9 Applicants should include appropriate mitigation measures as an integral part of their proposed development, including identifying where and how these will be secured (Paragraph 5.36 onwards). In particular, the applicant should demonstrate that:

- during construction, they will seek to ensure that activities will be confined to the minimum areas required for the works;
- during construction and operation, best practice will be followed to ensure that risk of disturbance or damage to species or habitats is minimised (including as a consequence of transport access arrangements);
- habitats will, where practicable, be restored after construction works have finished;
- developments will be designed and landscaped to provide green corridors and minimise habitat fragmentation where reasonable; and
- opportunities will be taken to enhance existing habitats and, where practicable, to create new habitats of value within the site landscaping proposals, for example through techniques such as the 'greening' of existing network crossing points, the use of green bridges and the habitat improvement of the network verge.

National Planning Policy Framework 2012

C.1.10 The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how these are expected to be applied by Local Authorities within their Local Development Frameworks (LDF). Chapter 11 of the NPPF 'Conserving and enhancing the natural environment' sets out the requirements to consider biodiversity in planning decisions.

C.1.11 The relevant paragraphs within Chapter 11 are summarised below:

109 The planning system should contribute to and enhance the natural and local environment by:

- Protecting and enhancing valued landscapes, geological conservation interests and soils;
- Recognising the wider benefits of ecosystem services; and
- Minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures.

114 Local planning authorities should set criteria based policies against which proposals for any development on or affecting protected wildlife or geodiversity

[26] Lists of habitats and species of principle importance for the conservation of biological diversity in England published in response to Section 41 of the Natural Environment and Rural Communities Act 2006 are available from the Biodiversity Reporting System website.

sites or landscape areas will be judged. Distinctions should be made between the hierarchy of international, national and locally designated sites, so that protection is commensurate with their status and gives appropriate weight to their importance and the contribution that they make to wider ecological networks.

117 Local planning authorities should set out a strategic approach in their Local Plans, planning positively for the creation, protection, enhancement and management of networks of biodiversity and green infrastructure.

To minimise impacts on biodiversity and geodiversity, planning policies should:

- Plan for biodiversity at a landscape-scale across local authority boundaries; identify and map components of the local ecological networks, including the hierarchy of international, national and locally designated sites of importance for biodiversity, wildlife corridors and stepping stones that connect them and areas identified by local partnerships for habitat restoration or creation;
- Promote the preservation, restoration and re-creation of priority habitats, ecological networks and the protection and recovery of priority species populations, linked to national and local targets, and identify suitable indicators for monitoring biodiversity in the plan; and
- Aim to prevent harm to geological conservation interests; and where Nature Improvement Areas are identified in Local Plans, consider specifying the types of development that may be appropriate in these Areas.

118 When determining planning applications, LPAs should aim to conserve and enhance biodiversity by applying the following principles:

- If significant harm resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;
- Proposed development on land within or outside a SSSI likely to have an adverse effect on a SSSI (either individually or in combination with other developments) should not normally be permitted. Where an adverse effect on the site's notified special interest features is likely, an exception should only be made where the benefits of the development, at this site, clearly outweigh both the impacts that it is likely to have on the features of the site that make it of special scientific interest and any broader impacts on the national network of SSSIs;
- Development proposals where the primary objective is to conserve or enhance biodiversity should be permitted;
- Opportunities to incorporate biodiversity in and around developments should be encouraged;
- Planning permission should be refused for development resulting in the loss or risk of deterioration of irreplaceable habitats, including ancient woodland and the loss of aged or veteran trees found outside ancient woodland, unless the need for, and benefits of, the development in that location clearly outweigh the loss; and

- The following wildlife sites should be given the same protection as European sites:
  - potential SPAs and possible SACs;
  - listed or proposed Ramsar sites; and
  - sites identified, or required, as compensatory measures for adverse effects on European sites, potential SPAs, possible SACs, and listed or proposed Ramsar sites.

119 The presumption in favour of sustainable development (paragraph 14) does not apply where development requiring appropriate assessment under the Birds or Habitats Directives is being considered, planned or determined.

Local Planning Policy

C.1.12 Table C.1 below provides a summary of relevant local planning policy.

Table C.1: Summary of relevant local policies

Planning Policies	Summary of Policy Content
Elmbridge Borough Council	**Elmbridge Core Strategy (July 2011) and Elmbridge Local Plan - Development Management Plan (April 2015)**
CS13 - Thames Basin Heaths Special Protection Area	New residential development which is likely to have a significant effect on the ecological integrity of the Thames Basin Heaths SPA will be required to demonstrate that adequate measures are put in place to avoid or mitigate any potential adverse effects. Further information in relation to zones of influence and provision of Suitable Accessible Natural Greenspace (SANG) is included in the policy.
CS15 - Biodiversity	The council will seek to avoid loss and contribute to a net gain in biodiversity across the region and the objective of the Surrey Biodiversity Action Plan (BAP) by: 1. Protecting and seeking to improve all sites designated for their biodiversity importance, as identified on the proposal map, in accordance to PPS9: Biodiversity and Geological Conservation and CS13 - Thames Basin Heaths SPA, including those sites considered to be relevant to the integrity of the South West London Waterbodies SPA and Ramsar site. Criteria based polices against which proposals will be judges for any development on, or affecting, sites of regional or local significance will be brought forward through future DPD/s that address Development Management and Site Allocations; 2. Support the implementation of the Regional Forests and Woodland Framework by: • Protecting all woodland, including ancient woodland, as shown on the proposals map, from damaging development and land uses; • Promoting the effective management, and where appropriate, extension and creation of new woodland areas including, in association with areas of major development, where this helps to restore and enhance degraded landscapes, screen noise and pollution, provide recreational opportunities, help mitigate climate change, and contributes to floodplain management; • Replacing woodland unavoidably lost through development with new woodland on at the same scale;

Planning Policies	Summary of Policy Content
	• Promoting and encouraging the economic use of woodlands and wood resources, including wood fuels as renewable energy source; and • Promoting the growth and procurement of sustainable timber products. 3. Protecting and enhancing BAP priority habitats and species and seeking to expand their coverage by supporting the development of the Biodiversity Opportunity Areas; as shown on the proposals map; 4. Managing and maintaining a mosaic of habitats and rich variety of wildlife across the Council's landholdings in accordance with the Elmbridge Countryside Strategy; 5. Working in partnership to re-store and enhance: • the Thames Basin Heath SPA, in accordance with CS13 - Thames Basin Heaths SPA; • which is an area of strategic opportunity for biodiversity improvement; • Brooklands Community Park and Esher Commons SSSI in accordance with the Council's most up-to-date mitigation strategy for the Thames Basin Heath SPA and the Esher Commons SSSI Restoration and Management Plan. 6. Maximising the contribution of other green spaces and features (15), where appropriate, to the area's biodiversity resources including identifying and developing wildlife corridors to provide ecological 'stepping stones' and form a coherent local and regional biodiversity network in accordance with CS12 - The River Thames and its tributaries and CS14 - Green Infrastructure; 7. Directing development to previously developed land in accordance with CS1 - Spatial Strategy, taking account of its existing biodiversity value; and 8. Ensuring new development does not result in a net loss of biodiversity and where feasible contributes to a net gain through the incorporation of biodiversity features.
DM6 - Landscape and trees	Development proposals should be designed to include an integral scheme of landscape, tree retention, protection and/or planting that: • Reflects, conserves or enhances the existing landscape and integrates the development into its surroundings, adding scale, visual interest and amenity; • Contributes to biodiversity by conserving existing wildlife habitats, creating new habitats and providing links to green infrastructure network; • Encourages adaption to climate change, for instance by incorporating Sustainable Drainage Systems (SuDS), providing areas for flood mitigation, green roofs, green walls, tree planting for shade, shelter and cooling and a balance of hard and soft element; • Does not result in loss of, or damage to, trees and hedgerows that are, or are capable of, making a significant contribution to the character or amenity of the area, unless in exceptional circumstances, the benefits would outweigh the loss; • Adequately protects existing trees including their root systems prior to, during and after construction process; • Would not result in the loss or deterioration of irreplaceable habitats including ancient woodland and ancient or veteran trees, unless in

Planning Policies	Summary of Policy Content
	exceptional circumstances the benefits would outweigh the loss; and • Includes proposals for the successful implementation, maintenance and management of landscape and tree planting schemes. To ensure high quality landscape schism and depending on the scale, nature and location of the development, the Council will seek appropriate considerations attached to planning permissions to secure various improvements. These may include tree retention and protection, the submission and implementation of a landscape or tree-planting scheme, surface materials, screen walls, fences and planting. Tree Preservation Orders (TPOs). In considering consent for works to trees protected by TPO, the council will: i. Assess the amenity value of the tree or woodland and the likely impact of the proposal on the amenity of the area; and ii. In the light of this assessment consider whether or not the proposal is justified, having regards to the reason put forward in support of it.
DM21 - Nature conservation and biodiversity	a. In accordance with Core Strategy policy CS15 - Biodiversity, all new development will be expected to preserve, manage and where possible enhance existing habitats, protected species and biodiversity features. The Council will work in partnership to explore new opportunities for habitat creation and restoration. • Support will be given to proposal that enhance existing and incorporate new biodiversity features, habitats and links to habitat network into the design of the buildings themselves as well as in appropriate design and landscape schemes of new developments with the aim of attracting wildlife and promoting biodiversity. Conditions will be used to secure the provision of mitigation measures, as appropriate; • Development affecting designated international sites of biodiversity importance and compensatory sites will be considered against Core Strategy policies CS13 - Thames Basin Heaths SPA, CS15 - Biodiversity, the Framework and relevant legalisation; • Development affecting national sites of biodiversity importance will not be permitted if it will have an adverse effect, directly or indirectly, individually or in combination, on the site or its features. IN exceptions circumstances, proposals that have an adverse effect on a national site may be permitted if the benefits of the development clearly outweigh the harm. If a development is approved under these circumstance, appropriate avoidance, mitigation and compensation will be sought wherever possible; • Development affecting locally designated sites of biodiversity importance of sites falling outside these that support national priority habitats or priority species will not be permitted if it will result in significant harm to the nature conservation value of the site or feature; and • Sites identified on Policies Map as having potential to be designated in future as Suitable Accessible Natural Greenspace (SANG) will be protected from development that may compromise tis ability to serve that function, taking into account the level of existing SANG when the development is proposed and any wider benefits of the proposal.

Planning Policies	Summary of Policy Content
Guildford Borough Council	**Guildford Borough Local Plan (2003)**
Policy NE2 Sites of Special Scientific Interest	Developments which would harm Sites of SSSIs will not be permitted unless the reasons for development clearly outweigh the intrinsic value of the site itself and the national policy to safeguard the nature conservation value of such sites.
Policy NE3 Local and non-statutory sites	Planning permission will not be granted for proposals which are likely to materially harm the Nature Conservation Interest, directly or indirectly, local or non-statutory sites, including LNRs and SNCIs, unless clear justification is provided that the reasons for development outweigh the value of the site in its local or regional context.
Policy NE4 Species protection	Planning permission will not be granted for any development that would be liable to cause any demonstrable harm to a species of animal or plant or its habitat, protected under British law unless conditions are attached requiring the developer to take steps to secure their protection.
Policy NE5 Development affecting trees, hedges and woodlands	Development will not be permitted if it would damage or destroy trees protected by a TPO or in a conservation area unless the removal would: • Be in the interests of good arboriculture practice; or • The need for the development outweighs the amenity value of the protected trees. If the removal of any trees is permitted as part of a development, a condition may require that an equivalent number (or more) of the new locally native trees be planted either on or near the site.
Policy NE6 Undesignated features of nature conservation interest	In considering proposals for development on undesignated sites where there is found to be a significant wildlife interest, the council will seek to preserve and enhance the features of ecological value.

Biodiversity Plan

C.1.13 Highways England have produced a Biodiversity Plan[27], which proposes a local approach to improving biodiversity surrounding the road network and encourages management activities to be guided by the principles of Natural England's The Mosaic Approach: Managing Habitats for Species[28], including efforts to target priority habitats and species[29].

Summary of Relevant Ecological Legislation

C.1.14 A summary of UK wildlife legislation relevant to the Scheme is provided below.

[27] Highways England (2015) Our plan to protect and increase biodiversity.
[28] http://publications.naturalengland.org.uk/publication/6415972705501184
[29] Habitats and species of principal importance for the conservation of biodiversity as identified by the Secretary of State for England, in consultation with Natural England, are referred to in Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006 for England.

C.2 Summary of Relevant Ecological Legislation in England

Table C.2: Summary of Relevant Ecological Legislation for Species in England

Species	Legislation	Offences	Licensing procedures and guidance
Bats *European protected species*	Conservation of Habitats and Species Regulations 2017 Reg 43	Deliberately[1] capture, injure or kill a bat; deliberate disturbance[2] of bats; or damage or destroy a breeding site or resting place used by a bat. [The protection of bat roosts is considered to apply regardless of whether bats are present.]	A Natural England (NE) licence in respect of development is required. Guidance documents: • NE Standing Advice for protected species 2013 • European Protected Species: Mitigation Licensing - How to get a licence (NE 2013) • Bat Mitigation Guidelines (English Nature 2004) • Bat Workers Manual (JNCC 2004)
	Wildlife and Countryside Act 1981 (as amended) S.9	Intentionally or recklessly obstruct access to any structure or place used for shelter or protection or disturb[3] a bat in such a place.	Licence from NE is required for surveys (scientific purposes) that would involve disturbance of bats or entering a known or suspected roost site.
Badger	Protection of Badgers Act 1992 (as amended)	Wilfully kill, injure or take a badger; or intentionally or recklessly damage, destroy or obstruct access to a badger sett or disturb a badger in its sett. [It is not illegal to carry out disturbance activities in the vicinity of setts that are not occupied.]	Where required, licences for development activities involving disturbance or sett interference or closure are issued by Natural England (NE). Licences for activities involving watercourse maintenance, drainage works or flood defences are issued under a separate process. Licences are normally not granted from December to June inclusive because cubs may be present within setts. Guidance documents: • NE Standing Advice for protected species 2013 • Badgers & Development (NE 2007)
Otter *European protected species*	Conservation of Habitats and Species	Deliberately[1] capture, injure or kill an otter; deliberate disturbance[2] of otters; or damage or	Licences issued for development by Natural England. Guidance documents:

Species	Legislation	Offences	Licensing procedures and guidance
	Regulations 2017 Reg 43	destroy a breeding site or resting place used by an otter.	• NE Standing Advice for protected species 2013 • European Protected Species: Mitigation Licensing- How to get a licence (NE 2013)
	Wildlife and Countryside Act 1981 (as amended) S.9	Intentionally or recklessly obstruct access to any structure or place used for shelter or protection or disturb[3] an otter in such a place.	No licence is required for survey in England. However, a licence would be required if the survey methodology involved disturbance.
Hazel dormouse *European protected species*	Conservation of Habitats and Species Regulations 2017 Reg 43	Deliberately[1] capture, injure or kill a hazel dormouse; deliberate disturbance[2] of a hazel dormouse; or damage or destroy a breeding site or resting place used by a hazel dormouse.	A Natural England licence in respect of development is required. Guidance documents: • NE Standing Advice for protected species 2013 • European Protected Species: Mitigation Licensing- How to get a licence (NE 2013) • Dormouse Conservation Handbook (English Nature 2006)
	Wildlife and Countryside Act 1981 (as amended) S.9	Intentionally or recklessly obstruct access to any structure or place used for shelter or protection or disturb[3] a hazel dormouse in such a place.	Licence issued for survey and conservation by Natural England.
Water vole	Wildlife and Countryside Act 1981 (as amended) S.9	Intentionally kill, injure or take water voles; intentionally or recklessly damage, destroy or obstruct access to any structure or place used for shelter or protection or disturb a water vole in such a place.	Conservation licences issued for trapping and translocation operations by Natural England. Certain displacement operations can be carried out under a class licence. Guidance documents: • The Water Vole Conservation Handbook (R. Strachan & T. Moorhouse, Wildlife Conservation Research Unit, 3nd Edition 2011) • Water voles and development licensing policy - NE Technical Information Note TIN042 2008 • NE Standing Advice for protected species 2013 • The Water Vole Mitigation Handbook (M. Dean, R. Strachan, D. Gow & R. Andrews 2016)

Species	Legislation	Offences	Licensing procedures and guidance
Birds	Wildlife and Countryside Act 1981 (as amended) S.1	Intentionally kill, injure or take any wild bird; intentionally take, damage or destroy the nest of any wild bird while that nest is in use or being built; intentionally take or destroy the nest or eggs of any wild bird. Intentionally or recklessly disturb a Schedule 1 species while it is building a nest or is in, on or near a nest containing eggs or young; intentionally or recklessly disturb dependent young of such a species [e.g. most birds of prey, kingfisher, barn owl, black redstart, little ringed plover].	No licences are available to disturb any birds in regard to development. Licences are available in certain circumstances to damage or destroy nests, but these only apply to the list of licensable activities in the Act and do not cover development. General licences are available in respect of 'pest species' but only for certain very specific purposes e.g. public health, public safety, air safety. Guidance documents: • NE Standing Advice for protected species 2013
Great crested newt *European protected species*	Conservation of Habitats and Species Regulations 2017 Reg 43	Deliberately[1] capture, injure or kill a great crested newt; deliberate disturbance[2] of a great crested newt; deliberately take or destroy its eggs; or damage or destroy a breeding site or resting place used by a great crested newt.	Licences issued for development by Natural England. Guidance documents: • NE Standing Advice for protected species 2013 • European Protected Species: Mitigation Licensing- How to get a licence (NE 2013) • Great Crested Newt Mitigation Guidelines (English Nature 2001)
	Wildlife and Countryside Act 1981 (as amended) S.9	Intentionally or recklessly obstruct access to any structure or place used for shelter or protection or disturb[3] a great crested newt in such a place.	Licences issued for science (survey), education and conservation by Natural England.
Natterjack toad **Sand lizard** **Smooth snake** *European protected species*	Conservation of Habitats and Species Regulations 2017 Reg 43	Deliberately[1] capture, injure or kill it; deliberate disturbance[2] of it; deliberately take or destroy its eggs; or damage or destroy a breeding site or resting place used by it.	Licences issued for development by Natural England. Guidance documents: • NE Standing Advice for protected species 2013 • European Protected Species: Mitigation Licensing- How to get a licence (NE 2013)

Species	Legislation	Offences	Licensing procedures and guidance
	Wildlife and Countryside Act 1981 (as amended) S.9	Intentionally or recklessly obstruct access to any structure or place used for shelter or protection or disturb[3] it in such a place.	A licence is required from Natural England for surveying and handling.
Adder **Common lizard** **Grass snake** **Slow worm**	Wildlife and Countryside Act 1981 S.9(1) and S.9(5)	Intentionally kill or injure any common reptile species.	No licence is required. However, an assessment for the potential of a site to support reptiles should be undertaken prior to any development works which have potential to affect these animals. Guidance documents: • NE Standing Advice for protected species 2013
Rabbits, foxes and other wild mammals	Wild Mammals (Protection) Act 1996	Intentionally inflict unnecessary suffering to any wild mammal.	Natural England provides guidance in relation to rabbits, foxes (which are also protected under the Wildlife and Countryside Act 1981 from live baits and decoys) and other wild mammals, on their website. Lawful and humane pest control of these species is permitted.
Plants *European protected species*	Conservation of Habitats and Species Regulations 2017 Reg 47	Deliberately pick, collect, cut, uproot or destroy a wild plant of a European protected species (Schedule 5).	Licences can be issued for science, education and conservation and also in respect of a development if it is of over-riding public interest. Guidance documents: • NE Standing Advice for protected species 2013 • European Protected Species: Mitigation Licensing- How to get a licence (NE 2013) • Guidance on sampling rare aquatic plants, NE 2009
Plants *Nationally protected species*	Wildlife and Countryside Act 1981 S.13 (Schedule 8)	Intentionally pick, uproot or destroy any wild plant on Schedule 8	Licences can be issued by Natural England for specific purposes only, such as science and education or conservation purposes. There is no provision for licensing the above actions for

Species	Legislation	Offences	Licensing procedures and guidance
			development operations under the Wildlife & Countryside Act 1981 (as amended). No licence is required for survey in England. Guidance on survey techniques is available from Natural England. Guidance documents: • NE Standing Advice for protected species 2013
Plants *Invasive species e.g.* Japanese knotweed, hybrid knotweed, giant knotweed, giant hogweed, rhododendron, Himalayan balsam	Wildlife and Countryside Act 1981 S.14	It is illegal to plant or otherwise cause these species to grow in the wild.	Any contaminated soil or plant material is classified as controlled waste and should be disposed of in a suitably licensed landfill site, accompanied by appropriate Waste Transfer documentation, and must comply with section 34 of the Environmental Protection Act 1990. Guidance documents: • The Knotweed Code of Practice (Environment Agency, 2013 version 3) • Managing Invasive Non-native Plants (Environment Agency 2010) • Guidance on Section 14 of the Wildlife and Countryside Act, 1981 (Defra 2010)

[1] Deliberate capture or killing is taken to include "accepting the possibility" of such capture or killing.
2 Deliberate disturbance of animals includes in particular any disturbance which is likely a) to impair their ability (i) to survive, to breed or reproduce, or to rear or nurture their young, or (ii) in the case of animals of hibernating or migratory species, to hibernate or migrate; or b) to affect significantly the local distribution or abundance of the species to which they belong.
3 Lower levels of disturbance not covered by the Conservation of Habitats and Species Regulations 2017 remain an offence under the Wildlife and Countryside Act 1981 although a defence is available where such actions are the incidental result of a lawful activity that could not reasonably be avoided.

Table C.3: Summary of Relevant Ecological Legislation for Designated Sites in England

Site Designation	Legislation	Protection	Guidance
Special Area of Conservation (SAC) **Special Protection Area (SPA)**	Conservation of Habitats and Species Regulations 2017 EC Directive on the conservation of natural	Assessment of the implications of plans and projects is effected through Part 6 of the Conservation of Habitats and Species Regulations 2017 (in particular Regs 61 - 69).	Formal Appropriate Assessment is required to be undertaken by the competent authority before undertaking, or giving consent, permission or other authorisation for a plan or project which is likely to have a significant effect on such a site.

Site Designation	Legislation	Protection	Guidance
Wetland of International Importance (Ramsar site)	habitats and of wild fauna and flora (92/42/EEC). EC Directive on the conservation of wild birds (79/409/EEC). Convention on Wetlands of International Importance especially as Waterfowl Habitat 1971 (the Ramsar Convention).	The legislation for the Site of Special Scientific Interest which will underpin each designation also applies. These sites are given protection through policies in the Local Development Plan.	Guidance documents: • The National Planning Policy Framework (Department for Communities and Local Government, March 2012), with particular reference to Policy 11. • The Government Circular: Biodiversity and Geological Conservation - Statutory Obligations and their Impact within the Planning System (ODPM Circular 6/2005 & Defra Circular 01/2005) (the joint Circular).
Site of Special Scientific Interest (SSSI)	Wildlife and Countryside Act 1981 (as amended)	It is an offence to carry out or permit to be carried out any potentially damaging operation. SSSIs are given protection through policies in the Local Development Plan.	Owners, occupiers, public bodies and statutory undertakers must give notice and obtain the appropriate consent under S.28 before undertaking operations likely to damage a SSSI. S.28G places a duty on all public bodies to further the conservation and enhancement of SSSIs. Guidance documents: • The National Planning Policy Framework (Department for Communities and Local Government, March 2012), with particular reference to Policy 11, and the joint Circular.
Local Nature Reserve (LNR)	National Parks and Access to the Countryside Act 1949 S.21	LNRs are given protection through policies in the Local Development Plan.	LNRs are generally owned and managed by local authorities. Development proposals that would potentially affect a LNR would need to provide a detailed justification for the work, an assessment of likely impacts, together with proposals for mitigation and restoration of habitats lost or damaged. Guidance documents: • The National Planning Policy Framework (Department for Communities and Local Government, March 2012), with particular reference to Policy 11, and the joint Circular.

Site Designation	Legislation	Protection	Guidance
Local Sites (e.g. Sites of Nature Conservation Importance and Conservation Verges)	There is no statutory designation for local sites.	Local sites are given protection through policies in the Local Development Plan.	Development proposals that would potentially affect a local site would need to provide a detailed justification for the work, an assessment of likely impacts, together with proposals for mitigation and restoration of habitats lost or damaged. Guidance documents: • The National Planning Policy Framework (Department for Communities and Local Government, March 2012), with particular reference to Policy 11, and the joint Circular.

Table C.4: Summary of Relevant Habitats and Species Legislation in England

Habitats and Species	Legislation	Guidance
Species and Habitats of Principal Importance for the Conservation of Biodiversity	Natural Environment & Rural Communities Act 2006 S.40	S.40 of the NERC Act 2006 sets out the duty for public authorities to conserve biodiversity in England. Habitats and species of principal importance for the conservation of biodiversity are identified by the Secretary of State for England, in consultation with Natural England, are referred to in S.41 of the NERC Act for England. The list, known as the 'England Biodiversity List', of habitats and species can be found on the Natural England web site. The 'England Biodiversity List' is used as a guide for decision makers such as public bodies, including local and regional authorities, in implementing their duty under Section 40 of the NERC Act 2006 to have regard to the conservation of biodiversity in England when carrying out their normal functions. Ecological impact assessments should include an assessment of the likely impacts to these habitats and species.
Biodiversity Action Plan (BAP) Habitats & Species	No specific legislation, unless it is also a species or habitat of principal importance as described above.	The Biodiversity Action Plan (BAP) is the UK's initiative to maintain and enhance biodiversity in response to the Convention on Biological Diversity signed in 1992. The UK BAP was used to draw up the 'England Biodiversity List' and has been succeeded by the UK Post-2010 Biodiversity Framework in 2012, due to a change in government strategy by all UK countries, focussing on managing the environment as a whole rather than dealing with different aspects of biodiversity and environment separately. However, the UK BAP list of priority habitats and species continue to be regarded as conservation priorities in the UK Post-2010 Biodiversity Framework (JNCC & Defra 2012).

C.3 Methodology

Desk study

C.3.1 A desk-based study was undertaken to gather information on designated sites, habitats and species within the study area which included the following:

- Information on statutory designated sites within 2 km of the Scheme; SACs for which bats are qualifying feature within 30 km of the Scheme boundary; and ancient woodlands within 1 km of the Scheme was obtained from the Multi-Agency Geographic Information for the Countryside (MAGIC) website;
- Information on non-statutory designated Sites of Nature Conservation Importance (SNCI) and Conservation Verges within 2 km of the Scheme was obtained from Surrey Biodiversity Information Centre (SBIC);
- Records of notable habitats, and notable and legally protected species from within 1 km of the Scheme; and records of bats from within 10 km of the Scheme, were obtained from SBIC;
- Records of reptiles and amphibians from within 1 km of the Scheme were obtained from Surrey Amphibian and Reptile Group (SARG);
- Records of veteran trees from within 50 m of the Scheme were obtained from the Woodland Trust's website; and
- Ordnance Survey maps and the Where's the Path website were used to identify the presence of water bodies within 500 m of the extent of the Scheme, in order to establish if great crested newts (*Triturus cristatus*) are potentially present on land within and immediately surrounding the Scheme.

Field surveys

Extended Phase 1 surveys

C.3.2 An extended Phase 1 Habitat Survey of the publicly accessible land on each of the four quadrants of Junction 10[30] was undertaken in February 2016. This survey broadly followed the Phase 1 habitat survey methodology as set out in Joint Nature Conservation Committee guidance[31] to record information on the habitats within the survey area, and was 'extended' to include a search for evidence of presence, and an assessment of the potential of each habitat to support, notable and protected species, as recommended by the Chartered Institute for Ecology and Environmental Management (CIEEM)[32].

C.3.3 A scoping survey was also undertaken of the A3 road verges between the Ockham Interchange and Painshill Junction in February 2016. This involved a high-level assessment of broad habitat types present with their potential to support legally protected and notable fauna, conducted from a vehicle. The

[30] M25 Junction 10 is bound by four areas of land. These are referred to as quadrants in this report, and are located to the north-east, north-west, south-east and south-west of the Junction.
[31] Joint Nature Conservation Committee (2010) Handbook for Phase 1 habitat survey - a technique for environmental audit
[32] Chartered Institute of Ecology and Environmental Management (2012). Guidelines for Preliminary Ecological Assessment

vehicle survey was undertaken for this section due to the health and safety risks associated with surveying the verge of a major trunk road.

C.3.4 An extended Phase 1 survey of the Scheme footprint at Wisley Airfield, Elm Corner SNCI and Painshill Park was carried out in October 2017.

C.3.5 Figure 7.2 in Volume 3 shows the Phase 1 habitats within the areas surveyed to date.

River Corridor Surveys

C.3.6 A River Corridor Survey (RCS) was undertaken on 21st September 2017 on a 500m section of the Stratford Brook to the south of Wisley airfield, east of the Ripley roundabout. A RCS will be undertaken on the downstream section of the Stratford Brook, west of the Ripley roundabout during this stage, once access permissions have been agreed.

Notable and protected species surveys

C.3.7 Initial species surveys commenced in 2016. The majority of these surveys are complete, although some surveys will continue through the Preliminary Design Stage.

Veteran trees

C.3.8 Arboricultural surveys of trees within the Scheme footprint will be undertaken during the Preliminary Design Stage, in order to identify any veteran trees that fall within or immediately adjacent to the permanent or temporary land take areas.

Notable plants

C.3.9 A National Vegetation Classification (NVC) survey of notable habitats, and a search for notable plant species was undertaken of the publicly accessible land on each of the four quadrants of Junction 10 in August 2016.

Bat surveys

C.3.10 Bat surveys were undertaken in 2016 and 2017, following good practice guidance[33]. The bat survey coverage is shown in Figure 7.3 in Volume 3.

Ground level tree assessments

C.3.11 Ground level tree assessments were undertaken in July 2017. Surveys were carried out of all trees within the Scheme boundary for four quadrants surrounding Junction 10, and also the woodland within Elm Corner SNCI. Refer to Figure 7.4 in Volume 3.

C.3.12 These surveys identified any potential bat roost features within trees, such as split limbs or possible cavities. Any potential bat roost features will require further inspection, either by tree climbing or bat emergence/return surveys. These will be carried out over winter/spring 2017/2018.

[33] Collins, J (ed) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn). The Bat Conservation Trust. London.

Bat transect surveys

C.3.13 Bat transect surveys were carried out within the four quadrants surrounding Junction 10, and also the woodland within Elm Corner SNCI.

C.3.14 Surveys of all of the transects were carried out twice-monthly between April 2017 and October 2017. Surveys started at dusk and lasted for approximately two hours. The July 2017 visits also included an additional pre-dawn survey. Anabat Walkabouts were used to detect bat calls, and all bats seen or heard during the surveys were recorded.

C.3.15 In addition, a single static bat detector (Song Meter 4) was positioned within a set location within each transect, and left to record all bat passes for two nights in a row.

Crossing point surveys

C.3.16 Crossing point surveys were carried out at Clearmount Bridge (the existing crossing point between the north-west and south-west quadrants, Cockrow Bridge (the existing crossing point between the south-east and south-west quadrants), Wisley Bridge (by Elm Lane) and the River Mole at Painshill Park.

C.3.17 Each crossing point location was surveyed monthly at dusk between June 2017 and October 2017. Surveys started at dusk and lasted for one hour, recording all bat flight activity, using Anabat Walkabouts.

C.3.18 In addition, each crossing point received a dawn survey in July 2017. Surveys started one hour before dawn, and lasted for one hour, recording all bat flight activity.

Bat trapping surveys

C.3.19 Bat trapping surveys using harp traps were carried out within the four quadrants surrounding M25 Junction 10, with two sessions conducted in each quadrant between July and August 2017.

C.3.20 Species-specific lures were played for a number of cryptic species that were considered to potentially occur within the Scheme footprint, but could potentially be overlooked during transect surveys. This included barbastelle and Bechstein's bats, both of which qualifying features of SACs within 30 km of the Scheme.

Great crested newt (Triturus cristatus) surveys

C.3.21 Great crested newt surveys were undertaken in 2016 and 2017, according to good practice guidance[34][35][36]. Great crested newt survey coverage is shown in igure 7.5 of Volume 3.

Environmental DNA (eDNA)

C.3.22 During spring 2017, eDNA surveys were carried out of 13 ponds and ditches within 500 m of the Scheme considered to be potentially suitable for breeding

[34] Oldham R.S., Keeble J., Swan M.J.S. & Jeffcote M. (2000). Evaluating the suitability of habitat for the Great Crested Newt (Triturus cristatus). Herpetological Journal 10 (4), 143-155.
[35] Biggs J, Ewald N, Valentini A, Gaboriaud C, Griffiths RA, Foster J, Wilkinson J, Arnett A, Williams P and Dunn F 2014. Analytical and methodological development for improved surveillance of the Great Crested Newt. Defra Project WC1067. Freshwater Habitats Trust: Oxford.
[36] Great Crested Newt Mitigation Guidelines (English Nature, 2001).

great crested newts, based on HSI assessments carried out just prior to the eDNA surveys.

C.3.23 The eDNA survey involved the collection of water samples from these water bodies to be tested for the presence of great crested newt DNA, which would indicate the species is present in a particular water body.

C.3.24 eDNA water sampling was undertaken on a single visit to all suitable water bodies on 8th May 2017 by suitably trained and experienced great crested newt surveyors from Atkins.

C.3.25 Sampling followed an approved methodology[37], recognised by Natural England that minimises risks of cross contamination. Field sampling equipment was supplied as sterile kits by the laboratory that was to carry out the DNA analysis (ADAS). In total, 20 water samples were collected from each water body sampled. Areas that may be used by great crested newts for displaying or egg-laying were selected for sampling and the sampling was carried out in daylight hours, and in dry weather. The surveyors held great crested newt survey licences from Natural England. Following completion of the sampling the collected water samples were stored under suitable conditions before being sent to the laboratory for testing.

Population assessment surveys

C.3.26 Four great crested newt presence/likely absence surveys were carried out on Boldermere Lake, two ponds in the south-east quadrant and a large pond in the southwest quadrant between 2nd May 2017 and 18th May 2017, utilising the following standard survey techniques:

- Torching: This involved two ecologists walking the circumference of each water body shining a high-powered torch (one million candlepower) into the water to record the number of great crested newts (and other amphibian species) present;
- Bottle Trapping: This survey technique involved placing specifically made bottle traps around the margins of each water body. The traps were set late in the evening and then retrieved early the following morning and any trapped great crested newts (and other amphibian species) were counted and sexed;
- Egg Searching: This survey technique involved searching the live and dead submerged vegetation present within each water body for great crested newt eggs (and other amphibian species); and
- Netting: Using a sturdy dip-net with a 2-4mm mesh the surveyors worked around the perimeter of the water body along 2m lengths of shoreline agitating the net through aquatic vegetation.

C.3.27 Great crested newts were found to be present within the two ponds in the south-east quadrant. In addition, the Wildlife Trust had confirmed the eDNA presence of great crested newts at Boldermere Lake in 2016. Therefore, Boldermere Lake and the two ponds in the south-east quadrant were surveyed a further two times

[37] Biggs, *et al* (2014) Technical Advice Note for Field and Laboratory Sampling of Great Crested Newt eDNA in *Analytical and methodological development for improved surveillance of the Great Crested Newt*. Defra Project WC1067. Appendix 5. Freshwater Habitats Trust, Oxford

between 22nd May 2017 and 1st June 2017 to support a population size class assessment to be undertaken.

C.3.28 The standard methodology[38] gives an indication of whether a population is small, medium or large in terms of the number of adult newts present in the breeding water body. The maximum adult count per water body (obtained from presence/absence surveys using torching/bottle trapping) is used to indicate population size as follows:

- Small for maximum counts up to 10;
- Medium for maximum counts between 11 and 100; and
- Large for maximum counts over 100.

Hazel dormouse (*Muscardinus avellanarius*) surveys

C.3.29 Hazel dormouse surveys were undertaken in 2016 and 2017, according to good practice guidance[39].

C.3.30 Hazel dormouse nest tube surveys were set up within the wooded areas of each of the four quadrants of Junction 10 in June 2016. Hazel dormouse survey coverage is shown in Figure 7.6 in Volume 3.

C.3.31 Much of the woodland is considered sub-optimal for dormice due to the dominance of conifers and absence of a scrub layer. However, there are patches of more diverse habitat, such as adjacent to the M25 to the south-east of J10, where species such as bramble, honeysuckle, holly, birch, gorse and sweet chestnut are present.

- A total of 60 dormice tubes were installed in the south-west quadrant;
- A total of 58 dormice tubes were installed in the south-east quadrant;
- A total of 63 dormice tubes were installed in the north-west quadrant; and
- A total of 64 dormice tubes were installed in the north-east quadrant.

C.3.32 Inspections of dormice tubes were carried out monthly between 5th June 2016 and 11th November 2016, and 23rd March 2017 and 19th May 2017.

C.3.33 The woodland at Elm Corner SNCI (including the adjacent ancient woodland), and the ancient woodland at the Girl Guides Camp at Painshill could potentially support dormice, but were not included in the 2016/2017 nest tube surveys, as access was not agreed at the time of survey.

C.3.34 A nut search of the woodland at Elm Corner SNCI (including the adjacent ancient woodland) on the 19th September 2017 produced no evidence of dormice. However, as a precaution it is considered that the woodland at Elm Corner SNCI (including the adjacent ancient woodland), and the ancient woodland at the Girl Guides Camp at Painshill should undergo a dormouse nest tube survey. Dormouse nest tube surveys will commence in these areas in spring 2018.

Reptile surveys

[38] Great Crested Newt Mitigation Guidelines (English Nature, 2001)

[39] Bright, P.W., Morris, P.A. and Mitchell-Jones, A. (2006) Dormouse Conservation Handbook 2nd Edition. English Nature, Peterborough.

C.3.35 Presence/likely absence surveys for common species of reptile were carried out between August 2017 and October 2017, according to good practice guidance[40].

C.3.36 Artificial refuges were laid in areas of habitat considered to be potentially suitable for reptiles. Survey areas included: the four quadrants surrounding M25 Junction 10, the eastern A3 verge, Wisley Airfield, Wisley Lane, Painshill and the adjacent field to Elm Lane (known locally as Snakes field). Reptile survey coverage is shown in Figure 7.7 in Volume 3.

C.3.37 Seven checks of the artificial refuges were undertaken in suitable weather conditions (taken to be daytime air temperatures between 9°C and 18°C with little or no wind or precipitation) between the 4th August 2017 and 28th September 2017 Surveyors initially checked the upper surface of reptile mats to identify any reptiles basking. The refuges were then lifted to identify any reptiles present underneath. Features that could be used for refuge by reptiles (e.g. litter and logs) were also checked where present. Notes of any reptiles identified including numbers, species, sex and age were recorded.

Otter (*Lutra lutra*) and water vole (*Arvicola amphibious*) surveys

C.3.38 Stratford Brook (connected to Ockham Mill Stream) passes under Stratford Bridge (central OS grid reference TQ0627957496). A survey of the section of Stratford Brook to the east of Stratford bridge was carried out on the 21st September 2017. The section of Stratford Brook to the west of the Ripley roundabout will be surveyed for water vole and otter evidence during this stage, once access permissions have been agreed.

C.3.39 The only other water body within the Scheme footprint is Boldermere Lake. This lake was surveyed for otter and water vole evidence during the extended Phase 1 survey and great crested newt surveys.

Badger (*Meles meles*) surveys

C.3.40 Detailed badger surveys of the Scheme footprint have not been carried out to date, although initial extended Phase 1 surveys have identified their presence within the Scheme footprint. A detailed survey of the Scheme footprint and immediate surrounds for badger evidence, will be carried out during winter 2017.

Bird surveys

C.3.41 An initial breeding bird survey was undertaken in spring/summer 2016. Four survey visits were carried out on the publicly accessible land on each of the four quadrants of Junction 10, between 28th April 2016 and 30th June 2016.

C.3.42 Four wintering bird surveys specifically focused on recording wintering woodlark within the heathland habitats within and adjacent to the Scheme were carried out between November 2016 and February 2017.

C.3.43 Detailed breeding bird surveys were carried out in 2017. A total of seven bird surveys were carried out between 10th March 2017 and 10th July 2017. The breeding bird surveys included the publicly accessible land on each of the four quadrants of Junction 10, as well as a transect through Elm Lane and Wisley Airfield. 2017 breeding bird survey coverage is shown in Figure 7.8 in Volume 3.

[40] Gent, T., Gibson, S. (2003). Herpetofauna Workers Manual.

C.3.44 The 2017 breeding bird surveys within the SPA heathland were timed to ensure that they incorporated the species-specific survey methods for Dartford warbler and woodlark, as described in Gilbert *et al* (1998)[41].

C.3.45 An additional four pre-dawn or post-dusk nightjar-specific surveys were carried out in June and July 2017, within both of the heathland sections of the SPA at M25 Junction 10.

C.3.46 In addition, a single survey of the Scheme footprint and surrounds was carried out at the Painshill area on the 19th June 2017.

Invertebrate surveys

C.3.47 One of the designation features of the Ockham and Wisley Commons SSSI is its invertebrate assemblage. The Scheme footprint within the four quadrants surrounding M25 Junction 10 were assessed for their invertebrate potential. Invertebrate survey coverage is shown in Figure 7.9 in Volume 3.

C.3.48 Of these, the south-east quadrant at M25 Junction 10 was ruled out due to the Scheme footprint being confined to a narrow strip of confer plantation, providing low potential to support a rich assemblage of invertebrates or key invertebrates.

C.3.49 The south-west, north-west and north-east quadrants surrounding M25 Junction 10 were subjected to five survey visits between 5th June 2017 and 25th August 2017.

C.3.50 The following sampling methods were used:

- Sweep netting: This method provided the main proportion of the survey element and is the most efficient method of cataloguing a site's invertebrate resource. A sweep net was swept through vegetation whilst walking through the survey areas;
- Spot sampling: Spot sampling was employed to enable close encounters with bumblebees and the collection of any other ambiguous specimens that cannot be identified in the field;
- Grubbing: Deadwood and piles of rotting timber were searched for deadwood beetles;
- Beating: Tree limbs and deadwood on branches were tapped to dislodge any hiding beetles. These were collected from a white sheet held under the branch; and
- Pitfall traps: Pitfall traps were used in each of the three quadrants surveyed:
  - South-west quadrant - two grids of 10 traps minimum were used in each of the two dominant habitat types, heath and woodland;
  - North-west quadrant - two grids of five traps in each grid were positioned in representative woodland habitat, one of which was adjacent to fallen deadwood; and
  - North-east quadrant - a single grid of seven traps was positioned in representative habitat adjacent to fallen deadwood.

Assessing value (sensitivity) of nature conservation resources

[41] *Monitoring Methods* by Gillian Gilbert, David W Gibbons and Julianne Evans (RSPB, 1998)

C.3.51 Nature conservation resources have been valued following the framework provided in IAN 130/10 Ecology and Nature Conservation: Criteria for Impact Assessment[42]. This is presented in Table C.5 below.

C.3.52 The evaluation was based on the information available from data searches and ecological surveys, and used professional judgement, as well as accepted criteria[43] (e.g. diversity, rarity and naturalness) for valuing nature conservation resources in a geographical context.

Table C.5: Evaluation of nature conservation resources

Examples of resource valuation based on geographical context
International or European Value
Natura 2000 sites including: Sites of Community Importance (SCIs); Special Protection Areas (SPAs); potential SPAs (pSPAs); Special Areas of Conservation (SACs); candidate or possible SACs (cSACs or pSACs[44]); and Wetlands of International Importance (Ramsar sites). Biogenetic Reserves, World Heritage Sites and Biosphere Reserves. Areas which meet the published selection criteria for those sites listed above but are not themselves designated as such[45]. Resident, or regularly occurring, populations of species which may be considered at International or European level[46] where: • The loss of these populations would adversely affect the conservation status or distribution of the species at this geographic scale; or • The population forms a critical part[47] of a wider population at this scale; or • The species is at a critical phase[48] of its life cycle at this scale.
UK or National Value
Designated sites including: Sites of Special Scientific Interest (SSSIs); Marine Protected Areas (MPAs) including Marine Conservation Zones (MCZs); and National Nature Reserves (NNRs). Areas which meet the published selection criteria e.g. JNCC (1998) for those sites listed above but which are not themselves designated as such[49]. Areas of key/priority habitats identified in the UK Biodiversity Action Plan (BAP); including those published in accordance with Section 41 of the Natural Environment and Rural Communities Act (2006) and those considered to be of principle importance for the conservation of biodiversity[50]. Areas of Ancient Woodland e.g. woodland listed within the Ancient Woodland Inventory[51]. Resident, or regularly occurring, populations of species which may be considered at International, European, UK or National level[52] where:

[42] Interim Advice Note 130/10 (2010) Ecology and Nature Conservation: Criteria for Impact Assessment
[43] Set out in Ratcliffe (1977) A Nature Conservation Review. Cambridge University Press
[44] pSACs are sites which have been formally advised to the UK government but have not yet been submitted to the European Commission. These sites should be valued at European level on the basis that they meet the relevant selection criteria for a SAC but are not yet designated as such.
[45] Valuation to be made in consultation with SEB.
[46] Valuation to be made in consultation with SEB. Such species include those listed within Council Directive 79/409/EEC on the conservation of wild birds or animal/plant species listed within Council Directive 92/43/EEC.
[47] Valuation to be made in consultation with SEB. Such population include sub-populations that are essential to maintenance of metapopulation dynamics e.g. critical emigration/immigration links between otherwise discrete populations.
[48] Seasonal activity or behaviour upon which survival or reproduction depends.
[49] Valuation to be made in consultation with SEB.
[50] Valuation to be made in consultation with SEB as such listings do not in themselves indicate intrinsic value, but instead indicate a conservation priority.
[51] Valuation to be made in consultation with SEB, and with use of professional judgement as listing does not in itself indicate intrinsic nature conservation value.
[52] Valuation to be made in consultation with SEB as such listings do not in themselves indicate intrinsic value. Such species include those listed within Council Directive 79/409/EEC on the conservation of wild birds or animal/plant species listed within Council Directive 92/43/EEC. Species which may be considered at the UK or National level means: birds,

Examples of resource valuation based on geographical context
• The loss of these populations would adversely affect the conservation status or distribution of the species at this scale; or • The population forms a critical part[53] of a wider population at this scale; or • The species is at a critical phase[54] of its life-cycle at this scale.
Regional Value
Areas of key/priority habitats identified in the Regional BAP (where available); areas of key/priority habitat identified as being of Regional vale in the appropriate Natural Area Profile (or equivalent); areas that have been identified by regional plans or strategies as areas for restoration or re-creation of priority habitats (for example South-west Nature Map); and areas of key/priority habitat listed within the Highways Agency's BAP. Resident, or regularly occurring, populations of species which may be considered at an International, European, UK or National level[5556] and key/priority species listed within the HABAP where: • The loss of these populations would adversely affect the conservation status or distribution of the species at this scale; or • The population forms a critical part[57] of a wider population; or • The species is at a critical phase[58] of its life cycle.
County or Unitary Authority Area Value
Designated sites including: Sites of Nature Conservation (SNCIs); County Wildlife Sites (CWSs); and Local Nature Reserves (LNRs) designated in the county or unitary authority area context[59]. Areas which meet the published selection criteria for those sites listed above but which are not themselves designated as such[60]. Areas of key/priority habitats identified in the Local BAP; and areas of habitat identified in the appropriate Natural Area Profile (or equivalent). Resident, or regularly occurring, populations of species which may be considered at an International, European, UK or National level[6162] where:

other animals and plants which receive legal protection on the basis of their conservation interest (those listed in the Wildlife and Countryside Act 1981 (as amended), SCH 1, 5 and 8); species listed for their principle importance for biodiversity (in accordance with the Natural Environment and Rural Communities Act 2006 Section 41 [England]; and priority species listed within the UKBAP or species listed within Red Data Books.

[53] Valuation to be made in consultation with the SEB. Such populations include sub-populations that are essential to the maintenance of metapopulation dynamics e.g. critical emigration/immigration links between otherwise discrete populations.

[54] A seasonal activity or behaviour upon which survival or reproduction depends.

[55] Valuation to be made in consultation with the SEB. Such species include those listed within Council Directive 79/409/EEC on the conservation of wild birds or animal/plant species listed within Council Directive 92/43/EEC.

[56] Valuation to be made in consultation with the SEB as such listings do not in themselves indicate intrinsic value. Such species include those listed within Council Directive 79/409/EEC on the conservation of wild birds or animal/plant species listed within Council Directive 92/43/EEC. Species which may be considered at the UK or National level means: birds, other animals and plants which receive legal protection on the basis of their conservation interest (those listed in the Wildlife and Countryside Act 1981 (as amended), SCH 1, 5 and 8); species listed for their principle importance for biodiversity (in accordance with the Natural Environment and Rural Communities Act 2006 Section 41 [England]; and priority species listed within the UKBAP or species listed within Red Data Books.

[57] Valuation to be made in consultation with the SEB. Such populations include sub-populations that are essential to the maintenance of metapopulation dynamics e.g. critical emigration/immigration links between otherwise discrete populations.

[58] A seasonal activity or behaviour upon which survival or reproduction depends.

[59] Valuation to be made in consultation with county ecologist or equivalent, with reference made to the criteria for designation.

[60] Valuation to be made in consultation with county ecologist or equivalent.

[61] Valuation to be made in consultation with the SEB. Such species include those listed within Council Directive 79/409/EEC on the conservation of wild birds or animal/plant species listed within Council Directive 92/43/EEC.

[62] Valuation to be made in consultation with the SEB as such listings do not in themselves indicate intrinsic value. Such species include those listed within Council Directive 79/409/EEC on the conservation of wild birds or animal/plant species listed within Council Directive 92/43/EEC. Species which may be considered at the UK or National level means: birds, other animals and plants which receive legal protection on the basis of their conservation interest (those listed in the Wildlife and Countryside Act 1981 (as amended), SCH 1, 5 and 8); species listed for their principle importance for

Examples of resource valuation based on geographical context
• The loss of these populations would adversely affect the conservation status or distribution of the species across the County or Unitary Authority Area; or • The population forms a critical part[63] of a wider population; or • The species is at a critical phase[64] of its life cycle.
Local Value
Designated sites including Local Nature Reserves (LNRs) designated in the local context[65]. Trees that are protected by Tree Preservation Orders (TPOs). Areas of habitat; or populations/communities of species considered to appreciably enrich the habitat resource within the local context (such as veteran trees), including features of value for migration, dispersal or genetic exchange.

Nature conservation assessment

C.3.53 During the Preliminary Design stage, a detailed assessment[66] will be undertaken with respect to biodiversity. This assessment will incorporate guidance from Design Manual for Roads and Bridges (DMRB) Volume 11: Environmental Assessment, IAN 130/10 and the Chartered Institute for Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment in the UK and Ireland[67].

C.3.54 At this stage, not all ecological surveys have been completed, and not all design details have been finalised. However, it is considered that sufficient information is available in order to allow informed preliminary assessment of the impacts of the Scheme on nature conservation resources.

C.3.55 The assessment will include an initial characterisation of the potential impacts on important nature conservation resources, and take into account both on-site impacts and those that may occur to adjacent and more distant ecological resources, including:

- Direct loss of habitats (including temporary loss);
- Fragmentation or isolation of habitats;
- Changes to the local hydrology, water quality and/or air quality;
- Direct mortality or injury to wildlife through construction activities; and
- Disturbance to species from noise, light or other visual stimuli.

C.3.56 An effect of impacts on nature conservation resources would be determined as significant if those impacts change the structure and functions of designated sites, notable habitats, or ecosystems; or the conservation status of habitats and species.

biodiversity (in accordance with the Natural Environment and Rural Communities Act 2006 Section 41 [England]; and priority species listed within the UKBAP or species listed within Red Data Books.

[63] Valuation to be made in consultation with the SEB. Such populations include sub-populations that are essential to the maintenance of metapopulation dynamics e.g. critical emigration/immigration links between otherwise discrete populations.

[64] A seasonal activity or behaviour upon which survival or reproduction depends.

[65] Valuation to be made in consultation with county ecologist or equivalent, with reference made to the criteria for designation.

[66] According to DMRB Volume 11, Section 2, Part 1 General Principles and Guidance of Environmental Impact Assessment.

[67] CIEEM (2016) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, freshwater and coastal (second edition). Chartered Institute of Ecology and Environmental Management, Winchester.

C.3.57 Effects are identified at the geographic scale at which they become significant dependant on the value of the affected resource and the characteristics of the ecological impact. The residual significance of effects takes into account any mitigation or compensation provided.

C.3.58 The significance of effects on nature conservation resources are categorised on the five-point scale in line with IAN 130/10 shown in Table C.6 below. Application will rely on professional judgement by experienced ecologists.

Table C.6: Significance of effects on nature conservation resource

Significance category	Typical descriptors of effect
Very large	An effect on one or more feature[68](s) of International, European, UK or National Value. NOTE: only adverse effects are normally assigned this level of significance. They should be considered to represent key factors in the decision-making process.
Large	An effect on one or more feature(s) of regional value. NOTE: these effects are considered to be very important considerations and are likely to be material in the decision-making process.
Moderate	An effect on one or more feature(s) of county value. NOTE: These effects may be important, but are not likely to be key decision-making factors.
Slight	An effect on one or more feature(s) of local value. NOTE: These effects are unlikely to be critical in the decision-making process, but are important in enhancing the subsequent design of the project.
Neutral	No significant effects on important nature conservation features. NOTE: Absence of effects, or those that are beneath levels of perception.

Limitations

C.3.59 The limitation and assumptions that apply to ecological surveys undertaken to date are provided in the Preliminary Design Stage Scoping Report (December 2017).

C.3.60 The detailed assessment is based on the baseline conditions and design information available at the time of writing this report. Further survey work is required in 2018 to update existing data and complete the data sets for notable and legally protected species. However, it is considered that sufficient information is available in order to allow an initial characterisation of the potential effects of the Scheme on nature conservation resources.

[68] Features are referred to as Nature Conservation Resources in this report

Appendix D. Road Drainage and the Water Environment

D.1 Planning and policy context

D.1.1 Relevant legislation is summarised in Table D.1. This will be reviewed as the Scheme progresses in order to determine ongoing relevance.

D.1.2 The impact on relevant policies will be assessed by identifying the degree of compliance or conflict with the Scheme. The evaluation of these will be undertaken and reported in the Environmental Statement (ES).

Table D.1: Relevant Legislation

Legislation	Description
European legislation	
Water Framework Directive (2000/60/EC)	The WFD requires that all inland waters within defined River Basin Districts (RBD) must reach at least good status by 2015 and defines how this should be achieved through the establishment of environmental objectives and ecological targets for surface waters. Any new scheme must not cause deterioration of the water environment or prevent the future attainment of good status.
Environmental Quality Standards Directive (2008/105/EC)	Lists environmental quality standards (EQS) for priority substances and certain other pollutants as provided for in Article 16 of the WFD, with the aim of achieving good surface water chemical status. It includes certain metals that are associated with runoff from highways.
Groundwater Directive (2006/118/EC)	Complements the WFD. It requires measures to prevent or limit inputs of pollutants into groundwater to be operational so that WFD environmental objectives can be achieved.
Habitats Directive (92/43/EEC)	To promote the maintenance of biodiversity by taking measures to maintain or restore natural habitats and wild species at a favourable conservation status, introducing robust protection for those habitats and species of European importance. Sites or species that come under this Directive will heighten the importance of water features that sustain them.
Floods Directive (2007/60/EC)	The aim is of this Directive is to reduce and manage the risks that floods pose to human health, the environment, cultural heritage and economic activity. It sets the strategic level for flood risk that any development will need to comply with.
National legislation	
Antipollution Works Regulations (1999)	Where pollution occurs, or is likely to occur the Environment Agency can serve a works notice under Section 161A of the Water Resources Act on any person who has caused or knowingly permitted the pollution (or risk of pollution) to a water course, requiring them to carry out anti-pollution/preventative works and operations.

Legislation	Description
	The Environment Agency can also recover the costs of any investigation and anti-pollution works carried out. The Anti-Pollution Works Regulations prescribe the content of anti-pollution works notices. They also prescribe the particulars of such matters as are required to be placed on the pollution control registers maintained by the Environment Agency.
Environment Act (1995)	The Act provides for the establishment of a body corporate to be known as the Environment Agency, the key regulator for the water environment.
Environmental Damage (Prevention and Remediation) Regulations (2015)	The emphasis of these Regulations is proactively putting in place appropriate pollution prevention measures to reduce risks to the environment.
Environmental Protection Act (1990)	This Act brings in a system of integrated pollution control for the disposal of wastes to land, water and air.
Flood Risk Regulations (2009) Amended SI2011/2880 transpose directive 2007/60/EC	This aims to provide a consistent approach to managing flood risk. The Environment Agency are responsible for managing flood risk from main rivers, the sea and reservoirs. LLFAs are responsible for local sources of flood risk, in particular surface water, groundwater and ordinary watercourses.
Flood and Water Management Act 2010 and Commencement Orders	The key areas covered by this Act are: • Roles and responsibilities for flood and coastal erosion risk management; and • Improving reservoir safety.
Groundwater (England and Wales) Regulations (2009)	These transpose the Groundwater Directive (2006/118/EC) into law in England and Wales. These powers are implemented in though the Environmental Permitting Regulations (2016).
Highways Act 1980 (HA 1980)	The Act deals with the management and operation of the road network in England and Wales including the drainage of highways into environmental waters and sewers.
NPPF (Department for Communities and Local Government (DCLG), 2012)	The NPPF sets strict tests to protect people and property from flooding which all local planning authorities are expected to follow. It forms the basis of assessment of flood risk for schemes.
National Planning Practice Guidance (NPPG) 2014 Policy 10: Meeting the challenge of Climate Change, Flooding and Coastal Change Policy 11: Conserving and Enhancing the Natural Environment	In 2014, accompanying the NPPF, the NPPG (DCLG, 2014) was published. This advises on how Local Planning Authorities can ensure water quality and the delivery of adequate water infrastructure and take account of the risks associated with flooding in the plan-making and the planning application process.

Legislation	Description
The Environmental Permitting (England and Wales) Regulations 2016	Provide a consolidated system of environmental permitting in England and Wales and transpose provisions of fifteen EU Directives which impose obligations requiring delivery through permits or which are capable of being delivered through permits. Covers Environment Agency permits for flood risk (on Main River) and certain discharges to watercourses.
The Water Resources (Environmental Impact Assessment) (England and Wales) Regulations 2003	Impose procedural requirements in relation to the consideration of applications or proposals for an abstraction or impounding licence under Chapter II of Part II of the Water Resources Act 1991 and require consent in other cases.
Water Act 2003 and Water Act 2014	Aims to improve water conservation, protect public health and the environment, and improve the service offered to consumers. The Act is in three parts relating to water resources, regulation of the water industry and other provisions.
Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015	These Directions set out the environmental standards to be used for the second cycle of river basin plans. They transpose Directive 2013/39/EC on environmental quality standards for priority substances.
Water Industry Act (1991) (Amendment) (England and Wales) Regulations (2009)	Sets out the responsibilities of the Environment Agency of England and Wales in relation to water pollution, resource management, flood defence, fisheries, and in some areas, navigation. The Act regulates discharges to controlled waters, namely rivers, estuaries, coastal waters, lakes and groundwaters.
Water Resources Act 1991	Act to regulate water resources, water quality and pollution, and flood defence. Sets out standards for Controlled Waters.
Water Environment (Water Framework Directive) (England and Wales) Regulations 2003	Outline the duties of regulators (Environment Agency in England) in relation to environmental permitting, abstraction and impoundment of water.
The Land Drainage Act 1991	Requires that a watercourse be maintained by its owner in such a condition that the free flow of water is not impeded. The 1994 Act amends it in relation to the functions of internal drainage boards and local authorities.
The Control of Pollution (Oil Storage) (England) Regulations 2001	Applicable for storage of more than 200 litres of oil above ground at an industrial, commercial or institutional site, then these Regulations affect you. The sites they cover include; factories, shops, offices, hotels, schools, churches, public sector buildings and hospitals. The Regulations apply only in England.

D.2 Methodology

Surface Water

D.2.1 The information has been assessed against the methodology guidance presented in the HD 45/09 and WebTAG. The Department for Transport (DfT) WebTAG assessment will be carried out in accordance with TAG Unit A3 Environmental Impact Appraisal (DfT, December 2015). It was felt appropriate to use WebTAG for assigning the importance and potential magnitude of impact at this stage of the EIA process when all data and design information is not available. WebTAG provides more of a qualitative assessment using professional judgment in the absence of specific quantitative data.

D.2.2 WebTAG provides guidance for appraising the impact of transport proposals on the built and natural environment. It provides an appraisal framework for analysing the key information of relevance to the water environment.

D.2.3 A key element of the WebTAG scoring system is the importance assigned to each resource/feature. If a feature is assigned a very high importance it will always show some level of significance of effects even when the impact magnitude is assessed as minor or negligible. This is important in determining the overall assessment score as, if several features are assessed as having significant impacts, this will increase the overall score.

D.2.4 The assessment for the ES will use drainage information and Annual Average Daily Traffic (AADT) data which is not currently available to establish potential impacts of the Scheme on the water environment within the study area and the requirement for mitigation measures to adequately reduce the risk.

D.2.5 For the ES, the potential ecological impacts of routine runoff on surface water will be assessed using the Highways Agency Water Risk Assessment Tool (HAWRAT) as advised in HD 45/09. Spillage risk tests will also be undertaken in accordance with HD 45/09.

Groundwater

D.2.6 At the time of reporting, it is unknown if discharge to ground will be required and the suitability of this method. Once confirmed, the assessment of the potential pollution impacts from runoff to groundwater may be required. This will be in accordance with Method C as outlined in HD 45/09.

Flood risk

D.2.7 A Flood Risk Assessment (FRA) will be carried out in accordance with the requirements of the NPPF (DCLG, 2012) and its accompanying Technical Guidance (DCLG, 2014), and the Environment Agency's 'Climate change allowances for planners' NPPF supporting guidance (Environment Agency, 2017) when the detailed drainage design information has been developed.

WFD

D.2.8 A WFD compliance assessment is required for new developments and schemes to demonstrate that schemes will not result in a deterioration in status (or

potential status) of any water body, or prevent the water body from meeting good status (or potential good status) in the future (2021 or 2027).

D.2.9 The Environment Agency is the competent authority for WFD. However, as the Scheme has the potential to also affect other watercourses not designated as a Main River watercourse, the lead local flood authority, Surrey County Council, has a duty to ensure the Scheme complies with WFD legislation.

D.2.10 A WFD preliminary assessment was undertaken in May 2017[69]. The preliminary assessment was based on the preliminary option drawings. This assessment has been updated and full details of this scoping WFD assessment are presented in Appendix D3. The scoping WFD assessment suggests that the Scheme would be compliant with the requirements of the WFD.

D.2.11 The approach to the WFD compliance assessment will follow the Planning Inspectorate's guidance on preparation of WFD assessments for a NSIP[70]. It will be based on a format that was originally developed in close consultation with the Environment Agency for a large transport infrastructure scheme[71]. This format was subsequently promoted by the Environment Agency as an example of best practice, particularly for large schemes that affect many waterbodies. It captures the core requirements of a compliance assessment whilst being transparent and simple to interpret. The assessment can be readily updated, creating a clear audit trail of WFD compliance as the Scheme progresses through its lifecycle from options assessment to design and environmental permitting.

[69] Road Investment Strategy M25 Junction 10/A3 Wisley Interchange Improvements. Water Framework Directive Assessment (Options Selection Stage) Highways England. May 2017
[70] The Planning Inspectorate (2017) Advice Note 18, The Water Framework Directive
[71] HS2, 2016. Water Framework Directive Compliance Assessment Update (C453) Supplementary Information. London: HS2. C454-ATK-EV-REP-000-000001

D.3 Water Framework Directive Scoping Assessment

Introduction

D.3.1 Highways England (HE) is proposing a Scheme to improve traffic flow through the M25 Junction 10 (J10)/A3 Wisley Interchange as well as on local roads near the junction. The Scheme comprises seven elements (changes to road configuration). Works associated with all elements potentially include modifications to the water environment.

D.3.2 This report is a Water Framework Directive (WFD) compliance scoping assessment for a preliminary design of the Scheme. The WFD is a European directive that imposes legal requirements to protect and improve the water environment. A compliance assessment is undertaken to determine whether works that potentially affect the water environment meet the requirements of the directive.

D.3.3 The purpose of undertaking this WFD compliance assessment is two-fold:

- To identify risks of the proposed development's activities to WFD receptors based on the relevant water bodies and their WFD quality elements; and
- To develop a set of principles that will guide the design team towards a design for the preliminary design and future design phases that is compliant with the WFD.

D.3.4 The Scheme has only been developed to preliminary design stage. It comprises general arrangements (Volume 3) and a general description (see section 'The Scheme' below). Since there is currently insufficient detail to confidently determine WFD compliance, this assessment is based on the key assumption that the design principles set out in the section 'Principles guiding WFDcompliant design' will be adopted within later stages of design and construction.A revised WFD assessment will need to accompany subsequent stages ofdesign.

Project background

Project processes

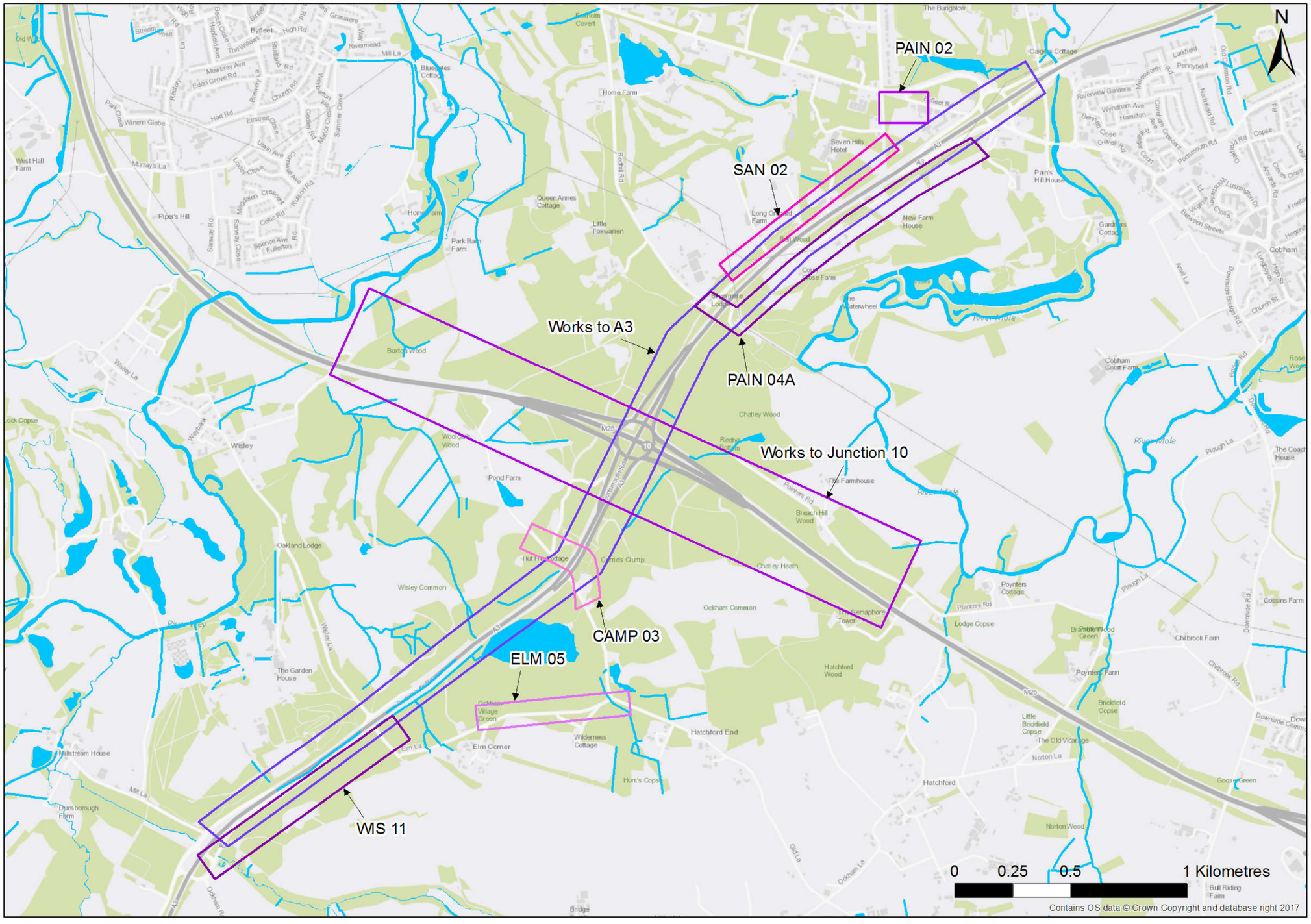
D.3.5 In December 2014, the Department for Transport (DfT) published its Road Investment Strategy (RIS) for 2015-2020. This sets-out a long-term programme for improvements to England's strategic road network. One scheme covered by the strategy is works to improve traffic flow though the M25 J10/A3 Wisley Interchange.

D.3.6 HE is the government company charged with modernising, maintaining and operating England's strategic road network. It is the 'overseeing organisation' for improvements to the M25 J10/A3 Wisley Interchange. This project is being managed under the Project Control Framework (PCF), a phased approach to developing and delivering major road projects (Highways Agency, 2013). The M25 J10/A3 Wisley Interchange project is currently at stage 3 in the PCF lifecycle. In this phase, the various aspects of the project (including environmental assessment) are developed sufficiently to complete the preliminary design.

Project location

D.3.7 The M25 J10 lies in the south west quadrant of the M25 London Orbital Motorway in Surrey. At J10 the A3, a key radial route from London to Portsmouth, crosses the M25 motorway. The M25 J10/A3 Wisley Interchange forms the confluence of radial routes between Surrey, Hampshire and Greater London with orbital routes between Kent, East and West Sussex, Surrey, Berkshire and beyond. An overview of the study area, together with the general location of element of the Scheme is set out in Figure D.1 below. Each element of the Scheme is briefly described in section 'The Scheme' below.

Figure D.1: Study area



Project aims and challenges

D.3.8 The proposed improvements to the M25 J10/A3 Wisley Interchange, as stated in the RIS, aim to: deliver free-flowing movement in all directions, together with improvements to the neighbouring Painshill interchange on the A3 to improve safety and congestion across the two sites.

D.3.9 The current challenges that users of the M25 J10/A3 Wisley Interchange face include:

- Congestion and delay disrupting journeys on the Strategic Road Network (SRN);
- Poor resilience resulting in frequent disruption and unreliable journey times;
- Safety concerns;
- High usage of lay-bys, including illegal stopping on the A3; and
- Congestion causing a barrier to growth. Enterprise M3 Local Enterprise Partnership has highlighted the M25 J10/A3 Wisley Interchange as a part of the transport network where projected increases in traffic would cause further congestion and delays.

The Scheme

Introduction

D.3.10 The Scheme is made up of seven elements (changes to road configurations).The most substantial of these is a re-structuring of the interchange itself with associated modifications to the A3. The other elements address issues on the local road network near the proposed works on the interchange and A3. The general location of the Scheme can be seen in Figure D.1. More detailed general arrangement drawings for each Scheme element can be found in Volume 3.

Description of Scheme elements

Works to Junction 10 and the A3

D.3.11 The Scheme proposed provides increased capacity at the M25 roundabout by elongating the existing roundabout, providing additional lanes to provide more circulatory capacity and enabling more traffic to discharge the roundabout whilst providing dedicated free-flowing left turns. The elongated roundabout would use the existing bridges under the A3 and new bridges over the M25, with additional lanes and capacity between the traffic signals and dedicated left-turn filters at the traffic signals. Most of the existing roundabout and slip roads would be broken out and removed, with the existing structures over the M25 remaining in place. The alterations to junction 10 include the increase from 3 lanes to 4 lanes on the M25 through the junction to enable the introduction of smart motorway arrangements on the junction 10 to 16 section in the future.

D.3.12 The Scheme also includes widening the A3 from Ockham to M25 Junction 10 and M25 Junction 10 to Painshill from three lanes to four lanes in both directions to cater for the volumes of traffic expected to use these roads in the future. There would also be widening of the A245 to three lanes between the Painshill junction and the B365 Seven Hills Road junction. As the A3 will be widened to four lanes

the current access to it from side roads and private properties will need to be closed and alternative arrangements will be put in place to provide access to the road network for the properties affected. Highways England expects to start construction in March 2020.

D.3.13 The Scheme also makes allowance for improved drainage measures to be introduced on the altered sections of the A3 and M25.

Local access provisions

D.3.14 The widening of the A3 necessitates the closure of the existing direct accesses to it and alternative provisions have been made. These are set out below.

Pond Farm access [referred to as CAMP 03 in this document]

D.3.15 A new two-way access road connecting Birchmere Scout Campsite, Hut Hill Cottage and Pond Farm to Old Lane at the Ockham Bites site via a rebuilt Cockrow overbridge would be provided. The bridge would be constructed as a 'multi-use bridge' to provide habitat connectivity between ecologically valuable land on either side of the A3. The existing access to the A3 northbound to M25 clockwise slip road at Junction 10 would be closed off. The existing track along Deers Farm Close and past Park Barn Farm would be retained.

Elm Corner access [referred to as ELM 05 in this document]

D.3.16 Elm Lane and Old Lane would be joined via the existing byway open to all traffic (BOAT). The existing BOAT would be reconstructed as a single lane, two-way local access road providing access from Elm Corner to the A3 via Old Lane and the M25 clockwise to A3 slip road.

A245 widening [referred to as PAIN 02 in this document]

D.3.17 Widening the A245 from the Painshill Junction to Seven Hills Road Junction to dual three lane all purpose (D3AP), with a two-way access road between Old Byfleet Road to Seven Hills Road South for Felton Fleet School. The existing right turn from Old Byfleet Road to the A245 would be closed.

Painshill access [referred to as PAIN 04A in this document]

D.3.18 A new road bridge spanning the widened A3 will be provided just to the south of the end of Redhill Road, linking the access road from Seven Hills Road South to a new two-way local access road running parallel along the south-east side of the A3 as far as Court Close Farm, Heyswood Guides Camp and New Farm. This new link road and bridge will also form part of the NMU network around the Scheme, via a bridleway link to the re-provided NMU route south from Painshill interchange.

Access to properties to north of A3 [referred to as SAN 02 in this document]

D.3.19 A two-way local access road with passing bays would be provided from Redhill Road to Seven Hills Road, providing access to Long Orchard Farm, Long Orchard House and San Domenico (Euro Garages).

Wisley Lane access [referred to as WIS 11 in this document]

D.3.20 A new two-way link road directly from the east side of the Ockham interchange roundabout along the north western edge of the Wisley airfield site before tuning north west to rise and cross over the A3 on a new bridge close to the line of Elm Lane. This access ties into the existing level of Wisley Lane beyond the Royal Horticultural Society's (RHS) entrance, which will need to be amended. The existing access to and from Wisley Lane from the northbound A3 will be closed. The new crossing would provide access over the A3 for non-motorised users (NMU) and the existing footbridge would be removed. An area of land for flood compensation is included where the structure carrying the road over the Stratford Brook watercourse might reduce the flood zone here.

Water Framework Directive background

WFD overview

D.3.21 The WFD (2000/60/EC) aims to protect and enhance the quality of the water environment across all European Union member states. The WFD requires member states to classify the current condition or 'status or potential' of surface water and ground water bodies and set a series of objectives for maintaining or improving condition.

D.3.22 The WFD requires all natural surface water bodies to achieve both Good Chemical Status (GCS) and Good Ecological Status (GES). Artificial and Heavily Modified Water Bodies (A/HMWBs) may be prevented from reaching GES due to the modifications necessary to maintain their function, e.g. navigation. They are, however, required to achieve Good Ecological Potential (GEP), through the implementation of a series of mitigation measures.

D.3.23 The WFD also requires good status (both qualitative and quantitative) to be achieved for all ground water bodies and the prevention of the deterioration in groundwater status. In addition, it requires the achievement of objectives and standards for protected areas; and the reversal of significant and sustained upward trends in pollutant concentrations in groundwater.

D.3.24 Status is reported at the water body scale, with individual water bodies forming part of larger river basin districts (RBD), for which river basin management plans (RBMPs) have been developed. The process of river basin management planning includes the preparation of programmes of measures for achieving the environmental objectives of the WFD and these act as the main reporting mechanism to the European Commission and the public.

D.3.25 Each RBMP documents the analysis, monitoring, objective-setting and consideration of measures required to maintain or improve status at a water body scale for both surface water and ground water bodies. The first RBMPs were published in 2009 followed by a Cycle 2 update published in 2016.

WFD compliance assessment

D.3.26 A WFD compliance assessment is required for new developments and schemes to demonstrate that proposals will not result in a deterioration in status (or potential) of any water body (defined in this report as Test A), or prevent the water body from meeting good status (or potential) in the future (2021 or 2027) (defined in this report as Test B).

D.3.27 Although Brexit introduces some uncertainty about the long term future of WFD legislation in the UK, it is likely to be guarded through the Great Repeal Bill process for an unspecified period beyond the UK's departure from the EU in March 2019.

D.3.28 Compliance with the directive can only be fully demonstrated once detailed designs of a scheme have been prepared. However, design is an evolutionary process, and the earlier within that process the WFD can be considered, the more readily the legal requirements of the directive can be integrated into the design. The compliance assessment presented in this document is intended to inform the development of the Scheme to be taken forward to preliminary design. It also sets out principles that will guide later design phases towards compliance with the directive.

WFD compliance assessment approach for the M25 J10/A3 Wisley Interchange

D.3.29 The compliance assessment is a scoping document. It has been prepared in accordance with the scoping processes set out in The Planning Inspectorates (2017). It uses as an approach that was originally developed in close consultation with the Environment Agency for a large transport infrastructure scheme (HS2, 2016). This approach has since been promoted by the Environment Agency as an example of best practice, particularly for large schemes that affect many water bodies. It captures the core requirements of a compliance assessment whilst being transparent and simple to interpret. Assessment can be readily updated, creating a clear audit trail of WFD compliance as a scheme progresses through its lifecycle from options assessment to design and environmental permitting.

D.3.30 For surface water bodies, the approach considers the effects of the project on the biological, physico-chemical and hydro-morphological sub-elements that comprise overall water body status. For ground water bodies, the approach uses quantitative and chemical criteria to assess the effects of the Scheme.

D.3.31 For each water body, the assessment is documented in a matrix, listing WFD quality sub-elements against key components of the Scheme. This ensures the effect of each component of the Scheme on each WFD sub-element is consistently assessed and reported. Note that some sub-elements (hydro-morphological and physico-chemical) are grouped at the element level to keep the matrix at a manageable size; however, the assessment process still considered each sub element.

D.3.32 Each assessment point in the matrix is assigned a colour-coded category through the adaption of a 'Red, Amber, Green' (RAG) risk based system agreed with the Environment Agency, based on the potential effect of any Scheme component on any given WFD sub-element.

D.3.33 The cumulative assessment within each sub-element is summarised as a final sub-element assessment based on the worst effect category recorded against individual Scheme components. The cumulative assessment across all sub-elements is then summarised as the overall risk of non-compliance for a given water body.

D.3.34 Descriptors for each of these colour-coded risk categories are set out in Table D.2 for surface water bodies and Table D.3 for ground water bodies. They are summarised in the bullets below:

- **Dark Blue:** beneficial effect of a scale sufficient to increase status class for the water body (certain).
- **Light Blue:** beneficial effect resulting in a localised improvement, but insufficient to increase status class at water body scale (certain).
- **Green:** no measurable change to (or effect on) water body (certain).
- **Yellow:** minor localised and/or temporary effect when balanced against the mitigation measures embedded in the design principles set out in the section 'Principles guiding WFD compliant design' - insufficient to affect an element at a water body scale (certain).
- **Amber:** an adverse effect is possible when balanced against the mitigation measures embedded in the design principles set out in the section 'Principles guiding WFD compliant design' - the extent of effect is uncertain, and there remains a potential to affect water body status[72].
- **Red:** adverse effect of sufficient scale to impact on a quality element at a water body scale (certain).

[72] The HS2 methodology (HS2, 2016) had two risk categories assigned to an amber effect - low and high. This recognised that, at the relatively early stage in the scheme lifecycle that the assessment was carried out, it was not possible to be certain that an effect assigned to the amber class would not lead to deterioration at a water body scale.

Table D.2: Decision matrix for assessing effect on surface water status class

Type of effect	Effect of Scheme component on WFD element	Overall effect of Scheme on WFD element	Overall effect of Scheme on water body status	Examples	Outcome
Dark Blue - Major beneficial	Impacts when taken on their own have the potential to lead to significant improvement.	Impacts in combination with others have the potential to lead to the improvement in the class of a WFD element.	Impacts in combination with others have the potential to lead to the improvement in the WFD status of the water body.	Creation of significant areas of riparian habitats (for example, within a river diversion) which enhance the value of the water body.	Increase in status class for that water body.
Light Blue - Minor /localised beneficial	Impacts when taken on their own have the potential to lead to a minor localised or temporary improvement.	Impacts in combination with others have the potential to lead to a minor localised or temporary improvement of the WFD element.	Impacts in combination with others have the potential to lead to a minor localised or temporary improvement that does not affect the overall WFD status of the water body.	Minor habitat creation measures such as creation of marginal berms up/downstream of a structure.	Localised improvement, no change in status of WFD water body.
Green - No impact	No measurable change to any quality elements.	No measurable change to any quality elements.	No measurable change to any quality elements.	Macrophytes - clear span bridge, which causes light shading. Invertebrates - changes to flow with no likely effect on macroinvertebrate community/contamination in area with highly tolerant invertebrate community (e.g. ASPT (average score per taxon) <4). Fish - minor, temporary encroachment.	No change.
Yellow - Localised/ temporary adverse effect	Impacts when taken on their own have the potential to lead to a minor localised or temporary effect.	Impacts in combination with others have the potential to lead to a minor localised or temporary effect on the WFD elements. Consideration will be given to habitat creation measures.	Impacts in combination with others have the potential to lead to a minor localised or temporary effect that does not affect the overall WFD status of the water body. Consideration will be given to habitat creation measures.	Macrophytes/phytoplankton - loss of macrophytes/diatoms due to shading from a bridge or other structure; temporary loss of invertebrates/ macrophytes etc. during channel re-alignment. Invertebrates - estimated loss in diversity of invertebrates for e.g. < 100 m of water body/or X% of water body surface (due to habitat loss, changes to flow etc.). Fish - localised loss of fish habitat/numbers of fish.	No change in status of WFD water body when balanced against mitigation measures embedded in the design principles set out in the section 'Principles guiding WFD compliant design'.
Amber - Adverse widespread or prolonged effect	Impacts when taken on their own have the potential to lead to a widespread or prolonged effect. Consideration will be given to habitat creation measures.	Impacts in combination with others have the potential to have an adverse effect on the WFD element. Additional mitigation measures will be applied.	Impacts in combination with others have the potential to have an adverse effect on the WFD water body. The current WFD risk category will be taken into account when assessing these combined impacts. Consideration will be given to habitat creation measures.	Macrophytes/phytoplankton - loss of macrophytes/diatoms for a significant length of water due to shading from a long (e.g. > 200 m) culvert or other similar structure. Invertebrates - likely significant drop in invertebrate diversity over e.g. > 300 m or X% of water body surface (due to habitat loss/siltation or combination of various impacts etc.). Fish - obstruction to upstream migration of fish to spawning grounds in a salmonid river therefore affecting fish in whole of WFD water body.	Adverse effect but risk of status change needs to be considered with any additional mitigation measures, and taking into account the level of confidence.
Red - Adverse effect on overall WFD status of water body	Impacts when taken on their own have the potential to lead to a widespread or prolonged effect even with mitigation in place.	Impacts in combination with others have the potential to have an adverse effect on the WFD element and change its class. Consideration will be given to habitat creation measures.	Impacts in combination with others have the potential to have an adverse effect on the WFD water body and change its status. The current WFD risk category will be taken into account when assessing these combined impacts. Consideration will be given to habitat creation measures.	Any change in status of an element that leads to an overall deterioration of WFD status of water body - this colour is only assigned when the positive benefits from mitigation for that water body are outweighed by negative impacts.	Decrease in status of WFD water body when balanced against additional mitigation measures. Outcome is considered to be certain.
Green (No impact)	No measurable change to groundwater levels or quality.	No measurable change to any WFD elements.	No measurable change to any WFD elements.	Foundation works above the water table.	No change.
Yellow - Localised/ temporary adverse effect	Impacts when taken on their own have the potential to lead to a minor localised or temporary effect.	Combined impacts have the potential to lead to a minor localised or temporary effect on the WFD element.	Combined impacts have the potential to lead to a minor localised or temporary effect on the WFD element. No change to groundwater body status.	Foundation works below the water table but drainage returned to ground within the same groundwater body and surface water catchment.	No change in status of WFD water body when balanced against mitigation measures embedded in the Scheme.

Type of effect	Effect of Scheme component on WFD element	Overall effect of Scheme on WFD element	Overall effect of Scheme on water body status	Examples	Outcome
Amber - Adverse widespread or prolonged effect	Impacts when taken on their own have the potential to lead to a widespread or prolonged effect.	Combined impacts have the potential to have an adverse effect on the WFD element.	Combined impacts have the potential to have an adverse effect on the WFD element, but not change its status at groundwater body scale.	Dewatering of cutting reduces baseflow to tributary but no adverse effects at scale of whole surface water body.	Adverse effect but risk of status change needs to be considered with any additional mitigation measures, and taking into account the level of confidence.
Red - Adverse effect on overall WFD status of water body	Impacts when taken on their own have the potential to lead to a significant effect.	Combined impacts in combination with others will have a significant adverse effect on the WFD element.	Combined impacts in combination with others will have an adverse effect on the WFD element AND change its status at the groundwater body scale.	Dewatering of cutting reduces baseflow to surface water body with adverse effects at scale of whole surface water body.	Decrease in status of WFD water body when balanced against additional mitigation measures. Outcome is considered to be certain.

M25 J10/A3 Wisley Interchange compliance assessment

Introduction

D.3.35 This section, together with assessment matrices in Appendix C, sets out the WFD compliance assessment for the Scheme for the M25 J10/A3 Wisley Interchange.

WFD water bodies potentially affected by M25 J10/A3 Wisley Interchange

D.3.36 The location of the water bodies potentially affected by the Scheme are shown in Figure D.2.

River water bodies

D.3.37 The Scheme lies in the Thames Basin WFD District (RBD 6) within two operational catchments. These are the Lower Mole and Rythe Operational Catchment (OPCAT ID 3277) and the Wey Operational Catchment (OPCAT ID 3110). Within these catchments there are three WFD assessed water bodies that are potentially influenced by the Scheme.

D.3.38 The Stratford Brook (GB106039017890) WFD assessed water body is crossed directly by one or more of the elements that comprise the Scheme. Neither the Wey (Shalford to River Thames confluence at Weybridge - GB106039017630) nor the Mole (Horley to Hersham - GB106039017621) are crossed by any of the Scheme elements; however, ditches and surface water flow paths that drain to these water bodies are potentially affected.

Lakes water bodies (and other open water surface water features)

D.3.39 There is one WFD designated lake affected by the Scheme. This is Boldermere Lake (GB30643218). Note this lake is also specifically referenced in the designation for the Ockham and Wisley Commons Site of Special Scientific Interest (SSSI). It is located south-east of the A3, with its western shoreline immediately adjacent to the carriageway. There are also some lakes and ponds that are not WFD designated within the bounds of the Scheme. As most will not be directly impacted by the Scheme, they will not be considered.

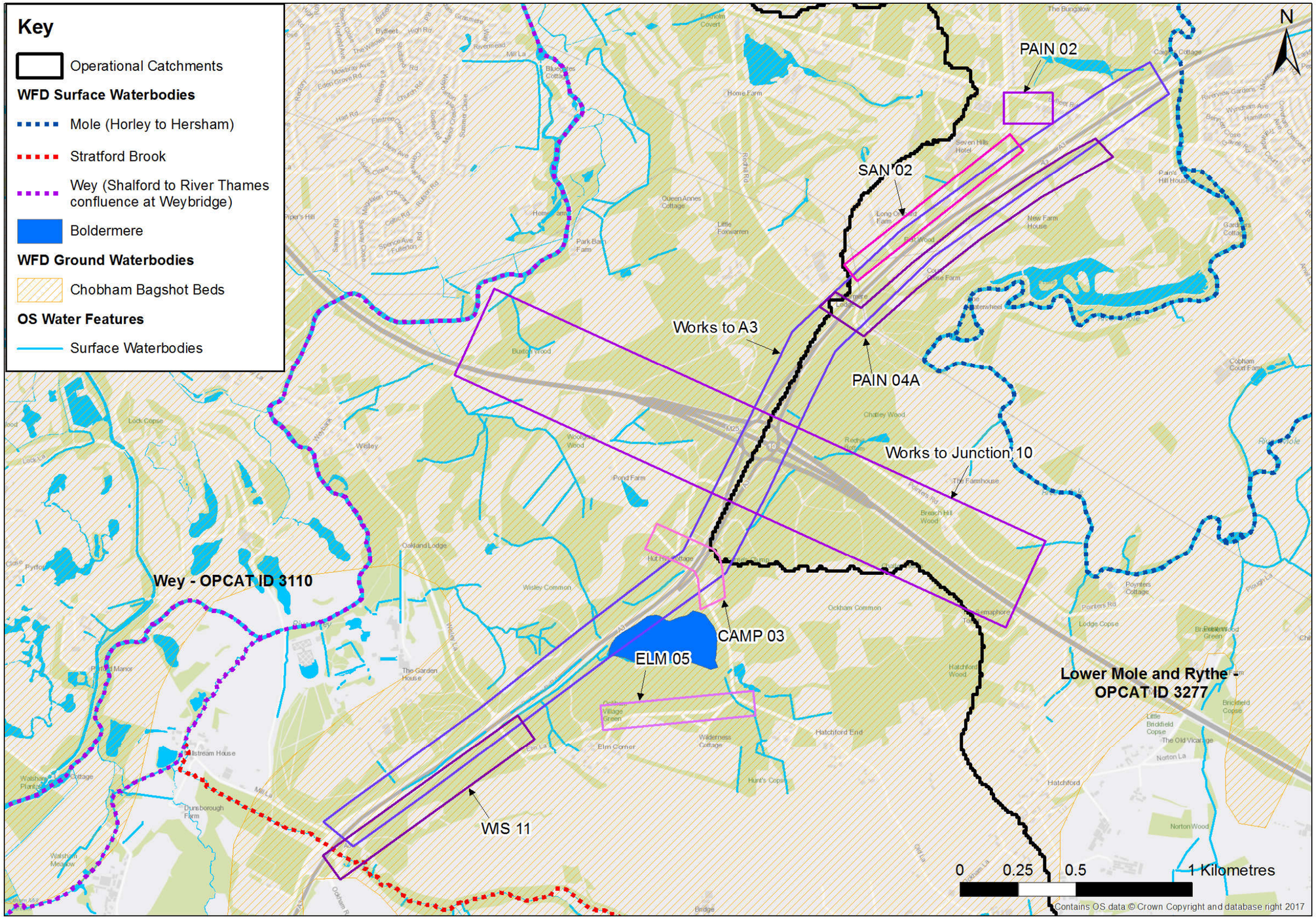
Groundwater

D.3.40 There is one WFD groundwater body underlying the whole of the Scheme area. This is the Chobham Bagshot Beds ground water body (GB40602G601400).

D.3.41 Based on geological open data (1:50,000 scale), most of the Scheme area is underlain by the Bagshot Formation (BGS, 2017). However, a small section under and beside Stratford Brook is underlain by the London Clay Formation.

D.3.42 There are no Source Protection Zones (SPZ) in the area covered by the Scheme.

Figure D.2: WFD (and other) water features near the M25 J10/A3 Wisley Interchange



Protected areas potentially affected by the M25 J10/A3 Wisley Interchange

D.3.43 There is one European designated site in the area directly affected by the Scheme. This is the Thames Basin Heath Special Protection Area (SPA) which is located south of the M25 and on both sides of the A3 between Wisley Gardens/Elm Road and J10 of the M25. There is also a nationally designated site, Ockham and Wisley Commons SSSI, which covers the same area as well as a small section north of the M25.

Screening WFD quality elements and water bodies

Surface water bodies and associated water features

D.3.44 Improvements to the road network around the M25 J10/A3 Wisley Interchange will require physical works affecting river water bodies and surface water features draining to these water bodies. The works have the potential to directly affect habitat by changing the shape or size of water features. They also have the potential to indirectly impact fish, macrophytes and/or invertebrates by changing how the physical habitat is created and maintained or by changing water quality. Biological, physico-chemical and hydro-morphological WFD quality elements are therefore screened INTO this assessment.

D.3.45 These physical works will not fundamentally change the water chemistry of water bodies. Impacts on water quality WFD elements are addressed in this assessment by focussing on the physico-chemical quality elements (Ammonia, dissolved oxygen (DO), pH, Phosphate and temperature). WFD specific pollutant and Chemical WFD elements have been screened OUT OF this assessment.

D.3.46 There is one river WFD assessed water body potentially directly affected by the Scheme: Stratford Brook (GB106039017890). This water body is therefore screened INTO this assessment. The proposed works also crosses other surface water features draining to two other WFD assessed water bodies: the Wey (Shalford to River Thames confluence at Weybridge - GB106039017630) nor the Mole (Horley to Hersham - GB106039017621). This assessment also considers the potential impacts of the Scheme on these water features.

D.3.47 Improvements to the A3 will require physical works that are assumed to affect a WFD lake water body. These works have the potential to directly affect habitat by changing the shape or size of this water body. They therefore may also indirectly impact macrophytes, phytobenthos, invertebrates and/or phytoplankton by changing the suitability of the physical habitat or by changing water quality. Lake water bodies have therefore been screened INTO this assessment.

Ground water bodies

D.3.48 Since the Scheme overlies the Chobham Bagshot Beds groundwater body (GB40602G601400), this groundwater body has been screened into the assessment.

Baseline WFD Status (and objectives)

Surface water

D.3.49 The Stratford Brook (GB106039017890), is directly affected by the Scheme and is also used in this assessment to represent tributaries to this water body that are

also crossed by the Scheme. It has Moderate Overall Water body status which comes from the invertebrate section of the Biological Quality Elements assessment, the rest of which were not assessed in 2015. Physico-chemical Quality Elements were assessed as Good, Specific Pollutants as High and Hydro-morphological Supporting Elements as Supporting Good. Objectives set for this water body in Cycle 2 (2015) were GES (by 2027), and Good Overall Status by 2027.

D.3.50 The Mole (Horley to Hersham) WFD assessed water body (GB106039017621) is not directly affected by the Scheme. However, it is included in this assessment because the Scheme crosses surface water features draining to this water body. The most recent assessment of this water body's WFD status was in the 2015 Cycle 2 when it was given an Overall Water body status of Moderate. The chemical status of the water body was Good; however, the ecological status was classed as Moderate. The reason for the Moderate Ecological Status was both Physico-chemical and Biological Quality Elements. Macrophytes and phytobenthos combined as well as invertebrates were classed Moderate within the Biological Quality Elements. Biochemical Oxygen Demand (BOD) was classed as Moderate giving the Physico-chemical element its status, however, phosphate was classed as Poor. Hydro-morphological supporting elements were assessed as Supports Good. Objectives set for this water body in Cycle 2 (2015) were Moderate Ecological Status (by 2015), and Moderate Overall Status by 2015. Reasons given for not aiming for GES were disproportionate expense and technical infeasibility of improving the status of Phosphate.

D.3.51 The Wey (Shalford to River Thames confluence at Weybridge) WFD water body (GB106039017630) is not directly affected by the Scheme. However, it is included in this assessment because the Scheme crosses surface water features draining to this water body. It is a heavily modified water body (HMWB) (the river is was historically used for navigation). In the 2015 WFD Cycle 2 the Overall Potential of this water body was Moderate. It was classed Good for Chemical status and Moderate for Ecological status. The Moderate Ecological status was driven by Supporting (not all mitigation measures in place), Biological Quality Elements (fish and macrophytes and phytobenthos combined) and Physico-chemical Element (Phosphate). The objective set for this water body in Cycle 2 (2015) was Moderate Potential by 2015. Reasons given for not achieving GES were disproportionate expense and technical infeasibility of improving the status of Macrophytes and Phytobenthos Combined and Phosphate.

D.3.52 Boldermere WFD Lake (GB30643218) is a heavily modified water body (HMWB) directly affected by the Scheme. The current (2015 Cycle 2) Overall Potential of this water body was Moderate. It had GCS and Moderate Ecological status. The Moderate status was driven by total phosphorus (Physico-chemical Quality Elements) and an expert judgement that Good Potential had not been achieved. The objective set for this water body in Cycle 2 (2015) is Good Overall Potential by 2027.

Groundwater

D.3.53 For the Chobham Bagshot Beds WFD groundwater body (GB40602G601400) the Overall Water body status for 2015 Cycle 2 was Good, with both the Quantitative and Chemical Elements reaching Good status. The objective is Good status by 2015.

Scheme components potentially affecting WFD water bodies

D.3.54 The components of the Scheme potentially affecting WFD water bodies are listed below in Box 1 (permanent effects) and Box 2 (temporary effects). Principles guiding WFD compliant designs of the Scheme components highlighted using italics are presented in the section 'Principles guiding WFD compliant design'.

Box 1
Components of the PERMANENT Scheme potentially affecting WFD water bodies

1. River crossings (WFD assessed watercourse) - construction of new channel crossing, either single span bridge or culvert; modification to (e.g. extension) existing bridge or culvert (see Note 1).
2. River crossings (minor watercourse) - construction of new channel crossing, either bridge or culvert; modification to (e.g. extension) existing culvert (see Note 1).
3. Realignment (minor watercourse) - Realignment of minor watercourse to accommodate Scheme components (see Note 1).
4. Realignment and crossing of drainage ditch - Realignment of drainage ditches to accommodate Scheme components. Construction of culverts and other crossings over drainage ditches (see Note 1).
5. Drainage of road runoff (to surface water) - Discharge of runoff from potentially contaminated surfaces to surface water body. Construction of outfalls in river banks.
6. Road & river crossings (effects on groundwater) - Deep foundation protruding into aquifer modify flow paths.
7. Drainage of road runoff (to groundwater) - Discharge of runoff from potentially contaminated surfaces to ground water bodies (aquifers), for instance through Sustainable Drainage Systems (SUDS).

Notes

Note 1 - Works commonly include modifications (widening, deepening, straightening or realigning) to channel upstream and downstream of crossing (to align channel with the new crossing). Bed protection or bank protection may also be used to manage erosion.

Box 2
TEMPORARY activities during construction potentially affecting WFD water bodies

1. Runoff from construction sites to surface water bodies - Management of runoff from construction sites prior to discharge to surface water body.
2. Disturbance of non-native invasive species (NNIS) - Construction activities can result in the spread of NNIS along surface water bodies and their riparian zone.
3. Vegetation management - Clearance of riparian and in channel vegetation during construction.
4. De-watering - local changes to groundwater levels associated with pumping out of subterranean works areas (e.g. deep foundations). Disposal of pumped water to surface water bodies.

5. Runoff from construction sites to ground water bodies - Untreated runoff from construction sites discharges through porous surface geology direct to an aquifer.

Effect of permanent works

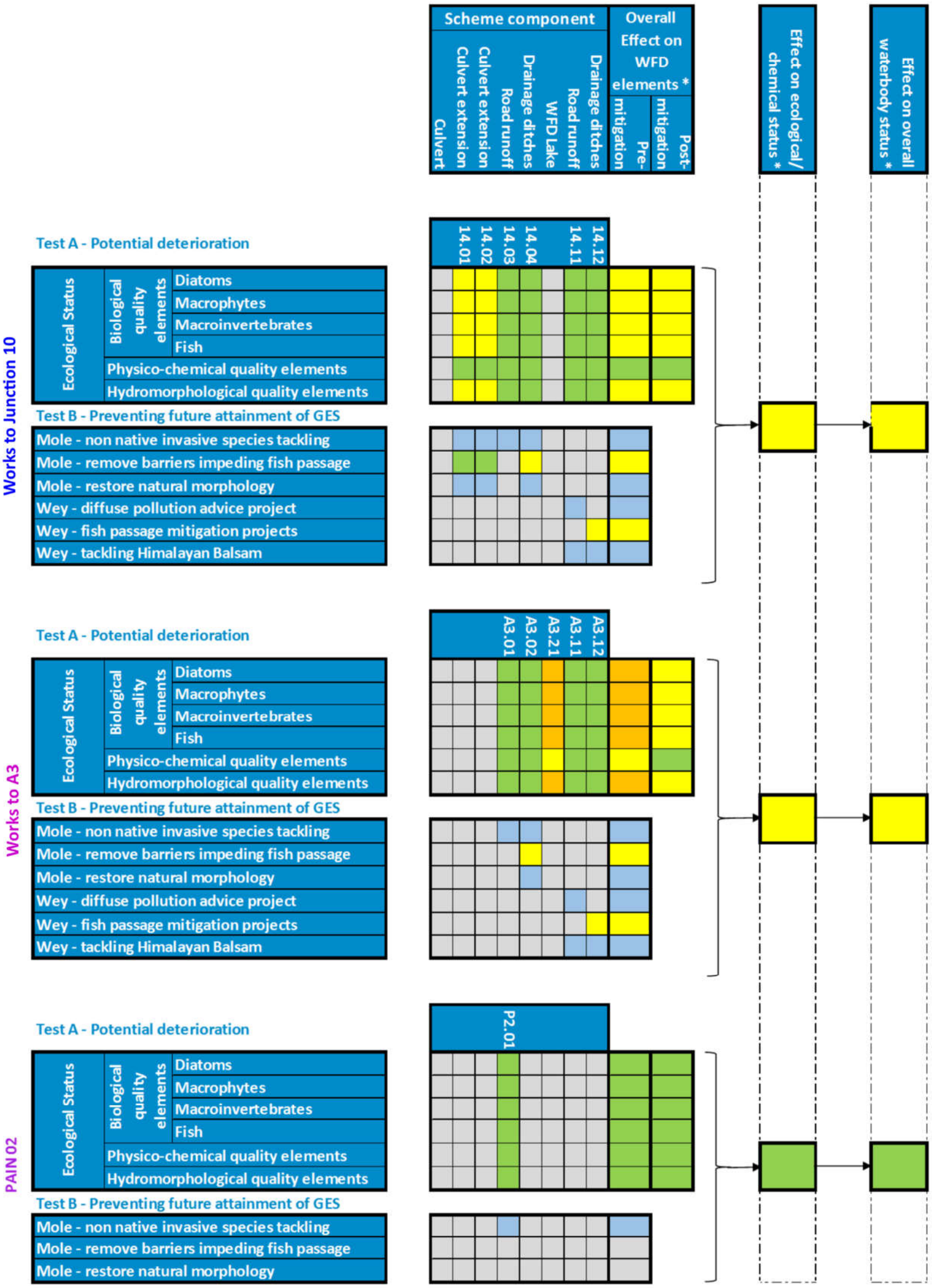
Introduction

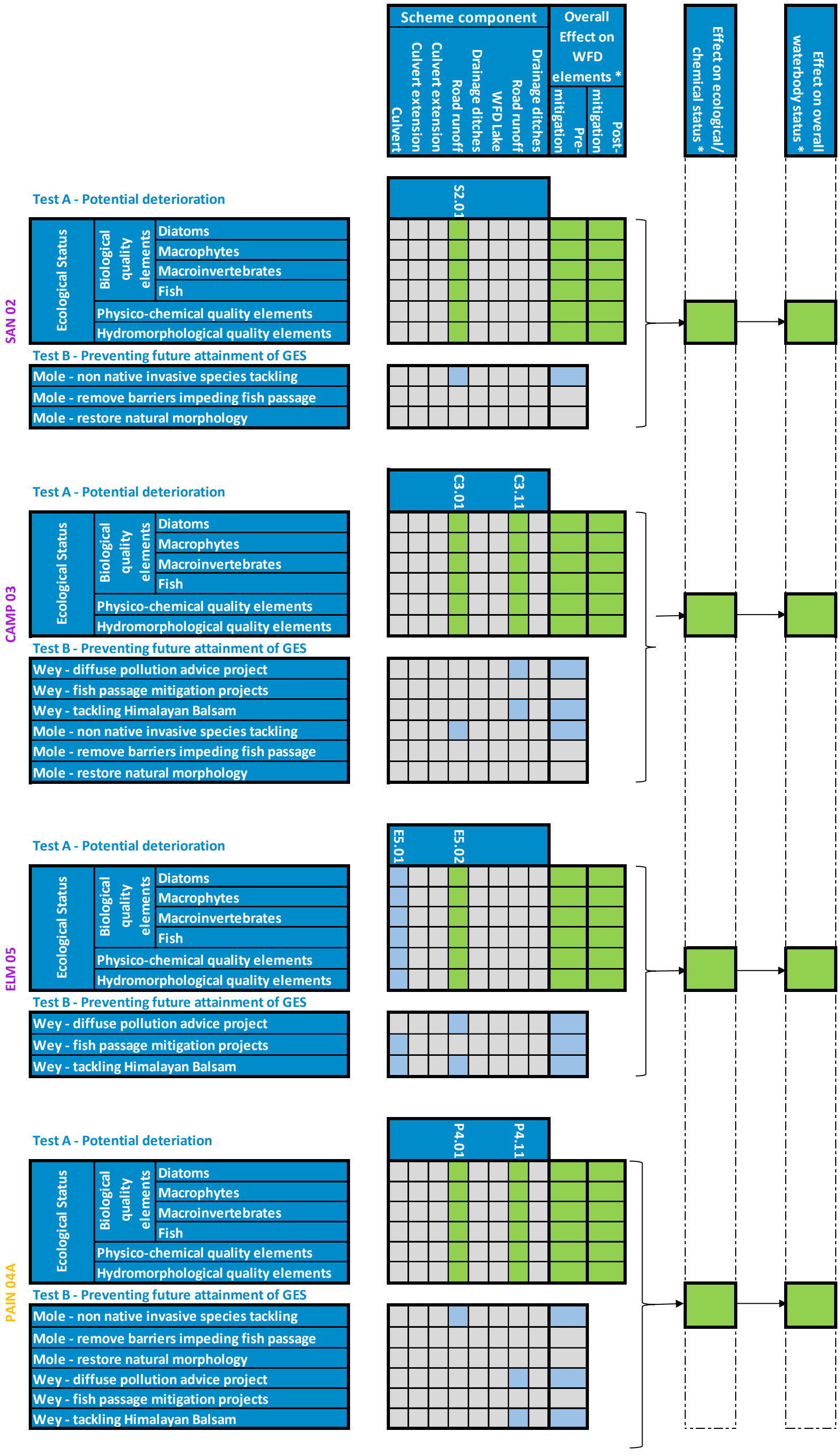
D.3.55 This section sets out an initial assessment of the compliance of each Scheme element for the M25 J10/A3 Wisley Interchange with the requirements of the WFD. It is a summary of the full assessments set out in the matrices in Appendix C. General arrangements of each Scheme element can be found in Volume 3. Scheme components affecting the water environment are marked on georeferenced general arrangements in Appendix B.

D.3.56 Figure D.3 is a visual summary of our WFD assessment of the effect of each Scheme element on surface water WFD elements. Figure D.4 summarises the assessment for groundwater WFD elements.

D.3.57 The assessments cover both Test A (no deterioration) and Test B (protecting future attainment of GES). They summarise the effect of Scheme components on WFD quality elements using the colour coding described in Table D.2. Assessments are aggregated as described in paragraphs D.3.29 to D.3.34 based on the WFD principle of “one out, all out” to eventually determine the effect of each Scheme element at a water body scale.

Figure D.3: Summary of initial WFD assessments for M25 J10/A3 Wisley Interchange (surface water bodies)




Scheme component
Overall Effect on WFD elements *
Culvert extension
Culvert extension
Road runoff
Drainage ditches
WFD Lake
Road runoff
Drainage ditches
Pre-mitigation
Post-mitigation
Effect on ecological/ chemical status *
Effect on overall waterbody status *
SAN 02
Test A - Potential deterioration
Ecological Status
Biological quality elements
Diatoms
Macrophytes
Macroinvertebrates
Fish
Physico-chemical quality elements
Hydromorphological quality elements
S2.01
Test B - Preventing future attainment of GES
Mole - non native invasive species tackling
Mole - remove barriers impeding fish passage
Mole - restore natural morphology
CAMP 03
Test A - Potential deterioration
C3.01
C3.11
Test B - Preventing future attainment of GES
Wey - diffuse pollution advice project
Wey - fish passage mitigation projects
Wey - tackling Himalayan Balsam
Mole - non native invasive species tackling
Mole - remove barriers impeding fish passage
Mole - restore natural morphology
ELM 05
Test A - Potential deterioration
E5.01
E5.02
Test B - Preventing future attainment of GES
Wey - diffuse pollution advice project
Wey - fish passage mitigation projects
Wey - tackling Himalayan Balsam
PAIN 04A
Test A - Potential deteriation
P4.01
P4.11
Test B - Preventing future attainment of GES
Mole - non native invasive species tackling
Mole - remove barriers impeding fish passage
Mole - restore natural morphology
Wey - diffuse pollution advice project
Wey - fish passage mitigation projects
Wey - tackling Himalayan Balsam

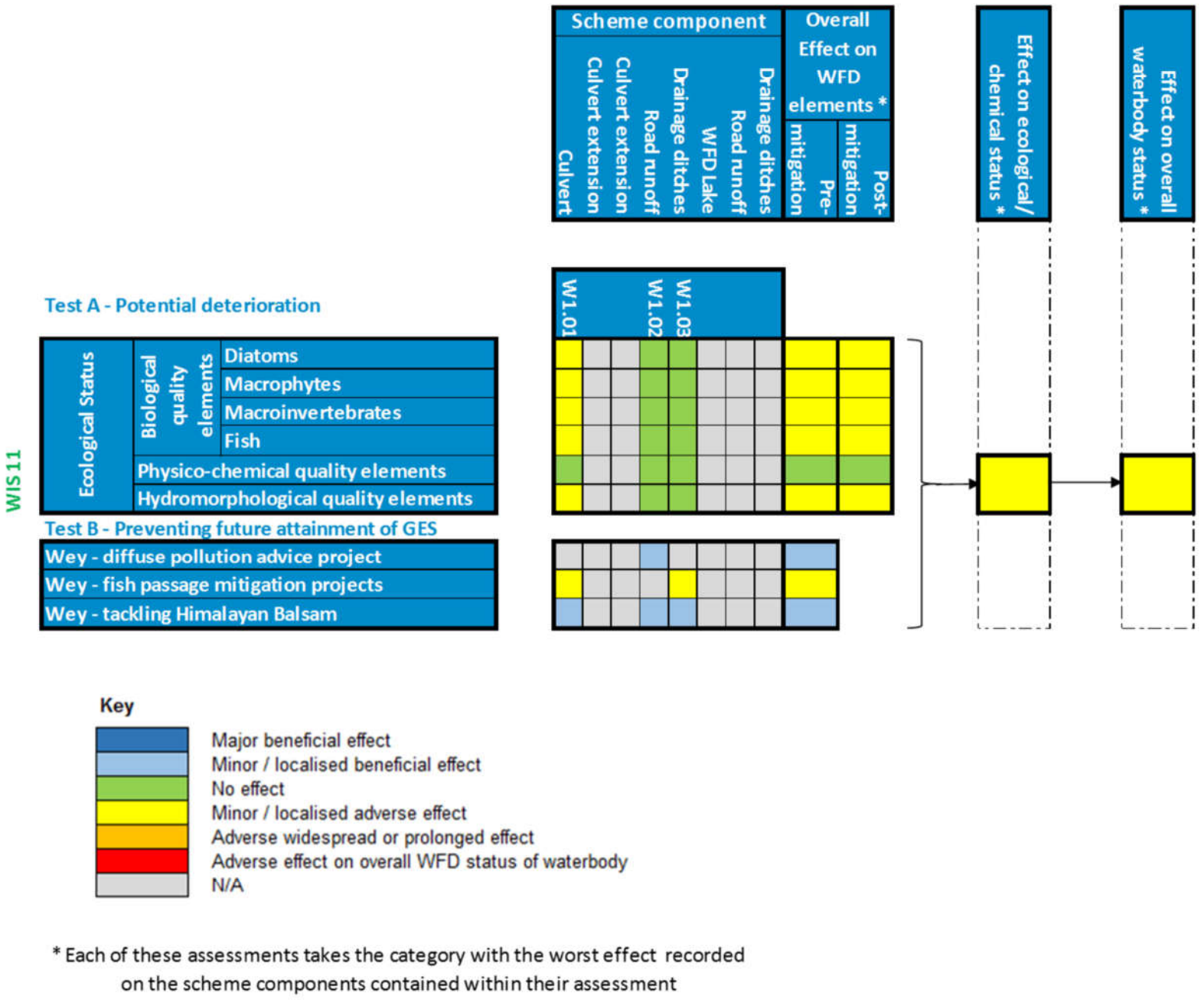
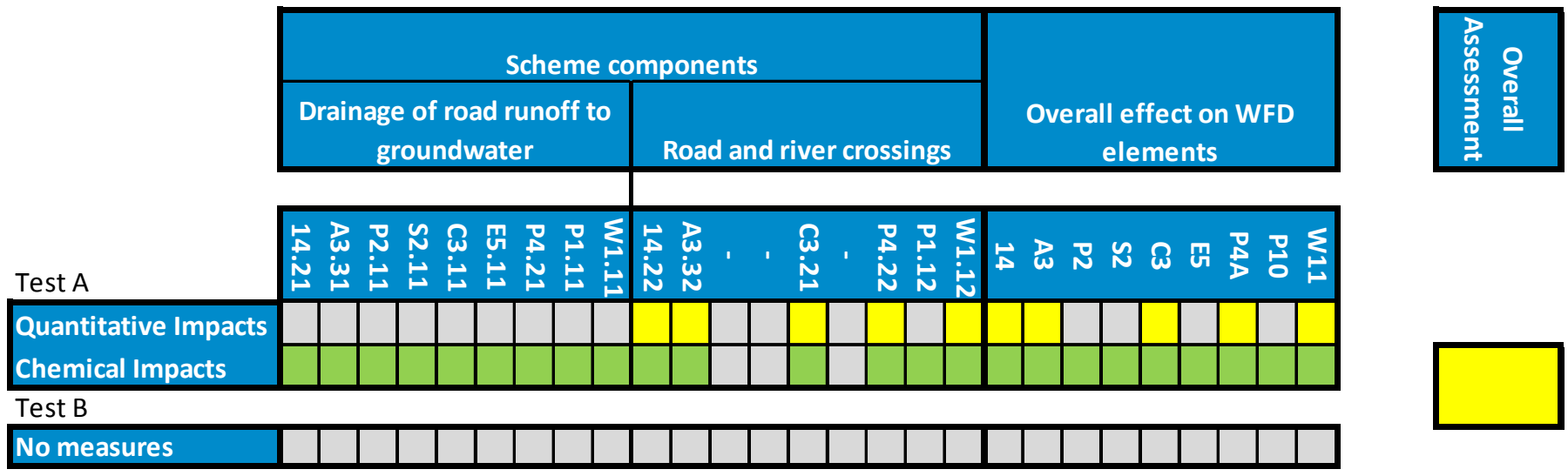


Figure D.4: Summary of initial WFD assessments for M25 J10/A3 Wisley Interchange (ground water bodies)



WFD assessment of the Scheme

Introduction

D.3.58 This section should be read in conjunction with the figures in Appendix B. There is one figure in the appendix for each element of the Scheme. Each figure shows the location of the Scheme elements making-up each plan that can also be mapped. Those Scheme elements that cannot be specifically located at this stage of design (e.g. drainage of road runoff to surface water) are normally noted in a text box at the bottom of each figure.

Works to Junction 10

D.3.59 This initial WFD assessment suggests that works to Junction 10 (if designed in accordance with the principles set out in the section 'Principles guiding WFD compliant design') would be compliant with the requirements of the WFD. This is because it is not considered to cause deterioration at the water body scale (thus passing Test A) and should not prevent future attainment of GES (Test B).

D.3.60 The Scheme element does, however, generate some minor or localised adverse effects. The most pronounced of these are the culvert extensions 14.01 and 14.02 (see Figure B1 in Appendix B). These extensions may increase:

- the loss of morphological and flow complexity;
- disruption to sediment continuity; and
- local reduction in riparian and aquatic habitat quality.

D.3.61 Deep foundations may be necessary to support structures within the Scheme (Scheme element 14.22) - these have potential to form barriers to groundwater flow.

D.3.62 Other key elements of the Scheme are considered to have neutral effects or the potential to benefit the water environment. The realignments associated with the culvert extensions 14.01 and 14.02 are an opportunity to restore sections of channel to more natural form and function.

D.3.63 Although there are no measures assigned to this water body in the RBMP or associated data sets, the local Catchment Partnerships do set out some aims in the RBMP (Environment Agency, 2015). This Scheme element could be considered to contribute to those on:

- the management of NNIS (including Himalayan Balsam);
- reduction of diffuse pollution from the region's road network; and
- restoration of natural morphology (in realigned sections).

D.3.64 However, the Scheme does counter an aim to remove barriers to fish passage.

Works to A3

D.3.65 This initial WFD assessment suggests that works to the A3 would be compliant with the requirements of the WFD. This assumes:

- suitable mitigation is put it place to prevent deterioration in the overall Potential[73] of the Boldermere Lake water body and
- designs are developed in accordance with the principles set out in the section 'Principles guiding WFD compliant design'.

D.3.66 On this basis, the Scheme element is not considered to cause deterioration at the water body scale (thus passing Test A) and should not prevent future attainment of GES (Test B).

D.3.67 The Scheme element is likely to reduce marginal lake habitat on the western shore of the Boldermere lake water body (A3.21 see Figure B2 in Appendix B). Without mitigation, this loss of habitat could result in deterioration in the overall Potential of the water body. We believe that suitable mitigation can be developed, thus preventing water body scale deterioration, but this needs to be confirmed (see proposed further technical investigation in the section 'Future technical investigations').

D.3.68 In addition, deep foundations may be necessary to support structures within the design (Scheme component A3.32) - these could form barriers to groundwater flow, resulting in local adverse effects to the lake and other local water features. The principles set out in the section 'Principles guiding WFD compliant design', together with mitigation measures discussed above, are assumed to mitigate this local issue.

D.3.69 Although there are no measures assigned to this water body in the RBMP or associated data sets[74], the local Catchment Partnerships do set out some aims in the RBMP (Environment Agency, 2015). This Scheme element could be considered to contribute to those on:

- the management of NNIS (including Himalayan Balsam); and
- reduction of diffuse pollution from the region's road network.

D.3.70 However, the Scheme may counter an aim to remove barriers to fish passage (at crossings of ditches).

A245 widening [referred to as PAIN 02 in this document]

D.3.71 This initial WFD assessment suggests that Scheme element PAIN 02 (if designed in accordance with the principles set out in the section 'Principles guiding WFD compliant design') would be compliant with the requirements of the WFD. This is because it is not considered to cause deterioration either at the local or the water body scale (thus passing Test A) and should not prevent future attainment of GES (Test B).

D.3.72 The only components of this Scheme element (road runoff to both surface water and groundwater - see Figure B3 in Appendix B) are considered to have neutral effects on the water environment. This assessment is made on the basis that industry standard measures to manage road runoff (as set out in the section 'Principles guiding WFD compliant design') will be implemented.

D.3.73 Although there are no measures assigned to this water body in the RBMP or associated data sets, the local Catchment Partnerships do set out some aims in

[73] Boldmere Lake is a Heavily Modified Water Body
[74] HMWB Mitigation Measures assessed as good in the 2015 RBMP

the RBMP (Environment Agency, 2015). This Scheme element could be considered to contribute to the management of NNIS.

Access to properties to north of A3 [referred to as SAN 02 in this document]

D.3.74 This initial WFD assessment suggests that Scheme element SAN 02 (if designed in accordance with the principles set out in the section 'Principles guiding WFD compliant design') would be compliant with the requirements of the WFD. This is because it is not considered to cause deterioration either at the local or the water body scale (thus passing Test A) and should not prevent future attainment of GES (Test B).

D.3.75 The only components of this Scheme element (road runoff to both surface water and groundwater - see Figure B4 in Appendix B) are considered to have neutral effects on the water environment. This assessment is made on the basis that industry standard measures to manage road runoff (as set out in the section 'Principles guiding WFD compliant design') will be implemented.

D.3.76 Although there are no measures assigned to this water body in the RBMP or associated data sets, the local Catchment Partnerships do set out some aims in the RBMP (Environment Agency, 2015). This Scheme element could be considered to contribute to the management of NNIS.

Pond Farm access [referred to as CAMP 03 in this document]

D.3.77 This initial WFD assessment suggests that Scheme element CAMP 03 (if designed in accordance with the principles set out in the section 'Principles guiding WFD compliant design') would be compliant with the requirements of the WFD. This is because it is not considered to cause deterioration at the water body scale (thus passing Test A) and should not prevent future attainment of GES (Test B).

D.3.78 The Scheme element does, however, generate some minor or localised adverse effects due to the potential impacts on groundwater from the deep foundations of road crossings (C3.22) (See Figure B5 in Appendix B).

D.3.79 Other key elements of the Scheme are considered to have neutral effects or the potential to benefit the water environment. Such as road drainage to river and ground water bodies.

D.3.80 Although there are no measures assigned to this water body in the RBMP or associated data sets, the local Catchment Partnerships do set out some aims in the RBMP (Environment Agency, 2015). This Scheme element could be considered to contribute to those on the management of NNIS (including Himalayan Balsam) and the reduction of diffuse pollution from the region's road network.

Elm Corner access [referred to as ELM 05 in this document]

D.3.81 This initial WFD assessment suggests that Scheme element ELM 05 (if designed in accordance with the principles set out in the section 'Principles guiding WFD compliant design') would be compliant with the requirements of the WFD. This is because it is not considered to cause deterioration at the water body scale (thus passing Test A) and should not prevent future attainment of GES (Test B).

D.3.82 The key components of the Scheme element are considered to have neutral effects or the potential to benefit the water environment. Although there will be a culvert (E5.01 - see Figure B6 in Appendix B) as part of the Scheme element, it is a replacement and the more environmentally sympathetic culvert design, together with river realignments upstream and downstream, present an opportunity to improve on the existing crossing.

D.3.83 Although there are no measures assigned to this water body in the RBMP or associated data sets, the local Catchment Partnerships do set out some aims in the RBMP (Environment Agency, 2015). This Scheme element could be considered to contribute to those on:

- the management of Himalayan Balsam;
- reduction of diffuse pollution from the region's road network; and
- improving fish passage.

Painshill access [referred to as PAIN 04A in this document]

D.3.84 This initial WFD assessment suggests that Scheme element PAIN 04 (if designed in accordance with the principles set out in the section 'Principles guiding WFD compliant design') would be compliant with the requirements of the WFD. This is because it is not considered to cause deterioration either at the local or the water body scale (thus passing Test A) and should not prevent future attainment of GES (Test B).

D.3.85 The Scheme element does, however, generate some minor or localised adverse effects due to the potential impacts on groundwater from the deep foundations of road crossings (P4.22) (See Figure B7 in Appendix B).

D.3.86 Other key elements of the Scheme (road runoff to both surface water and groundwater - see Figure B7 in Appendix B) are considered to have neutral effects on the water environment. This assessment is made on the basis that industry standard measures to manage road runoff (as set out in the section 'Principles guiding WFD compliant design') will be implemented.

D.3.87 Although there are no measures assigned to this water body in the RBMP or associated data sets, the local Catchment Partnerships do set out some aims in the RBMP (Environment Agency, 2015). This Scheme element could be considered to contribute to the management of NNIS (including Himalayan Balsam) and the reduction of diffuse pollution from the region's road network.

Wisley Lane access [referred to as WIS 11 in this document]

D.3.88 This initial WFD assessment suggests that Scheme element WIS 11 (if designed in accordance with the principles set out in the section 'Principles guiding WFD compliant design') would be compliant with the requirements of the WFD. This is because it is not considered to cause deterioration at the water body scale (thus passing Test A) and should not prevent future attainment of GES (Test B).

D.3.89 The Scheme element does, however, generate a minor or localised adverse effect caused by culvert W11.01 (see Figure B9 in Appendix B). This structure may:

- generate loss in morphological and flow complexity;
- disrupt sediment continuity; and

- potentially lead to a local reduction in riparian and aquatic habitat quality.

D.3.90 The positioning of the culvert will also result in the loss of one of the few more natural sections of planform on Stratford Brook. Therefore, mitigation to replicate this planform within the realignments upstream of the culvert is likely to be required and the backwater downstream of the culvert should be retained. Deep foundations may be necessary to support structures within the Scheme (Scheme element W11.12) - these have potential to form barriers to groundwater flow. Design in accordance with the principles set out in the section 'Principles guiding WFD compliant design' will minimise these adverse effects.

D.3.91 Other key elements of the Scheme are considered to have neutral effects or the potential to benefit the water environment. The realignments and mitigations associated with culvert W11.01 are an opportunity to restore sections of channel currently with poor morphological diversity to more natural form and function.

D.3.92 Although there are no measures assigned to this water body in the RBMP or associated data sets, the local Catchment Partnerships do set out some aims in the RBMP (Environment Agency, 2015). This Scheme element could be considered to contribute to those on:

- the management of Himalayan Balsam; and
- the reduction of diffuse pollution from the region's road network.

D.3.93 However, the Scheme does counter an aim to remove barriers to fish passage.

Effect of temporary works

D.3.94 Temporary construction activities are not expected to have an adverse effect at the water body scale. This assumes that appropriate mitigation can be developed for water body scale adverse effects on Boldemere Lake and that the project as a whole will be designed in accordance with the principles set out in the section below (Principles guiding WFD compliant design).

Principles guiding WFD compliant design

Components of the permanent Scheme

Single span bridges

D.3.95 Single span structures are the preferred type of crossing because they minimise impact on the water environment if designed appropriately.

D.3.96 They should be designed and constructed in such a way as to minimise disruption to the river and riparian zone. Abutments should be set well back from the bank edge to allow the river to function naturally and to maintain a wildlife corridor along the banks. Where practically possible the bridge deck should run perpendicular to the watercourse (again to reduce shading). Bed and bank protection should only be used where a real risk to life or critical infrastructure is apparent. A single span structure should not create a barrier to fish and other wildlife, or disrupt navigation or recreation (SEPA, 2010).

D.3.97 Single span structures are not always technically feasible, particularly on wide rivers (where it may be necessary to place additional abutments in the watercourses). They can take longer to construct. They may also be more

expensive than other crossing types as specialist construction techniques may be required.

D.3.98 Further guidance on the engineering of river crossings is available in SEPA (2010).

Culverts

D.3.99 Culverts present a higher risk (than single span structures) of:

- disrupting natural hydraulic and sediment transport processes;
- acting as a barrier to fish passage and movement of other wildlife; and
- damaging the bed and banks of a river during construction.

D.3.100 They are therefore NOT a preferred method of watercourse crossing from the perspective of protecting and improving the water environment.

D.3.101 Culverts are, however, generally cheaper and easier to build than single span structures because their construction process tends to be less complex. In some instances, they may be the only feasible technical solution. Hence, they can be consented by regulators (such as the Environment Agency) for crossing smaller watercourses if their adverse impact on the water environment is minimised.

D.3.102 A culvert designed solely for hydraulic performance will NOT be consented by regulators. Guidance must be sought on how to reduce their adverse impact on the water environment. Useful references include:

- Chapter 8 of Fluvial Design Guide (Environment Agency, 2010);
- Chapter 4 of Culvert design and operation guide (C689) (Ciria, 2010);
- Water Framework Directive Mitigation Measures Manual (Environment Agency, 2013);
- Advice on minimising impact on fish passage in the Fish Pass Manual (Environment Agency, 2010a); and
- SEPA's advice on river crossings and position statement on culverting (SEPA 2010, 2015).

D.3.103 Key considerations in environmentally sensitive culvert design are:

- 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; and
- 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. Embedment depths will depend on local geomorphological process but are commonly around 300mm.

Channel widening, deepening, straightening or realigning

D.3.104 Widening, deepening, straightening or realigning of naturally functioning channel will be opposed by regulators (e.g. the Environment Agency) because it will result in loss of a range of river habitats and, by disrupting natural processes, may result in degradation of further downstream (or upstream) habitat.

D.3.105 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 channels to a more natural state of ecological function in line with WFD objectives.

D.3.106 Where widening, deepening, straightening or realigning of naturally functioning channel 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 insist on environmental enhancements elsewhere to mitigate or offset adverse effects on the water environment.

D.3.107 Guidance should be sought on any works that result in the modification of a river channel. The guidance section of the River Restoration Centre website (RRC, 2014) is an excellent starting point for developing effective river restoration designs.

D.3.108 Key considerations in 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 or other elements of the Scheme and land purchases/agreements;
- As a general principle, the length of a realigned channel should exceed or match the length of channel prior to modification; and
- There are designers and contractors who specialise in river restoration. Designs developed by such specialists are more likely to be consented by the regulator.

Bank and Bed reinforcement

D.3.109 Hard bed and bank reinforcement will 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. 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.

D.3.110 Bank and bed erosion is part of the natural functioning of a river.

D.3.111 Further guidance on the environmental aspects of bank protection is available in Environment Agency (2013) and SEPA (2008).

Drainage of road runoff (to surface water)

D.3.112 Where SUDS are the designed road runoff management approach, they should be designed in accordance with industry standards, with particular emphasis on appropriate pollution prevention and control measures.

D.3.113 Appropriate mitigation for managing road runoff is identified through approaches set out in the Design Manual for Roads and Bridges, as reported in the Preliminary Environmental Information Report for the Scheme (Highways England, 2017).

Deep foundation protruding into aquifer

D.3.114 Where deep foundations extending beneath the groundwater table are designed to be 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.

Drainage of road runoff (to groundwater)

D.3.115 Appropriate mitigation for managing road runoff is identified through approaches set out in the Design Manual for Roads and Bridges, as reported in the Preliminary Environmental Information Report for the Scheme (Highways England, 2017). The potential consequences of unplanned catastrophic incidents should be dealt with via the environmental management and contingency planning process.

Temporary activities during construction

Runoff from construction sites to surface water bodies

D.3.116 Construction generates significant risks of pollution to surface water bodies. These need to be fully mitigated by suitable control of construction practices such as adherence to the Pollution Prevention Guidance (PPG) Notes, specifically PPG 5: Works and Maintenance in or near Water and PPG 6: Construction and Demolition Sites.

D.3.117 All PPGs that were previously maintained by the Environment Agency are currently under review and a new set of guidance notes are presently being issued as Guidance for Pollution Prevention (GPP) documents. These include GPP5 for works and maintenance in or near water (which replaces PPG5).

Disturbance of invasive non-native species

D.3.118 Construction activities in, over and adjacent to water bodies significantly increase the risk of the spread of NNIS associated with aquatic and riparian habitats. Risks will need to be managed effectively during the construction period through the implementation of biosecurity control, such as check-clean-dry procedures for plant, equipment and the workforce. The GB non-native species secretariat website (http://www.nonnativespecies.org) provides a key source of information for the identification of risks, appropriate control and management systems and disposal.

D.3.119 The Environment Agency should also be consulted to ascertain the status and distribution of invasive species in surface water bodies. Consideration needs to be given to the potential to create pathways for invasive species movement within/between water bodies, through for example, the removal of existing barriers e.g. artificial structures such as weirs and culverts.

Vegetation management

D.3.120 There is often the requirement to manage vegetation (both riparian and aquatic) during construction activities in, over and adjacent to water bodies. Vegetation clearance should only be undertaken following an ecological constraints assessment of the potential for vegetated habitats to support protected species (e.g. nesting birds, reptiles) and to determine the intrinsic ecological value of the habitat, plus the risk posed by NNIS.

D.3.121 Consideration should be given within the construction programme and design to translocate vegetation to an appropriate receptor site and/or improve conditions for target communities in line with regulatory drivers such as the WFD and the NERC Act (2006) species/habitat of principle importance.

Future technical investigations

Introduction

D.3.122 The following technical investigations are advised to inform:

- the principles guiding WFD compliant design set out in the section 'Principles guiding WFD compliant design'; and
- future WFD compliance assessments that will eventually be needed to support permit applications for construction works[75].

D.3.123 These investigations will also inform the wider environmental assessment/ management of the Scheme.

Walkover surveys

D.3.124 Full walkover surveys of the affected watercourses and lakes are needed to record the current ecological and geomorphological assemblages, to understand the sensitivity of those assemblages to the Scheme and to identify the location and type of potential measures to mitigate the local adverse effects of the Scheme.

Data gaps

D.3.125 The following data gaps need to be filled to inform future WFD compliance assessment:

- River Habitat Survey for the affected river reaches (if available);
- Fluvial audit of affected river reaches (if available);
- Groundwater level data for the Bagshot Formation in the vicinity of the Scheme (this should be scoped into the intrusive ground investigation); and
- Further information on measures that the Environment Agency and local catchment partnerships consider may improve WFD status of affected water bodies.

Design advice

[75] Flood Risk Activity Permits issued by the Environment Agency to consent works on Main River (or Local Authorities for works on Ordinary Watercourses) will need to be supported by a document detailing how the design complies with the requirements of the WFD (an update of this document).

D.3.126 Specialists[76] with experience in:

- sustainable design of river crossings, realignments, outfalls, and management of bed/bank erosion; and
- groundwater conceptualisation, particularly surface - groundwater interactions

D.3.127 need to be consulted during the evolution of the design of Scheme components affecting the water environment. Close co-operation between designers and these specialists will ensure the Scheme design integrates the requirements of the WFD as it evolves. This avoids abortive costs and time delays associated with modifying designs to achieve WFD compliance later in the design process.

Design advice - ensuring effects of the Scheme on Boldermere Lake water body can be adequately mitigated.

D.3.128 Works to the A3 are likely to reduce marginal lake habitat on the western shore of the Boldermere Lake water body (Scheme element A3.21 see Figure B3 in Appendix B). Without mitigation, this loss of habitat could result in deterioration of the water body.

D.3.129 We advise that the outline design for the 180 m long retaining wall along the lakes western shore is undertaken with early and close consultation with aquatic ecologists to confirm that adequate mitigation can be developed. This mitigation should be comprehensively developed as part of the design, and consulted on with the Environment Agency as a matter of priority.

Conclusion and recommendations

Conclusions

D.3.130 This scoping stage WFD assessment suggests that the Scheme to improve traffic flow through the M25 J10/A3 Wisley Interchange (and on nearby local roads) would be compliant with the requirements of the WFD. None of the elements that make up the Scheme are considered to cause deterioration at the water body scale (thus passing Test A). All should not prevent future attainment of GES or GEP (Test B).

D.3.131 This conclusion assumes that the design principles set out in the section 'Principles guiding WFD compliant design' will be adopted as the Scheme is taken forward to the detail design phase and construction. In particular, adequate mitigation needs to be put in place to avoid deterioration in the Potential of Boldmere WFD lake water body. This mitigation is necessary to avoid adverse impacts at a water body scale associated with the construction of a retaining wall (Scheme element A3.21) along the western shore of the lake.

Recommendations

D.3.132 The following key recommendations are made:

- Consultation with regulators (principally the Environment Agency) continues regularly throughout the design process to ensure that the Scheme is designed to be compliant with the objectives of the WFD and that feasible

[76] Normally with backgrounds in ecology and geomorphology

opportunities for improvements to the water environment are integrated into the Scheme;

- The design principles set out in the section 'Principles guiding WFD compliant design' are shared widely with all members of the design team involved in the development of Scheme components affecting the water environment;
- Specialists in sustainable design of river crossings, realignments, outfalls, management of bed/bank erosion and groundwater specialists are consulted during the evolution of the design of Scheme components that have potential to modify the water environment;
- This WFD assessment is updated as more detailed information about the Scheme becomes available. This is most likely to be at outline design and again at detail design; and
- The additional technical assessments set out in the section 'Future technical investigations' are carried out to support the design, consultation and permitting activities associated with the Scheme.

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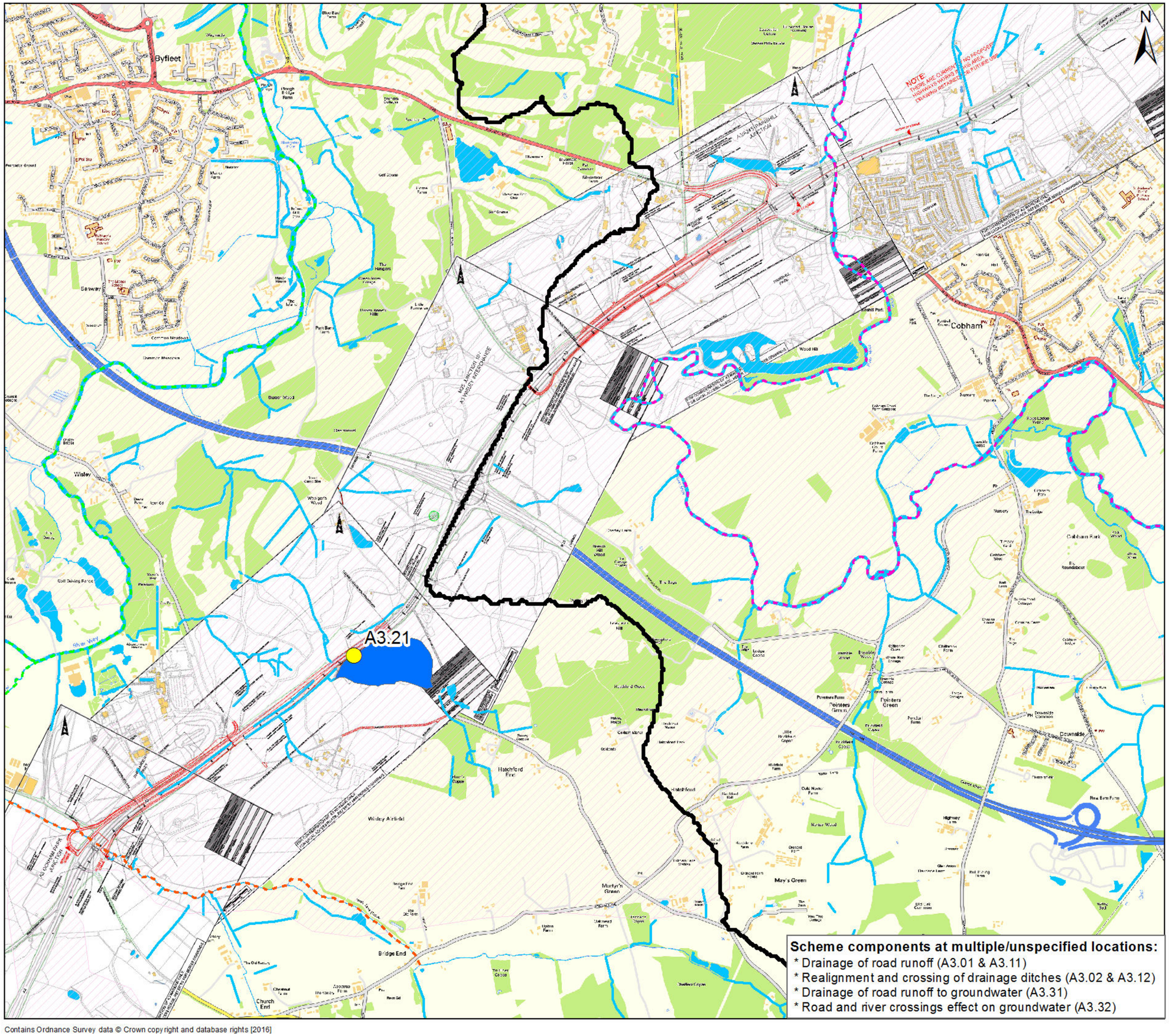
Road Investment Strategy Improvements to M25 J10/A3 Wisley Interchange

Figure B2: Plan of option A3 showing scheme components



Key

- Scheme Components

WFD Surface Waterbodies

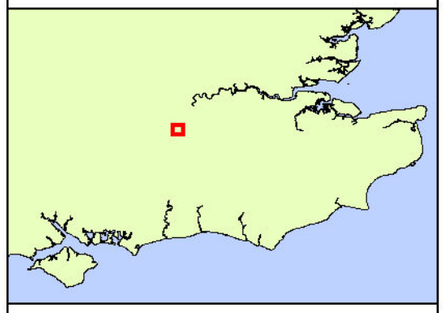
- Mole (Horley to Hersham)
- Stratford Brook
- Wey (Shalford to River Thames confluence at Weybridge)
- Boldermere Lake
- Operational Catchments

WFD Ground Waterbodies

- Chobham Bagshot Beds

OS Water Features

- Surface Waterbodies



Data sources: Environment Agency and Ordnance Survey

0 — 0.5 — 1 Km

Scale (at A3): 1:18,000

highways england

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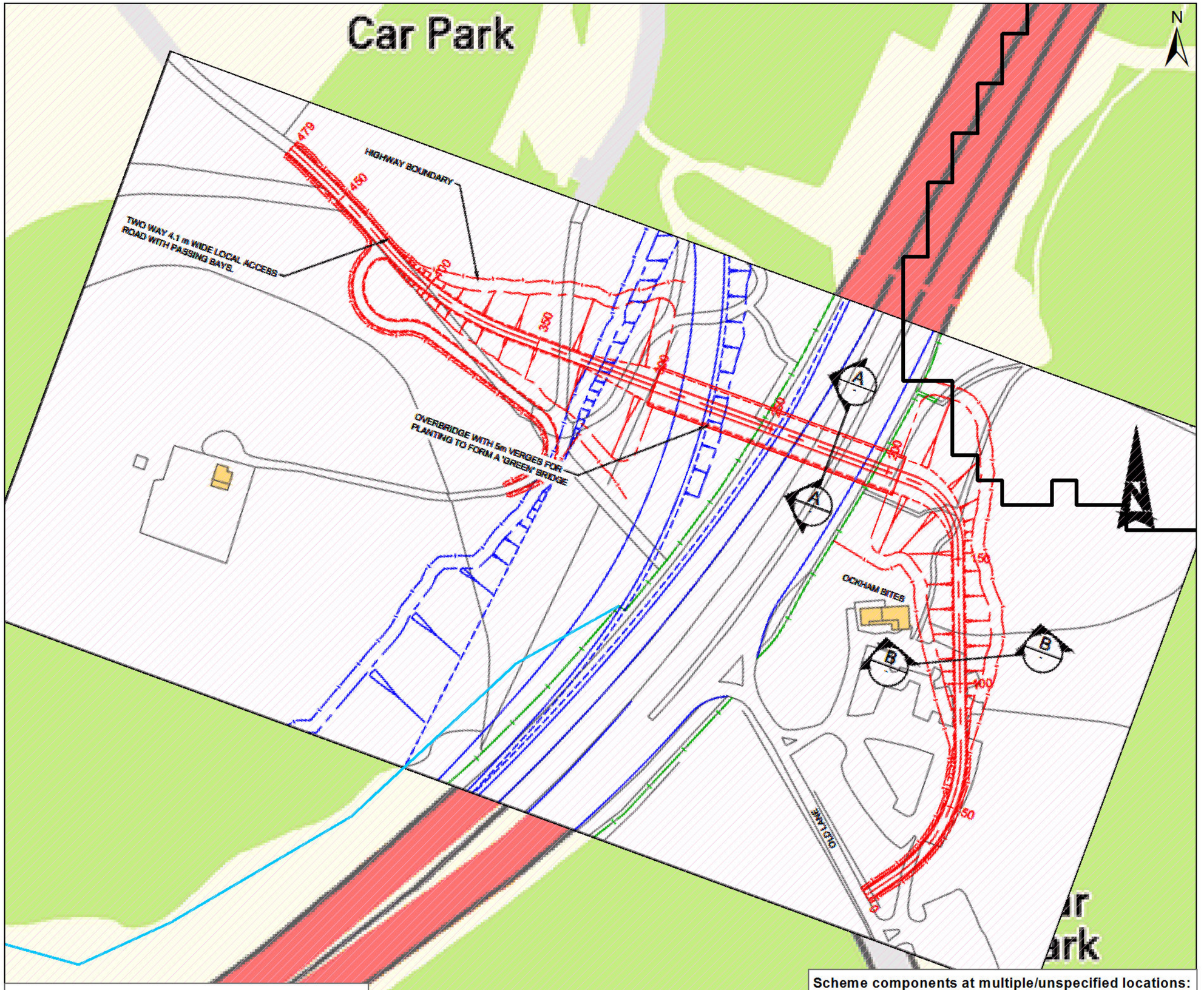
Figure B5: Plan of option CAMP 03 showing scheme components



Key

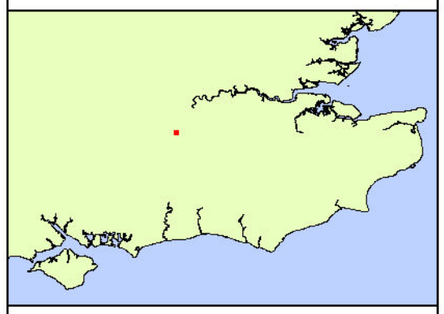
- Operational Catchments

WFD Ground Waterbodies

- Chobham Bagshot Beds

OS Water Features

- Surface Waterbodies



Data sources: Environment Agency and Ordnance Survey

0 — 0.04 — 0.08 Km

Scale (at A3): 1:1,500

Note: Blue lines on scheme drawing show the path of a now discounted option and therefore are not relevant to the WFD assessment.

Scheme components at multiple/unspecified locations:

* Drainage of road runoff (C3.01 & C3.11)
* Drainage of road runoff to groundwater (C3.21)
* Road and river crossings effect on groundwater (C3.22)

Status:	Purpose of issue:	Rev:	Model File Identifier:	
S1	For Information	Rev 2		
Reference:		Drawn:	Checked:	Authorised:
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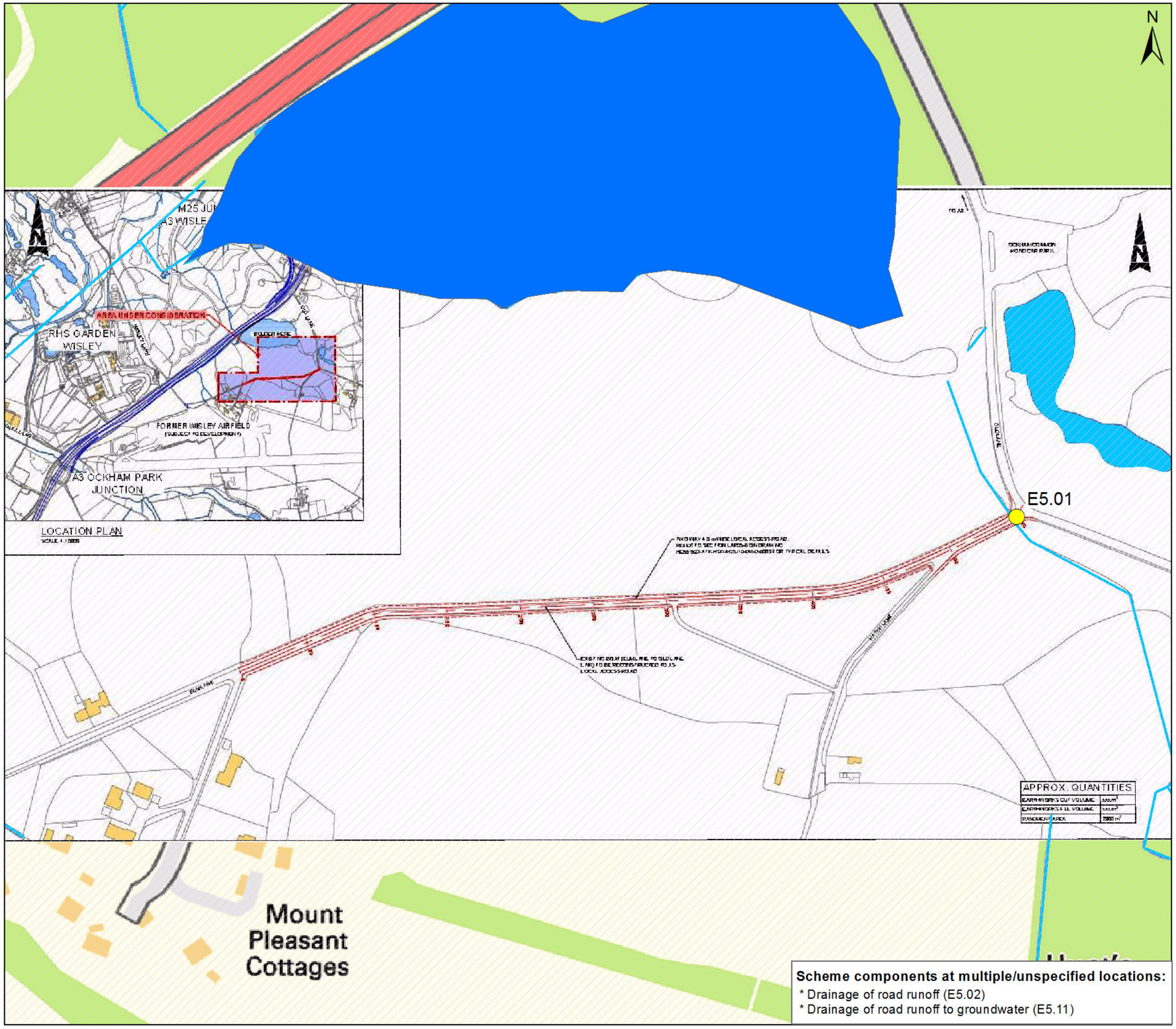
Road Investment Strategy Improvements to M25 J10/A3 Wisley Interchange

Figure B6: Plan of option ELM 05 showing scheme components



Scheme components at multiple/unspecified locations:

* Drainage of road runoff (E5.02)
* Drainage of road runoff to groundwater (E5.11)

Key

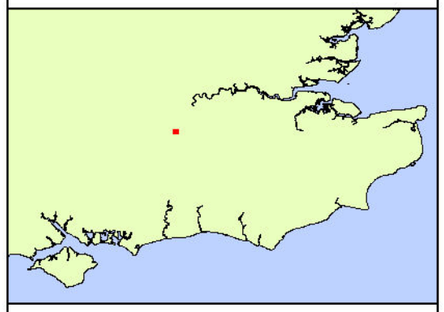
- Scheme Components
- Boldermere Lake

WFD Ground Waterbodies

- Chobham Bagshot Beds

OS Water Features

- Surface Waterbodies



Data sources: Environment Agency and Ordnance Survey

0 0.05 0.1 Km

Scale (at A3): 1:2,500

highways england

ATKINS

Status:	Purpose of issue:	Rev:	Model File Identifier:
S1	For Information	Rev 2	

Reference:	Drawn:	Checked:	Authorised:
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Road Investment Strategy Improvements to M25 J10/A3 Wisley Interchange

Figure B1: Plan of option 14 showing scheme components

Key

- Scheme Components

WFD Surface Waterbodies

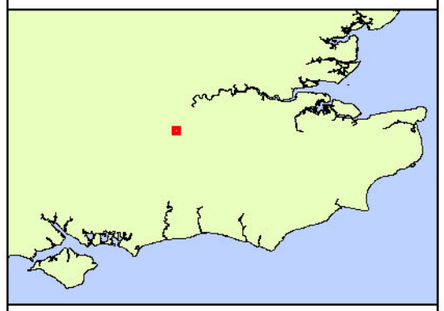
- Mole (Horley to Hersham)
- Wey (Shalford to River Thames confluence at Weybridge)
- Boldermere Lake
- Operational Catchments

WFD Ground Waterbodies

- Chobham Bagshot Beds

OS Water Features

- Surface Waterbodies



Data sources: Environment Agency and Ordnance Survey

0 0.25 0.5 Km

Scale (at A3): 1:9,000

highways england

ATKINS

Status:	Purpose of issue:	Rev:	Model File Identifier:		
S1	For Information	Rev 2			
Reference:		Drawn:	Checked:	Authorised:	
5XXXXXXX		BH 18/09/2017	MH 18/09/2017	KSS 18/09/2017	

Scheme components at multiple/unspecified locations:

* Drainage of road runoff (14.03 & 14.11)
* Realignment and crossing of drainage ditches (14.04 & 14.12)
* Drainage of road runoff to groundwater (14.21)
* Road and river crossings effect on groundwater (14.22)

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Road Investment Strategy Improvements to M25 J10/A3 Wisley Interchange

Figure B3: Plan of option PAIN 02 showing scheme components

Key

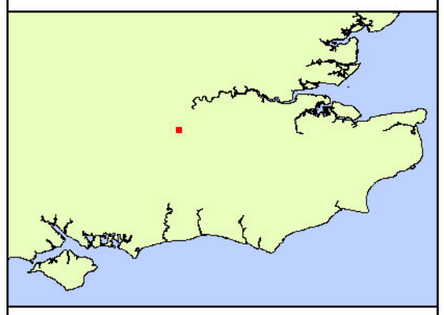
Operational Catchments

WFD Ground Waterbodies

Chobham Bagshot Beds

OS Water Features

Surface Waterbodies



Data sources: Environment Agency and Ordnance Survey

0 0.05 0.1 Km

Scale (at A3): 1:3,000

highways england

ATKINS

Status: S1	Purpose of issue: For Information	Rev: Rev 2	Model File Identifier:	
Reference: 5XXXXXXX		Drawn: BH 18/09/2017	Checked: MH 18/09/2017	Authorised: KSS 18/09/2017

Scheme components at multiple/unspecified locations:

* Drainage of road runoff (P2.01)
* Drainage of road runoff to groundwater (P2.11)

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Road Investment Strategy Improvements to M25 J10/A3 Wisley Interchange

Figure B7: Plan of option PAIN 04A showing scheme components

Key

WFD Surface Waterbodies

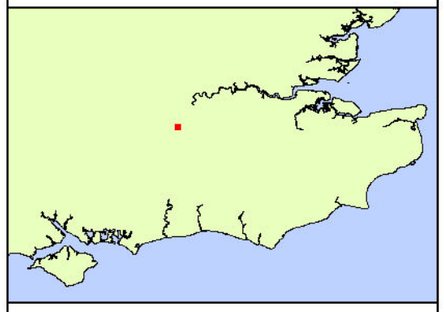
- Mole (Horley to Hersham)
- Operational Catchments

WFD Ground Waterbodies

- Chobham Bagshot Beds

OS Water Features

- Surface Waterbodies



Data sources: Environment Agency and Ordnance Survey

0 0.1 0.2 Km

Scale (at A3): 1:4,000

highways england

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Status:	Purpose of issue:	Rev:	Model File Identifier:
S1	For Information	Rev 2	

Reference:	Drawn:	Checked:	Authorised:
5XXXXXXXX	BH 18/09/2017	MH 18/09/2017	KSS 18/09/2017

Scheme components at multiple/unspecified locations:

* Drainage of road runoff (P4.01 & P4.11)
* Drainage of road runoff to groundwater (P4.21)
* Road and river crossings effect on groundwater (P4.22)

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Figure B8: Plan of option PAIN 10 showing scheme components

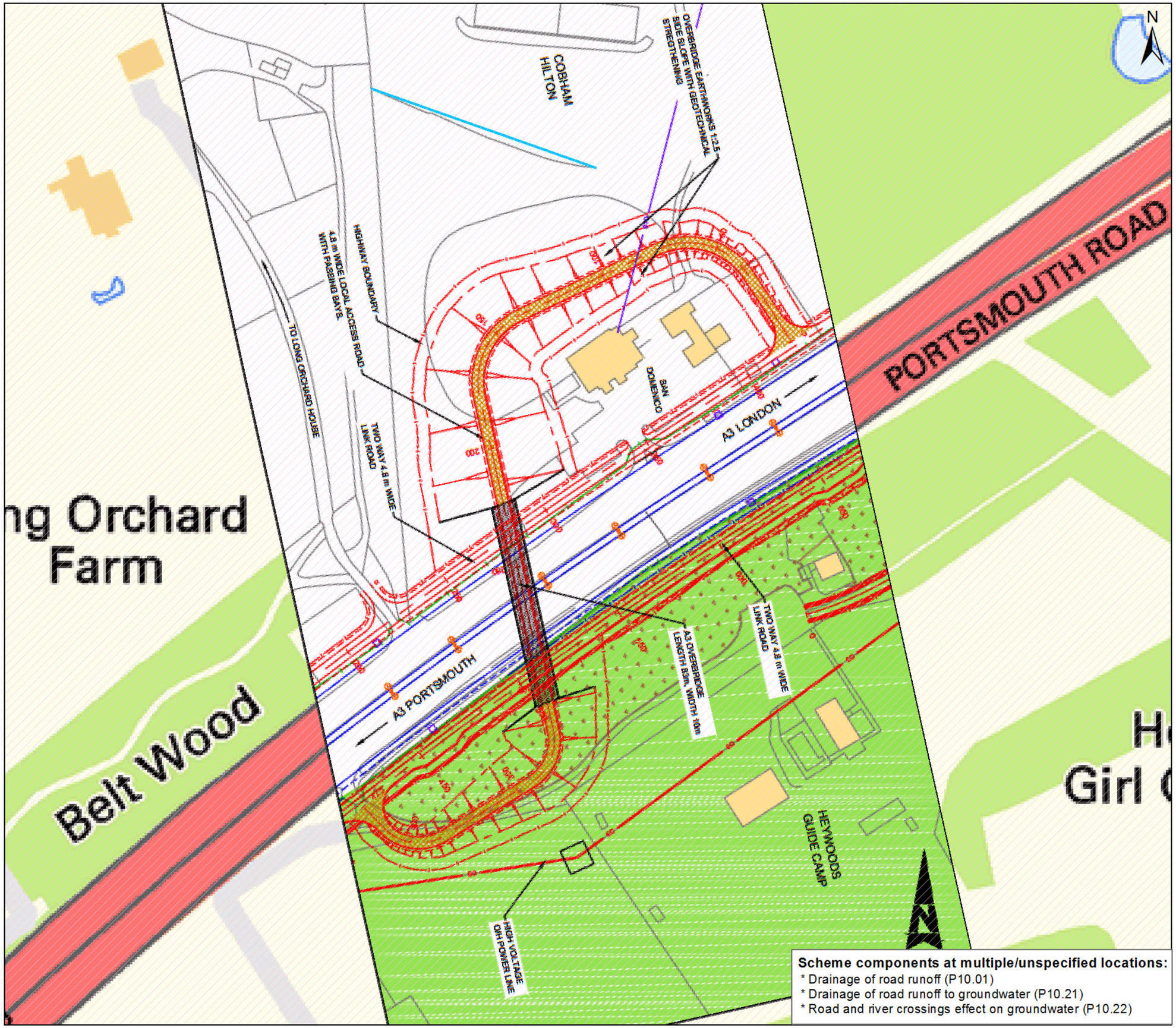
Key

WFD Ground Waterbodies

Chobham Bagshot Beds

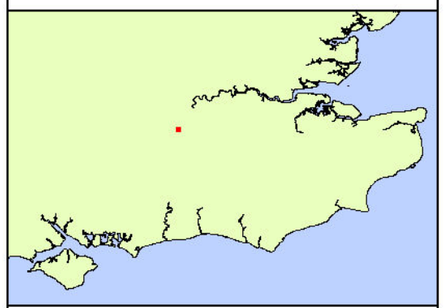
OS Water Features

Surface Waterbodies



Scheme components at multiple/unspecified locations:

* Drainage of road runoff (P10.01)
* Drainage of road runoff to groundwater (P10.21)
* Road and river crossings effect on groundwater (P10.22)



Data sources: Environment Agency and Ordnance Survey

0 0.04 0.08 Km

Scale (at A3): 1:1,500

highways england

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Status:	Purpose of issue:	Rev:	Model File Identifier:	
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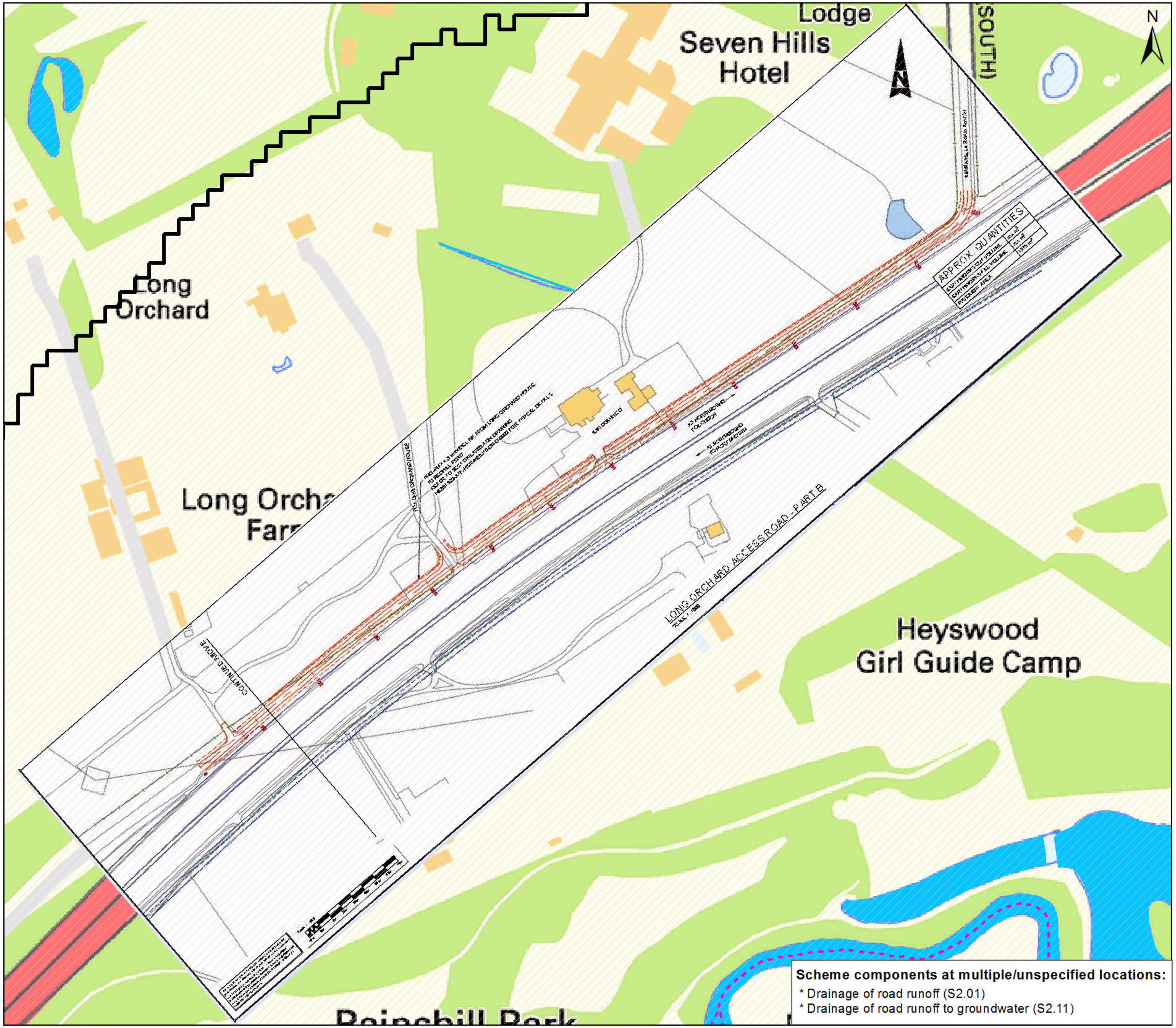

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Road Investment Strategy Improvements to M25 J10/A3 Wisley Interchange

Figure B4: Plan of option SAN 02 showing scheme components

Key

WFD Surface Waterbodies

Mole (Horley to Hersham)

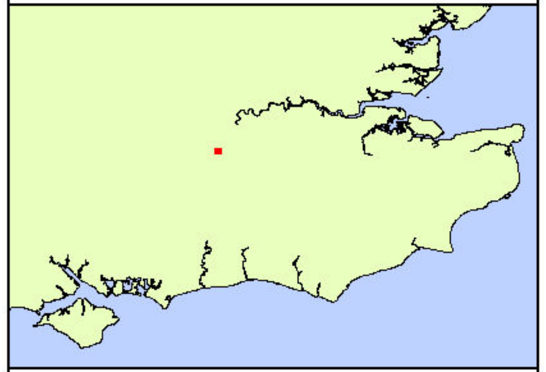
Operational Catchments

WFD Ground Waterbodies

Chobham Bagshot Beds

OS Water Features

Surface Waterbodies



Data sources: Environment Agency and Ordnance Survey

0 0.05 0.1 Km

Scale (at A3): 1:2,500

highways england

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Status: S1	Purpose of issue: For Information	Rev: Rev 2	Model File Identifier:
Reference: 5XXXXXXXX	Drawn: BH 18/09/2017	Checked: MH 18/09/2017	Authorised: KSS 18/09/2017

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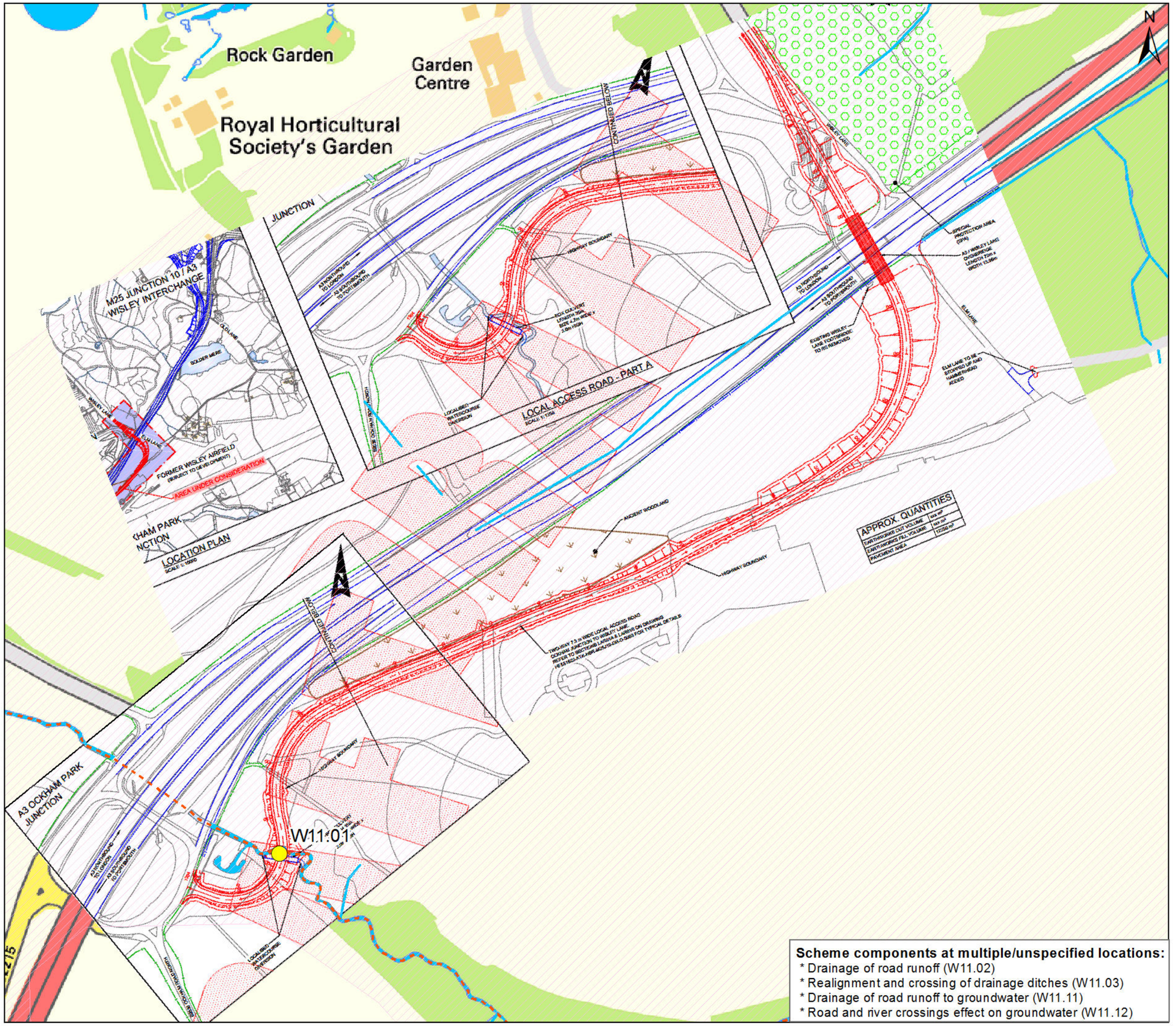
Road Investment Strategy Improvements to M25 J10/A3 Wisley Interchange

Figure B9: Plan of option WIS 11 showing scheme components



Scheme components at multiple/unspecified locations:

* Drainage of road runoff (W11.02)
* Realignment and crossing of drainage ditches (W11.03)
* Drainage of road runoff to groundwater (W11.11)
* Road and river crossings effect on groundwater (W11.12)

Key

Scheme Components

WFD Surface Waterbodies

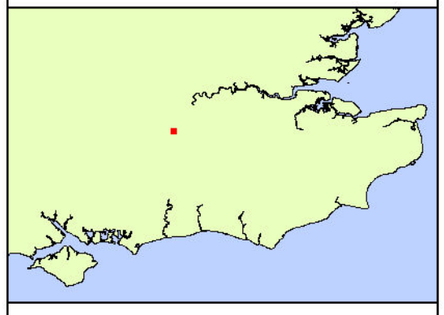
Stratford Brook

WFD Ground Waterbodies

Chobham Bagshot Beds

OS Water Features

Surface Waterbodies



Data sources: Environment Agency and Ordnance Survey

0 0.1 0.2 Km

Scale (at A3): 1:3,500

highways england

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Status:	Purpose of issue:	Rev:	Model File Identifier:
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Surface water body	
GB106039017621	
Mole (Horley to Hersham)	

Code	A3.01	A3.02
Scheme component	Drainage of road runoff	Realignment and crossing of drainage ditches
Watercourse type	WFD waterbody, minor watercourses and drainage ditches	Drainage ditches
Location	Multiple, as yet unspecified, locations	Multiple locations
Description	Management of runoff from road surfaces discharging to the Mole and tributaries	Realignment of drainage ditches. Construction of culverts and other crossings over drainage ditches.

Key

- major beneficial effect
- minor / localised beneficial effect
- no effect
- minor / localised adverse effect
- adverse widespread or prolonged effect
- adverse effect on overall WFD status of waterbody

Test A Potential to cause deterioration of current WFD Ecological Status

			Current Status	Status objective	Effect of scheme component of WFD element	Effect of scheme component of WFD element	Overall effect of scheme on WFD element	Additional Proposed Mitigation Measures	Residual effect of scheme on WFD element*	Effect of scheme on ecological / chemical status	Overall effect of scheme on water body status
ECOLOGICAL STATUS	Biological quality elements	Macrophytes and phytobenthos - diatoms	Moderate	Moderate by 2015	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	There are minor drainage ditches that may need to be realigned as part of the scheme. Crossings may also be required. These ditches are straightened and of minimal ecological value (though survey is needed to confirm this assumption). Risk of loss / disturbance damage to aquatic ecology, substrate and riparian zone. This WFD assessment is made on the basis that realignment of or crossing of these minor drainage ditches will be carried out in accordance with the design principles set out in section 5.	Assuming that works are managed in accordance with the principles set out in section 5, we expect no deterioration to ecological elements of this water body. On the same basis we expect no deterioration to the ecology of local water features.		No deterioration at waterbody or local scale.	No deterioration anticipated at waterbody scale.	No deterioration anticipated at waterbody scale.
		Macrophytes and phytobenthos - macrophytes	Moderate	Moderate by 2015	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	There are minor drainage ditches that may need to be realigned as part of the scheme. Crossings may also be required. These ditches are straightened and of minimal ecological value (though survey is needed to confirm this assumption). Risk of loss / disturbance damage to aquatic ecology, substrate and riparian zone. This WFD assessment is made on the basis that realignment of or crossing of these minor drainage ditches will be carried out in accordance with the design principles set out in section 5.					
		Macroinvertebrates	Moderate	Moderate by 2021	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	There are minor drainage ditches that may need to be realigned as part of the scheme. Crossings may also be required. These ditches are straightened and of minimal ecological value (though survey is needed to confirm this assumption). Risk of loss / disturbance damage to aquatic ecology, substrate and riparian zone. This WFD assessment is made on the basis that realignment of or crossing of these minor drainage ditches will be carried out in accordance with the design principles set out in section 5.					
		Fish	Good	Good by 2015	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	There are minor drainage ditches that may need to be realigned as part of the scheme. Crossings may also be required. These ditches are straightened and of minimal ecological value (though survey is needed to confirm this assumption). Risk of loss / disturbance damage to aquatic ecology, substrate and riparian zone. This WFD assessment is made on the basis that realignment of or crossing of these minor drainage ditches will be carried out in accordance with the design principles set out in section 5.					
	Physico-chemical quality elements	Physico-chemical quality elements comprise Dissolved Oxygen. pH, Phosphate, Ammonia and Temperature.	Moderate	Moderate by 2015	Runoff from existing and proposed road network will discharge to the drainage ditches and minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to preventing deterioration to physico-chemical elements . This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	Works to minor drainage ditches/required crossings not considered to adversely affect physico-chemical condition. This WFD assessment is made on the basis that realignment of or crossing of these minor drainage ditches will be carried out in accordance with the design principles set out in section 5.	Assuming that works are managed in accordance with the assumptions set out in section 5, we expect no deterioration to physico-chemical elements of this water body. On the same basis we expect no deterioration to the ecology of local water features.		No deterioration at waterbody or local scale.		
	Hydro-morphological quality elements	Hydro-morphological quality elements cover: quantity and dynamics of flow, connection to groundwater, river continuity, river depth and width variation, structure and substrate of river bed, and structure of riparian zone.	Supports Good	Supports Good by 2015	Runoff from existing and proposed road network will discharge to the WFD, minor watercourses and ditches at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to hydro-morphological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	There are drainage ditches that may need to be realigned as part of the scheme. Crossings may also be required. These ditches are straightened and of minimal hydro-morphological variety (though survey is needed to confirm this assumption). Risk of loss / disturbance damage to local morphological variety, substrate and riparian zone. This WFD assessment is made on the basis that realignment of or crossing of these drainage ditches will be carried out in accordance with the design principles set out in section 5.	Assuming that works are managed in accordance with the principles set out in section 5, we expect no deterioration to hydro-morphological elements at the water body scale. On the same basis we expect no deterioration to the hydro-morphology of local water features.		No deterioration expected at local or waterbody scale.		
	Specific pollutants	**Screened out of assessment**									
CHEMICAL STATUS		**Screened out of assessment**									

Test B Potential to prevent future attainment of Good Ecological Status

	RBMP measures to achieve objective	**Where RBMP measure will happen**	**When RBMP measure will happen**	**Effect of scheme component of WFD element**	**Effect of scheme component of WFD element**	**Overall effect of scheme on proposed measure**				
	No measures assigned to this waterbody listed in RBMP or supporting data sets	NA	NA	NA	NA	NA				
	At operational catchment scale (Wey catchment) the following measures relevant to these works are advocated by the local Catchment Partnership (Environment Agency, 2015)									

	Develop a comprehensive strategy for tackling non-native invasive species.	catchment wide	unspecified	See text under 'overall effect'		By adoption of good practice in NNIS management and biosecurity (see section 5), the works can contribute to this objective within the geographical confines of the scheme.				
	Remove barriers that are impeding fish passage and contributing directly to the local recovery of populations of threatened priority fish species, such as brown trout, Atlantic salmon and European eel, with associated recreational and fisheries benefits.	catchment wide	unspecified	NA	See text under 'overall effect'	Proposed potential use of a culvert may impact on fish passage and therefore would not align with fish passage objective.				
	Restore natural morphology where man-made modifications exist with channel habitat creation, gravel reintroduction, tree works and back waters, allowing naturalised flow regimes and sediment transport and associated flood management benefits.	catchment wide	unspecified	NA	See text under 'overall effect'	By using any realignment as an opportunity to restore natural morphology the works can contribute to this objective.				

* assumes additional proposed mitigation measure implemented

Surface water body	
GB106039017630	
Wey (Shalford to River Thames confluence at Weybridge)	

Code	A3.11	A3.12
Scheme component	Drainage of road runoff	Realignment and crossing of drainage ditches
Watercourse type	WFD waterbody, minor watercourses and drainage ditches	Drainage ditches
Location	Multiple, as yet unspecified, locations	Multiple locations
Description	Management of runoff from road surfaces discharging to the Wey and tributaries	Realignment of drainage ditches. Construction of culverts and other crossings over drainage ditches.

Key

- major beneficial effect
- minor / localised beneficial effect
- no effect
- minor / localised adverse effect
- adverse widespread or prolonged effect
- adverse effect on overall WFD status of waterbody

Test A Potential to cause deterioration of current WFD Ecological Status

			Current Status	Status objective	Effect of scheme component of WFD element	Effect of scheme component of WFD element	Overall effect of scheme on WFD element	Additional Proposed Mitigation Measures	Residual effect of scheme on WFD element*	Effect of scheme on ecological / chemical status	Overall effect of scheme on water body status
ECOLOGICAL STATUS	Biological quality elements	Macrophytes and phytobenthos - diatoms	Moderate	Moderate by 2015	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	There are minor drainage ditches that may need to be realigned as part of the scheme. Crossings may also be required. These ditches are straightened and of minimal ecological value (though survey is needed to confirm this assumption). Risk of loss / disturbance damage to aquatic ecology, substrate and riparian zone. This WFD assessment is made on the basis that realignment of or crossing of these minor drainage ditches will be carried out in accordance with the design principles set out in section 5.	Assuming that works are managed in accordance with the principles set out in section 5, we expect no deterioration to ecological elements of this water body. On the same basis we expect no deterioration to the ecology of local water features.		No deterioration at waterbody or local scale.	No deterioration anticipated at waterbody scale.	No deterioration anticipated at waterbody scale.
		Macrophytes and phytobenthos - macrophytes	Moderate	Moderate by 2015	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	There are minor drainage ditches that may need to be realigned as part of the scheme. Crossings may also be required. These ditches are straightened and of minimal ecological value (though survey is needed to confirm this assumption). Risk of loss / disturbance damage to aquatic ecology, substrate and riparian zone. This WFD assessment is made on the basis that realignment of or crossing of these minor drainage ditches will be carried out in accordance with the design principles set out in section 5.					
		Macroinvertebrates	High	Good by 2015	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	There are minor drainage ditches that may need to be realigned as part of the scheme. Crossings may also be required. These ditches are straightened and of minimal ecological value (though survey is needed to confirm this assumption). Risk of loss / disturbance damage to aquatic ecology, substrate and riparian zone. This WFD assessment is made on the basis that realignment of or crossing of these minor drainage ditches will be carried out in accordance with the design principles set out in section 5.					
		Fish	Moderate	Good by 2027	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	There are minor drainage ditches that may need to be realigned as part of the scheme. Crossings may also be required. These ditches are straightened and of minimal ecological value (though survey is needed to confirm this assumption). Risk of loss / disturbance damage to aquatic ecology, substrate and riparian zone. This WFD assessment is made on the basis that realignment of or crossing of these minor drainage ditches will be carried out in accordance with the design principles set out in section 5.					
	Physico-chemical quality elements	Physico-chemical quality elements comprise Dissolved Oxygen. pH, Phosphate, Ammonia and Temperature.	Moderate	Moderate by 2015	Runoff from existing and proposed road network will discharge to the drainage ditches and minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to preventing deterioration to physico-chemical elements . This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	Works to minor drainage ditches/required crossings not considered to adversely affect physico-chemical condition. This WFD assessment is made on the basis that realignment of or crossing of these minor drainage ditches will be carried out in accordance with the design principles set out in section 5.	Assuming that works are managed in accordance with the assumptions set out in section 5, we expect no deterioration to physico-chemical elements of this water body. On the same basis we expect no deterioration to the ecology of local water features.		No deterioration at waterbody or local scale.		
	Hydro-morphological quality elements	Hydro-morphological quality elements cover: quantity and dynamics of flow, connection to groundwater, river continuity, river depth and width variation, structure and substrate of river bed, and structure of riparian zone.	Supports Good	Supports Good by 2015	Runoff from existing and proposed road network will discharge to the WFD, minor watercourses and ditches at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to hydro-morphological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	There are drainage ditches that may need to be realigned as part of the scheme. Crossings may also be required. These ditches are straightened and of minimal hydro-morphological variety (though survey is needed to confirm this assumption). Risk of loss / disturbance damage to local morphological variety, substrate and riparian zone. This WFD assessment is made on the basis that realignment of or crossing of these drainage ditches will be carried out in accordance with the design principles set out in section 5.	Assuming that works are managed in accordance with the principles set out in section 5, we expect no deterioration to hydro-morphological elements at the water body scale. On the same basis we expect no deterioration to the hydro-morphology of local water features.		No deterioration expected at local or waterbody scale.		
	Specific pollutants	**Screened out of assessment**									
CHEMICAL STATUS		**Screened out of assessment**									

Test B Potential to prevent future attainment of Good Ecological Status

	RBMP measures to achieve objective	**Where RBMP measure will happen**	**When RBMP measure will happen**	**Effect of scheme component of WFD element**	**Effect of scheme component of WFD element**	**Overall effect of scheme on proposed measure**				
	No measures assigned to this waterbody listed in RBMP or supporting data sets	NA	NA	NA	NA	NA				
	At operational catchment scale (Wey catchment) the following measures relevant to these works are advocated by the local Catchment Partnership (Environment Agency, 2015)									

	Wey Diffuse Advice Project throughout the catchment. This would greatly extend a proven mechanism of reducing the impacts of rural and urban diffuse pollution, thus helping resolve catchment-wide problems with high levels of pesticides, phosphates and sediments impacting on river life and public drinking water abstractions.	catchment wide	unspecified	See text under 'overall effect'		By adopting good practice in road runoff management (see section 5), the works can extend the reduction of impacts of diffuse pollution from the roads. Therefore aligning with this scheme.				
	Fish passage mitigation projects on all key identified migratory barriers throughout the catchment, contributing directly to the local recovery of populations of threatened priority fish species, such as brown trout, Atlantic salmon and European eel, with associated recreational and fisheries provisioning benefits.	catchment wide	unspecified		See text under 'overall effect'	Proposed potential use of a culvert may impact on fish passage and therefore would not align with fish passage objective.				
	A Strategy has been developed to tackle Himalayan Balsam in the catchment targeting high risk areas and to containment points. Project officer time for the development of strategies for other NNIS such as floating pennywort, azolla and mink is needed	catchment wide	unspecified	See text under 'overall effect'		By adoption of good practice in NNIS management and biosecurity (see section 5), the works can contribute to this objective within the geographical confines of the scheme.				

* assumes additional proposed mitigation measure implemented

Surface water body GB30643218 **Boldermere**	

Code	A3.21
Scheme component	Retaining wall and potential realignment (Boldermere Lake)
Type	WFD lake water body
Location	A3 south of Junction 10
Description	Retaining wall into lake and potential realignment of A3 south of Junction 10

Key

- major beneficial effect
- minor / localised beneficial effect
- no effect
- minor / localised adverse effect
- adverse widespread or prolonged effect
- adverse effect on overall WFD status of waterbody

Test A Potential to cause deterioration of current WFD Ecological Status

			Current Status	Status objective	Effect of scheme component of WFD element	Overall effect of scheme on WFD element	Additional Proposed Mitigation Measures	Residual effect of scheme on WFD element*	Effect of scheme on ecological / chemical status	Overall effect of scheme on water body status
ECOLOGICAL STATUS	Biological quality elements	Macrophytes and phytobenthos - diatoms	Good	Good by 2015	Potential realignment of existing carriageway and construction of associated retaining wall has the potential to result in the direct loss of marginal lake habitat on its western shore and cause changes to the water body's diatom assemblage and community structure. It is assumed, in the absence of survey data, to have a good value for supporting diatoms. The works also have the potential to change existing drainage into the water body. Measures to minimise silt inputs to the water body are key to maintaining a healthy habitat for diatoms. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	Due to the potential for the loss of lake marginal habitat to affect lake ecosystem functioning there is a risk of a prolonged adverse affect at the water body scale.	Measures to enhance local lake habitats (to offset potential losses of the same habitat type on the western shore) need to be investigated and considered for incorporation into the final design.	It is anticipated that adequate mitigation can be undertaken to avoid deterioration at waterbody scale. Only minor localised effects are expected.	It is anticipated that adequate mitigation can be undertaken to avoid deterioration at waterbody scale. Only minor localised effects are expected.	**It is anticipated that adequate mitigation can be undertaken to avoid deterioration at waterbody scale. Only minor localised effects are expected.**
		Macrophytes and phytobenthos - macrophytes	Good	Good by 2016	Potential realignment of existing carriageway and construction of associated retaining wall has the potential to result in the direct loss of marginal lake habitat on its western shore and cause changes to the water body's macrophyte assemblage and community structure. It is assumed, in the absence of survey data, to have a good value for supporting macrophytes. The works also have the potential to change existing drainage into the water body. Measures to minimise silt inputs to the water body are key to maintaining a healthy habitat for macrophytes. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.					
		Macroinvertebrates	Good	Good by 2017	Potential realignment of existing carriageway and construction of associated retaining wall has the potential to result in the direct loss of marginal lake habitat on its western shore and cause changes to the water body's macroinvertebrate assemblage and community structure. It is assumed, in the absence of survey data, to have a good value for supporting macroinvertebrates. The works also have the potential to change existing drainage into the water body. Measures to minimise silt inputs to the water body are key to maintaining a healthy habitat for macroinvertebrates. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.					
		Phytoplankton	Good	Good by 2015	Potential realignment of existing carriageway and construction of associated retaining wall has the potential to result in the direct loss of marginal lake habitat on its western shore and cause changes to the water body's phytoplankton assemblage and community structure. It is assumed, in the absence of survey data, to have a good value for supporting phytoplankton. The works also have the potential to change existing drainage into the water body. Measures to minimise silt inputs to the water body are key to maintaining a healthy habitat for phytoplankton. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.					
	Physico-chemical quality elements	Physico-chemical quality elements comprise salinity and total phosphorus.	Moderate	Good by 2027	Potential realignment of existing carriageway and construction of associated retaining wall has the potential to change existing drainage into the water body and increase the risk of silt and pollutant ingress to the lake. Measures to minimise silt inputs to the water body are key to physico-chemical quality. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented. In addition, the loss of marginal habitats may potentially affect lake nutrient cycling and elevate phosphorus levels.	Assuming that management of road runoff is undertaken in accordance with the assumptions set out in section 5, we expect no significant deterioration to physico-chemical quality elements of this water body.	Management of road runoff will need to be undertaken in accordance with the principles set out in section 5.	Assuming management of road runoff is undertaken in accordance with the principles set out in section 5, no adverse effects anticipated.		
	Hydro-morphological quality elements	Hydro-morphological quality elements cover: quantity and dynamics of flow, level, residence time and connection to groundwater, depth variation, quantity and structure of substrate and structure and condition of shore zone.	Supports Good	Supports Good by 2015	Potential realignment of existing carriageway and construction of associated retaining wall could lead to the direct loss of marginal lake habitat on its western shore. Marginal habitat loss would negatively affect key quality elements, in particular the structure and condition of shore zone.	Due to the potential for the loss of lake marginal habitat to affect lake hydro-morphology there is a risk of a prolonged adverse affect at the water body scale.	Measures to enhance local lake shore morphological structure (to offset potential losses of the same habitat type on the w. shore) should be investigated and considered for the final design.	Assuming measures are incorporated that act to improve the structure of the western lake margins of the water body then minor localised effects are anticipated.		
	Specific pollutants				**Screened out of assessment**					
CHEMICAL STATUS					**Screened out of assessment**					

Test B Potential to prevent future attainment of Good Ecological Status

	RBMP measures to achieve objective	Where RBMP measure will happen	When RBMP measure will happen	Effect of scheme component of WFD element	Overall effect of scheme on WFD element	Additional Proposed Mitigation Measures	Residual effect of scheme on WFD element*	Effect of scheme on ecological / chemical status	Overall effect of scheme on water body status
	No measures were found for this Lake Waterbody. The data catchment explorer, the South East RBMP (Environment Agency, 2015) and the River Wey Catchment vision (2014) were all referenced as with the surface water measures.								

Test C Potential to prevent attainment of Protected Area Objectives

Addressed elsewhere in Environmental Scoping Report

* assumes additional proposed mitigation measure implemented

Groundwater body
GB40602G601400
Chobham Bagshot Beds

Code	A3.31	A3.32
Scheme component	Drainage of road runoff to groundwater	Road & river crossings
Watercourse type	WFD water body	WFD water body
Location	Multiple, as yet unspecified locations	Multiple, as yet unspecified locations
Description	Drainage of potentially contaminated surface water runoff to groundwater	Deep foundation protruding into aquifer

Key

- major beneficial effect
- minor / localised beneficial effect
- no effect
- minor / localised adverse effect
- adverse widespread or prolonged effect
- adverse effect on overall WFD status of waterbody

Test A Potential to cause deterioration of current WFD Ecological Status

		Current Status	Status objective	Effect of scheme component of WFD element	Effect of scheme component of WFD element	Overall effect of scheme on WFD element	Additional Proposed Mitigation Measures	Residual effect of scheme on WFD element*	Effect of scheme on ecological / chemical status	Overall effect of scheme on water body status
QUANTITATIVE IMPACTS	Quantitative impacts cover: Saline or other intrusions of poor quality water due to groundwater abstraction, the impact on the ecological status of surface water bodies, the impact on the condition of groundwater dependent terrestrial ecosystems, and the impact on the groundwater body water balance.	Good	Good by 2015	No impacts identified as a result of scheme element.	Deep foundations may form a barrier to groundwater flow, potentially reducing groundwater contributions to adjacent water courses and any groundwater abstractions in the water body.	Assuming that works are managed in accordance with the assumptions set out in section 5, we expect no deterioration of the quantitative elements of this groundwater body. However, introduction of deep foundations may lead to deterioration in local habitats if appropriate local mitigation cannot be identified.	Measures to reduce potential deterioration of local habitats need to be investigated and considered for incorporation into the final design.	No deterioration at waterbody scale. Residual effect on local habitat dependent on viable opportunities for local mitigations.	No deterioration at waterbody scale anticipated.	**No deterioration at waterbody scale anticipated.**
CHEMICAL IMPACTS	Chemical impacts cover: pollution concentrations, quality impact on groundwater abstractions, impact on the chemical & ecological status of surface water bodies, nutrient concentration impact on GWDTEs, Drinking Water Protected Areas and a General quality assessment.	Good	Good by 2015	Groundwater body is at outcrop at the scheme location, with no low permeability superficial deposits protecting the groundwater body. Potential for increased surface runoff from scheme to cause deterioration to water quality of groundwater body if runoff is contaminated. Potential secondary effects to groundwater dependant surface water bodies. This WFD assessment is made on the basis that management of road runoff will be carried out in accordance with the design principles set out in section 5 and therefore risks to groundwater quality will be reduced.	Deep foundations may create rapid vertical flow pathways into the groundwater body for potentially contaminated runoff. Assuming design & construction is to industry standards, this risk to the groundwater body should be mitigated.	Assuming that works are managed in accordance with the assumptions set out in section 5, we expect no chemical impacts to this groundwater body from this scheme. However, deterioration to local habitats are potentially possible.	Measures to reduce potential deterioration of local habitats need to be investigated and considered for incorporation into the final design.	No deterioration at waterbody scale. Residual effect on local habitat dependent on viable opportunities for local mitigations.		

Test B Potential to prevent future attainment of Good Ecological Status

	RBMP measures to achieve objective	Where RBMP measure will happen	When RBMP measure will happen	Effect of scheme component of WFD element	Effect of scheme component of WFD element	Overall effect of scheme on WFD element	Additional Proposed Mitigation Measures	Residual effect of scheme on WFD element*	Effect of scheme on ecological / chemical status	Overall effect of scheme on water body status
	No measures were found for this Ground Waterbody. The data catchment explorer, the South East RBMP (Environment Agency, 2015) and the River Wey Catchment vision (2014) were all referenced as with the surface water measures.									

Test C Potential to prevent attainment of Protected Area Objectives

Addressed elsewhere in Environmental Scoping Report

* assumes additional proposed mitigation measure implemented

Surface water body	
GB106039017621	
Mole (Horley to Hersham)	

Code	C3.01
Scheme component	Drainage of road runoff
Watercourse type	WFD waterbody, minor watercourses and drainage ditches
Location	Multiple, as yet unspecified, locations
Description	Management of runoff from road surfaces discharging to the Wey and tributaries

Key

- major beneficial effect
- minor / localised beneficial effect
- no effect
- minor / localised adverse effect
- adverse widespread or prolonged effect
- adverse effect on overall WFD status of waterbody

Test A Potential to cause deterioration of current WFD Ecological Status

			Current Status	Status objective	Effect of scheme component of WFD element	Overall effect of scheme on WFD element	Additional Proposed Mitigation Measures	Residual effect of scheme on WFD element*	Effect of scheme on ecological / chemical status	Overall effect of scheme on water body status
ECOLOGICAL STATUS	Biological quality elements	Macrophytes and phytobenthos - diatoms	Moderate	Moderate by 2015	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	Assuming works are set out in accordance with the assumptions set out in section 5, no adverse effects are expected at local or waterbody scale.		No deterioration expected at local or water body scale.	No deterioration anticipated at waterbody scale.	**No deterioration anticipated at waterbody scale.**
		Macrophytes and phytobenthos - macrophytes	Moderate	Moderate by 2015	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.					
		Macroinvertebrates	High	Good by 2015	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.					
		Fish	Moderate	Good by 2027	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.					
	Physico-chemical quality elements	Physico-chemical quality elements comprise Dissolved Oxygen. pH, Phosphate, Ammonia and Temperature.	Moderate	Moderate by 2015	Runoff from existing and proposed road network will discharge to the drainage ditches and minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to preventing deterioration to physico-chemical elements . This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	Assuming that works are managed in accordance with the assumptions set out in section 5, we expect no deterioration to physico-chemical elements at waterbody or local scales.		No deterioration expected at local or waterbody scale.		

	Hydro-morphological quality elements	Hydro-morphological quality elements cover: quantity and dynamics of flow, connection to groundwater, river continuity, river depth and width variation, structure and substrate of river bed, and structure of riparian zone.	Supports Good	Supports Good by 2015	Runoff from existing and proposed road network will discharge to the WFD, minor watercourses and ditches at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to hydro-morphological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	Assuming that works are managed in accordance with the assumptions set out in section 5, we expect no deterioration to hydro-morphological elements at local or water body scale.		No deterioration expected at local or water body scale.		
	Specific pollutants	**Screened out of assessment**									
CHEMICAL STATUS		**Screened out of assessment**									

Test B Potential to prevent future attainment of Good Ecological Status

	RBMP measures to achieve objective	Where RBMP measure will happen	When RBMP measure will happen	Effect of scheme component of WFD element	Overall effect of scheme on proposed measure				
	No measures assigned to this waterbody listed in RBMP or supporting data sets	NA	NA	NA	NA				
	At operational catchment scale (Wey catchment) the following measures relevant to these works are advocated by the local Catchment Partnership (Environment Agency, 2015)								
	Develop a comprehensive strategy for tackling non-native invasive species.	catchment wide	unspecified	See text under 'overall effect'	By adoption of good practice in NNIS management and biosecurity (see section 5), the works can contribute to this objective within the geographical confines of the scheme.				
	Remove barriers that are impeding fish passage and contributing directly to the local recovery of populations of threatened priority fish species, such as brown trout, Atlantic salmon and European eel, with associated recreational and fisheries benefits.	catchment wide	unspecified	NA	NA				
	Restore natural morphology where man-made modifications exist with channel habitat creation, gravel reintroduction, tree works and back waters, allowing naturalised flow regimes and sediment transport and associated flood management benefits.	catchment wide	unspecified	NA	NA				

* assumes additional proposed mitigation measure implemented

Surface water body
GB106039017630
Wey (Shalford to River Thames confluence at Weybridge)

Code	C3.11
Scheme component	Drainage of road runoff
Watercourse type	WFD waterbody, minor watercourses and drainage ditches
Location	Multiple, as yet unspecified, locations
Description	Management of runoff from road surfaces discharging to the Wey and tributaries

Key

- major beneficial effect
- minor / localised beneficial effect
- no effect
- minor / localised adverse effect
- adverse widespread or prolonged effect
- adverse effect on overall WFD status of waterbody

Test A Potential to cause deterioration of current WFD Ecological Status

			Current Status	**Status objective**	**Effect of scheme component of WFD element**	**Overall effect of scheme on WFD element**	**Additional Proposed Mitigation Measures**	**Residual effect of scheme on WFD element***	**Effect of scheme on ecological / chemical status**	**Overall effect of scheme on water body status**
ECOLOGICAL STATUS	Biological quality elements	Macrophytes and phytobenthos - diatoms	Moderate	Moderate by 2015	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	Assuming that works are managed in accordance with the assumptions set out in section 5, no adverse effects at local or waterbody scale are expected.		No deterioration expected at local or water body scale.	No deterioration anticipated at waterbody scale.	**No deterioration anticipated at waterbody scale.**
		Macrophytes and phytobenthos - macrophytes	Moderate	Moderate by 2015	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.					
		Macroinvertebrates	High	Good by 2015	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.					
		Fish	Moderate	Good by 2027	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.					
	Physico-chemical quality elements	Physico-chemical quality elements comprise Dissolved Oxygen. pH, Phosphate, Ammonia and Temperature.	Moderate	Moderate by 2015	Runoff from existing and proposed road network will discharge to the drainage ditches and minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to preventing deterioration to physico-chemical elements . This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	Assuming that works are managed in accordance with the assumptions set out in section 5, we expect no deterioration to physico-chemical elements at waterbody or local scales.		No deterioration expected at local or waterbody scale.		

	Hydro-morphological quality elements	Hydro-morphological quality elements cover: quantity and dynamics of flow, connection to groundwater, river continuity, river depth and width variation, structure and substrate of river bed, and structure of riparian zone.	Supports Good	Supports Good by 2015	Runoff from existing and proposed road network will discharge to the WFD, minor watercourses and ditches at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to hydro-morphological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	Assuming that works are managed in accordance with the assumptions set out in section 5, we expect no deterioration to hydro-morphological elements at a local or water body scale.		No deterioration expected at local or water body scale.		
	Specific pollutants	**Screened out of assessment**								
CHEMICAL STATUS		**Screened out of assessment**								

Test B Potential to prevent future attainment of Good Ecological Status

	RBMP measures to achieve objective	Where RBMP measure will happen	When RBMP measure will happen	Effect of scheme component of WFD element	Overall effect of scheme on proposed measure				
	No measures assigned to this waterbody listed in RBMP or supporting data sets	NA	NA	NA	NA				
	At operational catchment scale (Wey catchment) the following measures relevant to these works are advocated by the local Catchment Partnership (Environment Agency, 2015)								
	Wey Diffuse Advice Project throughout the catchment. This would greatly extend a proven mechanism of reducing the impacts of rural and urban diffuse pollution, thus helping resolve catchment-wide problems with high levels of pesticides, phosphates and sediments impacting on river life and public drinking water abstractions.	catchment wide	unspecified	See text under 'overall effect'	By adopting good practice in road runoff management (see section 5), the works can extend the reduction of impacts of diffuse pollution from the roads. Therefore aligning with this scheme.				
	Fish passage mitigation projects on all key identified migratory barriers throughout the catchment, contributing directly to the local recovery of populations of threatened priority fish species, such as brown trout, Atlantic salmon and European eel, with associated recreational and fisheries provisioning benefits.	catchment wide	unspecified	NA	NA				
	A Strategy has been developed to tackle Himalayan Balsam in the catchment targeting high risk areas and to containment points. Project officer time for the development of strategies for other NNIS such as floating pennywort, azolla and mink is needed	catchment wide	unspecified		By adoption of good practice in NNIS management and biosecurity (see section 5), the works can contribute to this objective within the geographical confines of the scheme.				

* assumes additional proposed mitigation measure implemented

Groundwater body
GB40602G601400
Chobham Bagshot Beds

Code	C3.21	C3.22
Scheme component	Drainage of road runoff to groundwater	Road & river crossings
Watercourse type	WFD water body	WFD water body
Location	Multiple, as yet unspecified locations	Multiple, as yet unspecified locations
Description	Drainage of potentially contaminated surface water runoff to groundwater	Deep foundation protruding into aquifer

Key

- major beneficial effect
- minor / localised beneficial effect
- no effect
- minor / localised adverse effect
- adverse widespread or prolonged effect
- adverse effect on overall WFD status of waterbody

Test A Potential to cause deterioration of current WFD Ecological Status

		Current Status	Status objective	Effect of scheme component of WFD element	Effect of scheme component of WFD element	Overall effect of scheme on WFD element	Additional Proposed Mitigation Measures	Residual effect of scheme on WFD element*	Effect of scheme on ecological / chemical status	Overall effect of scheme on water body status
QUANTITATIVE IMPACTS	Quantitative impacts cover: Saline or other intrusions of poor quality water due to groundwater abstraction, the impact on the ecological status of surface water bodies, the impact on the condition of groundwater dependent terrestrial ecosystems, and the impact on the groundwater body water balance.	Good	Good by 2015	No impacts identified as a result of scheme element.	Deep foundations may form a barrier to groundwater flow, potentially reducing groundwater contributions to adjacent water courses and any groundwater abstractions in the water body.	Assuming that works are managed in accordance with the assumptions set out in section 5, we expect no deterioration of the quantitative elements of this groundwater body. However, introduction of deep foundations may lead to deterioration in local habitats if appropriate local mitigation cannot be identified.	Measures to reduce potential deterioration of local habitats need to be investigated and considered for incorporation into the final design.	No deterioration at waterbody scale. Residual effect on local habitat dependent on viable opportunities for local mitigations.	No deterioration at waterbody scale anticipated.	No deterioration at waterbody scale anticipated.
CHEMICAL IMPACTS	Chemical impacts cover: pollution concentrations, quality impact on groundwater abstractions, impact on the chemical & ecological status of surface water bodies, nutrient concentration impact on GWDTEs, Drinking Water Protected Areas and a General quality assessment.	Good	Good by 2015	Groundwater body is an outcrop at the scheme location, with no low permeability superficial deposits protecting the groundwater body. Potential for increased surface runoff from scheme to cause deterioration to water quality of groundwater body if runoff is contaminated. Potential secondary effects to groundwater dependant surface water bodies. This WFD assessment is made on the basis that management of road runoff will be carried out in accordance with the design principles set out in section 5 and therefore risks to groundwater quality will be reduced.	Deep foundations may create rapid vertical flow pathways into the groundwater body for potentially contaminated runoff. Assuming design & construction is to industry standards, this risk to the groundwater body should be mitigated.	Assuming that works are managed in accordance with the assumptions set out in section 5, we expect no chemical impacts to this groundwater body from this scheme. However, deterioration to local habitats are potentially possible.	Measures to reduce potential deterioration of local habitats need to be investigated and considered for incorporation into the final design.	No deterioration at waterbody scale. Residual effect on local habitat dependent on viable opportunities for local mitigations.		

Test B Potential to prevent future attainment of Good Ecological Status

	RBMP measures to achieve objective	Where RBMP measure will happen	When RBMP measure will happen	Effect of scheme component of WFD element	Effect of scheme component of WFD element	Overall effect of scheme on WFD element	Additional Proposed Mitigation Measures	Residual effect of scheme on WFD element*	Effect of scheme on ecological / chemical status	Overall effect of scheme on water body status
	No measures were found for this Ground Waterbody. The data catchment explorer, the South East RBMP (Environment Agency, 2015) and the River Wey Catchment vision (2014) were all referenced as with the surface water measures.									

Test C Potential to prevent attainment of Protected Area Objectives

Addressed elsewhere in Environmental Scoping Report

* assumes additional proposed mitigation measure implemented

Surface water body	
GB106039017890	
Stratford Brook	

Code	E5.01	E5.02
Scheme component	River crossing (drainage ditch)	Drainage of road runoff
Watercourse type	Drainage ditch	WFD waterbody and minor watercourse
Location	East end of Elm Road	Multiple, as yet unspecified, locations on Ingrebourne
Description	Culvert replacement (to box culvert) assumed to be necessary because of increased traffic on road.	Management of runoff from road surfaces discharging to Ingrebourne

Key

- major beneficial effect
- minor / localised beneficial effect
- no effect
- minor / localised adverse effect
- adverse widespread or prolonged effect
- adverse effect on overall WFD status of waterbody

Test A Potential to cause deterioration of current WFD Ecological Status

			Current Status	Status objective	Effect of scheme component of WFD element	Effect of scheme component of WFD element	Overall effect of scheme on WFD element	Additional Proposed Mitigation Measures	Residual effect of scheme on WFD element*	Effect of scheme on ecological / chemical status	Overall effect of scheme on water body status
ECOLOGICAL STATUS	Biological quality elements	Macrophytes and phytobenthos - diatoms	Not assessed	Not assessed	At present a drainage ditch is assumed to flow through a pipe culvert under the road (channel under road assumed to be un-natural and of little ecological diversity, as are the channels upstream and downstream). We anticipate the new crossing will take the form of a box culvert to accommodate the slightly wider (c. 5m) and busier replacement road. It is assumed this new culvert will be constructed in accordance with the design principles set out in section 5. This more environmentally sympathetic culvert design, together with river realignments upstream and downstream, present an opportunity to improve on the existing crossing (though this would need to be confirmed by survey).	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	Assuming that works are managed in accordance with the principles set out in section 5, we expect no deterioration to ecological elements of this water body. On the same basis we expect no deterioration to the ecology of local water features.		No deterioration at waterbody or local scale.	No deterioration at waterbody or local scale.	**No deterioration at waterbody or local scale.**
		Macrophytes and phytobenthos - macrophytes	Not assessed	Not assessed	At present a drainage ditch is assumed to flow through a pipe culvert under the road (channel under road assumed to be un-natural and of little ecological diversity, as are the channels upstream and downstream). We anticipate the new crossing will take the form of a box culvert to accommodate the slightly wider (c. 5m) and busier replacement road. It is assumed this new culvert will be constructed in accordance with the design principles set out in section 5. This more environmentally sympathetic culvert design, together with river realignments upstream and downstream, present an opportunity to improve on the existing crossing (though this would need to be confirmed by survey).	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.					
		Macroinvertebrates	Moderate	Good by 2027	At present a drainage ditch is assumed to flow through a pipe culvert under the road (channel under road assumed to be un-natural and of little ecological diversity, as are the channels upstream and downstream). We anticipate the new crossing will take the form of a box culvert to accommodate the slightly wider (c. 5m) and busier replacement road. It is assumed this new culvert will be constructed in accordance with the design principles set out in section 5. This more environmentally sympathetic culvert design, together with river realignments upstream and downstream, present an opportunity to improve on the existing crossing (though this would need to be confirmed by survey).	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.					
		Fish	Not assessed	Not assessed	At present a drainage ditch is assumed to flow through a pipe culvert under the road (channel under road assumed to be un-natural and of little ecological diversity, as are the channels upstream and downstream). We anticipate the new crossing will take the form of a box culvert to accommodate the slightly wider (c. 5m) and busier replacement road. It is assumed this new culvert will be constructed in accordance with the design principles set out in section 5. This more environmentally sympathetic culvert design, together with river realignments upstream and downstream, present an opportunity to improve on the existing crossing (though this would need to be confirmed by survey).	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.					
	Physico-chemical quality elements	Physico-chemical quality elements comprise Dissolved Oxygen. pH, Phosphate, Ammonia and Temperature.	Good	Good by 2015	Culvert replacement not considered to adversely affect physico-chemical condition. This WFD assessment is made on the basis that culvert replacement, realignment of or crossing of these minor drainage ditches will be carried out in accordance with the design principles set out in section 5.	Runoff from existing and proposed road network will discharge to the drainage ditches and minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to preventing deterioration to physico-chemical elements . This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	Assuming that works are managed in accordance with the assumptions set out in section 5, we expect no deterioration to physico-chemical elements of this water body. On the same basis we expect no deterioration to the ecology of local water features.		No deterioration at waterbody or local scale.		
	Hydro-morphological quality elements	Hydro-morphological quality elements cover: quantity and dynamics of flow, connection to groundwater, river continuity, river depth and width variation, structure and substrate of river bed, and structure of riparian zone.	Supports Good	Supports Good by 2015	At present a drainage ditch is assumed to flow through a pipe culvert under the road (channel under road assumed to be un-natural and of little morphological diversity, as are the channels upstream and downstream). We anticipate the new crossing will take the form of a box culvert to accommodate the slightly wider (c. 5m) and busier replacement road. It is assumed this new culvert will be constructed in accordance with the design principles set out in section 5. This more environmentally sympathetic culvert design, together with river realignments upstream and downstream, present an opportunity to improve on the existing crossing (though this would need to be confirmed by survey).	Runoff from existing and proposed road network will discharge to the WFD, minor watercourses and ditches at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to hydro-morphological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	Assuming that works are managed in accordance with the assumptions set out in section 5, we expect no deterioration to hydro-morphological elements of this water body. Neither is deterioration expected at the local scale.		No deterioration anticipated at either water body or local scale.		
	Specific pollutants	**Screened out of assessment**									
CHEMICAL STATUS		**Screened out of assessment**									

Test B Potential to prevent future attainment of Good Ecological Status

	RBMP measures to achieve objective	**Where RBMP measure will happen**	**When RBMP measure will happen**	**Effect of scheme component of WFD element**	**Effect of scheme component of WFD element**	**Overall effect of scheme on proposed measure**				
	No measures assigned to this waterbody listed in RBMP or supporting data sets	NA	NA	NA	NA	NA				
	At operational catchment scale (Wey catchment) the following measures relevant to these works are advocated by the local Catchment Partnership (Environment Agency, 2015)									

	Wey Diffuse Advice Project throughout the catchment. This would greatly extend a proven mechanism of reducing the impacts of rural and urban diffuse pollution, thus helping resolve catchment-wide problems with high levels of pesticides, phosphates and sediments impacting on river life and public drinking water abstractions.	catchment wide	unspecified		See text under 'overall effect'	By adopting good practice in road runoff management (see section 5), the works can extend the reduction of impacts of diffuse pollution from the roads. Therefore aligning with this scheme.				
	Fish passage mitigation projects on all key identified migratory barriers throughout the catchment, contributing directly to the local recovery of populations of threatened priority fish species, such as brown trout, Atlantic salmon and European eel, with associated recreational and fisheries provisioning benefits.	catchment wide	unspecified	See text under 'overall effect'		By replacing a presumed pipe culvert under the current road with a box culvert the impact on fish migration would be reduced. Passage would be improved therefore aligning with this strategy.				
	A Strategy has been developed to tackle Himalayan Balsam in the catchment targeting high risk areas and to containment points. Project officer time for the development of strategies for other NNIS such as floating pennywort, azolla and mink is needed	catchment wide	unspecified	See text under 'overall effect'		By adoption of good practice in NNIS management and biosecurity (see section 5), the works can contribute to this objective within the geographical confines of the scheme.				

* assumes additional proposed mitigation measure implemented

Groundwater body
GB40602G601400
Chobham Bagshot Beds

Code	E5.11
Scheme component	Drainage of road runoff to groundwater
Watercourse type	WFD water body
Location	Multiple, as yet unspecified locations
Description	Drainage of potentially contaminated surface water runoff to groundwater

Key

- major beneficial effect
- minor / localised beneficial effect
- no effect
- minor / localised adverse effect
- adverse widespread or prolonged effect
- adverse effect on overall WFD status of waterbody

Test A Potential to cause deterioration of current WFD Ecological Status

		Current Status	Status objective	Effect of scheme component of WFD element	Overall effect of scheme on WFD element	Additional Proposed Mitigation Measures	Residual effect of scheme on WFD element*	Effect of scheme on ecological / chemical status	Overall effect of scheme on water body status
QUANTITATIVE IMPACTS	Quantitative impacts cover: Saline or other intrusions of poor quality water due to groundwater abstraction, the impact on the ecological status of surface water bodies, the impact on the condition of groundwater dependent terrestrial ecosystems, and the impact on the groundwater body water balance.	Good	Good by 2015	No impacts identified as a result of scheme element.	We expect no deterioration of the quantitative elements of this groundwater body.	Measures to reduce potential deterioration of local habitats need to be investigated and considered for incorporation into the final design.	No deterioration at waterbody scale.	No deterioration at waterbody scale anticipated.	No deterioration at waterbody scale anticipated.
CHEMICAL IMPACTS	Chemical impacts cover: pollution concentrations, quality impact on groundwater abstractions, impact on the chemical & ecological status of surface water bodies, nutrient concentration impact on GWDTEs, Drinking Water Protected Areas and a General quality assessment.	Good	Good by 2015	Groundwater body is an outcrop at the scheme location, with no low permeability superficial deposits protecting the groundwater body. Potential for increased surface runoff from scheme to cause deterioration to water quality of groundwater body if runoff is contaminated. Potential secondary effects to groundwater dependant surface water bodies. This WFD assessment is made on the basis that management of road runoff will be carried out in accordance with the design principles set out in section 5 and therefore risks to groundwater quality will be reduced.	Assuming that works are managed in accordance with the assumptions set out in section 5, we expect no chemical impacts to this groundwater body from this scheme. However, deterioration to local habitats are potentially possible.	Measures to reduce potential deterioration of local habitats need to be investigated and considered for incorporation into the final design.	No deterioration at waterbody scale. Residual effect on local habitat dependent on viable opportunities for local mitigations.		

Test B Potential to prevent future attainment of Good Ecological Status

	RBMP measures to achieve objective	Where RBMP measure will happen	When RBMP measure will happen	Effect of scheme component of WFD element	Overall effect of scheme on WFD element	Additional Proposed Mitigation Measures	Residual effect of scheme on WFD element*	Effect of scheme on ecological / chemical status	Overall effect of scheme on water body status
	No measures were found for this Ground Waterbody. The data catchment explorer, the South East RBMP (Environment Agency, 2015) and the River Wey Catchment vision (2014) were all referenced as with the surface water measures.								

Test C Potential to prevent attainment of Protected Area Objectives

Addressed elsewhere in Environmental Scoping Report

* assumes additional proposed mitigation measure implemented

Surface water body	Code	14.01	14.02	14.03	14.04
GB106039017621	**Scheme component**	Culvert extension (Minor watercourse)	Culvert extension (Minor watercourse)	Drainage of road runoff	Realignment and crossing of drainage ditches
Mole (Horley to Hersham)	**Watercourse type**	Minor watercourse	Minor watercourse	WFD waterbody, minor watercourses and drainage ditches	Drainage ditches
	Location	Diverge from westbound M25	Slip road for eastbound M25	Multiple, as yet unspecified, locations	Multiple locations
	Description	40m long culvert extension to south of M25 with upstream realignments	30m long culvert extension to north of M25 with downstream realignments.	Management of runoff from road surfaces discharging to the Mole and tributaries	Realignment of drainage ditches. Construction of culverts and other crossings over drainage ditches.

Key
- major beneficial effect
- minor / localised beneficial effect
- no effect
- minor / localised adverse effect
- adverse widespread or prolonged effect
- adverse effect on overall WFD status of waterbody

Test A Potential to cause deterioration of current WFD Ecological Status

			Current Status	Status objective	Effect of scheme component of WFD element	Effect of scheme component of WFD element	Effect of scheme component of WFD element	Effect of scheme component of WFD element	Overall effect of scheme on WFD element	Additional Proposed Mitigation Measures	Residual effect of scheme on WFD element*	Effect of scheme on ecological / chemical status	Overall effect of scheme on water body status
ECOLOGICAL STATUS	Biological quality elements	Macrophytes and phytobenthos - diatoms	Moderate	Moderate by 2015	At present a straightened section of a minor watercourse, of limited ecological diversity (needs confirming by survey). Currently 100m culvert, with an increase in length of 40m. The extension of the culvert will require realignment of approximately 50m of channel. The culvert is likely to cause local reduction in habitat quality for diatoms. This WFD assessment is made on the basis that this culvert extension will be carried out in accordance with the design principles set out in section 5.	At present a straightened section of a minor watercourse of limited ecological diversity (need confirming by survey). Currently 100m culvert, with an increase in length of 30m. The extension of the culvert will require extensive realignment of approximately 90m of channel. The culvert is likely to cause local reduction in habitat quality for diatoms. This WFD assessment is made on the basis that this culvert extension will be carried out in accordance with the design principles set out in section 5.	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	There are minor drainage ditches that may need to be realigned as part of the scheme. Crossings may also be required. These ditches are straightened and of minimal ecological value (though survey is needed to confirm this assumption). Risk of loss / disturbance damage to aquatic ecology, substrate and riparian zone. This WFD assessment is made on the basis that realignment of or crossing of these minor drainage ditches will be carried out in accordance with the design principles set out in section 5.	Assuming that works are managed in accordance with the assumptions set out in section 5, we expect no deterioration to ecological elements of this water body. However, increasing culvert length will have local impacts on ecology including fish passage.	Measures to reduce potential deterioration of local habitats need to be investigated and considered for incorporation into the final design.	No deterioration at waterbody scale. Residual effect on local habitat dependent of viable opportunities for local mitigations.	No deterioration anticipated at water body scale.	**No deterioration anticipated at water body scale.**
		Macrophytes and phytobenthos - macrophytes	Moderate	Moderate by 2015	At present a straightened section of a minor watercourse, of limited ecological diversity (needs confirming by survey). Currently 100m culvert, with an increase in length of 40m. The extension of the culvert will require realignment of approximately 50m of channel. The culvert is likely to cause local reduction in habitat quality for macrophytes. This WFD assessment is made on the basis that this culvert extension will be carried out in accordance with the design principles set out in section 5.	At present a straightened section of a minor watercourse of limited ecological diversity (need confirming by survey). Currently 100m culvert, with an increase in length of 30m. The extension of the culvert will require extensive realignment of approximately 90m of channel. The culvert is likely to cause local reduction in habitat quality for macrophytes. This WFD assessment is made on the basis that this culvert extension will be carried out in accordance with the design principles set out in section 5.	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	There are minor drainage ditches that may need to be realigned as part of the scheme. Crossings may also be required. These ditches are straightened and of minimal ecological value (though survey is needed to confirm this assumption). Risk of loss / disturbance damage to aquatic ecology, substrate and riparian zone. This WFD assessment is made on the basis that realignment of or crossing of these minor drainage ditches will be carried out in accordance with the design principles set out in section 5.					
		Macroinvertebrates	Moderate	Moderate by 2015	At present a straightened section of a minor watercourse, of limited ecological diversity (needs confirming by survey). Currently 100m culvert, with an increase in length of 40m. The extension of the culvert will require realignment of approximately 50m of channel. The culvert is likely to cause local reduction in habitat quality for macroinvertebrates. This WFD assessment is made on the basis that this culvert extension will be carried out in accordance with the design principles set out in section 5.	At present a straightened section of a minor watercourse of limited ecological diversity (need confirming by survey). Currently 100m culvert, with an increase in length of 30m. The extension of the culvert will require extensive realignment of approximately 90m of channel. The culvert is likely to cause local reduction in habitat quality for macroinvertebrates. This WFD assessment is made on the basis that this culvert extension will be carried out in accordance with the design principles set out in section 5.	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	There are minor drainage ditches that may need to be realigned as part of the scheme. Crossings may also be required. These ditches are straightened and of minimal ecological value (though survey is needed to confirm this assumption). Risk of loss / disturbance damage to aquatic ecology, substrate and riparian zone. This WFD assessment is made on the basis that realignment of or crossing of these minor drainage ditches will be carried out in accordance with the design principles set out in section 5.					
		Fish	Good	Good by 2015	At present a straightened section of a minor watercourse, of limited ecological diversity (needs confirming by survey). Currently 100m culvert, with an increase in length of 40m. The extension of the culvert will require realignment of approximately 50m of channel. The culvert is likely to cause local reduction in habitat quality for fish. This WFD assessment is made on the basis that this culvert extension will be carried out in accordance with the design principles set out in section 5.	At present a straightened section of a minor watercourse of limited ecological diversity (need confirming by survey). Currently 100m culvert, with an increase in length of 30m. The extension of the culvert will require extensive realignment of approximately 90m of channel. The culvert is likely to cause local reduction in habitat quality for fish. This WFD assessment is made on the basis that this culvert extension will be carried out in accordance with the design principles set out in section 5.	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	There are minor drainage ditches that may need to be realigned as part of the scheme. Crossings may also be required. These ditches are straightened and of minimal ecological value (though survey is needed to confirm this assumption). Risk of loss / disturbance damage to aquatic ecology, substrate and riparian zone. This WFD assessment is made on the basis that realignment of or crossing of these minor drainage ditches will be carried out in accordance with the design principles set out in section 5.					
	Physico-chemical quality elements	Physico-chemical quality elements comprise Dissolved Oxygen. pH, Phosphate, Ammonia and Temperature.	Moderate	Moderate by 2015	The culvert is not considered to adversely affect physico-chemical condition. This WFD assessment is made on the basis that realignment of or crossing of these minor drainage ditches will be carried out in accordance with the design principles set out in section 5.	The culvert is not considered to adversely affect physico-chemical condition. This WFD assessment is made on the basis that realignment of or crossing of these minor drainage ditches will be carried out in accordance with the design principles set out in section 5.	Runoff from existing and proposed road network will discharge to the drainage ditches and minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to preventing deterioration to physico-chemical elements . This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	Works to minor drainage ditches/required crossings not considered to adversely affect physico-chemical condition. This WFD assessment is made on the basis that realignment of or crossing of these minor drainage ditches will be carried out in accordance with the design principles set out in section 5.	Assuming that works are managed in accordance with the assumptions set out in section 5, we expect no deterioration to physico-chemical elements of this water body. On the same basis we expect no deterioration to the ecology of local water features.		No deterioration expected at local or waterbody scale.		
	Hydro-morphological quality elements	Hydro-morphological quality elements cover: quantity and dynamics of flow, connection to groundwater, river continuity, river depth and width variation, structure and substrate of river bed, and structure of riparian zone.	Supports Good	Supports Good by 2015	At present a straightened section of a minor watercourse, of limited morphological diversity. Currently 100m culvert, with an increase in length of 40m proposed to the south. The extension of the culvert will cause an increase in length with less dynamic flow, more uniform river morphology, loss of sediment continuity and loss of riparian zone. A realignment of approximately 50m of channel will also be required upstream. There is opportunity to undertake the realignment in an environmentally sympathetic way, introducing variation in plan, cross sectional and riparian form. This WFD assessment is made on the basis that the culvert extension will be carried out in accordance with the design principles set out in section 5.	At present a straightened section of a minor watercourse of limited morphological diversity. Currently 100m culvert, with an increase in length of 30m proposed to the north. The extension of the culvert will cause an increase in length with less dynamic flow, more uniform river morphology, loss of sediment continuity and loss of riparian zone. An extensive realignment of approximately 90m of channel will be required downstream. Here there is ample opportunity to undertake the realignment in an environmentally sympathetic way, creating variation in plan, cross sectional and riparian form along a substantial length of new channel. This WFD assessment is made on the basis that this culvert extension will be carried out in accordance with the design principles set out in section 5.	Runoff from existing and proposed road network will discharge to the WFD, minor watercourses and ditches at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to hydro-morphological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	There are drainage ditches that may need to be realigned as part of the scheme. Crossings may also be required. These ditches are straightened and of minimal hydro-morphological variety (though survey is needed to confirm this assumption). Risk of loss / disturbance damage to local morphological variety, substrate and riparian zone. This WFD assessment is made on the basis that realignment of or crossing of these drainage ditches will be carried out in accordance with the design principles set out in section 5.	Assuming that works are managed in accordance with the assumptions set out in section 5, we expect no deterioration to hydro-morphological elements at a water body scale. However, extensions of culverts on this scale may lead to deterioration in local morphology and habitats if appropriate local mitigation cannot be identified.	Measures to reduce potential deterioration of local habitats need to be investigated and considered for incorporation into the final design.	No deterioration at waterbody scale. Residual effect on local habitat dependent of viable opportunities for local mitigations.		
	Specific pollutants	**Screened out of assessment**											
CHEMICAL STATUS		**Screened out of assessment**											

Test B Potential to prevent future attainment of Good Ecological Status

	RBMP measures to achieve objective	Where RBMP measure will happen	When RBMP measure will happen	Effect of scheme component of WFD element	Effect of scheme component of WFD element	Effect of scheme component of WFD element	Effect of scheme component of WFD element	Overall effect of scheme on proposed measure				
	No measures assigned to this waterbody listed in RBMP or supporting data sets	NA	NA	NA	NA	NA	NA	NA				
	At operational catchment scale (Mole and Rythe catchment) the following measures relevant to these works are advocated by the local Catchment Partnership (Environment Agency, 2015)											
	Develop a comprehensive strategy for tackling non-native invasive species.	catchment wide	unspecified	See text under 'overall effect'				By adoption of good practice in NNIS management and biosecurity (see section 5), the works can contribute to this objective within the geographical confines of the scheme.				
	Remove barriers that are impeding fish passage and contributing directly to the local recovery of populations of threatened priority fish species, such as brown trout, Atlantic salmon and European eel, with associated recreational and fisheries benefits.	catchment wide	unspecified	Extension of culvert under an existing carriageway therefore not causing further barrier to fish passage but extending and increasing a current barrier.	Extension of culvert under an existing carriageway therefore not causing further barrier to fish passage but extending and increasing a current barrier.	NA	Potential use of culvert may impact on fish passage and therefore would not align with fish passage objective.	Culvert extensions will not align with the objective but they will also not cause any further barriers to fish passage. However, the potential new culverts will cause an extra barrier therefore against this objective. Good practice will be applied to mitigate the effect of these structure types on the water environment (see section 5).				
	Restore natural morphology where man-made modifications exist with channel habitat creation, gravel reintroduction, tree works and back waters, allowing naturalised flow regimes and sediment transport and associated flood management benefits.	catchment wide	unspecified	See text under 'overall effect'	See text under 'overall effect'	NA	See text under 'overall effect'	By using any realignment as an opportunity to restore natural morphology the works can contribute to this objective.				

* assumes additional proposed mitigation measure implemented

Surface water body
GB106039017630
Wey (Shalford to River Thames confluence at Weybridge)

Code	14.11	14.12
Scheme component	Drainage of road runoff	Realignment and crossing of drainage ditches
Watercourse type	WFD waterbody, minor watercourses and drainage ditches	Drainage ditches
Location	Multiple, as yet unspecified, locations	Multiple locations
Description	Management of runoff from road surfaces discharging to the Wey and tributaries	Realignment of drainage ditches. Construction of culverts and other crossings over drainage ditches.

Key

- major beneficial effect
- minor / localised beneficial effect
- no effect
- minor / localised adverse effect
- adverse widespread or prolonged effect
- adverse effect on overall WFD status of waterbody

Test A Potential to cause deterioration of current WFD Ecological Status

			Current Status	Status objective	Effect of scheme component of WFD element	Effect of scheme component of WFD element	Overall effect of scheme on WFD element	Additional Proposed Mitigation Measures	Residual effect of scheme on WFD element*	Effect of scheme on ecological / chemical status	Overall effect of scheme on water body status
ECOLOGICAL STATUS	Biological quality elements	Macrophytes and phytobenthos - diatoms	Moderate	Moderate by 2015	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	There are minor drainage ditches that may need to be realigned as part of the scheme. Crossings may also be required. These ditches are straightened and of minimal ecological value (though survey is needed to confirm this assumption). Risk of loss / disturbance damage to aquatic ecology, substrate and riparian zone. This WFD assessment is made on the basis that realignment of or crossing of these minor drainage ditches will be carried out in accordance with the design principles set out in section 5.	Assuming that works are managed in accordance with the assumptions set out in section 5, we expect no deterioration to ecological elements of this water body. On the same basis we expect no deterioration to the ecology of local water features.		No deterioration expected at local or waterbody scale.	No deterioration expected at local or waterbody scale.	**No deterioration expected at local or waterbody scale.**
		Macrophytes and phytobenthos - macrophytes	Moderate	Moderate by 2015	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	There are minor drainage ditches that may need to be realigned as part of the scheme. Crossings may also be required. These ditches are straightened and of minimal ecological value (though survey is needed to confirm this assumption). Risk of loss / disturbance damage to aquatic ecology, substrate and riparian zone. This WFD assessment is made on the basis that realignment of or crossing of these minor drainage ditches will be carried out in accordance with the design principles set out in section 5.					
		Macroinvertebrates	High	Good by 2015	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	There are minor drainage ditches that may need to be realigned as part of the scheme. Crossings may also be required. These ditches are straightened and of minimal ecological value (though survey is needed to confirm this assumption). Risk of loss / disturbance damage to aquatic ecology, substrate and riparian zone. This WFD assessment is made on the basis that realignment of or crossing of these minor drainage ditches will be carried out in accordance with the design principles set out in section 5.					
		Fish	Moderate	Good by 2027	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	There are minor drainage ditches that may need to be realigned as part of the scheme. Crossings may also be required. These ditches are straightened and of minimal ecological value (though survey is needed to confirm this assumption). Risk of loss / disturbance damage to aquatic ecology, substrate and riparian zone. This WFD assessment is made on the basis that realignment of or crossing of these minor drainage ditches will be carried out in accordance with the design principles set out in section 5.					
	Physico-chemical quality elements	Physico-chemical quality elements comprise Dissolved Oxygen. pH, Phosphate, Ammonia and Temperature.	Moderate	Moderate by 2015	Runoff from existing and proposed road network will discharge to the drainage ditches and minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to preventing deterioration to physico-chemical elements . This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	Works to minor drainage ditches/required crossings not considered to adversely affect physico-chemical condition. This WFD assessment is made on the basis that realignment of or crossing of these minor drainage ditches will be carried out in accordance with the design principles set out in section 5.	Assuming that works are managed in accordance with the assumptions set out in section 5, we expect no deterioration to physico-chemical elements of this water body. On the same basis we expect no deterioration to the ecology of local water features.		No deterioration expected at local or waterbody scale.		
	Hydro-morphological quality elements	Hydro-morphological quality elements cover: quantity and dynamics of flow, connection to groundwater, river continuity, river depth and width variation, structure and substrate of river bed, and structure of riparian zone.	Supports Good	Supports Good by 2015	Runoff from existing and proposed road network will discharge to the WFD, minor watercourses and ditches at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to hydro-morphological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	There are drainage ditches that may need to be realigned as part of the scheme. Crossings may also be required. These ditches are straightened and of minimal hydro-morphological variety (though survey is needed to confirm this assumption). Risk of loss / disturbance damage to local morphological variety, substrate and riparian zone. This WFD assessment is made on the basis that realignment of or crossing of these drainage ditches will be carried out in accordance with the design principles set out in section 5.	Assuming that works are managed in accordance with the assumptions set out in section 5, we expect no deterioration to hydro-morphological elements of this water body. On the same basis we expect no deterioration to the hydro-morphology of local water features.		No deterioration expected at local or waterbody scale.		
	Specific pollutants	**Screened out of assessment**									
CHEMICAL STATUS		**Screened out of assessment**									

Test B Potential to prevent future attainment of Good Ecological Status

	RBMP measures to achieve objective	**Where RBMP measure will happen**	**When RBMP measure will happen**	**Effect of scheme component of WFD element**	**Effect of scheme component of WFD element**	**Overall effect of scheme on proposed measure**				
	No measures assigned to this waterbody listed in RBMP or supporting data sets	NA	NA	NA	NA	NA				
	At operational catchment scale (Wey catchment) the following measures relevant to these works are advocated by the local Catchment Partnership (Environment Agency, 2015)									

	Wey Diffuse Advice Project throughout the catchment. This would greatly extend a proven mechanism of reducing the impacts of rural and urban diffuse pollution, thus helping resolve catchment-wide problems with high levels of pesticides, phosphates and sediments impacting on river life and public drinking water abstractions.	catchment wide	unspecified	See text under 'overall effect'		By adopting good practice in road runoff management (see section 5), the works can extend the reduction of impacts of diffuse pollution from the roads. Therefore aligning with this scheme.				
	Fish passage mitigation projects on all key identified migratory barriers throughout the catchment, contributing directly to the local recovery of populations of threatened priority fish species, such as brown trout, Atlantic salmon and European eel, with associated recreational and fisheries provisioning benefits.	catchment wide	unspecified		See text under 'overall effect'	The potential use of culverts may impact on fish passage and therefore would not align with the fish passage objective.				
	A Strategy has been developed to tackle Himalayan Balsam in the catchment targeting high risk areas and to containment points. Project officer time for the development of strategies for other NNIS such as floating pennywort, azolla and mink is needed	catchment wide	unspecified	See text under 'overall effect'	See text under 'overall effect'	By adoption of good practice in NNIS management and biosecurity (see section 5), the works can contribute to this objective within the geographical confines of the scheme.				

* assumes additional proposed mitigation measure implemented

Groundwater body
GB40602G601400
Chobham Bagshot Beds

Code	14.21	14.22
Scheme component	Drainage of road runoff to groundwater	Road & river crossings
Watercourse type	WFD water body	WFD water body
Location	Multiple, as yet unspecified locations	Multiple, as yet unspecified locations
Description	Drainage of potentially contaminated surface water runoff to groundwater	Deep foundation protruding into aquifer

Key

- major beneficial effect
- minor / localised beneficial effect
- no effect
- minor / localised adverse effect
- adverse widespread or prolonged effect
- adverse effect on overall WFD status of waterbody

Test A Potential to cause deterioration of current WFD Ecological Status

		Current Status	Status objective	Effect of scheme component of WFD element	Effect of scheme component of WFD element	Overall effect of scheme on WFD element	Additional Proposed Mitigation Measures	Residual effect of scheme on WFD element*	Effect of scheme on ecological / chemical status	Overall effect of scheme on water body status
QUANTITATIVE IMPACTS	Quantitative impacts cover: saline or other intrusions of poor quality water due to groundwater abstraction, the impact on the ecological status of surface water bodies, the impact on the condition of groundwater dependent terrestrial ecosystems, and the impact on the groundwater body water balance.	Good	Good by 2015	No impacts identified as a result of scheme element.	Deep foundations may form a barrier to groundwater flow, potentially reducing groundwater contributions to adjacent water courses and any groundwater abstractions in the water body.	Assuming that works are managed in accordance with the assumptions set out in section 5, we expect no deterioration of the quantitative elements of this groundwater body. However, introduction of deep foundations may lead to deterioration in local habitats if appropriate local mitigation cannot be identified.	Measures to reduce potential deterioration of local habitats need to be investigated and considered for incorporation into the final design.	No deterioration at waterbody scale. Residual effect on local habitat dependent on viable opportunities for local mitigations.	No deterioration at waterbody scale anticipated.	No deterioration at waterbody scale anticipated.
CHEMICAL IMPACTS	Chemical impacts cover: pollution concentrations, quality impact on groundwater abstractions, impact on the chemical & ecological status of surface water bodies, nutrient concentration impact on GWDTEs, Drinking Water Protected Areas and a General quality assessment.	Good	Good by 2015	Groundwater body is at outcrop at the scheme location, with no low permeability superficial deposits protecting the groundwater body. Potential for increased surface runoff from scheme to cause deterioration to water quality of groundwater body if runoff is contaminated. Potential secondary effects to groundwater dependant surface water bodies. This WFD assessment is made on the basis that management of road runoff will be carried out in accordance with the design principles set out in section 5 and therefore risks to groundwater quality will be reduced.	Deep foundations may create rapid vertical flow pathways into the groundwater body for potentially contaminated runoff. Assuming design & construction is to industry standards, this risk to the groundwater body should be mitigated.	Assuming that works are managed in accordance with the assumptions set out in section 5, we expect no chemical impacts to this groundwater body from this scheme. However, deterioration to local habitats are potentially possible.	Measures to reduce potential deterioration of local habitats need to be investigated and considered for incorporation into the final design.	No deterioration at waterbody scale. Residual effect on local habitat dependent on viable opportunities for local mitigations.		

Test B Potential to prevent future attainment of Good Ecological Status

	RBMP measures to achieve objective	Where RBMP measure will happen	When RBMP measure will happen	Effect of scheme component of WFD element	Effect of scheme component of WFD element	Overall effect of scheme on WFD element	Additional Proposed Mitigation Measures	Residual effect of scheme on WFD element*	Effect of scheme on ecological / chemical status	Overall effect of scheme on water body status
	No measures were found for this Ground Waterbody. The data catchment explorer, the South East RBMP (Environment Agency, 2015) and the River Wey Catchment vision (2014) were all referenced as with the surface water measures.									

Test C Potential to prevent attainment of Protected Area Objectives

Addressed elsewhere in Environmental Scoping Report

* assumes additional proposed mitigation measure implemented

Surface water body	
GB106039017621	
Mole (Horley to Hersham)	

Code	P2.01
Scheme component	Drainage of road runoff
Watercourse type	WFD waterbody, minor watercourses and drainage ditches
Location	Multiple, as yet unspecified, locations
Description	Management of runoff from road surfaces discharging to the Mole and tributaries

Key

- major beneficial effect
- minor / localised beneficial effect
- no effect
- minor / localised adverse effect
- adverse widespread or prolonged effect
- adverse effect on overall WFD status of waterbody

Test A Potential to cause deterioration of current WFD Ecological Status

			Current Status	Status objective	Effect of scheme component of WFD element	Overall effect of scheme on WFD element	Additional Proposed Mitigation Measures	Residual effect of scheme on WFD element*	Effect of scheme on ecological / chemical status	Overall effect of scheme on water body status
ECOLOGICAL STATUS	Biological quality elements	Macrophytes and phytobenthos - diatoms	Moderate	Moderate by 2015	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	Assuming that works are managed in accordance with the assumptions set out in section 5, we expect no deterioration to ecological elements of this water body. On the same basis we expect no deterioration to the ecology of local water features.		No deterioration expected at local or waterbody scale.	No deterioration expected at local or waterbody scale.	**No deterioration expected at local or waterbody scale.**
		Macrophytes and phytobenthos - macrophytes	Moderate	Moderate by 2015	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.					
		Macroinvertebrates	Moderate	Moderate by 2021	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.					
		Fish	Good	Good by 2015	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.					
	Physico-chemical quality elements	Physico-chemical quality elements comprise Dissolved Oxygen. pH, Phosphate, Ammonia and Temperature.	Moderate	Moderate by 2015	Runoff from existing and proposed road network will discharge to the drainage ditches and minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to preventing deterioration to physico-chemical elements . This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	Assuming that works are managed in accordance with the assumptions set out in section 5, we expect no deterioration to physico-chemical elements of this water body. On the same basis we expect no deterioration to the ecology of local water features.		No deterioration expected at local or waterbody scale.		
	Hydro-morphological quality elements	Hydro-morphological quality elements cover: quantity and dynamics of flow, connection to groundwater, river continuity, river depth and width variation, structure and substrate of river bed, and structure of riparian zone.	Supports Good	Supports Good by 2015	Runoff from existing and proposed road network will discharge to the WFD, minor watercourses and ditches at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to hydro-morphological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	Assuming that works are managed in accordance with the principles set out in section 5, we expect no deterioration to hydro-morphological elements at the water body scale. On the same basis we expect no deterioration to the hydro-morphology of local water features.		No deterioration expected at local or waterbody scale.		
	Specific pollutants	**Screened out of assessment**								
CHEMICAL STATUS		**Screened out of assessment**								

Test B Potential to prevent future attainment of Good Ecological Status

	RBMP measures to achieve objective	Where RBMP measure will happen	When RBMP measure will happen	Effect of scheme component of WFD element	Overall effect of scheme on proposed measure				
	No measures assigned to this waterbody listed in RBMP or supporting data sets	NA	NA	NA	NA				
	At operational catchment scale (Mole and Rythe catchment) the following measures relevant to these works are advocated by the local Catchment Partnership (Environment Agency, 2015)								
	Develop a comprehensive strategy for tackling non-native invasive species.	catchment wide	unspecified	See text under 'overall effect'	By adoption of good practice in NNIS management and biosecurity (see section 5), the works can contribute to this objective within the geographical confines of the scheme.				
	Remove barriers that are impeding fish passage and contributing directly to the local recovery of populations of threatened priority fish species, such as brown trout, Atlantic salmon and European eel, with associated recreational and fisheries benefits.	catchment wide	unspecified	NA	NA				
	Restore natural morphology where man-made modifications exist with channel habitat creation, gravel reintroduction, tree works and back waters, allowing naturalised flow regimes and sediment transport and associated flood management benefits.	catchment wide	unspecified	NA	NA				

* assumes additional proposed mitigation measure implemented

Contains *sensitive* information

Groundwater body
GB40602G601400
Chobham Bagshot Beds

Code	P2.11
Scheme component	Drainage of road runoff to groundwater
Watercourse type	WFD water body
Location	Multiple, as yet unspecified locations
Description	Drainage of potentially contaminated surface water runoff to groundwater

Key

- major beneficial effect
- minor / localised beneficial effect
- no effect
- minor / localised adverse effect
- adverse widespread or prolonged effect
- adverse effect on overall WFD status of waterbody

Test A Potential to cause deterioration of current WFD Ecological Status

		Current Status	Status objective	Effect of scheme component of WFD element	Overall effect of scheme on WFD element	Additional Proposed Mitigation Measures	Residual effect of scheme on WFD element*	Effect of scheme on ecological / chemical status	Overall effect of scheme on water body status
QUANTITATIVE IMPACTS	Quantitative impacts cover: Saline or other intrusions of poor quality water due to groundwater abstraction, the impact on the ecological status of surface water bodies, the impact on the condition of groundwater dependent terrestrial ecosystems, and the impact on the groundwater body water balance.	Good	Good by 2015	No impacts identified as a result of scheme element.	We expect no deterioration of the quantitative elements of this groundwater body.	Measures to reduce potential deterioration of local habitats need to be investigated and considered for incorporation into the final design.	No deterioration at waterbody scale.	No deterioration expected at local or waterbody scale.	No deterioration expected at local or waterbody scale.
CHEMICAL IMPACTS	Chemical impacts cover: pollution concentrations, quality impact on groundwater abstractions, impact on the chemical & ecological status of surface water bodies, nutrient concentration impact on GWDTEs, Drinking Water Protected Areas and a General quality assessment.	Good	Good by 2015	Groundwater body is an outcrop at the scheme location, with no low permeability superficial deposits protecting the groundwater body. Potential for increased surface runoff from scheme to cause deterioration to water quality of groundwater body if runoff is contaminated. Potential secondary effects to groundwater dependant surface water bodies. This WFD assessment is made on the basis that management of road runoff will be carried out in accordance with the design principles set out in section 5 and therefore risks to groundwater quality will be reduced.	Assuming that works are managed in accordance with the assumptions set out in section 5, we expect no chemical impacts to this groundwater body from this scheme. However, deterioration to local habitats are potentially possible.	Measures to reduce potential deterioration of local habitats need to be investigated and considered for incorporation into the final design.	No deterioration at waterbody scale. Residual effect on local habitat dependent on viable opportunities for local mitigations.		

Test B Potential to prevent future attainment of Good Ecological Status

	RBMP measures to achieve objective	Where RBMP measure will happen	When RBMP measure will happen	Effect of scheme component of WFD element	Overall effect of scheme on WFD element	Additional Proposed Mitigation Measures	Residual effect of scheme on WFD element*	Effect of scheme on ecological / chemical status	Overall effect of scheme on water body status
	No measures were found for this Ground Waterbody. The data catchment explorer, the South East RBMP (Environment Agency, 2015) and the River Wey Catchment vision (2014) were all referenced as with the surface water measures.								

Test C Potential to prevent attainment of Protected Area Objectives

Addressed elsewhere in Environmental Scoping Report

* assumes additional proposed mitigation measure implemented

Surface water body	
GB106039017621	
Mole (Horley to Hersham)	

Code	P4.01
Scheme component	Drainage of road runoff
Watercourse type	WFD waterbody, minor watercourses and drainage ditches
Location	Multiple, as yet unspecified, locations
Description	Management of runoff from road surfaces discharging to the Mole and tributaries

Key

- major beneficial effect
- minor / localised beneficial effect
- no effect
- minor / localised adverse effect
- adverse widespread or prolonged effect
- adverse effect on overall WFD status of waterbody

Test A Potential to cause deterioration of current WFD Ecological Status

		Current Status	**Status objective**	**Effect of scheme component of WFD element**	**Overall effect of scheme on WFD element**	**Additional Proposed Mitigation Measures**	**Residual effect of scheme on WFD element***	**Effect of scheme on ecological / chemical status**	**Overall effect of scheme on water body status**
ECOLOGICAL STATUS	Biological quality elements	Macrophytes and phytobenthos - diatoms	Moderate	Moderate by 2015	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	Assuming that works are managed in accordance with the assumptions set out in section 5, we expect no deterioration to ecological elements of this water body. On the same basis we expect no deterioration to the ecology of local water features.		No deterioration expected at local or waterbody scale.	No deterioration expected at local or waterbody scale.	**No deterioration expected at local or waterbody scale.**
		Macrophytes and phytobenthos - macrophytes	Moderate	Moderate by 2015	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.					
		Macroinvertebrates	Moderate	Moderate by 2021	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.					
		Fish	Good	Good by 2015	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.					
	Physico-chemical quality elements	Physico-chemical quality elements comprise Dissolved Oxygen. pH, Phosphate, Ammonia and Temperature.	Moderate	Moderate by 2015	Runoff from existing and proposed road network will discharge to the drainage ditches and minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to preventing deterioration to physico-chemical elements . This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	Assuming that works are managed in accordance with the assumptions set out in section 5, we expect no deterioration to physico-chemical elements of this water body. On the same basis we expect no deterioration to the ecology of local water features.		No deterioration expected at local or waterbody scale.		

	Hydro-morphological quality elements	Hydro-morphological quality elements cover: quantity and dynamics of flow, connection to groundwater, river continuity, river depth and width variation, structure and substrate of river bed, and structure of riparian zone.	Supports Good	Supports Good by 2015	Runoff from existing and proposed road network will discharge to the WFD, minor watercourses and ditches at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to hydro-morphological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	Assuming that works are managed in accordance with the principles set out in section 5, we expect no deterioration to hydro-morphological elements at the water body scale. On the same basis we expect no deterioration to the hydro-morphology of local water features.		No deterioration expected at local or waterbody scale.		
	Specific pollutants	**Screened out of assessment**								
CHEMICAL STATUS		**Screened out of assessment**								

Test B Potential to prevent future attainment of Good Ecological Status

	RBMP measures to achieve objective	Where RBMP measure will happen	When RBMP measure will happen	Effect of scheme component of WFD element	Overall effect of scheme on proposed measure				
	No measures assigned to this waterbody listed in RBMP or supporting data sets	NA	NA	NA	NA				
	At operational catchment scale (Mole and Rythe catchment) the following measures relevant to these works are advocated by the local Catchment Partnership (Environment Agency, 2015)								
	Develop a comprehensive strategy for tackling non-native invasive species.	catchment wide	unspecified	See text under 'overall effect'	By adoption of good practice in NNIS management and biosecurity (see section 5), the works can contribute to this objective within the geographical confines of the scheme.				
	Remove barriers that are impeding fish passage and contributing directly to the local recovery of populations of threatened priority fish species, such as brown trout, Atlantic salmon and European eel, with associated recreational and fisheries benefits.	catchment wide	unspecified	NA	NA				
	Restore natural morphology where man-made modifications exist with channel habitat creation, gravel reintroduction, tree works and back waters, allowing naturalised flow regimes and sediment transport and associated flood management benefits.	catchment wide	unspecified	NA	NA				

* assumes additional proposed mitigation measure implemented

Surface water body
GB106039017630
Wey (Shalford to River Thames confluence at Weybridge)

Code	P4.11
Scheme component	Drainage of road runoff
Watercourse type	WFD waterbody, minor watercourses and drainage ditches
Location	Multiple, as yet unspecified, locations
Description	Management of runoff from road surfaces discharging to the Wey and tributaries

Key

- major beneficial effect
- minor / localised beneficial effect
- no effect
- minor / localised adverse effect
- adverse widespread or prolonged effect
- adverse effect on overall WFD status of waterbody

Test A Potential to cause deterioration of current WFD Ecological Status

			Current Status	Status objective	Effect of scheme component of WFD element	Overall effect of scheme on WFD element	Additional Proposed Mitigation Measures	Residual effect of scheme on WFD element*	Effect of scheme on ecological / chemical status	Overall effect of scheme on water body status
ECOLOGICAL STATUS	Biological quality elements	Macrophytes and phytobenthos - diatoms	Moderate	Moderate by 2015	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	Assuming that works are managed in accordance with the assumptions set out in section 5, we expect no deterioration to ecological elements of this water body. On the same basis we expect no deterioration to the ecology of local water features.		No deterioration expected at local or waterbody scale.	No deterioration expected at local or waterbody scale.	**No deterioration expected at local or waterbody scale.**
		Macrophytes and phytobenthos - macrophytes	Moderate	Moderate by 2015	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.					
		Macroinvertebrates	High	Good by 2015	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.					
		Fish	Moderate	Good by 2027	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.					
	Physico-chemical quality elements	Physico-chemical quality elements comprise Dissolved Oxygen. pH, Phosphate, Ammonia and Temperature.	Moderate	Moderate by 2015	Runoff from existing and proposed road network will discharge to the drainage ditches and minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to preventing deterioration to physico-chemical elements . This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	Assuming that works are managed in accordance with the assumptions set out in section 5, we expect no deterioration to physico-chemical elements of this water body. On the same basis we expect no deterioration to the ecology of local water features.		No deterioration expected at local or waterbody scale.		

	Hydro-morphological quality elements	Hydro-morphological quality elements cover: quantity and dynamics of flow, connection to groundwater, river continuity, river depth and width variation, structure and substrate of river bed, and structure of riparian zone.	Supports Good	Supports Good by 2015	Runoff from existing and proposed road network will discharge to the WFD, minor watercourses and ditches at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to hydro-morphological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	Assuming that works are managed in accordance with the principles set out in section 5, we expect no deterioration to hydro-morphological elements at the water body scale. On the same basis we expect no deterioration to the hydro-morphology of local water features.		No deterioration expected at local or waterbody scale.		
	Specific pollutants	**Screened out of assessment**								
CHEMICAL STATUS		**Screened out of assessment**								

Test B Potential to prevent future attainment of Good Ecological Status

	RBMP measures to achieve objective	Where RBMP measure will happen	When RBMP measure will happen	Effect of scheme component of WFD element	Overall effect of scheme on proposed measure				
	No measures assigned to this waterbody listed in RBMP or supporting data sets	NA	NA	NA	NA				
	At operational catchment scale (Wey catchment) the following measures relevant to these works are advocated by the local Catchment Partnership (Environment Agency, 2015)								
	Wey Diffuse Advice Project throughout the catchment. This would greatly extend a proven mechanism of reducing the impacts of rural and urban diffuse pollution, thus helping resolve catchment-wide problems with high levels of pesticides, phosphates and sediments impacting on river life and public drinking water abstractions.	catchment wide	unspecified	See text under 'overall effect'	By adopting good practice in road runoff management (see section 5), the works can extend the reduction of impacts of diffuse pollution from the roads. Therefore aligning with this scheme.				
	Fish passage mitigation projects on all key identified migratory barriers throughout the catchment, contributing directly to the local recovery of populations of threatened priority fish species, such as brown trout, Atlantic salmon and European eel, with associated recreational and fisheries provisioning benefits.	catchment wide	unspecified	NA	NA				
	A Strategy has been developed to tackle Himalayan Balsam in the catchment targeting high risk areas and to containment points. Project officer time for the development of strategies for other NNIS such as floating pennywort, azolla and mink is needed	catchment wide	unspecified	See text under 'overall effect'	By adoption of good practice in NNIS management and biosecurity (see section 5), the works can contribute to this objective within the geographical confines of the scheme.				

* assumes additional proposed mitigation measure implemented

Surface water body	
GB106039017621	
Mole (Horley to Hersham)	

Code	P10.01
Scheme component	Drainage of road runoff
Watercourse type	WFD waterbody, minor watercourses and drainage ditches
Location	Multiple, as yet unspecified, locations
Description	Management of runoff from road surfaces discharging to the Mole and tributaries

Key

- major beneficial effect
- minor / localised beneficial effect
- no effect
- minor / localised adverse effect
- adverse widespread or prolonged effect
- adverse effect on overall WFD status of waterbody

Test A Potential to cause deterioration of current WFD Ecological Status

			Current Status	Status objective	Effect of scheme component of WFD element	Overall effect of scheme on WFD element	Additional Proposed Mitigation Measures	Residual effect of scheme on WFD element*	Effect of scheme on ecological / chemical status	Overall effect of scheme on water body status
ECOLOGICAL STATUS	Biological quality elements	Macrophytes and phytobenthos - diatoms	Moderate	Moderate by 2015	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	Assuming that works are managed in accordance with the assumptions set out in section 5, we expect no deterioration to the ecological aspects of the waterbody.		No deterioration at local or waterbody scale expected.	No deterioration at waterbody scale anticipated.	**No deterioration at waterbody scale anticipated.**
		Macrophytes and phytobenthos - macrophytes	Moderate	Moderate by 2015	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.					
		Macroinvertebrates	Moderate	Moderate by 2021	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.					
		Fish	Good	Good by 2015	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.					
	Physico-chemical quality elements	Physico-chemical quality elements comprise Dissolved Oxygen. pH, Phosphate, Ammonia and Temperature.	Moderate	Moderate by 2015	Runoff from existing and proposed road network will discharge to the drainage ditches and minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to preventing deterioration to physico-chemical elements . This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	Assuming that works are managed in accordance with the assumptions set out in section 5, we expect no deterioration to physico-chemical elements of this water body. On the same basis we expect no deterioration to the ecology of local water features.		No deterioration expected at local or waterbody scale.		

	Hydro-morphological quality elements	Hydro-morphological quality elements cover: quantity and dynamics of flow, connection to groundwater, river continuity, river depth and width variation, structure and substrate of river bed, and structure of riparian zone.	Supports Good	Supports Good by 2015	Runoff from existing and proposed road network will discharge to the WFD and minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to hydro-morphological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	Assumng that works are managed in accordance with the assumptions set out in section 5, no deterioration to hydro-morphological elements at the water body scale are expected.		No deterioration at local or waterbody scale expected.		
	Specific pollutants	**Screened out of assessment**									
CHEMICAL STATUS		**Screened out of assessment**									

Test B Potential to prevent future attainment of Good Ecological Status

	RBMP measures to achieve objective	Where RBMP measure will happen	When RBMP measure will happen	Effect of scheme component of WFD element	Overall effect of scheme on proposed measure				
	No measures assigned to this waterbody listed in RBMP or supporting data sets	NA	NA	NA	NA				
	At operational catchment scale (Mole and Rythe catchment) the following measures relevant to these works are advocated by the local Catchment Partnership (Environment Agency, 2015)								
	Develop a comprehensive strategy for tackling non-native invasive species.	catchment wide	unspecified	See text under "overall effect"	By adoption of good practice in NNIS management and biosecurity (see section 5), the works can contribute to this objective within the geographical confines of the scheme.				
	Remove barriers that are impeding fish passage and contributing directly to the local recovery of populations of threatened priority fish species, such as brown trout, Atlantic salmon and European eel, with associated recreational and fisheries benefits.	catchment wide	unspecified	NA	NA				
	Restore natural morphology where man-made modifications exist with channel habitat creation, gravel reintroduction, tree works and back waters, allowing naturalised flow regimes and sediment transport and associated flood management benefits.	catchment wide	unspecified	NA	NA				

* assumes additional proposed mitigation measure implemented

Groundwater body
GB40602G601400
Chobham Bagshot Beds

Code	P10.11	P10.12
Scheme component	Drainage of road runoff to groundwater	Road & river crossings
Watercourse type	WFD water body	WFD water body
Location	Multiple, as yet unspecified locations	Multiple, as yet unspecified locations
Description	Drainage of potentially contaminated surface water runoff to groundwater	Deep foundation protruding into aquifer

Key

- major beneficial effect
- minor / localised beneficial effect
- no effect
- minor / localised adverse effect
- adverse widespread or prolonged effect
- adverse effect on overall WFD status of waterbody

Test A Potential to cause deterioration of current WFD Ecological Status

		Current Status	Status objective	Effect of scheme component of WFD element	Effect of scheme component of WFD element	Overall effect of scheme on WFD element	Additional Proposed Mitigation Measures	Residual effect of scheme on WFD element*	Effect of scheme on ecological / chemical status	Overall effect of scheme on water body status
QUANTITATIVE IMPACTS	Quantitative impacts cover: Saline or other intrusions of poor quality water due to groundwater abstraction, the impact on the ecological status of surface water bodies, the impact on the condition of groundwater dependent terrestrial ecosystems, and the impact on the groundwater body water balance.	Good	Good by 2015	No impacts identified as a result of scheme element.	Deep foundations may form a barrier to groundwater flow, potentially reducing groundwater contributions to adjacent water courses and any groundwater abstractions in the water body.	Assuming that works are managed in accordance with the assumptions set out in section 5, we expect no deterioration of the quantitative elements of this groundwater body. However, introduction of deep foundations may lead to deterioration in local habitats if appropriate local mitigation cannot be identified.	Measures to reduce potential deterioration of local habitats need to be investigated and considered for incorporation into the final design.	No deterioration at waterbody scale. Residual effect on local habitat dependent on viable opportunities for local mitigations.	No deterioration at waterbody scale anticipated.	No deterioration at waterbody scale anticipated.
CHEMICAL IMPACTS	Chemical impacts cover: pollution concentrations, quality impact on groundwater abstractions, impact on the chemical & ecological status of surface water bodies, nutrient concentration impact on GWDTEs, Drinking Water Protected Areas and a General quality assessment.	Good	Good by 2015	Groundwater body is at outcrop at the scheme location, with no low permeability superficial deposits protecting the groundwater body. Potential for increased surface runoff from scheme to cause deterioration to water quality of groundwater body if runoff is contaminated. Potential secondary effects to groundwater dependant surface water bodies. This WFD assessment is made on the basis that management of road runoff will be carried out in accordance with the design principles set out in section 5 and therefore risks to groundwater quality will be reduced.	Deep foundations may create rapid vertical flow pathways into the groundwater body for potentially contaminated runoff. Assuming design & construction is to industry standards, this risk to the groundwater body should be mitigated.	Assuming that works are managed in accordance with the assumptions set out in section 5, we expect no chemical impacts to this groundwater body from this scheme. However, deterioration to local habitats are potentially possible.	Measures to reduce potential deterioration of local habitats need to be investigated and considered for incorporation into the final design.	No deterioration at waterbody scale. Residual effect on local habitat dependent on viable opportunities for local mitigations.		

Test B Potential to prevent future attainment of Good Ecological Status

	RBMP measures to achieve objective	Where RBMP measure will happen	When RBMP measure will happen	Effect of scheme component of WFD element	Effect of scheme component of WFD element	Overall effect of scheme on WFD element	Additional Proposed Mitigation Measures	Residual effect of scheme on WFD element*	Effect of scheme on ecological / chemical status	Overall effect of scheme on water body status
	No measures were found for this Ground Waterbody. The data catchment explorer, the South East RBMP (Environment Agency, 2015) and the River Wey Catchment vision (2014) were all referenced as with the surface water measures.									

Test C Potential to prevent attainment of Protected Area Objectives

Addressed elsewhere in Environmental Scoping Report

* assumes additional proposed mitigation measure implemented

Surface water body	
GB106039017621	
Mole (Horley to Hersham)	

Code	S2.01
Scheme component	Drainage of road runoff
Watercourse type	WFD waterbody, minor watercourses and drainage ditches
Location	Multiple, as yet unspecified, locations
Description	Management of runoff from road surfaces discharging to the Mole and tributaries

Key

- major beneficial effect
- minor / localised beneficial effect
- no effect
- minor / localised adverse effect
- adverse widespread or prolonged effect
- adverse effect on overall WFD status of waterbody

Test A Potential to cause deterioration of current WFD Ecological Status

			Current Status	Status objective	Effect of scheme component of WFD element	Overall effect of scheme on WFD element	Additional Proposed Mitigation Measures	Residual effect of scheme on WFD element*	Effect of scheme on ecological / chemical status	Overall effect of scheme on water body status
ECOLOGICAL STATUS	Biological quality elements	Macrophytes and phytobenthos - diatoms	Moderate	Moderate by 2015	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	Assuming that works are managed in accordance with the principles set out in section 5, we expect no deterioration to ecological elements of this water body. On the same basis we expect no deterioration to the ecology of local water features.		No deterioration at waterbody or local scale.	No deterioration at waterbody or local scale.	No deterioration at waterbody or local scale.
		Macrophytes and phytobenthos - macrophytes	Moderate	Moderate by 2015	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.					
		Macroinvertebrates	Moderate	Moderate by 2021	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.					
		Fish	Good	Good by 2015	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.					
	Physico-chemical quality elements	Physico-chemical quality elements comprise Dissolved Oxygen. pH, Phosphate, Ammonia and Temperature.	Moderate	Moderate by 2015	Runoff from existing and proposed road network will discharge to the drainage ditches and minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to preventing deterioration to physico-chemical elements . This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	Assuming that works are managed in accordance with the assumptions set out in section 5, we expect no deterioration to physico-chemical elements of this water body. On the same basis we expect no deterioration to the ecology of local water features.		No deterioration at waterbody or local scale.		

	Hydro-morphological quality elements	Hydro-morphological quality elements cover: quantity and dynamics of flow, connection to groundwater, river continuity, river depth and width variation, structure and substrate of river bed, and structure of riparian zone.	Supports Good	Supports Good by 2015	Runoff from existing and proposed road network will discharge to the WFD, minor watercourses and ditches at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to hydro-morphological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	Assuming that works are managed in accordance with the principles set out in section 5, we expect no deterioration to hydro-morphological elements at the water body scale. On the same basis we expect no deterioration to the hydro-morphology of local water features.		No deterioration expected at local or waterbody scale.		
	Specific pollutants	**Screened out of assessment**								
CHEMICAL STATUS		**Screened out of assessment**								

Test B Potential to prevent future attainment of Good Ecological Status

	RBMP measures to achieve objective	Where RBMP measure will happen	When RBMP measure will happen	Effect of scheme component of WFD element	Overall effect of scheme on proposed measure				
	No measures assigned to this waterbody listed in RBMP or supporting data sets	NA	NA	NA	NA				
	At operational catchment scale (Mole and Rythe catchment) the following measures relevant to these works are advocated by the local Catchment Partnership (Environment Agency, 2015)								
	Develop a comprehensive strategy for tackling non-native invasive species.	catchment wide	unspecified	See text under 'overall effect'	By adoption of good practice in NNIS management and biosecurity (see section 5), the works can contribute to this objective within the geographical confines of the scheme.				
	Remove barriers that are impeding fish passage and contributing directly to the local recovery of populations of threatened priority fish species, such as brown trout, Atlantic salmon and European eel, with associated recreational and fisheries benefits.	catchment wide	unspecified	NA	NA				
	Restore natural morphology where man-made modifications exist with channel habitat creation, gravel reintroduction, tree works and back waters, allowing naturalised flow regimes and sediment transport and associated flood management benefits.	catchment wide	unspecified	NA	NA				

* assumes additional proposed mitigation measure implemented

Groundwater body
GB40602G601400
Chobham Bagshot Beds

Code	S2.11
Scheme component	Drainage of road runoff to groundwater
Watercourse type	WFD water body
Location	Multiple, as yet unspecified locations
Description	Drainage of potentially contaminated surface water runoff to groundwater

Key

- major beneficial effect
- minor / localised beneficial effect
- no effect
- minor / localised adverse effect
- adverse widespread or prolonged effect
- adverse effect on overall WFD status of waterbody

Test A Potential to cause deterioration of current WFD Ecological Status

	Current Status	Status objective	Effect of scheme component of WFD element	Overall effect of scheme on WFD element	Additional Proposed Mitigation Measures	Residual effect of scheme on WFD element*	Effect of scheme on ecological / chemical status	Overall effect of scheme on water body status
QUANTITATIVE IMPACTS	Quantitative impacts cover: Saline or other intrusions of poor quality water due to groundwater abstraction, the impact on the ecological status of surface water bodies, the impact on the condition of groundwater dependent terrestrial ecosystems, and the impact on the groundwater body water balance.	Good	Good by 2015	No impacts identified as a result of scheme element.	We expect no deterioration of the quantitative elements of this groundwater body.	Measures to reduce potential deterioration of local habitats need to be investigated and considered for incorporation into the final design.	No deterioration at waterbody scale.	No deterioration at waterbody or local scale.	No deterioration at waterbody or local scale.
CHEMICAL IMPACTS	Chemical impacts cover: pollution concentrations, quality impact on groundwater abstractions, impact on the chemical & ecological status of surface water bodies, nutrient concentration impact on GWDTEs, Drinking Water Protected Areas and a General quality assessment.	Good	Good by 2015	Groundwater body is an outcrop at the scheme location, with no low permeability superficial deposits protecting the groundwater body. Potential for increased surface runoff from scheme to cause deterioration to water quality of groundwater body if runoff is contaminated. Potential secondary effects to groundwater dependant surface water bodies. This WFD assessment is made on the basis that management of road runoff will be carried out in accordance with the design principles set out in section 5 and therefore risks to groundwater quality will be reduced.	Assuming that works are managed in accordance with the assumptions set out in section 5, we expect no chemical impacts to this groundwater body from this scheme. However, deterioration to local habitats are potentially possible.	Measures to reduce potential deterioration of local habitats need to be investigated and considered for incorporation into the final design.	No deterioration at waterbody scale. Residual effect on local habitat dependent on viable opportunities for local mitigations.		

Test B Potential to prevent future attainment of Good Ecological Status

	RBMP measures to achieve objective	Where RBMP measure will happen	When RBMP measure will happen	Effect of scheme component of WFD element	Overall effect of scheme on WFD element	Additional Proposed Mitigation Measures	Residual effect of scheme on WFD element*	Effect of scheme on ecological / chemical status	Overall effect of scheme on water body status
	No measures were found for this Ground Waterbody. The data catchment explorer, the South East RBMP (Environment Agency, 2015) and the River Wey Catchment vision (2014) were all referenced as with the surface water measures.								

Test C Potential to prevent attainment of Protected Area Objectives

Addressed elsewhere in Environmental Scoping Report

* assumes additional proposed mitigation measure implemented

Surface water body	
GB106039017890	
Stratford Brook	

Code	W11.01	W11.02	W11.03
Scheme component	River crossing (Stratford Brook)	Drainage of road runoff	Realignment and crossing of drainage ditches
Watercourse type	WFD waterbody	WFD waterbody and minor watercourse	Drainage ditches
Location	A3 Ockham Park Junction	Multiple, as yet unspecified, locations	Multiple locations
Description	30m long culvert with upstream and downstream realignments	Management of runoff from road surfaces discharging to Stratford Brook and tributaries	Realignment of drainage ditches. Construction of culverts and other crossings over drainage ditches.

Key

- major beneficial effect
- minor / localised beneficial effect
- no effect
- minor / localised adverse effect
- adverse widespread or prolonged effect
- adverse effect on overall WFD status of waterbody

Test A Potential to cause deterioration of current WFD Ecological Status

			Current Status	Status objective	Effect of scheme component of WFD element	Effect of scheme component of WFD element	Effect of scheme component of WFD element	Overall effect of scheme on WFD element	Additional Proposed Mitigation Measures	Residual effect of scheme on WFD element*	Effect of scheme on ecological / chemical status	Overall effect of scheme on water body status
ECOLOGICAL STATUS	Biological quality elements	Macrophytes and phytobenthos - diatoms	Not assessed	Not assessed	At present a watercourse flows through a sinuous channel assumed to be of good ecological diversity (to be confirmed by survey).We assume the proposed culvert to be 30m in length with upstream and downstream realignments. The culvert is likely to cause local reduction in habitat quality for diatoms. This WFD assessment is made on the basis that this culvert extension will be carried out in accordance with the design principles set out in section 5.	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	There are minor drainage ditches that may need to be realigned as part of the scheme. Crossings may also be required. These ditches are straightened and of minimal ecological value (though survey is needed to confirm this assumption). Risk of loss / disturbance damage to aquatic ecology, substrate and riparian zone. This WFD assessment is made on the basis that realignment of or crossing of these minor drainage ditches will be carried out in accordance with the design principles set out in section 5.	Assuming that works are managed in accordance with the principles set out in section 5, we expect no deterioration to ecological elements of this water body. However, a 30m culvert will have local impacts on ecology including fish passage.	Measures to reduce potential deterioration of local habitats need to be investigated and considered for incorporation into the final design.	No deterioration at waterbody scale. Residual effect on local habitat dependent of viable opportunities for local mitigations	No deterioration at waterbody scale anticipated.	**No deterioration at waterbody scale anticipated.**
		Macrophytes and phytobenthos - macrophytes	Not assessed	Not assessed	At present a watercourse flows through a sinuous channel assumed to be of good ecological diversity (to be confirmed by survey).We assume the proposed culvert to be 30m in length with upstream and downstream realignments. The culvert is likely to cause local reduction in habitat quality for macrophytes. This WFD assessment is made on the basis that this culvert extension will be carried out in accordance with the design principles set out in section 5.	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	There are minor drainage ditches that may need to be realigned as part of the scheme. Crossings may also be required. These ditches are straightened and of minimal ecological value (though survey is needed to confirm this assumption). Risk of loss / disturbance damage to aquatic ecology, substrate and riparian zone. This WFD assessment is made on the basis that realignment of or crossing of these minor drainage ditches will be carried out in accordance with the design principles set out in section 5.					
		Macroinvertebrates	Moderate	Good by 2027	At present a watercourse flows through a sinuous channel assumed to be of good ecological diversity (to be confirmed by survey).We assume the proposed culvert to be 30m in length with upstream and downstream realignments. The culvert is likely to cause local reduction in habitat quality for macroinvertebrates. This WFD assessment is made on the basis that this culvert extension will be carried out in accordance with the design principles set out in section 5.	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	There are minor drainage ditches that may need to be realigned as part of the scheme. Crossings may also be required. These ditches are straightened and of minimal ecological value (though survey is needed to confirm this assumption). Risk of loss / disturbance damage to aquatic ecology, substrate and riparian zone. This WFD assessment is made on the basis that realignment of or crossing of these minor drainage ditches will be carried out in accordance with the design principles set out in section 5.					
		Fish	Not assessed	Not assessed	At present a watercourse flows through a sinuous channel assumed to be of good ecological diversity (to be confirmed by survey).We assume the proposed culvert to be 30m in length with upstream and downstream realignments. The culvert is likely to cause local reduction in habitat quality for fish. This WFD assessment is made on the basis that this culvert extension will be carried out in accordance with the design principles set out in section 5.	Runoff from existing and proposed road network will discharge to minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to ecological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	There are minor drainage ditches that may need to be realigned as part of the scheme. Crossings may also be required. These ditches are straightened and of minimal ecological value (though survey is needed to confirm this assumption). Risk of loss / disturbance damage to aquatic ecology, substrate and riparian zone. This WFD assessment is made on the basis that realignment of or crossing of these minor drainage ditches will be carried out in accordance with the design principles set out in section 5.					
	Physico-chemical quality elements	Physico-chemical quality elements comprise Dissolved Oxygen. pH, Phosphate, Ammonia and Temperature.	Good	Good by 2015	The culvert is not considered to adversely affect physico-chemical condition. This WFD assessment is made on the basis that realignment of or crossing of these minor drainage ditches will be carried out in accordance with the design principles set out in section 5.	Runoff from existing and proposed road network will discharge to the drainage ditches and minor watercourses at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to preventing deterioration to physico-chemical elements . This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	Works to minor drainage ditches/required crossings not considered to adversely affect physico-chemical condition. This WFD assessment is made on the basis that realignment of or crossing of these minor drainage ditches will be carried out in accordance with the design principles set out in section 5.	Assuming that works are managed in accordance with the assumptions set out in section 5, we expect no deterioration to physico-chemical elements of this water body. On the same basis we expect no deterioration to the ecology of local water features.		No deterioration expected at local or waterbody scale.		
	Hydro-morphological quality elements	Hydro-morphological quality elements cover: quantity and dynamics of flow, connection to groundwater, river continuity, river depth and width variation, structure and substrate of river bed, and structure of riparian zone.	Supports Good	Supports Good by 2015	At present a WFD watercourse flows through a sinuous channel assumed to be of good morphological diversity. The channel overlies London Clay and Alluvium, so unlikely to be in continuity with groundwater. Crossing is expected to be a culvert with potential impacts of less dynamic flow, more uniform river morphology, loss of sediment continuity and loss of riparian zone. The positioning of the culvert will result in the loss of one of the few more natural sections of planform on the waterbody. Mitigation to replicate this planform within the realignments upstream of the culvert is likely to be required. The backwater downstream of the culvert should be retained. This WFD assessment is made on the basis that this realignment / crossing will be carried out in accordance with the design principles set out in section 5.	Runoff from existing and proposed road network will discharge to the WFD, minor watercourses and ditches at multiple locations. Risk of silt and pollutant release to watercourse. Measures to minimise silt inputs to river system key to hydro-morphological health. This WFD assessment is made on the basis that industry standard measures to manage road runoff (as set out in section 5) will be implemented.	There are drainage ditches that may need to be realigned as part of the scheme. Crossings may also be required. These ditches are straightened and of minimal hydro-morphological variety (though survey is needed to confirm this assumption). Risk of loss / disturbance damage to local morphological variety, substrate and riparian zone. This WFD assessment is made on the basis that realignment of or crossing of these drainage ditches will be carried out in accordance with the design principles set out in section 5.	Assuming that works are managed in accordance with the principles set out in section 5, we expect no deterioration to hydro-morphological elements at the water body scale. However, introduction of a culvert may lead to deterioration in local habitats if appropriate local mitigation cannot be identified.	Measures to reduce potential deterioration of local habitats need to be investigated and considered for incorporation into the final design. Mitigations for loss of more natural sections of planform within the realignment should also be implemented.	No deterioration at waterbody scale. Residual effect on local habitat dependent of viable opportunities for local mitigations (particularly for loss of more natural sections of planform).		
	Specific pollutants	**Screened out of assessment**										
CHEMICAL STATUS		**Screened out of assessment**										

Test B Potential to prevent future attainment of Good Ecological Status

	RBMP measures to achieve objective	Where RBMP measure will happen	When RBMP measure will happen	Effect of scheme component of WFD element	Effect of scheme component of WFD element	Effect of scheme component of WFD element	Overall effect of scheme on proposed measure				
	No measures assigned to this waterbody listed in RBMP or supporting data sets	NA	NA	NA	NA	NA	NA				
	At operational catchment scale (Wey catchment) the following measures relevant to these works are advocated by the local Catchment Partnership (Environment Agency, 2015)										
	Wey Diffuse Advice Project throughout the catchment. This would greatly extend a proven mechanism of reducing the impacts of rural and urban diffuse pollution, thus helping resolve catchment-wide problems with high levels of pesticides, phosphates and sediments impacting on river life and public drinking water abstractions.	catchment wide	unspecified		See text under 'overall effect'		By adopting good practice in road runoff management (see section 5), the works can extend the reduction of impacts of diffuse pollution from the roads. Therefore aligning with this scheme.				
	Fish passage mitigation projects on all key identified migratory barriers throughout the catchment, contributing directly to the local recovery of populations of threatened priority fish species, such as brown trout, Atlantic salmon and	catchment wide	unspecified	Proposed use of a culvert may impact on fish passage and therefore would not align with fish passage objective.		Potential use of culvert may impact on fish passage and therefore would not align with fish passage objective.	The proposed use and potential use of culverts may impact on fish passage and therefore would not align with the fish passage objective.				

	A Strategy has been developed to tackle Himalayan Balsam in the catchment targeting high risk areas and to containment points. Project officer time for the development of strategies for other NNIS such as floating pennywort, azolla and mink is needed	catchment wide	unspecified	See text under 'overall effect'	By adoption of good practice in NNIS management and biosecurity (see section 5), the works can contribute to this objective within the geographical confines of the scheme.				

* assumes additional proposed mitigation measure implemented

Groundwater body
GB40602G601400
Chobham Bagshot Beds

Code	W11.11	W11.12
Scheme component	Drainage of road runoff to groundwater	Road & river crossings
Watercourse type	WFD water body	WFD water body
Location	Multiple, as yet unspecified locations	Multiple, as yet unspecified locations
Description	Drainage of potentially contaminated surface water runoff to groundwater	Deep foundation protruding into aquifer

Key

- major beneficial effect
- minor / localised beneficial effect
- no effect
- minor / localised adverse effect
- adverse widespread or prolonged effect
- adverse effect on overall WFD status of waterbody

Test A Potential to cause deterioration of current WFD Ecological Status

		Current Status	Status objective	Effect of scheme component of WFD element	Effect of scheme component of WFD element	Overall effect of scheme on WFD element	Additional Proposed Mitigation Measures	Residual effect of scheme on WFD element*	Effect of scheme on ecological / chemical status	Overall effect of scheme on water body status
QUANTITATIVE IMPACTS	Quantitative impacts cover: Saline or other intrusions of poor quality water due to groundwater abstraction, the impact on the ecological status of surface water bodies, the impact on the condition of groundwater dependent terrestrial ecosystems, and the impact on the groundwater body water balance.	Good	Good by 2015	No impacts identified as a result of scheme element.	Deep foundations may form a barrier to groundwater flow, potentially reducing groundwater contributions to adjacent water courses and any groundwater abstractions in the water body.	Assuming that works are managed in accordance with the assumptions set out in section 5, we expect no deterioration of the quantitative elements of this groundwater body. However, introduction of deep foundations may lead to deterioration in local habitats if appropriate local mitigation cannot be identified.	Measures to reduce potential deterioration of local habitats need to be investigated and considered for incorporation into the final design.	No deterioration at waterbody scale. Residual effect on local habitat dependent on viable opportunities for local mitigations.	No deterioration at waterbody scale anticipated.	**No deterioration at waterbody scale anticipated.**
CHEMICAL IMPACTS	Chemical impacts cover: pollution concentrations, quality impact on groundwater abstractions, impact on the chemical & ecological status of surface water bodies, nutrient concentration impact on GWDTEs, Drinking Water Protected Areas and a General quality assessment.	Good	Good by 2015	Groundwater body is at outcrop at the scheme location, with no low permeability superficial deposits protecting the groundwater body. Potential for increased surface runoff from scheme to cause deterioration to water quality of groundwater body if runoff is contaminated. Potential secondary effects to groundwater dependant surface water bodies. This WFD assessment is made on the basis that management of road runoff will be carried out in accordance with the design principles set out in section 5 and therefore risks to groundwater quality will be reduced.	Deep foundations may create rapid vertical flow pathways into the groundwater body for potentially contaminated runoff. Assuming design & construction is to industry standards, this risk to the groundwater body should be mitigated.	Assuming that works are managed in accordance with the assumptions set out in section 5, we expect no chemical impacts to this groundwater body from this scheme. However, deterioration to local habitats are potentially possible.	Measures to reduce potential deterioration of local habitats need to be investigated and considered for incorporation into the final design.	No deterioration at waterbody scale. Residual effect on local habitat dependent on viable opportunities for local mitigations.		

Test B Potential to prevent future attainment of Good Ecological Status

	RBMP measures to achieve objective	Where RBMP measure will happen	When RBMP measure will happen	Effect of scheme component of WFD element	Effect of scheme component of WFD element	Overall effect of scheme on WFD element	Additional Proposed Mitigation Measures	Residual effect of scheme on WFD element*	Effect of scheme on ecological / chemical status	Overall effect of scheme on water body status
	No measures were found for this Ground Waterbody. The data catchment explorer, the South East RBMP (Environment Agency, 2015) and the River Wey Catchment vision (2014) were all referenced as with the surface water measures.									

Test C Potential to prevent attainment of Protected Area Objectives

Addressed elsewhere in Environmental Scoping Report

* assumes additional proposed mitigation measure implemented

Appendix E. Landscape

E.1 Planning and policy context

Landscape Designations

E.1.1 There are no statutory designated landscapes that have the potential to be directly and indirectly affected by the Scheme within the study area. However, there are other designations (listed below) within the study area, that will be affected by the Scheme.

E.1.2 Painshill Park is a Grade I Registered Park and Gardens which is located approximately 800 m to the north east of the M25 Junction 10 and immediately adjacent to the A3. The main purpose for designation of Registered Park and Gardens is to "celebrate designed landscapes of note, and encourage appropriate protection."

E.1.3 The RHS Wisley Grade II* Registered Park and Gardens is located to the south west (approximately 1.6 km from the centre of the M25 Junction 10 junction). The designated area includes the RHS Gardens at Wisley, formal and informal decorative gardens, several glasshouses and an extensive arboretum and small-scale gardens. The RHS Gardens at Wisley is also a visitor attraction of national importance.

National Planning Policy Framework March 2012

E.1.4 The NPPF establishes national planning policy to achieve sustainable development, through themes which include promoting sustainable transport, supporting a prosperous rural economy and promoting healthy communities, with a presumption in favour of sustainable development.

E.1.5 To support a prosperous rural economy, planning should promote the sustainable growth and expansion of businesses and enterprise in rural areas, the diversification of agricultural and land-based rural businesses, and the retention and development of local services and community facilities (paragraph 28).

E.1.6 Paragraph 75 states policies should protect and enhance PRoW and access.

National Policy Statement for National Networks (2014)

E.1.7 The NPSNN establishes the need for, and Government's policies to deliver, development of nationally significant infrastructure projects on the national road and rail networks in England.

E.1.8 Paragraph 5.144 states, "where the development is subject to EIA the applicant should undertake an assessment of any likely significant landscape and visual impacts in the environmental impact assessment and describe these in the environmental assessment. The landscape and visual assessment should include reference to any landscape character assessment and associated studies, as a means of assessing landscape impacts relevant to the proposed project. The applicant's assessment should also take account of any relevant policies based on these assessments in local development documents in England."

E.1.9 Paragraph 5.145 states, "The applicant's assessment should include any significant effects during construction of the project and/or the significant effects

of the completed development and its operation on landscape components and landscape character (including historic landscape characterisation)."

E.1.10 Paragraph 5.146 states, "The assessment should include the visibility and conspicuousness of the project during construction and of the presence and operation of the project and potential impacts on views and visual amenity. This should include any noise and light pollution effects, including on local amenity, tranquillity and nature conservation."

E.1.11 Paragraph 5.149 states, "Landscape effects depend on the nature of the existing landscape likely to be affected and nature of the effect likely to occur. Both of these factors need to be considered in judging the impact of a project on landscape. Projects need to be designed carefully, taking account of the potential impact on the landscape. Having regard to siting, operational and other relevant constraints, the aim should be to avoid or minimise harm to the landscape, providing reasonable mitigation where possible and appropriate."

E.1.12 Paragraph 5.156 states, "Outside nationally designated areas, there are local landscapes that may be highly valued locally and protected by local designation."

E.1.13 Paragraph 5.158 states, "The Secretary of State will have to judge whether the visual effects on sensitive receptors, such as local residents, and other receptors, such as visitors to the local area, outweigh the benefits of the development."

E.1.14 Paragraph 5.159 states, "Reducing the scale of a project or making changes to its operation can help to avoid or mitigate the visual and landscape effects of a proposed project."

E.1.15 Paragraph 5.160 states, "Adverse landscape and visual effects may be minimised through appropriate siting of infrastructure, design (including choice of materials), and landscaping schemes, depending on the size and type of proposed project. Materials and designs for infrastructure should always be given careful consideration."

Local Policy

E.1.16 Local policy which has indirect relevance for people, community use and enjoyment are set within adopted local planning policy for EBC and the GBC.

Elmbridge Borough Council

E.1.17 The Elmbridge Core Strategy (2011) include spatial policy CS14 'Green Infrastructure' the Council will protect, enhance and manage a diverse network of accessible multi-functional green infrastructure by:

- Policy: 2. Ensuring new development protects and enhances local landscape character, strategic views and key landmarks as shown on the proposals map, and takes account of their setting, intrinsic character and amenity value.

E.1.18 Green Infrastructure Assets; The following areas can form part of networks of Green Infrastructure:

- Parks and gardens - including urban parks, country parks and formal gardens; and
- Natural and semi-natural urban greenspaces - including woodlands, urban forestry, scrub, grasslands (e.g. downlands, commons and meadows)

wetlands, open and running water, wastelands and derelict open land and rock areas (e.g. cliffs, quarries and pits).

E.1.19 Spatial policy CS17 - Local Character, Density and Design Elmbridge's unique environment is characterised by its green infrastructure, river corridors, historic assets and distinctive town and village settlements. Particular attention should be given to the design of development which could have an effect on heritage assets which include conservation areas, historic buildings, scheduled monuments, and the Borough's three historic parks and gardens.

Guildford Borough Council

E.1.20 In the GBC saved policies Local Plan (2003) policy HE11 scheduled ancient monuments and other sites and monuments of national importance.

E.1.21 Policy RE2 development within the Green Belt.

E.1.22 Policy: 2. Essential facilities for outdoor sport and outdoor recreation, cemeteries and other uses of land which preserve the openness of the Green Belt and which do not conflict with the purposes of including land within it.

E.1.23 Policy HE12 Historic Parks and Gardens, Planning permission will not be granted for development which would detract from the character or appearance of a park or garden of special historic interest, or its setting. Permission will not be granted for unsympathetic subdivision.

E.2 Methodology

E.2.1 The landscape and visual assessment will be carried out following published guidance including IAN 135/10 Landscape and Visual Effects Assessment and DMRB Volume 11, Section 2, Part 2 HA 202/08 Environmental Impact Assessment but also with a consideration to the published Guidelines for Landscape and Visual Impact Assessment (GLVIA) 3rd edition.

E.2.2 The assessment of significant landscape and visual effects will be based on a combination of magnitude with sensitivity using assessment matrix included in IAN 135/10 Landscape and Visual Effects Assessment and DMRB Volume 11 Environmental Impact Assessment.

E.2.3 The report will follow the format of a detailed assessment, stating the reasons for the decision.

Landscape receptors

E.2.4 The sensitivity of landscape resources/receptors combines judgements of their susceptibility to the type of change or development proposed with the value attached to the landscape (as per the GVLIA 3rd edition).

E.2.5 The GLVIA notes that:

> *"The determination of the sensitivity of the landscape resource is based upon an evaluation of each key element or characteristic of the landscape likely to be affected. The evaluation will reflect such factors as its quality, value, contribution to landscape character, and the degree to which the particular element or characteristic can be replaced or substituted".*

E.2.6 For the purposes of this assessment, and in accordance with the relevant guidance contained in Highways England IAN 135/10, the landscape sensitivity is divided into five categories: Very High, High, Medium, Low and Negligible.

E.2.7 Very High and High sensitive landscapes include those landscapes which by nature of their character would be unlikely to be able to accommodate change of the type proposed without undue consequences; such as designated areas, places of high quality and/or recognised value.

E.2.8 Moderate sensitive landscapes might include those areas which by nature of their character would likely be able to accommodate change of the type proposed, albeit with some consequences; such as areas comprised of commonplace elements and features creating generally unremarkable character but with some sense of place.

E.2.9 Landscapes identified as Low and Negligible sensitivity by nature of their character would be able to accommodate change of the type proposed with little or no consequences. Typically, these would be comprised of some features and elements that are discordant, derelict or in decline, resulting in indistinct character with little or no sense of place.

Visual receptors

E.2.10 Visual receptors are the people who live in or visit the landscape, and who will experience views of the Scheme. The sensitivity of the visual receptors (people)

combines judgements of their susceptibility to the type of change in views and visual amenity with the value attached to particular views (as per GLVIA).

E.2.11 The following groups of people are considered to be visual receptors:

- Local communities (e.g. villages and settlements) and isolated residential properties - these receptors are generally considered to be High sensitivity; views of residents are particularly susceptible to changes in visual amenity;
- Visitors at publicly accessible sites, including for example registered park and gardens, historic sites, and other visitor attractions - these receptors are generally considered to be High sensitivity; visitors are likely to consider views as part of their experience whilst visiting publicly accessible sites. Views are also likely to be associated with the historic setting of certain visitor attractions;
- Schools and other institutional buildings, and their outdoor areas - these receptors are generally considered to be Medium sensitivity; views of pupils and staff are generally focused on indoor activities and therefore are less susceptible to change;
- People engaged in the outdoor sport activity at playing fields or pitches - these receptors are generally considered to be Medium sensitivity as views of people engaged in outdoor sports activities are usually focused on the sports activity which usually does not depend upon appreciation of views into adjacent landscape;
- People using nationally designated or regionally promoted footpaths, cycle routes, bridleways, the local rights of way network and areas of Open Access Land - these receptors are generally considered to be High sensitivity; the enjoyment of views from these routes is one of their key attributes;
- Road users - these receptors are generally considered to be Low sensitivity as their views are focused mainly on the road corridor whilst views into adjacent landscape are usually transient and glimpsed; and
- People in their places of work - these receptors are generally considered to be Low sensitivity as they are orientated primarily on work activities.

E.3 Assessment Methodology

Overview

E.3.1 The assessment follows the guidelines produced by relevant professional bodies concerned with transport related schemes and landscape and visual impact assessment, specifically the Highways Agency's Interim Advice Note IAN 135/10 (Landscape and Visual Effects Assessment) and the Landscape Institute's Guidelines for Landscape and Visual Impact Assessment Third Edition (GLVIA 3).

E.3.2 The desk top study determined the extent of the study area for both landscape and visual effects. It is expected that potentially significant landscape effects would be restricted to the land directly adjacent to the Scheme, however consideration of landscape effects will be given to the wider area within 500m from the area of proposed works.

E.3.3 It is considered that majority of visual receptors that might experience potentially significant effects are located within a 500m buffer of the Scheme. The assessment also considered the effects on sensitive visual receptors beyond 500m, but no further than 2km from the Scheme. The views from receptors located further than 2km away are unlikely to give rise to significant effects and are therefore not considered in this report. This judgement is based on professional judgement and experience of the assessment of similar projects. The assessment is based around the assembly, assessment and scoping of data beyond that which is readily available (i.e. which would be collected for the Scoping exercise), and adds further appropriate detail gained through investigation of relevant data sources, and field surveys.

E.3.4 At this stage, the landscape and visual impact assessment has been based on the preliminary geometric layout of the Highways design of each option.

Landscape effects

E.3.5 A desk study was undertaken to assist the overall survey through the implementation of preliminary analytical studies, which were then used to inform and supplement the site survey. The study was tailored to meet the requirements of the project, bearing in mind the project objectives and the level of reporting required.

E.3.6 This allowed an impression of the site to be formed, and provided knowledge of particular designations and cultural values associated with the area. A review of the data collected was undertaken to identify the local and wider landscape character, together with the natural and cultural/social factors that influenced the development of the landscape.

E.3.7 As the proposals are generally of a local scale (and as the junctions are located within a range of the character areas identified) the effects have been reported on the landscape resource as a whole, to enable comparison between the effects of each of the options on the landscape resource within the study area. Whilst this is the case for assessment, baseline text specific to each character area has been provided to understand the local context.

Field survey

E.3.8 Landscape Character Assessment is the process whereby the different elements that form the landscape are recorded and assessed. This process was applied at local, regional and national levels, and the assessment for the project set the landscape within its national and regional landscape character context.

E.3.9 The survey was undertaken to confirm and supplement the desk study data with current information, which may not have been reflected by reports, mapping or aerial photographs. The process was supported by a comprehensive photographic record (recording the viewpoint position and date of the photograph) and annotated mapping completed during the survey. As with the desk study, the site survey was tailored to meet the requirements of the project, bearing in mind the project objectives and the level of reporting required.

E.3.10 Based on the results of the desk study and field survey, a judgement was made as to the value of the landscape. This was based on consideration of character and quality (i.e. of the landscape as a whole and the features and elements that make up character and their condition), together with the value that has been placed upon the landscape by society.

Assessing landscape sensitivity

E.3.11 The outputs from the landscape character assessment (i.e. landscape characteristics, their condition and value) were considered to assess their sensitivity to changes arising from the project. Landscape sensitivity depends on the character of the receiving landscape, the nature of the proposed project and the type of change. Indicative criteria are provided in Table E.1.

Table E.1: Landscape Sensitivity and Typical Examples (from IAN 135/10)

Sensitivity	Typical Descriptors and Examples
High	Landscapes which by nature of their character would be unable to accommodate change of the type proposed. Typically these would be: • Of high quality with distinctive elements and features making a positive contribution to character and sense of place. • Likely to be designated, but the aspects which underpin such value may also be present outside designated areas, especially at the local scale. • Areas of special recognised value through use, perception or historic and cultural associations. • Likely to contain features and elements that are rare and could not be replaced.
Moderate	Landscapes which by nature of their character would be able to partly accommodate change of the type proposed. Typically these would be: • Comprised of commonplace elements and features creating generally unremarkable character but with some sense of place. • Locally designated, or their value may be expressed through non-statutory local publications. • Containing some features of value through use, perception or historic and cultural associations. • Likely to contain some features and elements that could not be replaced.
Low	Landscapes which by nature of their character would be able to accommodate change of the type proposed. Typically these would be: • Comprised of some features and elements that are discordant, derelict or in decline, resulting in indistinct character with little or no sense of place.

Sensitivity	Typical Descriptors and Examples
	• Not designated. • Containing few, if any, features of value through use, perception or historic and cultural associations. • Likely to contain few, if any, features and elements that could not be replaced.

Identification of impacts and assessment of the significance of landscape effects

E.3.12 Project proposals were reviewed alongside the baseline data to identify sources of potential impacts on the landscape in order to determine subsequent landscape effects. The assessment of landscape impacts was undertaken by the same landscape professional who undertook and co-ordinated the baseline assessment/evaluation.

E.3.13 Effects on landscape character were assessed by considering the components that define character and their sensitivity to the type, scale and duration of the proposed change, taking into account any mitigation measures.

Assessing magnitude of landscape impact

E.3.14 Based on consideration of the project, the magnitude of impact (either adverse or beneficial) was estimated. Indicative criteria are provided in Table E.2.

Table E.2: Landscape Sensitivity and Typical Examples (from IAN 135/10)

Magnitude of Impact	Typical Criteria Descriptors
Major Adverse	Total loss or large scale damage to existing character or distinctive features and elements, and/or the addition of new but uncharacteristic conspicuous features and elements.
Moderate Adverse	Partial loss or noticeable damage to existing character or distinctive features and elements, and/or the addition of new but uncharacteristic noticeable features and elements.
Minor Adverse	Slight loss or damage to existing character or features and elements, and/or the addition of new but uncharacteristic features and elements.
Negligible Adverse	Barely noticeable loss or damage to existing character or features and elements, and/or the addition of new but uncharacteristic features and elements.
No Change	No noticeable loss, damage or alteration to character or features or elements.
Negligible Beneficial	Barely noticeable improvement of character by the restoration of existing features and elements, and/or the removal of uncharacteristic features and elements, or by the addition of new characteristic elements.
Minor Beneficial	Slight improvement of character by the restoration of existing features and elements, and/or the removal of uncharacteristic features and elements, or by the addition of new characteristic elements.
Moderate Beneficial	Partial or noticeable improvement of character by the restoration of existing features and elements, and/or the removal of uncharacteristic and noticeable features and elements, or by the addition of new characteristic features.
Major Beneficial	Large scale improvement of character by the restoration of features and elements, and/or the removal of uncharacteristic and conspicuous features and elements, or by the addition of new distinctive features.

Assessing significance of effect

E.3.15 The evaluation of the significance of the landscape effects of the project was derived by assessing the sensitivity of the landscape against the magnitude of impact (bearing in mind the effectiveness of the mitigation measures), as shown in the matrix in Table E.3.

E.3.16 Typical descriptors of the significance of effect categories in the matrix are provided in Table E.4.

Table E.3: Typical Descriptors of Significance of Effect Categories (from IAN 135/10)

Magnitude of Impact						
Landscape Sensitivity		No Change	Negligible	Minor	Moderate	Major
	High	Neutral	Slight	Slight/ Moderate	Moderate/ Large	Large/Very Large
	Moderate	Neutral	Neutral/ Slight	Slight	Moderate	Moderate/ Large
	Low	Neutral	Neutral/ Slight	Neutral/ Slight	Slight	Slight/ Moderate

Table E.4: Significance of Effect Categories (from IAN 135/10)

Significance Category	Significance Category Typical Descriptors of Effect
Very Large Beneficial (Positive) Effect	The project would: • Greatly enhance the character (including quality and value) of the landscape • Create an iconic high quality feature and/or series of elements. • Enable a sense of place to be created or greatly enhanced.
Large Beneficial (Positive) Effect	The project would: • Enhance the character (including quality and value) of the landscape. • Enable the restoration of characteristic features and elements lost as a result of changes from inappropriate management or development. • Enable a sense of place to be enhanced.
Moderate Beneficial (Positive) Effect	The project would: • Improve the character (including quality and value) of the landscape. • Enable the restoration of characteristic features and elements partially lost or diminished as a result of changes from inappropriate management or development. • Enable a sense of place to be restored.
Slight Beneficial (Positive) Effect	The project would: • Complement the character (including quality and value) of the landscape. • Maintain or enhance characteristic features and elements. • Enable some sense of place to be restored.
Neutral Effect	The project would:

Significance Category	Significance Category Typical Descriptors of Effect
	• Maintain the character (including quality and value) of the landscape. • Blend in with characteristic features and elements. • Enable a sense of place to be retained.
Slight Adverse (Negative) Effect	The project would: • Not quite fit the character (including quality and value) of the landscape. • Be at variance with characteristic features and elements. • Detract from a sense of place.
Moderate Adverse (Negative) Effect	The project would: • Conflict with the character (including quality and value) of the landscape. • Have an adverse impact on characteristic features or elements. • Diminish a sense of place.
Large Adverse (Negative) Effect	The project would: • Be at considerable variance with the character (including quality and value) of the landscape. • Degrade or diminish the integrity of a range of characteristic features and elements. • Damage a sense of place.
Very Large Adverse (Negative) Effect	The project would: • Be at complete variance with the character (including quality and value) of the landscape. • Cause the integrity of characteristic features and elements to be lost. • Cause a sense of place to be lost.

Visual effects

Desk study

E.3.17 A study of contoured Ordnance Survey mapping and aerial photographs was undertaken to identify potential screening features (generally tree lines, woodland blocks or urban areas/large individual buildings) for later verification on site. Potential visual receptors such as residential properties, Public Rights of Way, and recreation or amenity areas were also noted for more detailed assessment on site.

E.3.18 Due to the number of possible receptors, only the more sensitive receptors were selected for specific investigation and in general, views from receptors of low sensitivity (such as from industrial estates and quarries for example) were omitted from the study. Also, although distant views from outside of the study area may be possible, it is considered that any effects on these views are unlikely to be perceptible given the distance involved.

E.3.19 The views experienced by on-road vehicle travellers were not been examined in depth, as it is considered that the highway infrastructure is a part of the visual experience expected by vehicle travellers.

Field survey

E.3.20 A site visit was undertaken by a Landscape Architect in March 2017 to verify and expand upon the results of the desk study. This included assessing the nature of views and number/type of receptors looking towards the project, as well as looking out from the project location to determine which areas and receptors would be visible and to make an informed judgement about the degree of change in the view that would be caused by the project.

E.3.21 Where access to the land was not possible, estimates of the nature of the view and number of receptors affected were made from the nearest areas with public access.

E.3.22 Viewpoints were accurately recorded on a plan noting the direction of view, and photographs were taken from each viewpoint appropriately representing the landscape as seen by a person at that location.

Visual receptors and their sensitivity

E.3.23 An important part of assessment is to determine the sensitivity of potential visual receptors (i.e. viewers) within the study area. The identification of various categories of visual receptor and the assumed visual sensitivity of each forms part of the visual baseline against which the change in the view brought about by the project can be assessed.

E.3.24 Visual receptors were categorised by their sensitivity, and included people in their homes, users of Public Rights of Way (PRoW) and other areas of open space or recreational landscapes, people at work and people travelling along roads. Indicative levels and examples are provided in Table E.5.

Table E.5: Visual Sensitivity and Typical Examples (from IAN 135/10)

Sensitivity	Typical Criteria
High	• Residential properties. • Users of Public Rights of Way or other recreational trails (e.g. National Trails, footpaths, bridleways etc.). • Users of recreational facilities where the purpose of that recreation is enjoyment of the countryside (e.g. Country Parks, National Trust, Registered Parks and Gardens or other access land etc.).
Moderate	• Outdoor workers • Users of scenic roads, railways or waterways or users of designated tourist routes. • Schools and other institutional buildings, and their outdoor areas.
Low	• Indoor workers • Users of main roads (e.g. trunk roads) or passengers in public transport on main arterial routes. • Users of recreational facilities where the purpose of that recreation is not related to the view (e.g. sports facilities).

Identification of Impacts and Assessment of the Significance of Visual Effects

E.3.25 Project proposals were reviewed alongside the baseline data to identify sources of potential visual impacts in order to determine subsequent visual effects. The assessment of visual impacts was undertaken by the same landscape

professional who undertook and co-ordinated the baseline assessment/ evaluation.

E.3.26 Effects on visual receptors were assessed by considering the scale and duration of the proposed change, taking into account any mitigation measures.

Assessing Magnitude of Visual Impact

E.3.27 The magnitude of impact, or degree of change, was assessed using the indicative criteria in Table E.6.

Table E.6: Magnitude of Impact and Typical Descriptors (from IAN 135/10)

Magnitude of Impact	Typical Criteria Descriptors
Major	The project, or a part of it, would become the dominant feature or focal point of the view.
Moderate	The project, or a part of it, would form a noticeable feature or element of the view which is readily apparent to the receptor.
Minor	The project, or a part of it, would be perceptible but not alter the overall balance of features and elements that comprise the existing view.
Negligible	Only a very small part of the project would be discernible, or it is at such a distance that it would form a barely noticeable feature or element of the view.
No Change	No part of the project, or work or activity associated with it, is discernible.

Assessing Significance of Visual Effects

E.3.28 The evaluation of the significance of the visual effects of the project was derived by assessing the sensitivity of the receptor (Table E.5) against the degree of change in the view resulting from the project (Table E.6). These aspects were combined to form a significance matrix as shown in Table E.7. Typical descriptors of the significance levels in the matrix are provided in Table E.8.

E.3.29 In general terms, a major magnitude of change on a highly sensitive receptor will produce an effect of high significance, and a minor magnitude of change on a less sensitive receptor will produce an effect of low or negligible significance. Major changes for less sensitive receptors and minor changes for more sensitive receptors can also produce significant levels of effect.

Table E.7: Significance of Effect Categories (from IAN 135/10)

	Magnitude of Impact					
Visual Sensitivity		No Change	Negligible	Minor	Moderate	Major
	High	Neutral	Slight	Slight/ Moderate	Moderate/ Large	Large/Very Large
	Moderate	Neutral	Neutral/ Slight	Slight	Moderate	Moderate/ Large
	Low	Neutral	Neutral/ Slight	Neutral/ Slight	Slight	Slight/ Moderate

Table E.8: Typical Descriptors of the Significance of Effect Categories (from IAN 135/10)

Magnitude of Impact	Typical Criteria Descriptors
Very Large Beneficial	The project would create an iconic new feature that would greatly enhance the view.
Large Beneficial	The project would lead to a major improvement in a view from a highly sensitive receptor.
Moderate Beneficial	The proposals would cause obvious improvement to a view from a moderately sensitive receptor, or perceptible improvement to a view from a more sensitive receptor.
Slight Beneficial	The project would cause limited improvement to a view from a receptor of medium sensitivity, or would cause greater improvement to a view from a receptor of low sensitivity.
Neutral Effect	No perceptible change in the view.
Slight Adverse	The project would cause limited deterioration to a view from a receptor of medium sensitivity, or cause greater deterioration to a view from a receptor of low sensitivity.
Moderate Adverse	The project would cause obvious deterioration to a view from a moderately sensitive receptor, or perceptible damage to a view from a more sensitive receptor.
Large Adverse	The project would cause major deterioration to a view from a highly sensitive receptor, and would constitute a major discordant element in the view.
Very Large Adverse	The project would cause the loss of views from a highly sensitive receptor, and would constitute a dominant discordant feature in the view.

Detailed landscape and visual assessment tables

E.3.30 Below a detailed assessment of landscape effects has been presented in the Table E.9 during construction and operational stages.

Table E.9: Effects on potential landscape receptors

Baseline and Sensitivity	Scheme Element	Magnitude of Impact	Significance of effect
Sensitivity: **High** The sensitivity of the landscape has been assessed as part of the Guildford Landscape Character Assessment and Guidance (January 2007). The Scheme is located wholly within the Wisley Wooded and Settled Heath (G2) that forms part of Wooded and Settled Heath Landscape Character Type and has been categorised as **High**. The sensitivity of the landscape has been assessed as part of the Elmbridge Borough Council Landscape Character Assessment (April 2015 prepared by HDA). Three relevant landscape character Areas were identified to inform the baseline, these are as follows:	Junction 10 and side road alterations - Construction Phase	A proportion of the of the wooded areas that border the junction would be removed to accommodate the proposed improvements. There would be some land take resulting in the reduction of common land and an extension to the highway pattern. Uncharacteristic pattern of construction activities and increased noise would reduce the levels of the local tranquillity. The alterations to the local landscape character would be temporary and short term. Moderate adverse	Effects on landscape character would include: • introduction of compounds, parking and welfare facilities; • loss of vegetation; loss of common land; requirement for temporary construction land and temporary presence of material set down areas and stock piles. A noticeable alteration to the existing junction is expected in the construction stage. The construction operations would be at variance with the local landscape character. Construction operation would introduce uncharacteristic features associated with construction sites, a dynamic pattern of vehicle movement that would gradually progress from earthworks formation to build up of road surface with pedestrian crossings and designated footways. Moderate adverse (significant)
	Junction 10 and side road alterations - Operation Phase	A loss of character to the landscape surrounding junction 10 is expected here as the widened junction and increased road corridor would introduce and increase new urban elements into the landscape and result in the loss of common land. Introduced elements of the Scheme would discernibly alter the tranquillity of the surrounding landscape.	Effects on landscape character include: • loss of vegetation, including wooded areas and heathland to common land; • introduction of uncharacteristic elements. The proposed alterations would be at variance with the existing local landscape character as the introduced junction would be more perceptible and diminish the sense of place, the junction would

Baseline and Sensitivity	Scheme Element	Magnitude of Impact	Significance of effect
• RF10 Lower Mole River Floodplain; • SS9 Weybridge South Settled and Wooded Sandy Farmland; and • SW5 Wisley Sandy Woodland. These have all been categorised as **High**. The landscape within the study area has a strong sense of place particularly with the strong landscape characteristics associated with Wisley and Ockham Commons. The wider landscape contains historical elements as well as culturally important components comprised of Registered Parks and Gardens (RHS Wisley and Painshill Park). The landscape structure is defined by the wooded and open expanses of heathlands associated with the commons. Away from the A3 and M25 areas of tranquillity with a sense of wildness can be experienced.		Careful design at the detail design stage and sympathetic use of materials could greatly reduce the impact of the proposals and the retention of existing elements such as mature screening vegetation. The loss of tranquillity and landscape character would be permanent but restricted to the area adjacent to Junction 10. Moderate adverse	become more dominant in comparison to the baseline scenario due to the open character of the common land. It is expected that maturing vegetation would help to integrate the Scheme within the existing landscape beyond the area of common land. Slight adverse (not significant)
	Painshill - Construction Phase	Partial alteration to the local landscape character is expected during construction stage. Improvements within this area would require a loss of vegetation along the existing road corridor and localized vegetation loss within the Painshill Park Registered Park and Garden. Construction activities would be temporary and short term, but will create a noticeable alteration to the existing landscape character, with the introduction of construction vehicles and disruption to the existing road network. The loss of vegetation along the existing road corridor will be difficult to replace and the loss of character will be permanent. Moderate adverse	Effects on landscape character include: • loss of vegetation within the existing road corridor. • loss of vegetation and alteration of land use within the Painshill Park Registered Park and Garden. There will be small scale alteration to character in limited areas affecting loss of privately owned boundary features. Loss of vegetation along the existing road corridor would open up views of the into the road corridor and will lead to a change in the landscape character within this area. Loss of vegetation combined with extension of highway as well as introduction of construction activities would be conflicting with the local landscape character resulting in Moderate adverse effects. Moderate adverse (significant)
	Painshill - Operation Phase	A loss of character to the wider landscape character along this section of the A3 is expected here as the widened carriageway and local access road and bridge would introduce and increase new urban elements into the landscape and result in the loss of common land. The significant scale of the introduced elements of the	Effects on landscape character include: • loss of vegetation, including wooded areas. • introduction of uncharacteristic elements. • large scale infrastructure works in an otherwise tranquil landscape.

Baseline and Sensitivity	Scheme Element	Magnitude of Impact	Significance of effect
Junction 10 The landscape around the junction is characterised by the wooded and open heathlands of the associated commons (Wisley and Ockham). Where wooded areas are present then they provide dense areas of coverage which provides screening towards the road network. This has been categorised as **high** sensitivity. Painshill The landscape north of junction 10 up to the junction with the A245 is well defined by the road corridor. The landscape within the Painshill Park Registered Parks and Garden (to the east of the A3) is a defining component within the wider landscape. The land to the west of the A3 is characterised by a hotel, private residences and paddocks. This has been categorised as **High** sensitivity. Wisley		Scheme would discernibly alter the tranquillity of the surrounding landscape. Careful design at the detail design stage and sympathetic use of materials could greatly reduce the impact of the proposals and the retention of existing elements such as mature screening vegetation. The loss of tranquillity and landscape character would be permanent and would influence the wider landscape around Junction 10. Moderate adverse	The proposed alterations would be at variance with the existing local landscape character as the introduced infrastructure works would be more perceptible and diminish the sense of place, the proposed access bridge and access roads would become more dominant in comparison to the baseline scenario due to the sensitive nature of the surrounding landscape. It is expected that maturing vegetation would help to integrate the Scheme within the existing landscape beyond the area of common land. Moderate adverse (significant)
	Wisley - Construction phase	Partial alteration to the local landscape character is expected during construction stage. Improvements within this area would require a loss of vegetation along the existing road corridor, common land and localised vegetation loss within the RHS Wisley Registered Park and Garden. Construction activities would be temporary and short term, but will create a noticeable alteration to the existing landscape character, with the introduction of construction vehicles and disruption to the existing road network. The loss of vegetation along the existing road corridor will be difficult to replace and the loss of character will be permanent. Moderate adverse	Effects on landscape character include: • loss of vegetation within the existing road corridor. • loss of trees and vegetation within area of Ancient Woodland. There will be small scale alteration to character in limited areas affecting loss of privately owned boundary features. Loss of vegetation along the existing road corridor would open up views of the into the road corridor and will lead to a change in the landscape character within this area. Loss of vegetation combined with extension of highway as well as introduction of construction activities would be conflicting with the local landscape character resulting in Moderate adverse effects. Moderate adverse (significant)
	Wisley - Operation phase	A loss of character to the wider landscape character along this section of the A3 is expected here as the widened carriageway and local access road and bridge would introduce and increase new urban elements into	Effects on landscape character include: • loss of vegetation, including wooded areas. • introduction of uncharacteristic elements.

Baseline and Sensitivity	Scheme Element	Magnitude of Impact	Significance of effect
The landscape south of junction 10 to the Ockham junction is defined by the adjacent Wisley and Ockham commons comprising wooded areas, open water and open heathland. The RHS Wisley Registered Park and Garden forms the western boundary to the A3 road corridor and is a defining component within the wider landscape. This has been categorised as **High** sensitivity.		the landscape and result in the loss of common land. The proposed local access road would result in an adverse impact on the adjacent common land and a subsequent result of a loss of vegetation for the installation of the overbridge. The significant scale of the Introduced elements of the Scheme would discernibly alter the tranquillity of the surrounding landscape. Careful design at the detail design stage and sympathetic use of materials could greatly reduce the impact of the proposals and the retention of existing elements such as mature screening vegetation. The loss of tranquillity and landscape character would be permanent and would influence the wider landscape around Junction 10. Moderate adverse	• large scale infrastructure works in an otherwise tranquil landscape. The proposed alterations would be at variance with the existing local landscape character as the introduced infrastructure works would be more perceptible and diminish the sense of place, the proposed access bridge and access roads would become more dominant in comparison to the baseline scenario due to the sensitive nature of the surrounding landscape. The proposed encroachment of the road corridor. It is expected that maturing vegetation would help to integrate the Scheme within the existing landscape beyond the area of common land. Moderate adverse (significant)

E.3.31 Below a detailed assessment of visual effects has been presented in Table E.10 during construction and operational stages.

Table E.10: Effects on potential visual receptors

Potential Visual Amenity Receptor and baseline	Sensitivity	Scheme element	Magnitude of Impact		Significance of Effect(s)	
			Construction	Operation	Construction	Operation
Receptor 1 Users of Wisley Common south west (open access) Located to the south west of junction 10, looking north east. Characteristic existing views from this location are over the open common/scrub land with mature woodland (mix of birch and pine) in the middle distance. The ground level varies with mounds and Tumulus (Scheduled Ancient Monument) providing elevated positions.	Receptors are users of the public common who use the open space for the purposes of recreation and enjoyment of the countryside. High sensitivity to change	Junction 10 with common elements	During construction, some elements of the construction activity may be discernible where environmental barriers are removed as part of the construction activities. The magnitude of change of any temporary impacts is likely to be Moderate.	It is expected that views would be similar to those currently experienced, however the motorway corridor would encroach onto the Wisley Common area. The access track may be wider than the current layout including passing places. The magnitude is likely to be Minor.	Moderate adverse	Slight adverse

Potential Visual Amenity Receptor and baseline	Sensitivity	Scheme element	Magnitude of Impact		Significance of Effect(s)	
			Construction	Operation	Construction	Operation
Receptor 2 Users of Ockham Common (open access) including Ockham Bites café. Located to the south east of junction 10, looking north west.	Receptors are users of the public common who use the open space for the purposes of recreation and enjoyment of the countryside. High sensitivity to change	Junction 10 with common elements	During construction, some elements of the construction activity may be discernible particularly where environmental barriers are removed, resulting in partial views of construction activities. The magnitude of any temporary impacts is likely to be Moderate.	It is expected that views would be slightly altered as a result of the motorway corridor being widened and encroaching into Ockham Common. The magnitude is likely to be Minor.	Moderate adverse	Slight adverse
Receptor 3 Users of Footpath numbers 11 & 12 to the north west of Junction 10, looking south/south east.	Receptors are users of public right of way network. High sensitivity to change	Junction 10 with common elements	During construction, some elements of the construction activity may be discernible particularly where environmental barriers are removed as part of the construction activities, and the motorway corridor being widened. The magnitude of any temporary impacts is likely to be Moderate.	It is expected that views would be changed as a result of the motorway corridor being widened and encroaching into the area of open land affecting the footpath links. The magnitude is likely to be Minor.	Moderate adverse	Slight adverse
		Side roads	During construction of the overbridge some elements of the construction activity may be discernible particularly from users of nearby footpath. Construction activities would form a small component within the wider landscape. The magnitude of any temporary impacts is likely to be Moderate.	It is expected that views would be changed as a result of the introduction of the overbridge, however this would form a small component within the wider landscape, that cannot be easily mitigated. The magnitude is likely to be Minor.	Moderate adverse	Slight adverse

Potential Visual Amenity Receptor and baseline	Sensitivity	Scheme element	Magnitude of Impact		Significance of Effect(s)	
			Construction	Operation	Construction	Operation
Receptor 4 Users of Bridleway number 544 to the south west of Elm Corner, looking north west.	Receptors are users of public right of way network. High sensitivity to change	Junction 10 with common elements	During construction, some elements of the construction activity may be discernible particularly where environmental barriers are removed as part of the construction activities, and the motorway corridor being widened. The magnitude of any temporary impacts is likely to be Minor.	It is expected that views would be changed as a result of the motorway corridor being widened and encroaching into the area of open land affecting the footpath links. The magnitude is likely to be Negligible.	Moderate adverse	Slight adverse
		Side roads	During the construction of the local access road some elements of the construction may be discernible, partial and filtered through intervening vegetation. Where views will be available, they would be prominent within landscape. The magnitude of any temporary impacts is likely to be Moderate.	It is expected that the introduction of the local access road would introduce a new component into the landscape, however as majority of the road would follow the existing road alignment which combined with the introduced environmental design measures would result in Minor magnitude of change.	Moderate adverse	Slight adverse
Receptor 5 (foot bridge over A3) Users of footpath number 17, looking north east.	Receptors are users of public right of way network. High sensitivity to change	Junction 10 with common elements	During construction of the widened A3 some elements of the construction may be discernible or more visible from the elevated footbridge, where from largely open views of construction operations are expected. The magnitude of any temporary impacts is likely to be Moderate.	It is expected that the widened A3 would form a larger component within the view, however as the improvements take place largely within existing road alignment a Minor magnitude of change is expected.	Moderate adverse	Slight adverse

Potential Visual Amenity Receptor and baseline	Sensitivity	Scheme element	Magnitude of Impact		Significance of Effect(s)	
			Construction	Operation	Construction	Operation
		Side roads	During construction the views of construction activities would be prominent as new uncharacteristic features will be introduced including construction machinery, compounds and earthmoving operations. Views will be partial but considerably altered resulting in Moderate magnitude of change.	It is expected that the introduction of the Scheme would increase the size of the existing highway component of the view within the landscape. Although views would be prominent the effects will be reduced through the introduction of environmental design measures. The magnitude of change is likely to be Minor.	Moderate adverse	Slight adverse
Receptor 6 Users of footpath number 13, looking west.	Receptors are users of public right of way network. High sensitivity to change	Junction 10 with common elements	During the construction of the widened A3 some elements of the construction may be partially visible through belts of trees along the A3. Where views will be available these would be prominent within the view. The magnitude of any temporary impacts is likely to be Moderate.	It is expected that the widened A3 would form a larger component within the view, however this would create an inconspicuous change to the baseline characteristic of the view. As a result of the construction activities associated with the introduced Scheme a Minor magnitude of change is expected.	Moderate adverse	Slight adverse

Potential Visual Amenity Receptor and baseline	Sensitivity	Scheme element	Magnitude of Impact		Significance of Effect(s)	
			Construction	Operation	Construction	Operation
		Side roads	During the construction of the local access road some elements of the construction activities will be prominent in the view. These views would be prominent within an open landscape view. The magnitude of any temporary impacts is likely to be Moderate.	It is expected that the introduction of the local access road would introduce a new component into the landscape. As some of the Scheme elements will be elevated to create a links with the A3 Ockham Park Junction, the effects will only be partially reduced through the introduction of the environmental design measures resulting in Minor magnitude of change.	Moderate adverse	Slight adverse
Receptor 7 RHS Wisley Users of the gardens within RHS Wisley, view south within the trials garden.	Receptors are visitors to a Registered Park and Garden. High sensitivity to change	Side roads	During the construction of the local access road some elements of the construction activities will be prominent in the view. These views would be prominent within an open landscape view. The magnitude of any temporary impacts is likely to be Minor.	It is expected that the introduction of the local access road would introduce a new component into the landscape. As some of the Scheme elements will be elevated to create a links with the A3 Ockham Park Junction, the effects will only be partially reduced through the introduction of the environmental design measures resulting in No change magnitude of change.	Slight adverse	Neutral

Potential Visual Amenity Receptor and baseline	Sensitivity	Scheme element	Magnitude of Impact		Significance of Effect(s)	
			Construction	Operation	Construction	Operation
		Junction 10 with common elements	During the construction of the widened A3 some elements of the construction may be discernible, however these would be seen within the context of the existing road corridor. The change in the view would form a minor component within this view. The magnitude of any temporary impacts is likely to be Minor.	It is expected that the widened A3 would form a minor component within the view and would be seen within the context of the existing A3 that display similar characteristic to those introduced within the Scheme. It is expected that over a time introduced woodland planting would result in Minor Magnitude of change.	Slight adverse	Slight adverse
Receptor 8 Painshill Park Users of the gardens within Painshill Park, views south and west within the gardens. Residents of Court Close Farm, Heyswood Girl Guides camp and New Farm	Receptors are visitors to a Registered Park and Garden. High sensitivity to change	Junction 10 with common elements	During the construction of the widened A3 some elements of the construction may be discernible, these would be seen within the context of the existing road corridor. These views would form a minor component within this view. The magnitude of any temporary impacts is likely to be Minor.	It is expected that the widened A3 would form a minor component within the view and will be seen within the context of the existing A3 that consists of similar elements of the highway infrastructure to those proposed. The magnitude is likely to be Minor.	Slight adverse	Slight adverse
		Side roads	During construction of the overbridge some elements of the construction activity may be discernible from users of within the Registered Parks and Gardens. The construction activities would form a small component within the view. The magnitude of any temporary impacts is likely to be Moderate.	It is expected that views would be changed as a result of introduced overbridge; which would form a small component within the wider landscape resulting in Moderate magnitude of change.	Moderate adverse	Moderate adverse

Potential Visual Amenity Receptor and baseline	Sensitivity	Scheme element	Magnitude of Impact		Significance of Effect(s)	
			Construction	Operation	Construction	Operation
Receptor 9 Users of Bridleway number 12 to the north east of Junction 10.	Receptors are users of public right of way network. High sensitivity to change	Side roads	During construction, some elements of the construction activities will occupy large part of the view. The visibility would be increased through removal of existing vegetation and widening of the existing highway alignment with associated earthworks. The magnitude of any temporary impacts is expected to be Moderate.	It is expected that views would be similar to those currently experienced, however the motorway corridor would encroach the lower parts of Red Hill resulting in Minor magnitude of change.	Moderate adverse	Slight adverse
Receptor 10 Residential properties Elm Corner	Receptors are residential users. High sensitivity to change	Junction 10 with common elements	During the construction of the widening of the A3 some elements of the construction may be visible partially and filtered through vegetation along the road. The views will be filtered through belts of trees. The magnitude of any temporary impacts is likely to be Minor.	It is expected that the widened A3 would form slightly larger component within a filtered view. Although the change may be perceptible considering distance and presence of overlapping vegetation the magnitude is likely to be Negligible.	Moderate adverse	Slight adverse
		Side roads	During the construction of the upgraded byway some elements of the construction may be perceptible to the residents or Elm Corner. The views would be filtered through belt of trees. The magnitude of any temporary impacts is likely to be Minor.	It is expected that the upgraded byway would form a new component within the existing view, this would be seen within the background of the view with a backdrop formed by the existing woodland. The magnitude is likely to be Negligible.	Moderate adverse	Slight adverse

Potential Visual Amenity Receptor and baseline	Sensitivity	Scheme element	Magnitude of Impact		Significance of Effect(s)	
			Construction	Operation	Construction	Operation
			During the construction of the local access road some elements of the construction may be discernible by visitors to the Registered Park and Gardens, particularly if vegetation is removed. These views would be prominent within the existing landscape view. The magnitude of any temporary impacts is likely to be Minor.	It is expected that the introduction of the local access road would introduce a new component into the landscape. The alteration would be introduced within a peripheral section of the Registered Park and Garden. The magnitude is likely to be No change.	Slight adverse	Neutral
			During the construction of the local access road, some elements of the construction may be visible. These views would be partial and filtered through the existing vegetation. The magnitude of any temporary impacts is likely to be Moderate.	It is expected that the introduction of the local access road would introduce a new component into the landscape as the A3 overbridge and approach to the A3 Ockham Junction would be noticeable. It is expected that introduced environmental design measures would help to integrate the Scheme into the existing landscape. The magnitude is likely to be Minor.	Moderate adverse	Slight adverse
Receptor 11 Views from Chatley Heath Farm	Receptors are residential users. High sensitivity to change	Side roads	There will be No change to the views from Chatley Heath Farm as the existing mature woodland combined with landform undulation would completely screen the views of the Scheme.	There will be No change to the views as views of the Scheme will be screened by a combination of existing landform and existing vegetation	Neutral	Neutral

Potential Visual Amenity Receptor and baseline	Sensitivity	Scheme element	Magnitude of Impact		Significance of Effect(s)	
			Construction	Operation	Construction	Operation
Receptor 12 Views from Hut Hill Cottage.	Receptors are residential users. High sensitivity to change	Side roads	There will be No change to the views from Hut Hill cottage as views are screened completely by tall mature trees located close to the house. The views will be blocked despite the Scheme being located close to the receptor.	There will be No change to the views from Hut Hill cottage as views are screened completely by tall mature trees located close to the house.	Neutral	Neutral
Receptor 13 Views from San Domenico restaurant	Receptors are users of the restaurant and its workforce. Low sensitivity to change	Junction 10 with common elements	During construction, the views will encompass views of construction operations along a short section of the A3. The effects will be short term but open allowing for clear views of earthworks formation, widening of the A3 and views of construction machinery resulting in a Major magnitude of change.	It is expected that in the operational stage the implemented environmental design measures will screen partially the Scheme. The view will be altered but its characteristic will remain largely similar to the baseline scenario resulting in a Minor magnitude of change.	Moderate adverse	Neutral
		Side roads	Similarly, as in case of Junction 10 with common elements, a Major magnitude of change is expected during construction stage.	Similarly, as in case of Junction 10 with common elements, Minor magnitude of change is expected during operational stage.	Moderate adverse	Slight adverse
		Side roads	During construction of the alternative access to the A245, partial views of the construction activity may be prominent in views from users of the Registered Park and Garden and this would detract substantially from the views. The magnitude of any temporary impacts is likely to be Moderate.	It is expected that views from the Registered Park and Garden would be altered through the introduction of the alternative access road. These changes in the view would detract partially and would create a Minor change in the view.	Moderate adverse	Slight adverse

Potential Visual Amenity Receptor and baseline	Sensitivity	Scheme element	Magnitude of Impact		Significance of Effect(s)	
			Construction	Operation	Construction	Operation
Receptor 14 Views from Feltonfleet School	Receptors are school children and staff. Moderate sensitivity to change	Side roads	The views from the School will encompass partial views of construction works including removal of trees, construction of the new access from the School Site to Byfleet Road. Temporary views would include also construction machinery and views of delivery lorries delivering material to the Site. Therefore, a Minor magnitude of change is expected.	It is expected that implemented environmental design measures would help to blend the proposed alteration to the Junction close to the School. The views would include new alignment of the junction that would extend further into the School site resulting in Minor effects.	Slight adverse	Slight adverse
		Side roads	During construction of the alternative access to the A245, partial views of the construction activity may be prominent in views from users of the Registered Park and Garden and this would detract substantially from the views. The magnitude of any temporary impacts is likely to be Moderate.	It is expected that views from the Registered Park and Garden would be altered through the introduction of the alternative access road. These changes in the view would detract partially and would create a Minor change in the view.	Moderate adverse	Slight adverse

Potential Visual Amenity Receptor and baseline	Sensitivity	Scheme element	Magnitude of Impact		Significance of Effect(s)	
			Construction	Operation	Construction	Operation
		Junction 10 with common elements	The widening of the existing A3 route will result in partial views of construction operations undertaken along the short section of the widening taking place opposite to the School. The views will be temporarily altered through the introduction of construction machinery and works associated within the area of land take resulting in Moderate effects.	Once the Scheme is implemented, it is expected that views would not vary considerably from those available at baseline scenario. It is expected that the proposed environmental mitigation measures will establish over a time to provide similar level of screening that was afforded by the cleared vegetation which combined with a relatively small extension to the existing highway would result in barely perceptible change to the views and Negligible magnitude of change.	Moderate adverse	Slight adverse
Receptor 15 Views from Pond Farm	Receptors are workers in their place of work. Medium sensitivity to change	Junction 10 with common elements	Partial views of construction operations taking part along the existing alignment of the M25 and the A3 are expected during the construction stage. These will be filtered by intervening woodland and undulating landform, however due to their scale the views will be temporarily altered including views of earthworks formation, progressing works along the highway with potential views of compounds and access tracks resulting in Moderate magnitude of change.	In operational stage, it is expected that introduced environmental measures would successfully screen the views of the Scheme. The views if available would be discernible at the distance resulting in Negligible magnitude of change.	Moderate adverse	Slight adverse

Potential Visual Amenity Receptor and baseline	Sensitivity	Scheme element	Magnitude of Impact		Significance of Effect(s)	
			Construction	Operation	Construction	Operation
Receptor 16 Views from Bramley Hedge Farm, Long Orchard Farm, Firtree Cottage and Foxwarren Cottage.	Receptors are residential users. High sensitivity to change	Side roads	During construction filtered views of construction works along a short section of the A3 widening are likely to be expected. The views would be partial, short term and filtered by existing vegetation. Most of the Scheme would be blocked by woodland between Redhill Road and the M25J10 Therefore, a Minor magnitude of change is expected.	It is expected that implemented environmental design measures would successfully screen most of the improvements along the A3 whilst views of other parts of the Scheme would be blocked by large areas of woodland, resulting in a Negligible magnitude of change.	Moderate adverse	Slight adverse
		Side roads	The construction activities associated with the proposed overbridge in this Scheme element would be partially visible from a few residential properties located close to the Redhill Road. The views are likely to include cranes and other tall machinery but temporarily resulting in Moderate magnitude of change.	A barely perceptible change in the views is expected through the introduction of the A3 overbridge. It is expected that views will be barely perceptible due to a screening provided by existing vegetation along the A3 and vegetation or other built form close to the receptor resulting in Minor magnitude of change.	Moderate adverse	Slight adverse
		Side roads	During construction of the alternative access to the A245, partial views of the construction activity may be prominent in views from users of the Registered Park and Garden and this would detract substantially from the views. The magnitude of any temporary impacts is likely to be Moderate.	It is expected that views from the Registered Park and Garden would be altered through the introduction of the alternative access road. These changes in the view would detract partially and would create a Minor change in the view.	Moderate adverse	Slight adverse

Potential Visual Amenity Receptor and baseline	Sensitivity	Scheme element	Magnitude of Impact		Significance of Effect(s)	
			Construction	Operation	Construction	Operation
Receptor 17 Views from Little Foxwarren, Katz Castle, Queen Annes Cottage	Receptors are residential users. High sensitivity to change	Side roads	There will be No change to the views from these receptors as views are screened completely by tall mature trees located close to the properties.	There will be No change to the views from these receptors as views are screened completely by tall mature trees located close to the house.	Neutral	Neutral
Receptor 18 Views from Sainsbury's site at the junction of Bridge Way and the A245 Portsmouth Road.	Receptors are workforce and shoppers at Sainsbury's site. Low sensitivity to change	Side roads	Partial and filtered views of construction activities at the roundabout linking PAIN 05D with Portsmouth Road/A245 will be available. The views however would form a very small part of the construction activities associated with the Scheme. The views will be short term and would include views of construction activity and associated machinery resulting in No change magnitude of change.	A barely perceptible change of the views is expected in operational stage as new link from the roundabout to Painshill Park will be created resulting in a No change effect.	Neutral	Neutral
		Side roads	The construction activities associated with the proposed overbridge in this Scheme element would be partially visible from a few residential properties located close to the Redhill Road. The views are likely to include cranes and other tall machinery but temporarily resulting in **No change** magnitude of change.	A barely perceptible change in the views is expected through the introduction of the A3 overbridge. It is expected that views will be barely perceptible due to a screening provided by existing vegetation along the A3 and vegetation or other built form close to the receptor resulting in **No change** magnitude of change.	**Neutral**	**Neutral**

Potential Visual Amenity Receptor and baseline	Sensitivity	Scheme element	Magnitude of Impact		Significance of Effect(s)	
			Construction	Operation	Construction	Operation
Receptor 19 Views from residential properties at Seven Hills Road.	Receptors are residential users. High sensitivity to change	Side roads	The construction activities associated with this Scheme element would be partially visible from a few residential properties located close to the Seven Hills Road. The views are likely to include cranes and other tall machinery but temporarily resulting in Minor magnitude of change.	A barely perceptible change in the views is expected through the introduction of the A3 overbridge. It is expected that views will be barely perceptible due to a screening provided by existing vegetation along the A3 and vegetation or other built form close to the receptor resulting in No change magnitude of change.	Slight adverse	Neutral
		Side roads	The construction activities associated with the proposed overbridge in this Scheme element would be partially visible from a few residential properties located close to the Seven Hills Road. The views are likely to include cranes and other tall machinery but temporarily resulting in Moderate magnitude of change.	A barely perceptible change in the views is expected through the introduction of the A3 overbridge. It is expected that views will be barely perceptible due to a screening provided by existing vegetation along the A3 and vegetation or other built form close to the receptor resulting in Minor magnitude of change.	Moderate adverse	Minor adverse
Receptor 20 Views from residential properties at peripheries of Church End and Ockham village	Receptors are residential users. High sensitivity to change	Side roads	Partial and filtered views of construction activities will be available, however considering the distance from the receptor, relatively short section of the proposed improvement and screening provided by overlapping vegetation will result in Minor magnitude of change.	There will be No change to the views from these receptors as views are screened completely by tall mature trees located along the Seven Hills Road.	Slight adverse	Neutral

Potential Visual Amenity Receptor and baseline	Sensitivity	Scheme element	Magnitude of Impact		Significance of Effect(s)	
			Construction	Operation	Construction	Operation
		Side roads	During construction, partially filtered views are expected from residential properties at Church End. The views will be filtered through dense tree cover around the village and intervening vegetation, however it is expected that construction activities will be noticeable in the view due to the extent of the Scheme located on raised land in comparison to the receptor location but also through creation of the link to the A3 Ockham Park Junction resulting in Moderate magnitude of change.	During operational stage implemented environmental design measures will help to blend the Scheme into the existing landscape. However, part of the Scheme will be noticeable, especially the elevated section at southern end of the Scheme linking to the A3 Ockham Park Junction, resulting in a Minor magnitude of change.	Moderate adverse	Slight adverse
Receptor 21 Views from Seven Hills Hotel (Hilton).	Receptors are users of the hotel and employees. Moderate sensitivity to change	Side roads	A very narrow section of construction activities along the A3 is likely to be visible from the Hotel. The views of construction activities will be temporary and would be focused on the existing road corridor. Overall the Moderate magnitude of change is expected during construction.	A barely noticeable change in the view is expected in the operational stage as a result of the introduced Scheme. It is expected that the extension to the highway corridor along the A3 through the introduction of this Option will result in discernible change to the views as implemented environmental design measures will contribute to the screening, resulting in a Minor magnitude of change.	Moderate adverse	Slight adverse

Potential Visual Amenity Receptor and baseline	Sensitivity	Scheme element	Magnitude of Impact		Significance of Effect(s)	
			Construction	Operation	Construction	Operation
		Side roads	A very narrow section of construction activities along the A3 is likely to be visible from the Hotel. The views of construction activities will be temporary and would be focused on the existing road corridor. Overall the Moderate magnitude of change is expected during construction.	A barely noticeable change in the view is expected in the operational stage as a result of the introduced Scheme. It is expected that the extension to the highway corridor along the A3 through the introduction of this Option will result in discernible change to the views as implemented environmental design measures will contribute to the screening, resulting in a Minor magnitude of change.	Moderate adverse	Slight adverse
		Junction 10 with common elements	Similarly, as in the case of Scheme element SAN-02 Minor magnitude of change is expected during construction stage.	Similarly, as in the case of Scheme element SAN-02 Negligible magnitude of change is expected during construction stage.	Slight adverse	Neutral

Appendix F. Geology and Soils

F.1 Planning and policy context

Ground Conditions

National Planning Policy Framework

F.1.1 The National Planning Policy Framework (NPPF)[77] states that local planning policies and decisions should ensure that:

- the site is suitable for its new use, taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any proposed land remediation;
- after remediation, as a minimum, land should not be capable of being determined as Contaminated Land as defined under Part 2A of the Environmental Protection Act (as amended);
- adequate site investigation information, prepared by a competent person, is presented; and
- the economic and other benefits of BMV agricultural land are taken into account and that, where significant development of agricultural land is demonstrated to be necessary, local planning authorities should seek to use areas of poorer quality land in preference to that of a higher quality.

Environmental Protection Act

F.1.2 Part 2A of the Environmental Protection Act (EPA) 1990[78] introduced a statutory regime for the identification and remediation of 'Contaminated Land'. It introduced, for the first time in the UK, a statutory definition of 'Contaminated Land' based on significant harm or the likelihood of significant harm or the pollution or likely pollution of controlled waters (all groundwater, inland waters and estuaries, excluding water perched above the zone of saturation).

F.1.3 Local authorities are the primary regulators under the Part 2A regime, with a duty to identify whether the land in their area is 'Contaminated Land', although provision is made for consultation and co-ordination with the Environment Agency in situations when pollution of controlled waters is an issue.

Environment Agency Report R&D66

F.1.4 Environment Agency report R&D66[79] provides guidance on the development and application of the consequence and probability matrix and guidance on conducting a risk assessment. R&D66 sets out land quality estimation of the Level of Risk by Comparison of Consequence and Probability.

National Policy Statement for National Networks

F.1.5 The National Networks National Policy Statement (NPS)[80] seeks to ensure that Nationally Significant Infrastructure Projects (NSIPs) are designed so as to

[77] Department for Communities and Local Government (2012) National Planning Policy Framework.
[78] United Kingdom Parliament (1990) Environmental Protection Act.
[79] Environment Agency (2008) Guidance for the Safe Development of Housing on Land Affected by Contamination
[80] Department for Transport (2014) National Networks National Policy Statement (NN NPS), Accessed from https://www.gov.uk/government/collections/national-networks-national-policy-statement

minimise social, environmental impacts and to improve quality of life. Further, in delivering new schemes, opportunities to deliver environmental benefits should also be considered as part of scheme proposals.

F.1.6 The NPS is set out in paragraphs 5.162 and 5.185. With respect to geology and soils, key requirements are that the economic and other benefits of BMV agricultural land need to be considered, that areas of poorer agricultural quality land are used in preference to those of a higher quality and that mineral resources are safeguarded as far as possible.

F.1.7 Water quality and resource guidance and policy is set out in paragraphs 5.219 to 5.231. The objective is that new and existing development should be prevented from contributing to, or being put at unacceptable risk from, or being adversely affected by, water pollution. Key requirements are that the existing status of water quality, water resources and physical characteristics in the water environment must be ascertained and that the impacts of the proposed project, including those associated with any cumulative effects, are assessed as part of the Environmental Statement (ES). Careful design to facilitate adherence to good pollution control practice can reduce the risk of impacts on the water environment.

Contaminated Land Statutory Guidance

F.1.8 The principal objectives of the legislation are described in the Department for Environment, Food and Rural Affairs (DEFRA) Contaminated Land Statutory Guidance 2012[81], as follows:

- Identify and remove unacceptable risks to human health and the environment;
- Seek to ensure that contaminated land is made suitable for its current use; and
- Ensure that the burdens faced by individuals, companies and society as a whole are proportionate, manageable and compatible with the principles of sustainable development.

F.1.9 These three objectives underlie the ‘suitable for use’ approach to the assessment and remediation of 'land contamination’. This approach recognises that the risks presented by any given level of land contamination will vary greatly according to the use of the land and a wide range of other factors, such as the sensitivity of the underlying geology and the receptors which may be affected. The ‘suitable for use’ approach consists of three elements:

- Ensuring that land is suitable for its current use;
- Ensuring that land is made suitable for any new use; and
- Limiting requirements for remediation to the work necessary to prevent unacceptable risks to human health or the environment in relation to the current use or future use of the land.

Contaminated Land Report 11 and Guiding Principles for Land Contamination

[81] Department for Environment, Food and Rural Affairs. (2012) Environmental Protection Act: Part 2A Contaminated land Statutory Guidance.

F.1.10 Primary guidance for assessing and managing land contamination is presented in Contaminated Land Report 11 (CLR11)[82] and the Guiding Principles for Land Contamination (GPLC)[83]. These documents provide a technical framework for the identification and remediation of contamination through the application of a risk management process.

Borough of Elmbridge Council, Local Plan and Development Control Policies

F.1.11 The northern section of the Scheme, including the A3 north of M25 Junction 10 to Painshill junction and the eastern portion of the M25 towards Chatley Heath, are within the Borough of Elmbridge. The Borough of Elmbridge Council released the Local Plan in 2016 and the Development Control Policies in 2015 as part of the portfolio of documents forming the Local Development Framework. The Local Plan establishes planning policies for Elmbridge forward to 2019. Those most relevant to this Geology and Soils chapter are contained in Section DM5 - Pollution which include requirements for development on, or near to land which is suspected to be contaminated, including that:

- Development affecting contaminated land will be permitted if it is remediated to be suitable for the proposed use;
- Development of contaminated land must consider the sensitivity of future receptors;
- Remedial decontamination measures must prevent harm to living conditions, biodiversity, or the buildings themselves; and
- All works, including the investigation of the nature of contamination should be conducted without escape of contaminants that cause a risk to health or the environment.

Guildford Borough Council, Local Plan

F.1.12 Parts of the southern and western extents of the Scheme, are situated within the Borough of Guildford. Guildford Borough Council has undertaken an ongoing consultation process to produce a Local Plan, with the current version of the Draft Local Plan produced in January 2003 considered hereafter. The new Local Plan has been submitted to the secretary of state for examination by the planning inspectorate. The current plan (2003 Draft Local Plan[84]) sets out policies for development of Guildford up to 2006 but the Secretary of State for Communities and Local Government gave a direction in 2007 that the Local Plan policies are saved and remain in effect apart from policies H1, H10, S1, RE7, HE11, and proposal U1.

F.1.13 The Draft Local Plan[84] contains policies relating to environmental protection and enhancement. Most relevant to this Geology and Soils chapter are contained in paragraphs 4.22, 4.32 which include requirements for development on, or near to land which is suspected to be contaminated, including that:

- Developments affecting contaminated land must not give rise to unacceptable risks to the environment or health;

[82] Environment Agency (2004) The Model Procedures for the Management of Land Contamination (CLR 11).
[83] Environment Agency (2010) Guiding principles for land contamination (GPLC).
[84] Guilford Borough (2003) Local Plan. http://www.guildford.gov.uk/newlocalplan/CHttpHandler.ashx?id=1068&p=0 (accessed April 2017)

- When proposed development is near contaminated land the applicant must show that the site is safe or can be made so through remedial measures; and
- Development in the vicinity of a site known to be for the storage or transport of hazardous substances will not be granted permission if there would be an unacceptable risk to the safety of its users.

Woking Borough Council, Woking 2027

F.1.14 The north-western Scheme extents, are situated within the Woking Borough Council. As part of Woking Borough Council's statutory responsibility to prepare local development documents to guide planning and development they have produced Woking 2027. Woking 2027 includes the SA/SEA Environmental Adoption Statement which states that appraisals should look for the following aspects with respect to contaminated land and agricultural soils:

"Development that helps remediate contaminated land to suitable use; avoid development of high quality agricultural land".

Surrey County Council - Surrey Minerals Plan 2011 Core Strategy Policy (MC6)

F.1.15 Non-mineral development has the potential to sterilise the minerals or prejudice the operation of existing or proposed sites. Development needs to consider the quality and quantity of mineral reserve impacted by the proposed development, if the mineral can be abstracted prior or during development and whether the proposal can be modified to avoid sterilisation.

Hydrogeology

F.1.16 The following legislation is considered relevant for hydrogeology:

National Planning Policy Framework

F.1.17 The NPPF[85;] sets out policies for water quality and resources in paragraphs 5.219 and 5.231. The key aspects addressed are as follows:

- Preventing new and existing development from contributing or being adversely affected by water pollution;
- The existing quality of waters, water resources, physical characteristics of the water environment, and any cumulative effects must be considered in environmental statements; and
- The risk of impacts on the water environment can be reduced by using good pollution control practice.

The Water Resources Act (WRA) 1991 (as amended)

F.1.18 The WRA[86] sets controls of pollution of water sources in Section III. It contains information about water quality objectives, powers to prevent and control pollution, and pollution offenses.

[85] Department for Communities and Local Government (2012) National Planning Policy Framework.
[86] UK Government (1991) The Water Resources Act (Online). Accessed from http://www.legislation.gov.uk/ukpga/1991/57/contents.

Environment Agency's approach to groundwater protection

F.1.19 The Environment Agency's approach to groundwater protection[87] contains position statements on source protection zones (SPZs), areas identified as drinking water protected areas and aquifer designations. It states that:

- The development of infrastructure should be directed to less sensitive groundwater locations;
- The Environment Agency will use a risk based tiered approach to regulate activities that may impact groundwater resources; and
- The Environment Agency expects developers and operators to take into account all current and future groundwater uses and their dependant ecosystems.

Water Framework Directive

F.1.20 The purpose of the Water Framework Directive (WFD)[88] is to establish a framework for the protection of inland surface waters, transitional waters, coastal waters and groundwater. It requires that:

- Environmental objectives should be set to ensure that good status of groundwater is achieved and that its deterioration is avoided. This includes that any upward sustaining trend in the concentration of a pollutant must be identified and reversed;
- A good status of groundwater requires early action and stable long-term planning of protective measures, owing to the natural time lag in its formation and renewal; and
- Monitoring programmes should cover monitoring of the chemical and quantitative status of groundwater.

River Basin Management Plan

F.1.21 The River Basin Management Plan (RBMP)[89] is designed to protect and improve the quality of the water environment. It includes consideration of the following topics:

- Plans for the protection and improvement of the water environment;
- Future plans that may affect the infrastructure sector and its obligations;
- Development proposal considerations regarding the requirements of the RBMP; and
- Environmental permit applications.

[87] Environment Agency (2017a) The Environment Agency's approach to groundwater protection (Online). Accessed from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/620438/LIT_7660.pdf in July 2017
[88] European Parliament (2000) Water Framework Directive (Directive 2000/60/EC).
[89] Department for Environment and Food and Rural Affairs & Environment Agency (2009) River Basin Management Plan - Thames River Basin District.

F.2 Methodology

F.2.1 The assessment of the potential impacts of the Scheme on soils and geology will be undertaken over two stages, in consultation with the Environment Agency:

- Stage 1 - land contamination risk assessment; and
- Stage 2 - impact assessments.

F.2.2 Based on information available to date, assessment of baseline conditions within the study area has been largely qualitative, with only limited ground investigation data available to assess ground conditions on site.

F.2.3 A phase of ground investigation is to be undertaken to inform the design and to confirm the appropriate mitigation measures. The ground investigation is currently being procured. At this stage, it is envisaged that the ground investigation will:

- Target areas of identified potential contamination sources;
- Provide an assessment of geological boundaries, thickness of strata and geotechnical testing to provide geotechnical parameters for design;
- Characterise the groundwater regime within the study area;
- Sample identified surface water receptors to derive site specific environmental quality standards;
- Determine the extent and nature of any fill materials (Made Ground) which may be present; and
- Determine the aggressivity of the ground towards buried concrete.

F.2.4 Given the timescales associated with the procurement process and the scale of the ground investigation, it is currently envisaged that the ground investigation work and subsequent report will not be available for inclusion within the ES or DCO submission. The ground investigation is expected to take five months to complete with subsequent baseline monitoring, laboratory analysis, assessments and reporting. In light of this the associated assessments and reporting will subsequently be made available as soon as possible.

F.2.5 The soils and geology issues at baseline have been reviewed in this chapter, albeit based on desk based information only, in the absence of ground investigation data which is not yet available and will also not be available in time to be reported in the ES. Potential impacts upon the existing ground conditions which construction and operation of the Scheme could bring about and, in turn, impact upon identified receptors have been identified in line with guidance in the government's Good Practice Guide to EIA[90].

Stage 1 - Land Contamination Risk Assessment

F.2.6 The approach adopted for the land contamination risk assessment will be based on the guidance document CLR11[109] and the Good Practice Guide to EIA[90].

[90] Department for Communities and Local Government, 2006. Environmental Impact Assessment: A guide to good practice and procedures. It should be noted that this document has been archived; however, it still constitutes good advice and should be referred to in the absence of alternative guidance documents. Document available at: http://webarchive.nationalarchives.gov.uk/20120919132719/www.communities.gov.uk/documents/planningandbuilding/pdf/151087. Accessed September 2017

These documents are considered key guidance in the United Kingdom and provide a technical framework for the application of a risk management process through the following steps:

- Develop a Preliminary Conceptual Site Model (PCSM). A desk study review of available documentary information will be undertaken to develop the PCSM, which will describe the linkages between potential contamination hazards/ sources, pathways and receptors relevant to the site. Where all three are present or considered likely to be present, these are described as potential contaminant linkages (PCLs) which can then be subject to the risk assessment process;
- Gather site specific information. The available information will be used to assess the potential for existing contamination at the site. Once these data have been reviewed, recommendations for further ground investigation will be made if required;
- Risk Assessment. Generic quantitative risk assessments (GQRAs) for human health and groundwater receptors will be undertaken to evaluate whether the concentrations of contaminants in soil, soil leachate soil gas and groundwater represent a potential risk to identified receptors. GQRAs will be carried out through the comparison of the ground investigation results to appropriate generic assessment criteria (GAC). GAC are concentrations of a contaminant in soil or groundwater, below which the level of risk is considered to be acceptable. Using the information from the ground investigation and the GQRA, the PCSM will be updated to include an assessment of the level of risk associated with each PCL identified during the baseline, construction and operational phases. Where risks are identified, consideration will be given to whether these would be appropriately mitigated through design and/or the development of a remediation strategy and its subsequent validation, as necessary. The residual risks will be determined and assessed based on estimation of likelihood and consequence. In the absence of ground investigation data, risk assessment will be undertaken with using desk-based information; and
- The risk assessment applies the principles given in the National House Building Council (NHBC) and Environment Agency report R&D66[79], which provides guidance on the development and application of the consequence and probability matrix (as presented in Table F.1 for contaminated land risk assessment).

Table F.1: Land Quality Estimation of the Level of Risk by Comparison of Consequence and Probability

		Consequence			
		Severe	**Medium**	**Mild**	**Minor**
Probability	High Likelihood	Very High Risk	High Risk	Moderate Risk	Moderate/ Low Risk
	Likely	High Risk	Moderate Risk	Moderate/ Low Risk	Low Risk
	Low Likelihood	Moderate Risk	Moderate/ Low Risk	Low Risk	Very Low Risk

		Consequence			
		Severe	Medium	Mild	Minor
	Unlikely	Moderate/ Low Risk	Low Risk	Very Low Risk	Very Low Risk

Table Source: based on R&D66[79]

F.2.7 The potential risk to a receptor is a function of the probability of, and the consequence of a PCL being realised. Probability (likelihood of an event occurring) takes into account both the presence of the hazard and the receptor and the integrity of the exposure pathway[79]. Consequence takes into account both the potential severity of the hazard and the sensitivity of the receptor[79]. Definitions for the classification of probability and consequence are provided below.

Table F.2: Classification of Probability

Classification	Definition of the Probability of Harm/Pollution Occurring
High Likelihood	The contaminant linkage exists and it is very likely to be realised in the short term, and/or will almost inevitably be realised in the long term, and/or there is current evidence of it being realised.
Likely	The source, pathway and receptor exist for the contaminant linkage and it is probable that this linkage will be realised. Circumstances are such that realisation of the linkage is not inevitable, but possible in the short term and likely over the long term.
Low Likelihood	The source, pathway and receptor exist and it is possible that it could be realised. Circumstances are such that realisation of the linkage is by no means certain in the long term and less likely in the short term.
Unlikely	The source, pathway and receptor exist for the contaminant linkage but it is improbable that it will be realised even in the long term.

Table F.3: Classification of Consequences

Classification	Definition of Consequences
Human Health Receptors - Site End Users	
Severe	Acute damage to human health based on the potential effects on the critical human health receptor.
Medium	Chronic damage to human health based on the potential effects on the critical human health receptor.
Minor	Minimal short- term effects on human health based on the potential effects on the critical human health receptor.
Negligible	No appreciable impact on human health based on the potential effects on the critical human health receptor.
Controlled Water Receptors	
Severe	Pollution of a principal aquifer within a source protection zone (inner and outer) or potable supply characterised by a breach of drinking water standards. Pollution of a surface water course characterised by a breach of an EQS at a statutory monitoring location or resulting in a change in GQA grade of river reach. Discharge of a List I or List II substance to groundwater.

Classification	Definition of Consequences
Human Health Receptors - Site End Users	
Medium	Pollution of a principal aquifer outside a source protection zone (inner and outer) or a secondary A aquifer characterised by a breach of drinking water standards. Pollution of an industrial groundwater abstraction or irrigation supply that impairs its function. Substantial pollution but insufficient to result in a change in the GQA grade of river reach.
Minor	Low levels of pollution of a principal aquifer outside a source protection zone or an industrial abstraction, or pollution of a secondary A or B aquifer. Low levels of pollution insufficient to result in a change in the GQA grade of river reach, pollution of a surface water course without a quality classification.
Negligible	No appreciable pollution, or pollution of a low sensitivity receptor such as a secondary (undifferentiated) aquifer or a surface water course without a quality classification.
Ecosystem Receptors	
Severe	For sites with designations as follows - Site of Special Scientific Interest, National Nature Reserve, Special Protection Area (and potential sites), Special Area of Conservation (and candidate sites) or Ramsar. Irreversible adverse change in the functioning of the ecological system or any species of special interest that forms part of that system.
Medium	For sites with designations as follows - Site of Special Scientific Interest, National Nature Reserve, Special Protection Area (and potential sites), Special Area of Conservation (and candidate sites) or Ramsar. Substantial adverse change in the functioning of the ecological system or any species of special interest that forms part of that system.
Minor	Harm to ecosystems of a low sensitivity such as sites of local importance. No appreciable harm to ecosystems with statutory designations.
Negligible	Limited harm to ecosystems of low sensitivity such as sites of local importance.
Property Receptors - Buildings, Foundations and Services including the operational HS2 scheme	
Severe	Collapse of a building or structure including the services infrastructure from explosion.
Medium	Significant damage to a building or structure including the services infrastructure impairing their function.
Minor	Damage to buildings/structures and foundations but not resulting in them being unsafe for occupation. Damage to services but not sufficient to impair their function.
Negligible	No appreciable damage to buildings/structures, foundations and services.
Property Receptors - Grade 1 Agricultural land	
Severe	Substantial loss in the value of crops or domestically-grown produce resulting from disease, death or other physical damage. Death to livestock, domesticated animals or wild animals subject to shooting or fishing rights.
Medium	Substantial diminution in yield of crops or domestically-grown produce resulting from disease, death or other physical damage. Serious disease or other serious physical damage to livestock, domesticated animals or wild animals subject to shooting or fishing rights.

Classification	Definition of Consequences
Human Health Receptors - Site End Users	
Minor	Harm to crops but not resulting in a substantial loss in value or diminution in yield. Limited harm in terms of disease or other physical damage to livestock, domesticated animals or wild animals subject to shooting or fishing rights.
Negligible	No appreciable harm, or harm to a low sensitivity receptor.

F.2.8 Based on R&D66[79], the descriptions of the classified risks are as follows:

- Very high risk: There is a high probability that severe harm could arise to a designated receptor from an identified hazard at the site without remediation action OR there is evidence that severe harm to a designated receptor is already occurring. Realisation of that risk is likely to present a substantial liability to the site owner/or occupier. Investigation is required as a matter of urgency and remediation works likely to follow in the short-term;
- High risk: Harm is likely to arise to a designated receptor from an identified hazard at the site without remediation action. Realisation of the risk is likely to present a substantial liability to the site owner/or occupier. Investigation is required as a matter of urgency to clarify the risk. Remediation works may be necessary in the short-term and are likely over the longer term;
- Moderate risk: It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, and if any harm were to occur it is more likely, that the harm would be relatively mild. Further investigative work is normally required to clarify the risk and to determine the potential liability to site owner/occupier. Some remediation works may be required in the longer term;
- Low risk: It is possible that harm could arise to a designated receptor from identified hazard, but it is likely at worst, that this harm if realised would normally be mild. It is unlikely that the site owner/or occupier would face substantial liabilities from such a risk. Further investigative work (which is likely to be limited) to clarify the risk may be required. Any subsequent remediation works are likely to be relatively limited;
- Very low risk: It is a low possibility that harm could arise to a designated receptor, but it is likely at worst, that this harm if realised would normally be mild or minor; and
- No potential risk: There is no potential risk if no pollution linkage has been established.

Stage 2 - Impact Assessment

Land Contamination

F.2.9 The land contamination impact assessment requires comparison of the baseline with the potential impacts that the development will have during the construction phase and operational phase. This approach enables changes in the impact to receptors during the construction and operational phases to be identified, an assessment of the effect of the Scheme to be made and appropriate mitigation measures specified. The changes in contamination status are described as either beneficial or adverse and consideration is made of whether they are major,

moderate, minor or negligible, on the basis of the value of the receptor, the area over which the effect may occur, duration (short, medium or long term) and whether the effect is permanent or temporary.

F.2.10 A methodology for the assessment of significant effects using sensitivity and magnitude is presented below in Table F.4 and Table F.5. However, it should be noted that this assessment is built into the Stage 1 land contamination risk assessment process and the R&D6674 assessment method integrates the sensitivity of the receptor into the assessment of the magnitude (defined as consequence in R&D6674) of harm and then compares this against the likelihood of the harm occurring. However, as land contamination cannot be defined as a resource, the magnitude of impact on the resource is not assessed, rather the magnitude of impact on each receptor. Table 10.1 above shows how the interactions of consequence and likelihood associated with the PCLs results in the significance of a potential risk or impact.

F.2.11 For the purposes of informing the land contamination impact assessment, land contamination risk assessments need to be undertaken for each development phase.

F.2.12 The development phases to be considered include: construction without mitigation; construction with mitigation, based on the identified mitigation measures that would need to be implemented through the design and construction stages of the Scheme (see section 10.6 Potential mitigation measures in Volume 1); and operation of the Scheme (including maintenance) assuming all mitigation has been undertaken prior to and during construction.

Geology and Geomorphology

F.2.13 An impact assessment of the potential effects of the Scheme on ground conditions and geology as a valuable resource has been undertaken using a qualitative approach considering the effects on topography, soil compaction, soil erosion and ground stability, and loss, destruction or sterilisation of a valuable geological resource.

Assessing Effects and Defining Significance

F.2.14 The value of a receptor is considered when determining consequence of an effect in the impact assessment. The value and/or sensitivity of each of the receptors is determined using the classifications given in Table F.4.

F.2.15 As mentioned above, the below criteria are not utilised in the assessment of land contamination impacts as the value of a receptor is considered when determining consequence of an effect in the risk assessment.

Table F.4: Criteria for classifying the value and/or sensitivity of environmental resources/receptors

Value/Sensitivity	Criteria	Examples
High	Attribute possesses key characteristics which contribute significantly to the distinctiveness, rarity and character of the site/receptor.	Principal Aquifer providing potable water to a large population, within an inner or outer groundwater source protection zone (Source Protection Zone (SPZ) 1 or SPZ 2). WFD high status water body (surface water) providing potable water to a small population.

Value/Sensitivity	Criteria	Examples
	Attribute has a very low capacity to accommodate the proposed change.	Sensitive human health receptors, e.g. young children. Buildings, including services and foundations but of high historic value or other sensitivity e.g. statutory designations, schools, residential dwellings. Ecological statutory designations with high sensitivity e.g. SSSI, LNR, SPA, RAMSAR etc. Statutory geological sites e.g. Geological SSSIs. Regionally important mineral resource. Major topographic, ground stability, soil compaction or erosion hazards present at the site. High potential for materials re-use.
Medium	Attribute possesses key characteristics which contribute significantly to the distinctiveness, rarity and character of the site/receptor. Attribute has a low capacity to accommodate the proposed change.	Principal Aquifer beyond a SPZ, or secondary aquifer. Secondary aquifer providing abstraction water for agricultural or industrial use. WFD good status water body (surface water). Buildings, including services and foundations. Less sensitive human receptors, e.g. construction workers using PPE. Moderately economically viable mineral resource. Moderate topographic, ground stability, soil compaction or erosion hazards present at the site. Moderate potential for materials re-use.
Low	Attribute only possesses characteristics which are locally significant. Attribute has some tolerance to accommodate the proposed change.	Unproductive strata or Secondary Aquifer without abstraction. WFD moderate - poor status (surface water). Infrastructure (roads, bridges, railways). Non-statutory designated sites of regional importance that are not highly sensitive to damage from coastal change. No economically viable minerals. No sensitive human receptors. No topographic, ground stability, soil compaction or erosion hazards present at the site. No opportunity for materials re-use.

Table Source: DMRB Volume 11, Section 2, Part 5

F.2.16 Following determination of the value of receptors, the magnitude of potential construction phase and operational phase impacts is determined based on the criteria defined in Table F.5. The magnitude of land contamination impacts is

guided by comparison of baseline, construction phase and operational phase risks, determined in the Option Selection Stage assessment.

F.2.17 Again, as mentioned above, the below criteria are not utilised in the assessment of land contamination impacts as the assessment of magnitude is considered when determining consequence of an effect in the risk assessment.

Table F.5: Classification of Magnitude of Impact

Classification of Magnitude	Criteria
High	Total loss of major alterations to one of more of the key elements, features or characteristics of the baseline. The post-development situation will be fundamentally different.
Medium	Partial loss or alteration to one of more of the key elements or characteristics of the baseline. The post-development situation will be partially changed.
Low	Minor loss or alteration to one or more of the key elements, features or characteristics of the baseline. Post-development, the change will be discernible but the underlying situation will remain similar to the baseline.
Negligible	Very minor loss or alteration to one of more of the key elements, features or characteristics of the baseline, such that post-development, the change will be barely discernible, approximating to the “no change” situation.

F.2.18 The overall potential significance of effects is then defined using the matrix presented below in Table F.6, which describes the relationship between the value of the resource (sensitivity) as defined in Table F.4 and magnitude of the potential impact as defined in Table F.5.

Table F.6: Criterion for determining the impact significance of effects

Value/Sensitivity of receptor	Magnitude of impact			
	High	Medium	Low	Negligible
High	Major	Moderate/ Major	Moderate	Minor/ Moderate
Medium	Moderate/ Major	Moderate	Minor/ Moderate	Minor
Low	Moderate	Minor/ Moderate	Minor	Negligible

F.2.19 The classification of significance of effects has been based on the criteria defined in Table F.7.

Table F.7: Classification of Significance of Effects

Classification of Significance	Effect
Major adverse	Complete loss of destruction of an important geological site. Significant sterilisation of mineral resources. Complete permanent change in topography which impacts the local community.

Classification of Significance	Effect
	Significant soil erosion, soil compaction or ground instability that is permanent in nature. An increase in contamination risk from the existing baseline conditions of 4 or 5 risk levels in the risk matrix, e.g. land that has a very low contamination risk in the baseline becomes a high or very high risk. Land that does not meet the statutory definition of Contaminated Land in the existing baseline becomes capable of being determined under Part 2A. The generation of significant volumes of hazardous waste requiring off-site disposal to appropriate landfill.
Moderate adverse	Moderate damage of an important geological site. Moderate sterilisation of a mineral resource. Partial long term (> 10 years) change in topography which impacts the local community. Moderate soil erosion, soil compaction, or ground instability that is either permanent or long term in nature. An increase in contamination risk from the existing baseline conditions of 2 or 3 risk levels in the risk matrix, e.g. land that has a low contamination risk in the baseline becomes a moderate or high risk. Land that does not meet the statutory definition of Contaminated Land in the existing baseline becomes capable of being determined under Part 2A. The generation of a moderate volume of waste requiring offsite disposal.
Minor adverse	Minor damage of an important geological site. Minor sterilisation of a mineral resource. Limited medium term (5 to 10 years) change in topography which impacts the local community. Limited medium term soil erosion, soil compaction, or ground instability. An increase in contamination risk from the existing baseline conditions of 1 risk level in the risk matrix, e.g. land that has a low contamination risk in the baseline becomes a moderate/low risk. The generation of a minor amount of waste.
Negligible	No change to geological receptors. No measurable impact on topography, soil erosion, soil compaction, or ground instability or impacts that are only temporary in nature (< 5 years). Negligible change in contamination risks. No generation of waste as part of the development, materials are used sustainably.
Minor beneficial	Minor improvement of an important geological site. Minor improvement in access to a mineral resource. Limited medium term (5 to 10 years) change in topography which has a positive impact on the local community. Limited medium term reduction in existing soil erosion, soil compaction, or ground instability issues. A reduction in contamination risk from the existing baseline conditions of 1 risk level in the risk matrix, e.g. land that has a moderate/low contamination risk in the baseline becomes a low risk. A minor amount of materials reuse as part of the development limiting the offsite disposal of waste.

Classification of Significance	Effect
Moderate beneficial	Moderate improvement of an important geological site. Moderate improvement in access to a mineral resource. Partial long term (> 10 years) change in topography which has a positive impact on the local community. Moderate permanent or long term reduction in existing soil erosion, soil compaction, or ground instability issues. A reduction in contamination risk from the existing baseline conditions of 2 or 3 risk levels in the risk matrix, e.g. land that has a high contamination risk in the baseline becomes a moderate/low or low risk. Land that meets the statutory definition of Contaminated Land in the existing baseline is no longer capable of being determined under Part 2A. A moderate amount of materials re-use as part of the development limiting the offsite disposal of waste.
Major beneficial	Major improvement of an important geological site. Major improvement in access to a mineral resource. Complete permanent change in topography which has a positive impact on the local community. Significant permanent reduction in existing soil erosion, soil compaction or ground instability issues. A reduction in contamination risk from the existing baseline conditions of 4 or 5 risk levels in the risk matrix, e.g. land that has a very high contamination risk in the baseline becomes a low or very low risk. Land that meets the statutory definition of Contaminated Land in the existing baseline is no longer capable of being determined under Part 2A. Sustainable use of material including recycling/reusing on site material. No offsite disposal of wastes to landfill.

F.2.20 Following the classification of an effect, as detailed in Table F.7, a clear statement is made as to whether the effect is ‘significant’ or ‘not significant’. As a general rule, major and moderate effects are considered to be significant and minor and negligible effects are considered to be not significant. However, professional judgement is also applied, where appropriate.

F.3 Trade Directories

Table F.4: Trade Directories

Name	Activity	Status	Location
Shotblast Group	Blast Cleaning Equipment Manufacturers	Active	Byfleet
Bright Green Technology Ltd	Lighting Manufacturers	Active	Byfleet
Bone-Dry	Carpet, Curtain & Upholstery Cleaners	Inactive	Byfleet
The Surrey Car Company	Car Dealers - Used	Active	Ripley
Cleaners Byfleet	Cleaning Services - Domestic	Inactive	Byfleet
Construction Connected Ltd	Commercial Vehicle Dealers	Active	Byfleet
Pro Cleaners West Byfleet	Cleaning Services - Domestic	Inactive	Byfleet
Choice Integrated Services Ltd	Air Conditioning & Refrigeration Contractors	Active	Byfleet
Preformed Markings Ltd	Road Marking & Surfacing Equipment & Material Manufacturers	Inactive	West Byfleet
Prospect Materials Ltd	Sand, Gravel & Other Aggregates	Inactive	Byfleet
The Ripley Carpet Company	Carpet & Fabric Proofing	Inactive	Woking
Jet	Petrol Filling Stations	Active	Byfleet
Bright & Beautiful	Cleaning Services - Domestic	Inactive	Cobham
Cooper Cobham	Car Dealers	Active	Cobham
Shell Service Station	Petrol Filling Stations	Active	Wisley
Oyster Lane Filling Station	Petrol Filling Stations	Active	Byfleet
A P T Radar Systems Ltd	Electronic Engineers	Inactive	Byfleet
London Metier	Picture & Picture Frame Renovating & Restoring	Inactive	Cobham
Porsche Centre Brooklands	Car Customisation & Conversion Specialists	Active	Byfleet

Name	Activity	Status	Location
The Picture Restoration Studio	Art Restoration & Picture Cleaning	Inactive	Ripley
Charles Austen Pumps Ltd	Pump Manufacturers	Inactive	Byfleet
Hydralectric Appliance Controls	Electronic Component Manufacturers & Distributors	Inactive	Byfleet
Wipeout Environmental Cleaning Services	Commercial Cleaning Services	Active	Byfleet
Integrated Finishers Ltd	Metal Finishing Services	Active	Byfleet
S D M O Energy Ltd	Electricity Generating & Distributing Equipment	Active	Byfleet
Woodham Autos	Car Dealers - Used	Inactive	Byfleet
Etyres	Tyre Dealers	Inactive	Byfleet
Beetles To Bentleys	Garage Services	Inactive	Surrey
T M S Autos	Garage Services	Inactive	Cobham
Mcguire & Reed	Sheet Metal Work	Inactive	Byfleet
Premier Groundcare	Lawnmowers & Garden Machinery - Sales & Service	Inactive	Ripley
Carlton St Martins Ltd	Carpet, Curtain & Upholstery Cleaners	Inactive	Byfleet
Ripley Garage	Petrol Filling Stations	Inactive	Ripley
Aegg Golden Glow	Cleaning Services - Domestic	Inactive	Cobham
Halfords Autocentre	Garage Services	Active	Byfleet
Ashaden Cars	Garage Services	Active	Ripley
Profile Cleaning Services	Cleaning Services - Domestic	Inactive	Byfleet
I Z O Joinery	Joinery Manufacturers	Inactive	Cobham
Stay Cool	Air Conditioning Equipment & Systems	Inactive	Byfleet
Nice-Bugs	Garage Services	Inactive	Ripley
The Wheel Wizard	Car Painters & Sprayers	Active	Cobham
Byfleet Classic Cars	Car Dealers	Inactive	Byfleet

Name	Activity	Status	Location
Pest Control Byfleet	Pest & Vermin Control	Inactive	Byfleet
D & A Autos	Car Engine Tuning & Diagnostic Services	Inactive	Byfleet
Surrey Performance Cars	Car Dealers	Inactive	Byfleet
Cooper Cobham Bmw	Car Dealers	Inactive	Surrey
Mclellan Print	Printers	Inactive	Cobham
Cridfords Of Surrey	Car Dealers - Used	Inactive	Ripley
Charles Austen Pumps	Pump Manufacturers	Active	Byfleet
Surrey Restoration Ltd	Antiques - Repairing & Restoring	Active	Cobham
H W Restorations	Classic Car Specialists	Inactive	Ripley
Cooper Cobham Bmw	Car Dealers	Active	Cobham
Finishing Touches	French Polishing	Inactive	Cobham
K Watts Construction Ltd	Asphalt & Coated Macadam Laying Contractors	Active	Byfleet
M F Autos	Garage Services	Active	Byfleet
The House Of Questa Ltd	Printers	Inactive	Byfleet
P M L Air Conditioning Ltd	Air Conditioning & Refrigeration Contractors	Active	Byfleet
Cameronaire Environmental Ltd	Air Conditioning Equipment & Systems	Inactive	Byfleet
General Motor Repairs	Commercial Vehicle Bodybuilders & Repairers	Inactive	Byfleet
Janousek Racing Boats Ltd	Boatbuilders & Repairers	Inactive	Byfleet
A H C S	Waste Disposal Services	Inactive	Byfleet
Merry Maids	Cleaning Services - Domestic	Active	Byfleet
The Send Group	Packaging & Wrapping Equipment & Supplies	Inactive	High Street/Ripley/Woking
Access Repairs	Washing Machines - Servicing & Repairs	Active	Byfleet
Kaile Engineering	Engineers - General	Inactive	Cobham

Name	Activity	Status	Location
Supercraft	Aviation Engineers	Active	Byfleet
Tyrefix	Tyre Dealers	Inactive	Surrey
Sendmarsh Tractors	Agricultural Machinery - Sales & Service	Active	Cobham
South East Pest Control	Pest & Vermin Control	Inactive	Cobham
Roycott Wire Products	Wire Products - Manufacturers	Inactive	Byfleet
Hydralectric Group	Electronic Component Manufacturers & Distributors	Active	Byfleet
Murco Petroleum Ltd	Petrol Filling Stations	Inactive	Byfleet
Ripley Village Coachworks	Car Body Repairs	Inactive	Ripley
Katz Castle Garden Machinery Services	Lawnmowers & Garden Machinery - Sales & Service	Inactive	Cobham
Automated Machine Tools Ltd	Machine Tool Accessories & Services	Inactive	Byfleet
Winchem Ltd	Chemicals - Distributors & Wholesalers	Inactive	Ripley
Pristines	Dry Cleaners	Inactive	Ripley
Printmasters Ltd	Printers	Inactive	Byfleet
Badalex Ltd	Precision Engineers	Inactive	Byfleet
Heathrow Haulage Co Ltd	Road Haulage Services	Inactive	Byfleet
P R G Powerhouse	Electrical Goods Sales, Manufacturers & Wholesalers	Inactive	Surrey
P R M Automotive	Garage Services	Inactive	Byfleet
Qanta Bio Tech Ltd	Scientific Apparatus & Instruments - Manufacturers	Inactive	Byfleet
Aaa Waste Services Ltd	Waste Disposal Services	Inactive	Cobham
Pnt Trading	Electrical Goods Sales, Manufacturers & Wholesalers	Inactive	Byfleet
Brooklands Vehicles	Car Dealers	Inactive	Ripley
B H Environmental Services	Pest & Vermin Control	Active	Redhill Road
Brooklands Vehicles	Car Dealers	Inactive	Ripley

Name	Activity	Status	Location
Cridfords	Car Dealers - Used	Inactive	Ripley
Village Coachworks-Ripley Ltd	Car Body Repairs	Inactive	Ripley
Motorflair	Car Dealers	Inactive	Ripley
Surrey Car Co	Car Dealers - Used	Inactive	Byfleet
Pole Position Cars Ltd	Car Dealers	Inactive	Cobham
Hain Lifescience	Laboratory Equipment, Instruments & Supplies	Active	Surrey
The Wheel Wizard Ltd	Garage Services	Inactive	Byfleet
Kelsi Print	Printing Equipment Manufacturers	Inactive	Surrey
P G Foam Supplies Ltd	Foam Products - Rubber & Plastics	Active	Downside
Firework Displays Ltd	Firework Stockists	Active	Cobham
Rain-Dance	Blinds, Awnings & Canopies	Inactive	Ripley
Elmwood Coachworks Ltd	Car Body Repairs	Inactive	Ripley
Spm Motor Works	Garage Services	Inactive	Surrey
Wendale Services Group	Commercial Cleaning Services	Inactive	Surrey
Pest Control Byfleet	Pest & Vermin Control	Inactive	Byfleet
Oakcrown Developments Ltd	Air Conditioning Equipment & Systems	Inactive	Surrey
Aec Treatment Ltd	Metal Finishing Services	Inactive	Byfleet
Edjo Papers	Distribution Services	Inactive	Surrey
Peregrine Polymer & Rubber Ltd	Rubber & Plastic Products - Manufacturers	Inactive	Byfleet
British Bus Sales	Commercial Vehicle Dealers	Inactive	Cobham
Brown Bros	Paint Spraying Equipment & Accessories	Inactive	Surrey
Airwerx	Classic Car Specialists	Inactive	Surrey
Carpet Bright	Carpet, Curtain & Upholstery Cleaners	Active	Surrey

Name	Activity	Status	Location
Shell Cobham	Petrol Filling Stations	Active	Cobham
All Pests	Pest & Vermin Control	Active	Surrey
A H C S	Waste Disposal Services	Active	Byfleet
Mason Ltd	Garage Services	Inactive	Ripley
Shotblast Group	Blast Cleaning Equipment Manufacturers	Inactive	Byfleet
Batac Design & Construction	Cabinet Makers	Active	Downside
Clipper Containers & Closures	Packaging & Wrapping Equipment & Supplies	Inactive	Cobham
Becon Precision Engineering Ltd	Precision Engineers	Active	Surrey
I Stewart & Sons	Asphalt & Coated Macadam Laying Contractors	Inactive	Surrey
Squire Furneaux Cobham Ltd	Car Dealers	Inactive	Surrey
Bill Shepherd Mustang	Car Dealers	Inactive	Surrey
Quest Print Technology Ltd	Printers	Inactive	Surrey
Ellery Transport Ltd	Road Haulage Services	Inactive	Surrey
Janousek & Stampli Racing Group	Boatbuilders & Repairers	Inactive	Byfleet
W V C Service Ltd	Garage Services	Active	Byfleet

F.4 Baseline Risk Assessment

Table F.5: Baseline Risk Assessment

Source	Receptor	Pathway	Baseline			Construction without mitigation			Mitigation Measures	Construction with mitigation			Operation (including maintenance) (assuming all mitigation undertaken prior to and during construction)		
			Potential Consequence	Probability	Classification of Risk	Potential Consequence	Probability	Classification of Risk		Potential Consequence	Probability	Classification of Risk	Potential Consequence	Probability	Classification of Risk
Potential contaminants in soil/groundwater and gases/vapours associated with the following on-site sources: • Made Ground of unknown provenance associated with the construction of the M25, A3, A245, local access roads, Wisley Airfield and San Dominico sites. • Historical Landfills (Old Rectory Farm, Land at East of Buxton Wood and Pond Farm). • Pollution incidents (notably oils and chemicals). • Potentially contaminative activities associated with the former Wisley Airfield. • Agricultural activities within	Human Health (on-site) Construction workers and site workers	Inhalation, ingestion and dermal contact with contaminants in soil and soil-derived dust/fibres	Medium	Likely	Moderate Risk	Medium	High likelihood	High Risk	Ground investigation and risk assessment as necessary to define risk. Remediation/removal of existing contamination if risk assessments deem necessary. Implementation of measures in the Construction Environmental Management Plan (CEMP) such as good management of stockpiles in accordance with EA PPG, implementation of pollution incident control e.g. plant drip trays and spill kits. Implementation of dust management systems. RAMS to be completed prior to construction and risk management with appropriate personal protective equipment (PPE). Additional monitoring and risk assessment if required to determine mitigation measures that may need to be incorporated into design of structures and services.	Medium	Low Likelihood	Moderate/ Low Risk	Medium	Unlikely	Low Risk
		Inhalation, ingestion and dermal contact with contaminants within perched water and shallow groundwater	Medium	Low Likelihood	Moderate/ Low Risk	Medium	High likelihood	High Risk		Medium	Low Likelihood	Moderate/ Low Risk	Medium	Unlikely	Low Risk
		Migration and accumulation of ground gases followed by inhalation or ignition causing asphyxiation and/or explosion	Severe	Low Likelihood	Moderate Risk	Severe	Likely	High Risk		Severe	Low Likelihood	Moderate Risk	Severe	Unlikely	Moderate/ Low Risk
		Inhalation of vapours from soil and/or groundwater	Medium	Low Likelihood	Moderate/ Low Risk	Medium	High Likelihood	High Risk		Medium	Low Likelihood	Moderate/ Low Risk	Medium	Unlikely	Low Risk
	Human Health (on-site) Members of the public using public rights of way (non-motorised users)	Inhalation, ingestion and dermal contact with contaminants in soil and soil-derived dust/fibres	Medium	Likely	Moderate Risk	Receptor not present on-site during construction phase		-		Receptor not present on-site during construction phase		-	Medium	Unlikely	Low Risk
		Ingestion and dermal contact with contaminants within perched water and shallow groundwater	Medium	Unlikely	Low Risk			-				-	Medium	Unlikely	Low Risk
		Migration and accumulation of ground gases followed by inhalation or ignition causing asphyxiation and/or explosion	Severe	Low Likelihood	Moderate Risk			-				-	Severe	Unlikely	Moderate/ Low Risk
		Inhalation of vapours from soil and/or groundwater	Medium	Low Likelihood	Moderate/ Low Risk			-				-	Medium	Unlikely	Low Risk

Source	Receptor	Pathway	Baseline			Construction without mitigation			Mitigation Measures	Construction with mitigation			Operation (including maintenance) (assuming all mitigation undertaken prior to and during construction)		
			Potential Consequence	Probability	Classification of Risk	Potential Consequence	Probability	Classification of Risk		Potential Consequence	Probability	Classification of Risk	Potential Consequence	Probability	Classification of Risk
the red line boundary. • Sub-station. (Potential contaminants of concern include a range of inorganic and organic contaminants including heavy metals, hydrocarbons, fuels/oil, Polycyclic Aromatic Hydrocarbons (PAH), Total Petroleum Hydrocarbons (TPH), solvents, asbestos, Polychlorinated Biphenyls (PCBs), herbicides and pesticides).	Human Health (off-site) Local residents School children and staff (Feltonfleet School) Workers and visitors at nearby commercial premises and recreational facilities Members of the public using public rights of way (non-motorised users)	Inhalation, ingestion and dermal contact with contaminants in windblown soil-derived dust/fibres	Medium	Low Likelihood	Moderate/ Low Risk	Medium	High Likelihood	High Risk	Ground investigation and risk assessment as necessary to define risk. Remediation/removal of existing contamination if risk assessments deem necessary. Controlled Waters piling risk assessments. Dewatering risk assessment if dewatering processes are to be implemented. Implementation of measures in the CEMP such as good management of stockpiles in accordance with EA PPG, implementation of pollution	Medium	Low Likelihood	Moderate/ Low Risk	Medium	Unlikely	Low Risk
		Ingestion and dermal contact with contaminants within perched water and shallow groundwater	Medium	Low Likelihood	Moderate/ Low Risk	Medium	Low Likelihood	Moderate/ Low Risk		Medium	Low Likelihood	Moderate/ Low Risk	Medium	Unlikely	Low Risk
		Migration and accumulation of ground gases followed by inhalation or ignition causing asphyxiation and/or explosion	Severe	Low Likelihood	Moderate Risk	Severe	Likely	High Risk		Severe	Low Likelihood	Moderate/ Low Risk	Severe	Unlikely	Moderate/ Low Risk
		Inhalation of vapours from soil and/or groundwater	Medium	Low Likelihood	Moderate/Low Risk	Medium	Likely	Moderate Risk		Medium	Low Likelihood	Moderate/Low Risk	Medium	Unlikely	Low Risk
	Controlled Waters (on-site) Groundwater (superficial Principal and Secondary A Aquifers, bedrock Secondary A Aquifer). Surface water (Stratford Brook, River Mole, Bolder Mere, Manor Lake, drains and ditches).	Leaching/vertical migration of contaminants in soils to underlying groundwater	Medium	Likely	Moderate Risk	Medium	High Likelihood	High Risk		Medium	Low Likelihood	Moderate/ Low Risk	Medium	Unlikely	Low Risk
		Vertical migration of contaminants via preferential pathways such as via piles to deeper groundwater	Medium	Low Likelihood	Moderate/ Low Risk	Medium	High Likelihood	High Risk		Medium	Unlikely	Low Risk	Medium	Unlikely	Low Risk
		Lateral migration of contamination in groundwater	Medium	Likely	Moderate Risk	Medium	High Likelihood	High Risk		Medium	Low Likelihood	Moderate/ Low Risk	Medium	Unlikely	Low Risk
		Migration of contaminants entrained in surface water run-off	Medium	Low Likelihood	Moderate/ Low Risk	Medium	High Likelihood	High Risk		Medium	Low Likelihood	Moderate/ Low Risk	Medium	Unlikely	Low Risk
		Migration of contamination via surface waters	Medium	Low Likelihood	Moderate/ Low Risk	Medium	High Likelihood	High Risk		Medium	Low Likelihood	Moderate/ Low Risk	Medium	Unlikely	Low Risk

Source	Receptor	Pathway	Baseline			Construction without mitigation			Mitigation Measures	Construction with mitigation			Operation (including maintenance) (assuming all mitigation undertaken prior to and during construction)		
			Potential Consequence	Probability	Classification of Risk	Potential Consequence	Probability	Classification of Risk		Potential Consequence	Probability	Classification of Risk	Potential Consequence	Probability	Classification of Risk
	Controlled Waters (off-site) Groundwater (Superficial Principal and Secondary A Aquifers, bedrock Secondary A Aquifer). Surface water (Stratford Brook, River Mole, River Wey, Bolder Mere, Pond Farm Pond, Manor Pond, drains, ditches and ponds).	Leaching/vertical migration of contaminants in soils to underlying groundwater	Medium	Likely	Moderate Risk	Medium	High Likelihood	High Risk	incident control e.g. plant drip trays and spill kits. Control of run off and implementation of dust management systems.	Medium	Low Likelihood	Moderate/ Low Risk	Medium	Unlikely	Low Risk
		Lateral migration of contamination in groundwater	Medium	Likely	Moderate Risk	Medium	High Likelihood	High Risk		Medium	Low Likelihood	Moderate/ Low Risk	Medium	Unlikely	Low Risk
		Migration of contaminants entrained in surface water run-off	Medium	Low Likelihood	Moderate/ Low Risk	Medium	High Likelihood	High Risk		Medium	Low Likelihood	Moderate/ Low Risk	Medium	Unlikely	Low Risk
		Migration of contamination via surface waters	Medium	Low Likelihood	Moderate Risk	Medium	High Likelihood	High Risk		Medium	Low Likelihood	Moderate/ Low Risk	Medium	Unlikely	Low Risk
	Ecology Thames Basin Heath SPA, Ockham Common and Wisley Common SSSI, Ockham and Wisley LNR and Ancient Woodland.	Lateral migration of contamination in shallow groundwater	Medium	Likely	Moderate Risk	Medium	High Likelihood	High Risk	Ground investigation and risk assessment as necessary to define risk. Remediation/removal of existing contamination if risk assessments deem necessary. Dewatering risk assessment if dewatering processes are to be implemented. Implementation of measures in the CEMP such as good management of stockpiles in accordance with EA PPG, implementation of pollution incident control e.g. plant drip trays and spill kits. Control of run off and implementation of dust management systems.	Medium	Low Likelihood	Moderate/Low Risk	Medium	Unlikely	Low Risk
		Migration of contaminants entrained in surface water run-off	Medium	Low likelihood	Moderate/Low Risk	Medium	High Likelihood	High Risk		Medium	Low Likelihood	Moderate/Low Risk	Medium	Unlikely	Low Risk

Source	Receptor	Pathway	Baseline			Construction without mitigation			Mitigation Measures	Construction with mitigation			Operation (including maintenance) (assuming all mitigation undertaken prior to and during construction)		
			Potential Consequence	Probability	Classification of Risk	Potential Consequence	Probability	Classification of Risk		Potential Consequence	Probability	Classification of Risk	Potential Consequence	Probability	Classification of Risk
	Property (on-site) Piles and other foundations Underground services.	Chemical attack from aggressive chemical constituents in soil or groundwater	Mild	Low likelihood	Low Risk	Mild	High Likelihood	Moderate Risk	Ground investigation and risk assessment as necessary to define risks. Remediation/removal of existing contamination if risk assessments deem necessary. Appropriate assessment and design of services resistant to chemical attack if risk assessments deem necessary. Additional monitoring and risk assessment if required to determine mitigation measures that may need to be incorporated into design of structures and services.	Mild	Unlikely	Very Low Risk	Mild	Unlikely	Very Low Risk
		Migration of ground gases or vapours along preferential pathways including permeable ground, services trenches and service entry points and accumulation in enclosed spaces such as services ducts or access points	Severe	Low Likelihood	Moderate Risk	Severe	Likely	High Risk		Severe	Low Likelihood	Moderate Risk	Severe	Unlikely	Moderate/Low Risk
	Property (off-site) Residential, commercial and industrial properties Underground services	Chemical attack from aggressive chemical constituents in soil or groundwater	Mild	Low Likelihood	Low Risk	Mild	High Likelihood	Moderate Risk		Mild	Low Likelihood	Low Risk	Mild	Unlikely	Very Low Risk
		Migration of ground gases or vapours along preferential pathways including permeable ground, services trenches and service entry points and accumulation in enclosed spaces such as services ducts or access points	Severe	Low Likelihood	Moderate Risk	Severe	Likely	High Risk		Severe	Low Likelihood	Moderate Risk	Severe	Unlikely	Moderate/Low Risk
Potential contaminants in soil/groundwater and gases/vapours associated with the following off-site sources: • Made Ground of unknown provenance associated with the construction of local roads, Wisley Airfield, Battleston Hill,	Human Health (on-site) Construction workers and site workers	Inhalation, ingestion and dermal contact with contaminants in windblown soil-derived dust/fibres	Medium	Low Likelihood	Moderate/Low Risk	Medium	Likely	Moderate Risk	Ground investigation and risk assessment as necessary to define risks. RAMS to be completed prior to construction and risk management with appropriate personal protective equipment (PPE). Additional monitoring and risk assessment if required to determine mitigation measures that may need to	Medium	Low Likelihood	Moderate/Low Risk	Medium	Low Likelihood	Moderate/Low Risk
		Ingestion and dermal contact with contaminants within perched water and shallow groundwater	Medium	Low Likelihood	Moderate/ Low Risk	Medium	Low Likelihood	Moderate/ Low Risk		Medium	Low Likelihood	Moderate/ Low Risk	Medium	Unlikely	Low Risk
		Migration and accumulation of ground gases followed by inhalation or ignition causing asphyxiation and/or explosion	Severe	Low Likelihood	Moderate Risk	Severe	Low Likelihood	Moderate Risk		Severe	Low Likelihood	Moderate/ Low Risk	Severe	Unlikely	Moderate/ Low Risk

Source	Receptor	Pathway	Baseline			Construction without mitigation			Mitigation Measures	Construction with mitigation			Operation (including maintenance) (assuming all mitigation undertaken prior to and during construction)		
			Potential Consequence	Probability	Classification of Risk	Potential Consequence	Probability	Classification of Risk		Potential Consequence	Probability	Classification of Risk	Potential Consequence	Probability	Classification of Risk
RHS Wisley and Feltonfleet School and the infilling of ponds and gravel/sand pits. • Historical Landfills (Old Rectory Farm, Land at East of Buxton Wood, Pond Farm, Pointer's Farm, Silvermere Pet Cemetery, Cobham Bridge, Chatley Farm, Dunsborough Farm) • Pollution incidents (notably oils and chemicals). • Active and previous potentially contaminative activities within the study area (including garden machinery services, car body repairs shop, vehicle dealers, wood and furniture polishers, garage services, picture frame renovators, pest control services, small business park and stationery printers, a builder's yard, a DEFRA site being		Inhalation of vapours in the soil and/or groundwater	Medium	Low Likelihood	Moderate/ Low Risk	Medium	Low Likelihood	Moderate/ Low Risk	be incorporated into design of structures and services.	Medium	Low Likelihood	Moderate/ Low Risk	Medium	Unlikely	Low Risk
	Human Health (on-site) Members of the public using public rights of way (non-motorised users)	Inhalation, ingestion and dermal contact with contaminants in windblown soil-derived dust/fibres	Medium	Low Likelihood	Moderate/ Low Risk	Receptor not present on-site during construction phase		-		Receptor not present on-site during construction phase		-	Medium	Low Likelihood	Moderate/ Low Risk
		Ingestion and dermal contact with contaminants within perched water and shallow groundwater	Medium	Unlikely	Moderate/ Low Risk			-				-	Medium	Unlikely	Low Risk
		Migration and accumulation of ground gases followed by inhalation or ignition causing asphyxiation and/or explosion	Severe	Low Likelihood	Moderate Risk			-				-	Severe	Unlikely	Moderate/ Low Risk
		Inhalation of vapours in the soil and/or groundwater	Medium	Low Likelihood	Moderate/ Low Risk			-				-	Medium	Unlikely	Low Risk
	Controlled Waters (on-site) Groundwater (superficial Principal and Secondary A Aquifers, bedrock Secondary A Aquifer). Surface water (Stratford Brook, River Mole, Bolder Mere, Manor Lake, drains and ditches).	Lateral migration of contamination in groundwater	Medium	Likely	Moderate Risk	Medium	Likely	Moderate Risk	Ground investigation and risk assessment as necessary to define risks. Dewatering risk assessment if dewatering processes are to be implemented. Additional monitoring and risk assessment if required to determine control measures that may need to be implemented if risk assessments deem necessary.	Medium	Low Likelihood	Moderate/ Low Risk	Medium	Unlikely	Low Risk
		Migration of contaminants entrained in surface water run-off	Medium	Low Likelihood	Moderate/ Low Risk	Medium	Low Likelihood	Moderate/ Low Risk		Medium	Low Likelihood	Moderate/ Low Risk	Medium	Unlikely	Low Risk
		Migration of contamination via surface waters	Medium	Likely	Moderate Risk	Medium	Likely	Moderate Risk		Medium	Low Likelihood	Moderate/Low Risk	Medium	Unlikely	Low Risk Low Risk
	Property (on-site) Piles and other foundations	Chemical attack from aggressive chemical constituents in soil or groundwater	Mild	Low Likelihood	Low Risk	Mild	Low Likelihood	Low Risk	Ground investigation and risk assessment as necessary to define risks.	Mild	Low Likelihood	Low Risk	Mild	Unlikely	Very Low Risk Low Risk

Source	Receptor	Pathway	Baseline			Construction without mitigation			Mitigation Measures	Construction with mitigation			Operation (including maintenance) (assuming all mitigation undertaken prior to and during construction)		
			Potential Consequence	Probability	Classification of Risk	Potential Consequence	Probability	Classification of Risk		Potential Consequence	Probability	Classification of Risk	Potential Consequence	Probability	Classification of Risk
used to test livestock vaccines and the former Wisley Airfield site). • Agricultural activities in the surrounding area. • Sub-station. (Potential contaminants of concern include a range of inorganic and organic contaminants including heavy metals, hydrocarbons, fuels/oil, Polycyclic Aromatic Hydrocarbons (PAH), Total Petroleum Hydrocarbons (TPH), solvents, asbestos, Polychlorinated Biphenyls (PCBs), herbicides and pesticides).	Underground services.	Migration of ground gases or vapours along preferential pathways including permeable ground, services trenches and service entry points and accumulation in enclosed spaces such as services ducts or access points	Severe	Low Likelihood	Moderate Risk	Severe	Low Likelihood	Moderate Risk	Dewatering risk assessment if dewatering processes are to be implemented. Additional monitoring and risk assessment if required to determine mitigation measures that may need to be incorporated into design of structures and services.	Severe	Low Likelihood	Moderate Risk	Severe	Unlikely	Moderate/Low Risk

Appendix G. Cultural Heritage

G.1 Planning and policy context

National Planning Policy Framework

G.1.1 The NPPF (DCLG 2012) sets out 12 Core Planning Principles of which the conservation of historic environment is one. One of the NPPF's core principles is that 'planning should conserve heritage assets in a manner appropriate to their significance, so that they can be enjoyed for their contribution to the quality of life of this and future generations' (DCLG 2012, Para 17).

G.1.2 The DCLG published PPG online in 2014, to expand upon the NPPF. '18a: Conserving and Enhancing the Historic Environment' was published in April 2014. The Guidance notes that 'conservation is an active process of maintenance and managing change. It requires a flexible and thoughtful approach to get the best out of assets as diverse as listed buildings to as yet undiscovered, undesignated buried remains of archaeological interest'.

G.1.3 The NPPF and the PPG identifies two categories of non-designated sites of archaeological interest:

G.1.4 'Those that are demonstrably of equivalent significance to scheduled monuments and are therefore considered subject to the same policies as those for designated heritage assets' (PPG citing National Planning Policy 'Framework Paragraph 139); and

G.1.5 'Other non-designated heritage assets of archaeological interest. By comparison this is a much larger category of lesser heritage significance, although still subject to the conservation objective. On occasion, the understanding of a site may change following assessment and evaluation prior to a planning decision and move it from this category to the first' (PPG).

National Policy Statement for National Networks

G.1.6 In addition to the overarching regulatory and policy framework discussed above, the impacts and effects of the Scheme have been reviewed in light of relevant historic environment legislation and policy.

G.1.7 Policy with regard to assessment of the historic environment effects of nationally significant transport infrastructure is laid out in the NPSNN.

G.1.8 Historic Environment Policy is laid out in paragraphs 5.120 to 5.142 of the NPSNN. The key aspects which should be addressed are as follows:

- the significance, setting and viability of the heritage assets likely to be affected by the proposed development should be considered;
- when considering the impact of a proposed development on the significance of a designated heritage asset great weight should be given to the asset's conservation. The more important the asset, the greater the weight should be; and
- harm or loss affecting any designated heritage asset should require clear and convincing justification - substantial harm to or loss of a grade II Listed building or grade II Registered Park or Garden should be exceptional; substantial harm to or loss of designated assets of the highest significance should be wholly exceptional.

G.1.9 There is no definition of what constitutes 'substantial harm' in the NPSNN or other published policy documents. However, guidance in National Planning Policy Guidance (NPPG), supporting policy advice and case law indicates that whilst clearly a step down from total loss, substantial harm still represents a considerable degree of change to the significance of an asset. This could, for example, be as the result of removal of significant elements of fabric or the degradation/removal of key aspects of an asset's setting that notably contribute to its significance.

G.1.10 When considering the consequences of substantial harm there is a strong presumption against development.

G.1.11 NPSNN embodies an underlying principle of balancing harm and benefit which places greater weight on the conservation of more important assets. Where less than substantial harm would occur, there is a need to ensure that harm is justified and minimised and that the wider public benefits of the proposed are appropriately articulated.

Local Policy

Guildford Borough Local Plan

G.1.12 The western portion, to the west of Painshill Park, of the Scheme Boundary area is located within the local administrative area of GBC. The Council is expected to consult on the draft of a new local plan in summer 2017; but until its adoption the Guildford Borough Local Plan (2003) remains current. Policies HE4, HE6, HE10 and HE12 are relevant to this assessment. Policy HE11 Scheduled Ancient Monument and other Sites and Monuments of National Importance has now expired and the NPPF should be considered when assessing impacts upon archaeological remains.

G.1.13 The Local Plan Policies which are relevant to this assessment state:

Policy HE4: NEW DEVELOPMENT WHICH AFFECTS THE SETTING OF A LISTED BUILDING

G.1.14 Planning permission will not be granted for development that adversely affects the setting of a listed building by virtue of design, proximity or impact on significant views.

Policy HE6: LOCALLY LISTED BUILDINGS

G.1.15 In considering applications for development affecting buildings included on the local list the council will have regard to the effects of the development on the architectural or historic interest of the buildings and its setting.

Policy HE10: DEVELOPMENT WHICH AFFECTS THE SETTING OF A CONSERVATION AREA

G.1.16 The Borough Council will not grant permission for development which would harm the setting of a conservation area, or views into or out of that area.

Policy HE12: HISTORIC PARKS AND GARDENS

G.1.17 Planning permission will not be granted for development which would detract from the character or appearance of a park or garden of special historic interest, or its setting. Permission will not be granted for unsympathetic subdivision.

Elmbridge Borough Council Local Plan

G.1.18 The north eastern portion of the Scheme Boundary area, to the east of the western boundary of Painshill Park, is located within the administrative area of EBC. The Elmbridge Local Plan is made up of the Elmbridge Core Strategy (2011) and the Elmbridge Development Management Plan (2015). The Core Strategy does not provide specific policy for the historic environment, though historic assets are considered under Policy CS17 - Local Character, Density and Design. Policy DM12 - Heritage of the Development Management Plan deals specifically with the historic environment and states:

G.1.19 Planning permission will be granted for developments that protect, conserve and enhance the Borough's historic environment. This includes the following heritage assets:

- Listed Buildings and their settings;
- Conservation Areas and their settings;
- Parks and Gardens of Special Historic Interest and their settings;
- Scheduled Monuments and their settings;
- Areas of High Archaeological Potential and County Sites of Archaeological Importance (CSAIs);
- Locally Listed Buildings and other identified or potential assets (including non-designated locally significant assets identified in the local lists compiled by the Council):

a. Listed Buildings

i. The Council will encourage appropriate development to maintain and restore Listed Buildings, particularly those identified as being most at risk;
ii. Development to, or within the curtilage or vicinity of, a listed building or structure should preserve or enhance its setting and any features of special architectural or historical interest which it possesses;
iii. A change of use of part, or the whole, of a Listed Building will be approved provided that its setting, character and features of special architectural or historic interest would be preserved or enhanced. Consideration will also be given to the long-term preservation that might be secured through a more viable use; and
iv. Development which would cause substantial harm to or loss of a listed building (including curtilage buildings), such as total or partial demolition, will be permitted only in exceptional circumstances. In such cases, consideration will be given to the asset's significance. Applicants will need to clearly demonstrate that either:

1. There are substantial public benefits outweighing any harm or loss; or
2. All of the following apply:

v. the nature of the listed building prevents all reasonable use of the site; and

- no viable use of the listed building can be found in the medium term through appropriate marketing that will enable its conservation:
  - it can be demonstrated that charitable or public funding/ownership is not available to enable its conservation;
  - any harm or loss is outweighed by the benefit of bringing the site back into use.

b. Conservation Areas

i. Proposals for all new development, including alterations and extensions to buildings, their re-use and the incorporation of energy efficiency and renewable energy technologies, must have a sensitive and appropriate response to context and good attention to detail;
ii. Development within or affecting the setting of a conservation area, including views in or out, should preserve or enhance the character and appearance of the area, taking account of the streetscape, plot and frontage sizes, materials and relationships between existing buildings and spaces;
iii. Open spaces, trees and other hard and soft landscape features important to the character or appearance of the area should be retained or be in keeping with the character of the area; and
iv. Proposals to demolish buildings and/or structures will be assessed against their contribution to the significance of the conservation area as a heritage asset. Where substantial harm would be caused to a conservation area's significance, the proposal will be resisted unless exceptional circumstances, including substantial public benefits outweighing any harm to the conservation area, can be demonstrated. Where the harm would be less than substantial, it will be weighed against any public benefits of the proposal, including securing optimum viable use of the heritage asset and whether it would enhance or better reveal the significance of the conservation area.

c. Parks and Gardens of Special Historic Interest

i. Parks and Gardens identified as being of special historic interest, including landscape features and buildings, and their setting, will be protected and their sensitive restoration encouraged; and
ii. Any proposed development within or conspicuous from a historic park or garden will be permitted provided that it does not detract from the asset.

d. Scheduled Monuments and County Sites of Archaeological Interest (CSAI)

i. Development that adversely affects the physical survival, setting or overall heritage significance of any element of a Scheduled Monument or CSAI will be resisted; and
ii. Any new development should be sensitive to these criteria and positively act to enhance the monument or CSAI overall and ensure its continued survival.

e. Areas of High Archaeological Potential

i. Proposals for development should take account of the likelihood of heritage assets with archaeological significance being present on the site, provide for positive measures to assess the significance of any such assets, and enhance understanding of their value.

f. Locally Listed Buildings and other non-designated heritage assets

i. The Council will seek to retain these, where possible, and will assess proposals which would directly or indirectly impact on them in the light of their significance and the degree of harm or loss, if any, which would be caused.

Guidance

G.1.20 The cultural heritage chapter has been undertaken with reference to the following standards and guidance:

- Ancient Monuments and Archaeological Areas Act (1979);
- Planning (Listed Buildings and Conservation Areas) Act (1990);
- Standards and guidance for archaeological evaluations and watching briefs: Chartered Institute for Archaeologists (CIfA) (2014);
- Standards and guidance for archaeological desk-based assessment: Chartered Institute for Archaeologists (CIfA) (2014, revised 2017);
- The Setting of Heritage Assets Historic Environment Good Practice Advice in Planning: 3, Historic England 2015; and
- DMRB Volume 11, Section 3, Part 2: Highways Agency (2007).

G.2 Methodology

G.2.1 The historic environment comprises designated and non-designated heritage assets and other features or remains of historic interest as follows:

- World Heritage Sites;
- Scheduled Monuments;
- Listed Buildings;
- Registered Parks and Gardens;
- Conservation Areas;
- Registered Battlefield;
- Buildings and structures of historic interest (not listed);
- Known archaeological sites and areas of archaeological potential; and
- Findspots.

G.2.2 The methodology for assessing potential impacts and/or effects on the historic environment and the assets set out above is determined through identifying an asset's value and assessing the degree of change that the Scheme would have on a heritage asset. This is in line with the guidance provided in DMRB HA 208/07, Annex 5.

G.2.3 Following such guidelines, this provides a score ranging from Very High, High, Medium, to Low or Negligible in terms of heritage value. Table G.1 sets out the criteria for assessing the value of heritage assets, as identified in DMRB HA 208/07.

Table G.1: Value of heritage assets

Value	Description	Example
Very High	Internationally important or significant heritage assets.	World Heritage Sites, or buildings recognised as being of international importance.
High	Nationally important heritage assets generally recognised through designation as being of exceptional interest and value.	Grade I and II* Listed Buildings, Grade I and II* Registered Parks and Gardens, Scheduled Monuments, Protected Wreck Sites, Registered Historic Battlefields, Conservation Areas with notable concentrations of heritage assets and undesignated assets of national or international importance.
Medium	Nationally or regionally important heritage assets recognised as being of special interest, generally designated.	Grade II Listed Buildings, Grade II Registered Parks and Gardens, Conservation Areas and undesignated assets of regional or national importance, including archaeological remains, which relate to regional research objectives or can provide important information relating to particular historic events or trends that are of importance to the region.
Low	Assets that are of interest at a local level primarily for the contribution to the local historic environment.	Undesignated heritage assets such as locally listed buildings, undesignated archaeological sites, undesignated historic parks and gardens etc. Can also include degraded designated assets that no longer warrant designation.

Value	Description	Example
Negligible	Elements of the historic environment which are of insufficient significance to merit consideration in planning decisions and hence be classed as heritage assets.	Undesignated features with very limited or no historic interest. Can also include highly degraded designated assets that no longer warrant designation.
Unknown	The importance of an asset has not been ascertained.	

Table Source: DMRB Volume 11, Section 3, Part 2, HA 208/07, Annex 5, Table 5.1 and Annex 7, Table 7.1

G.2.4 The scale of change the proposed development would have on the significance of the asset is assessed by determining the magnitude of impact.

G.2.5 Table G.2 identifies the criteria for establishing the magnitude of impacts on heritage assets.

Table G.2: Magnitude of impact

Magnitude of Impact	Description of Nature of Change
Major Adverse	Substantial harm to, or loss of an asset's significance as a result of changes to its physical form or setting. For example, this would include demolition, removal of physical attributes critical to an asset, loss of all archaeological interest or the transformation of an asset's setting in a way that fundamentally compromises its ability to be understood or appreciated. The scale of change would be such that it could result in a designated asset being undesignated or having its level of designation lowered.
Moderate Adverse	Less than substantial harm to an asset's significance as a result of changes to its physical form or setting. For example, this could include: physical alterations that remove or alter some elements of significance, but do not substantially alter the overall significance of the asset; notable alterations to the setting of an asset that affect our appreciation of it and its significance; or the unrecorded loss of archaeological interest.
Minor Adverse	Limited harm to an asset's significance as a result of changes to its physical form or setting. For example, this could include: physical changes that alter some elements of significance but do not noticeably alter the overall significance of the asset; and small-scale alterations to the setting of an asset that hardly affect its significance.
Negligible	Very minor changes to setting or form of the asset.
No Change/Neutral	No appreciable change to an asset's significance.
Minor Beneficial	Limited improvement of an asset's significance as a result of changes to its physical form or setting. For example, this could include: physical changes that reveal or conserve some elements of significance but do not noticeably alter the overall significance of the asset; or small-scale alterations to the setting of an asset that improve our ability to appreciate it.
Moderate Beneficial	Notable enhancement of an asset's significance as a result of changes to its physical form or setting.

Magnitude of Impact	Description of Nature of Change
	For example, this could include: physical alterations that conserve or restore elements of significance; notable alterations to the setting of an asset that improve our appreciation of it and its significance; or changes in use that help safeguard an asset.
Major Beneficial	Substantial enhancement of an asset's significance as a result of changes to its physical form or setting. For example, this could include: major changes that conserve or restore elements of high significance; alterations to the setting of an asset that very substantially improve our appreciation of it and its significance; or changes in use that safeguard an asset, e.g. by taking it off the At Risk Register.

Table Source: DMRB Volume 11, Section 3, Part 2, HA 208/07, Annex 5-7

G.2.6 Table G.3 shows how the significance of effect is determined. This combines the value of the heritage asset and the scale of change (impact) to provide the measure of effect.

Table G.3: Significance of effects

Value/ Sensitivity	Magnitude of impact				
	Major	**Moderate**	**Minor**	**Negligible**	**No change**
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 Source: DMRB Volume 11, Section 2, Part 2, HA 208/07, Table 5.1

G.2.7 Generally, moderate to major adverse or beneficial effects are considered to be 'significant' in terms of EIA regulations.

G.2.8 This PEIR document presents the baseline data and makes a preliminary assessment of the likely effects on heritage assets. It takes into account the Option Selection Stage Environmental Assessment Report findings and recommendations, the Scoping Report produced at the Preliminary Design Stage, and the following historic environment datasets and reporting.

G.2.9 Historic environment baseline data was collected from the following sources:

- Surrey Historic Environment Record (HER);
- Historic England's National Heritage List for England; and
- Secondary sources which have primarily been discussed in the desk-based assessment which is currently being produced.

G.2.10 The Surrey HER and NHLE data was ordered in September 2017 and comprises an updated dataset from the Option Selection Stage deliverable. A gazetteer of designated and non-designated heritage assets which are located within the Scheme boundary and study area, is presented in Appendix G.3 and shown on Figures 11.1 and 11.2 in Volume 3. Heritage assets are referred to by their unique ID which, for designated assets, are their NHLE entry numbers, and for non-designated assets by their preferred Surrey HER ID (prefixed with “MSE”) with Areas of High Archaeological Potential referenced by a unique Atkins Archaeological Notification Areas asset ID.

G.2.11 The NHLE data order for designated assets included an area within 500 m of the Scheme. Due to the nature of works within the M25 corridor, the September HER data order has only been acquired within a 500 m buffer of the Scheme and side road elements, as no intrusive groundworks are associated with the gantry upgrades.

G.2.12 In order to further understand and contextualise this data, statements of significance have been commissioned for both of the Registered Parks and Gardens within the study area, Painshill and RHS Wisley. In addition, an archaeological desk-based assessment (DBA) is currently being produced. Interim copies of these reports have been used to inform this PEIR, and they will also form part of the evidence base for the forthcoming EIA, with copies submitted with the Cultural Heritage chapter of the ES.

G.3 Gazetteer of Heritage Assets

Table G.4: Designated Heritage Assets

Reference	Name	Description	Value
1005923	Late Roman bath house at Chatley Farm (Scheduled Monument)	Late Roman bath house, likely associated with the site of a Roman villa. Despite damage from river erosion, a large amount of the bath house survives in a good state of preservation, shown by excavation to contain important archaeological information.	High
1007905	Hengi-form monument at Red Hill (Scheduled Monument)	Middle to late Neolithic hengi-form monument, including oval enclosure bank and inner ditch, with possible graves inside the enclosure. The site includes a 2m boundary around the archaeological features, considered essential for the monument's support and preservation.	High
1012204	Bell barrow on Cockrow Hill (Scheduled Monument)	Early to middle Bronze Age bell barrow, situated on a slight rise in the Bagshot Sands. Despite partial excavation, the barrow survives well and contains archaeological remains and environmental evidence relating to the monument and its landscape. The site includes a 2m boundary around the archaeological features, considered essential for the monument's support and preservation.	High
1012205	Bowl barrow west of Cockrow Hill (Scheduled Monument)	Late Neolithic to late Bronze Age bowl barrow, situated on a slight rise in the Bagshot Sands. The barrow survives well and contains archaeological remains and environmental evidence relating to the monument and its landscape. The site includes a 2m boundary around the archaeological features, considered essential for the monument's support and preservation.	High
1000125	Painshill Park (Grade I Registered Park and Garden)	Landscaped pleasure grounds and park laid out between 1738 and 1773 by the Hon Charles Hamilton. The park contains a further thirteen listed buildings.	High
1378241	Church of St Mary The Virgin (Grade I Listed Building)	Church C13 with south aisle of 1841, transept by H. Woodyer 1864 and vestry 1867. Flint and puddingstone rubble with stone dressings; plain tiled roof with wood shingled bell turret under broach spire to west end. Nave, north porch south aisle and transept, Chancel with vestry addition to the south east. Windows all 2 light except for 3 light east window with intersecting tracery; north porch gabled with arched north door.	High
1236613	Manor House and Manorside West (Grade II* Listed Building)	House. 1686 incorporating details of earlier house with restoration and extensions of 1905 by E.P. Warren. Red brick, plain tiled roofs, hipped over left hand extension with end stacks to centre block and stacks to outer ends of extensions.	High

Reference	Name	Description	Value
1030132	Painshill House (Grade II* Listed Building)	House, 1778, with 19th century alterations and 19th century wings, and associated gardens. Located within Painshill Park Registered Park and Garden.	High
1189110	Foxwarren Park (Grade II* Listed Building)	Victorian Gothic country house, 1860.	High
1191694	The Gothic Tower (Grade II* Listed Building)	Mid-19th century brick four stage tower. Located within Painshill Park Registered Park and Garden.	High
1286699	Chatley Semaphore Tower (Grade II* Listed Building)	Semaphore tower, 1822, restored 1989 after fire. An unusually fine example of an early 19th century telegraph-signalling station and the only surviving tower type.	High
1000126	Royal Horticultural Society's Gardens, Wisley (Grade II* Registered Park and Garden)	Experimental wild gardens laid out 1870s to 1900s, acquired by RHS in 1903, being enlarged and further developed since then.	High
1029370	Foot Bridge House (Grade II Listed Building)	17th century house with early 19th century extensions.	Medium
1029402	Walls and Gates to Ockham Park (Grade II Listed Building)	Late 19th century wall and gates. Brick wall with stone finials, wrought iron gates.	Medium
1029404	Bridgefoot Farmhouse (Grade II Listed Building)	Mid-17th century house, extended in 19th century and 20th century.	Medium
1029405	Barn, 30m north east of Bridgefoot Farm House (Grade II Listed Building)	17th century barn, altered and restored in 19th century and 20th century.	Medium
1030053	Foxwarren Cottage (Grade II Listed Building)	Estate cottage, c.1860 with late 20th century additions on left.	Medium
1030125	The Mausoleum (Grade II Listed Building)	Mid-late 18th century mausoleum.	Medium
1030126	The Water Wheel	Water wheel, c.1830, timber frame on brick plinth.	Medium

Reference	Name	Description	Value
	(Grade II Listed Building)		
1030133	Belfry House Stable Cottage (Grade II Listed Building)	Early 19th century former stable block, now divided, with clock tower. 20th century alterations.	Medium
1030140	Hatchford Park School (Grade II Listed Building)	House, now school. Original house of 1850, encased and remodelled in c.1890.	Medium
1030141	Entrance Wall, Pavilions and Gates to Hatchford Park School (Grade II Listed Building)	Entrance walls, gates and pavilions, c.1890. Rubblestone wall with dressed stone piers and iron gates, single storey pavilions.	Medium
1030254	Lodge, 15 yards east of Feltonfleet School (Grade II Listed Building)	Lodge, c.1860 with 20th century extensions.	Medium
1188416	Millstream House Ockham Mill (Grade II Listed Building)	Mill house, with mill attached, four storey mill dated 1862.	Medium
1188497	Nos 1 and 2 Bridgefoot Farm Cottages (Grade II Listed Building)	17th century house, now divided into two cottages.	Medium
1188506	Gate and gate piers/walls at Ockham Park (Grade II Listed Building)	Late 19th century brick walls and iron gates.	Medium
1188574	Barn across rear of The Talbot (Grade II Listed Building)	17th century rectangular barn, now store.	Medium
1189118	Royal Horticultural Society Offices, Wisley Gardens (Grade II Listed Building)	Offices, 1914, in picturesque Vernacular style.	Medium
1191776	The Old House Vine House	Late 18th century office terrace.	Medium

Reference	Name	Description	Value
	(Grade II Listed Building)		
1191800	The Round House (Grade II Listed Building)	Early 19th century former outbuilding, now house.	Medium
1191810	Westwood House (East) and West Lodge to Painshill House, including gate piers (Grade II Listed Building)	Lodges, dating c.1800. Gate piers attached and between lodges, and iron railings and gates in between.	Medium
1286910	Chatley Farm House (Grade II Listed Building)	16th century house with 18th century front, brick with timber framed core.	Medium
1286954	Remains of grotto and rockwork bridge on Grotto Island (Grade II Listed Building)	Late 18th century grotto and bridge of brick and Derbyshire spa stone. Circular domed roof with tunnel leading to bridge over arm of lake. Located within Painshill Park Registered Park and Garden.	Medium
1294963	Feltonfleet School (Grade II Listed Building)	House, circa 1860, now school. 20th century alterations and wing addition.	Medium
1365888	Service Courtyard to Hatchford Park School (Grade II Listed Building)	Stable court, 1890. Includes brick walls and pavilions.	Medium
1377488	Cobham Bridge (Grade II Listed Building)	Bridge, red brick with stone coping, 1792, parapets rebuilt in 1914.	Medium
1377829	Former service buildings to right of Ripley House and Little Ripley House (Grade II Listed Building)	House extended and divided. Early 18th century to centre, with 19th century extensions to ends, 20th century extension to the left.	Medium
1377855	Water Tower in Foxwarren Park (Grade II Listed Building)	Brick water tower, c.20 feet high, c.1860.	Medium

Reference	Name	Description	Value
1393787	Millwater (Grade II Listed Building)	House, formerly farmhouse, built c.1600. 17th century lobby entrance restored in 18th century, with 19th, 20th and 21st century additions.	Medium
1236705	Entrance Walls and Gate Piers to Byfleet Manor House (Grade II Listed Building)	Early 17th century red brick entrance walls and gate piers to Manor House.	Medium
1029335	Orchard Cottage (Grade II Listed Building)	House. 1860 in Foxwarren style possibly built by Charles Buxton or Frederick Barnes. Red and blue diaper pattern brickwork with terracotta mouldings and steep pitched, plain-tiled roofs. T-shaped plan.	Medium
1030127	The Chinese Bridge (Grade II Listed Building)	Bridge. mid-19th century, or later.	Medium
1029399	Yarne (Grade II Listed Building)	House. !5th century core, extended to ends and re-fronted in 20th century. Timber framed, clad in red brick below, tile hung above with bottom courses swept out over ground floor. Original roof hipped with gablets, plain tiled mansard roof over extension.	Medium
1377805	Ockham Court (Grade II Listed Building)	House. Circa 1700, extended to left in 20th century. Red and brown brick, some in chequer-work pattern to right half of front, under hipped, plain-tiled roofs, lower gabled roof over extensions. Double pile plan with extensions set back to left.	Medium
1189122	Old School House (Grade II Listed Building)	House. Mid-16th century with 18th century alterations, restored in 20th century.	Medium
1030210	Village Pump (Grade II Listed Building)	Pump. 1858 erected by Harvey Combe. Cast iron panelled obelisk approximately 6 feet high with acorn finial, inscription plaque on side. Pump spout to side with stone trough below. Pump handle to rear.	Medium
1030060	Chilbrook Farmhouse (Grade II Listed Building)	House, formerly farmhouse. Early to mid C17 origin extensively rebuilt in early C18 and now appearing predominantly of the later period, refenestrated in C20.	Medium
1294555	The Cricketers Inn (Grade II Listed Building)	Public house. 17th century much extended. Timber framed on rendered plinth, rendered cladding with plain tiled roof and rendered gables.	Medium
1030052	St Matthews Church of England First School (Grade II Listed Building)	School. Built in 1901 as a girls School by the firm of Treadwell and Martin for Mary Sophia Dawson a local benefactor. Art Nouveau style. Built of red brick in English bond battered to base front having timber-framed gables with plaster infill.	Medium

Reference	Name	Description	Value
1044723	Cooper Tomb 20 Yards West of Church of St Mary The Virgin (Grade II Listed Building)	Chest tomb. 1828 dedicated to Harriet M. Cooper. Stone c4 foot high with panelled sides, flat top. Remains of surrounding railings in stone plinth.	Medium
1264426	Hoodsfield (Grade II Listed Building)	House. 16th century with late 19th century and 20th century extensions to ends. Timber frame with whitewashed brick infill below, rendered infill above; brick and rendered extensions to each end.	Medium
1392421	The Old Fire Station (Grade II Listed Building)	The Old Fire Station, Byfleet, is recommended for designation for the following principal reasons: It is a good example of a small late C19 fire station built to serve a privately established local volunteer fire brigade.	Medium
1236238	Shrapnell Tomb 20 yards north west of church of St Mary The Virgin (Grade II Listed Building)	Chest tomb. 1818, dedicated to Mrs. Elizabeth Shrapnell. Stone, panelled sides with fluted edge band and corner rosettes; gabled top. Remains of railed surround in stone plinth.	Medium
	Ockham Mill Conservation Area	Small Conservation Area around Ockham Mill and associated buildings, a number of which are Grade II listed. The area has a strong historic character with few additional buildings around original mill complex.	Medium
	Ripley Conservation Area	Conservation Area around the historic centre of the large village of Ripley, including a number of Grade II* and Grade II listed buildings. A number of buildings in the village date from the 17th and 18th century, and the High Street of the village maintains largely its historic character.	Medium

Table G.5: Non-Designated Heritage Assets

Reference (HER)	Name	Description
MSE236	Romano-British Pottery, Cobham	Romano-British Pottery, Cobham.
MSE487	Romano-British cremation	An urned cremation dating to the 1st century AD, found with empty accessory vessels and nearby four cremation pits. Excavated in 1911.

Reference (HER)	Name	Description
MSE488	Disputed Bowl Barrow, Foxwarren, Wisley	A probable bowl barrow was investigated in the 1970s, turning out to be a slight mound of modern origins. No evidence of a barrow was found during this archaeological investigation.
MSE494	Probable Natural Mound, Currie's Clump, Ockham Common	This mound could not positively be identified. Around the east side of Currie's Clump are several low mounds of varying size and height. By their very numbers and the fact that this is an area of sands and gravels, the features are without doubt natural. Numerous similar examples occur all over the commons of Wisley and Ockham.
MSE495	Probable tree Planting Earthbank, Ockham Common	Circular earth ring with outer ditch, cut by a boundary trench of later date. A parish boundary bank obliterates the ditch and merges with the bank on the west side. It is disputably a round barrow, but may also be a fairly recent tree planting earth bank.
MSE496	Mesolithic or Neolithic Quartzite Mace, Wisley Common	Mesolithic or Neolithic Qyartzite Mace, Wisley Common.
MSE503	Mesolithic Site, Ockham Common and Chatley Heath	Mesolithic site astride a sandy path on borders of Ockham Common and Chatley Heath. Covering a 2 sq ft area, there was evidence of a primitive flint industry mostly worked from pebbles on the site. There is a resemblance to the Mesolithic material from Ripley.
MSE746	Two Palaeolithic handaxes, Walton-On-Thames	Two Palaeolithic handaxes, Walton-On-Thames.
MSE2109	Early Bronze Age Flanged Axe, Bolder Mere, Ockham	Early Bronze Age Flanged Axe, Bolder Mere, Ockham.
MSE2301	Undated Flakes	Undated Flakes.
MSE2451	Possible Late Bronze Age Pot	Possible Late Bronze Age Pot.
MSE2455	Flint Scraper	Flint Scraper.
MSE2456	Undated Flakes	Undated Flakes.
MSE2812	Possible medieval boundary bank, Wisley/Ockham parish boundary	Excavation on Wisley Common for Surrey Archaeological Society and Department of the Environment in 1977, sectioned the parish boundary bank. No finds were made. The site archive (plans and photos) were deposited in Guildford Museum.
MSE3182	Neolithic flint scraper, Cobham	Neolithic flint scraper, Cobham.

Reference (HER)	Name	Description
MSE3243	Possible field system or mineral extraction site of unknown date, Ockham/Wisley	An extensive system of large earth ridges or banks, often parallel to one another These are often of exceptional size, being, on average, between 1.5m and 2.7m high over large areas near the centre of these earthworks. The intervening 'ditches' or hollows, are about 10m across from top of bank to top of bank. The ridges appear to lead into a large sub-circular hollow up to 80m in diameter. This latter feature is clearly a quarry hollow, and the edges seem to radiate out from this quarry, often following well-defined alignments, but sometimes forming different alignments. In some cases, the 'ditches' take on the appearance of trackways leading into and out of the quarry. This is clearly marked, as described above, on the 1881 OS 25" map (sheet xvii.12). However, the extent of the earthworks is greater than that surveyed on to this map.
MSE3269	Prehistoric Pottery Sherds	Prehistoric Pottery Sherds.
MSE3270	Mesolithic Flints	Mesolithic Flints.
MSE3271	Roman Pottery Sherds	Roman Pottery Sherds.
MSE3272	Medieval Pottery Sherds	Medieval Pottery Sherds.
MSE3310	Possible Roman quarrying site	Quarrying at the Red Hill hengi-form monument (HER 3309), presumably for ironstone as this occurs in the sand bedrock locally. Suggested to be of Roman date, possibly connected with the occupation site at Chatley Farm.
MSE3463	Milestone, Ockham	Milestone, marked Portsmouth 48, Hyde Park Corner 21, Cobham 4 and Guildford 6 miles.
MSE3464	Parish boundary stone, between Ockham and Wisley	A much weathered boundary stone between Ockham and Wisley parishes.
MSE3502	Mesolithic Flint Cores, Wisley	Mesolithic Flint Cores, Wisley.
MSE3575	Milestone	Milestone on the south side of the old A3. The top is illegible, the front marked Hyde Park Corner 17 and the sides Esher 3 and Ripley 4.
MSE3695	Worked flints, River Wey area	Worked flints, River Wey area.
MSE3696	Possible field system or quarrying earthworks, Ockham Common	Ridges and other features revealed in motorway construction. The features probably agricultural in origin.
MSE4133	Two Palaeolithic hand-axes	Two Palaeolithic hand-axes.
MSE4738	Medieval pottery	Medieval pottery.

Reference (HER)	Name	Description
MSE4739	Prehistoric (Bronze Age?) pottery	Prehistoric (Bronze Age?) pottery.
MSE6886	Anti-aircraft gun emplacement	Defence site: anti-aircraft gun emplacement.
MSE13733	Ashtead and Epsom Commons landscape survey	Survey of the archaeological and historic landscape of the Commons by C Currie of CKC Archaeology for Surrey County Council and the Corporation of London undertaken with reference to them being proposed as Areas of Historic Landscape Value. In the north of Ashtead Common a number of earthworks and other features surround the site of a Roman villa. The villa is a rare type of corridor villa, with considerable evidence that it adjoined a large scale tile manufactory. Extensive areas of quarries and spoil heaps demonstrate the extent of industrial activity on the site in the Roman period. Nearby are further earthworks associated with a large undated ditched enclosure, and a 17th century medicinal well. There are also a large number of ancient pollarded oaks on the common. They are a rare survival of an ancient land management type that was mainly superseded in other parts of England in the post-medieval period by overgrazing. Epsom Common has few surviving historic features. The site of Old Wells, a 17th century mineral spring for which Epsom is strongly associated, is covered in housing. Those features that do remain, such as the Stew Ponds, have been much altered, and the historic character of the farmland to the south-west of Ashtead Common has been affected by the evolution of temporary features associated with the pasturing of horses.
MSE13861	Bronze Age pottery and flintwork: Nutberry Farm, Wisley	Evaluation by SLR Archaeology prior to the construction of a composting facility. A single linear feature containing Bronze Age pottery and flintwork was revealed.
MSE14312	Aerial photograph cropmark features, Byfleet Park	An aerial photograph shows a small cluster of linear features south-west of Byfleet Manor House (NAR29). Two that are linear and parallel with a ditch further east could be of drains.
MSE14725	Cropmarks caused by aggregates work: non antiquities, Ockham	A prominent pair of parallel linear crop-marks seen in a 1988 set of photographs (TQ 0657/2: NMR 4228: frame 80 and others) of the Stratford Bridge area of Ockham (at TQ 061 575) are now thought from other aerial photographic evidence to be due to a road built to a temporary aggregates plant for the construction of the A3 Ripley by-pass in 1975 - and thus not evidence of any ‘missing’ Roman road in the area. The parallel crop-marks are not aligned with the expected course of a Roman road between London and Farnham.
MSE14766	Dam, Bolder Mere, Ockham Common	Dam bank for Bolder Mere, a large pond of about 6 hectares on Ockham Common. The bank is shown by a straight stretch of earthwork, at a slight angle to the A3, in the south-east comer of the pond. This bank is about 70m in length, and about 2m high at its maximum near where the present

Reference (HER)	Name	Description
		outfall sluice leaves the pond. A ditch approaching the pond from the south-west is channelled into the pond side of the dam, and is crossed by a small footbridge. The A3 has cut across the north-east end of the dam, destroying some of its original length. The back of the bank is heavily disturbed by drainage channels that seem to have been put in as a result of the upgrading of the A3. As at Frensham Great and Little Ponds, the siting of the dam has been carefully chosen to allow for a minimum length of bank to enclose the maximum water area, thus making as large a pond as possible from the minimum of effort.
MSE14767	Post-medieval pond, Bolder Mere, Ockham Common	A large pond of about 6 hectares on Ockham Common. The A3 runs along the north-west bank cutting across the north-east end of the dam bank. The pond is shown on Norden's county map of 1594, and other early county maps. Local tradition claims the pond was made to power an iron forge, but there is no evidence to support this. Seller's map of circa 1680 shows two 'iron mills' below Wisley Pond, but this should not be translated to Bolder Mere. Although not entirely discounting the iron mill theory, it is not impossible that the pond began its life as a simple fishpond. Previously known as Hut Pond, after the Hut Public House on the north side of the A3.
MSE14768	Remnant of Purple Pond, Ockham	A marshy pool, heavily overgrown, and much silted up. This pond was originally much larger, described by Bloxam (1963, 58-59) as the shape of a medieval boot. Marshy land to the south and south-east probably marks the original extent of the pond. At the north end of the pond, a car park has been made. This may have destroyed part of the pond. It looks as if the present road (Old Lane) may have been the dam to the pond, but it is not possible to be certain of this. On present evidence, it is not known if this was once a purpose-made pond, a former quarry hollow that has filled with water, or a natural depression into which local water drains.
MSE14769	Mound and bank, possible ornamental tree mound, Currie's Clump, Ockham	A large tree covered mound known as Currie's Clump. It stands about 8m above the surrounding landscape and has a diameter of about 80m. It is surmounted by conifers. About 30m from the base of the mound is a bank with an external ditch surrounding the clump. This has been eroded, and cut through by paths and A3 works in places, but it is shown as an encircling boundary on most historic maps. A cafe, toilet and car park seems to have been built across this boundary on the south side. This is probably a natural mound that was used to plant an eyecatching clump or plantation in the later 18th or early 19th century. Manning and Bray record that the 6th and 7th Lord Kings made a number of plantations on the Commons. It was fashionable to ornament such areas at this time. This clump seems to have been named after the banker, William Currie, who lived at East Horsley Place until he sold it to the 8th Lord King in 1840.
MSE14770	Medieval pond, Wemere	Pond mentioned on the 14th century bounds of Cobham. Partially silted up.

Reference (HER)	Name	Description
MSE14771	Pond site, Culverlake, Ockham	An old pond site, lying partly across the old Ockham/Cobham boundary. It was mentioned as Culverlake on the 14th - century bounds of Cobham, although this may refer only to the stream that later fed the pond. The dam was on the east and north sides, but this is now partly buried under the M25. According to OS maps, the site was largely dried up before work started on the motorway. A lease of 1740 deals with two ponds in “Redhill Bottom”, that may refer to this pond site (SRO 181/15/47).
MSE14772	Ore Lane Trackway	Old trackway mentioned on 14th-century bounds of Cobham as 'Holeweye'. It may have later been mentioned as a 'causeway' (Henn's Causeway) in an indenture of 1783-84 (GMR 53/40). This may refer to the section passing between the “old enclosure” known as Crook's Island and Wemere Pond, where the track crosses the dam of the pond. Once beyond Crook's Island the track follows what is possibly a more recent line across the common. This does not have a hollow appearance. It seems likely that the original track continued north towards the large quarry shown on the first edition OS 25" map of 1881.
MSE14773	Settlement site, Henn’s Enclosure, Ockham	The original enclosure was about four acres, and is variously referred to as the “old enclosure”, “Henn's Enclosure” and “Crock's Island”. The last two names after former tenants in the 17th to early 19th century. In the south-east comer of the land there were four cottages by the early 19th century. A settlement or farmstead/cottage is recorded on the site from the 17th century at least. However, it is possible that there may have been an assart here in the 14th century.
MSE14774	Red Hill Road Holloway or ditch feature, Wisley	Ditch-like feature, possibly a holloway running alongside the former line of Red Hill Road. By the 18th-century, it may have formed the boundary of adjoining Painshill Park. It is shown as a ditch-like feature on early OS maps, and as a track on other early maps. The OS 25 map of 1870 shows the feature as a ditch alongside the road. The present feature varies in size, but is about 1.2-1.8m deep, and between 4-6m wide across the top. In places it is only as wide as a footpath. It ascends the hill from Chatley Farm. Before the Enclosure Act of 1793 for Cobham it probably served as a track to Weybridge from Chatley Farm along the edge of the heath. Probably of medieval origin.
MSE14775	Linear earthworks, Foxwarren Park, Wisley	Linear earthworks running approximately north-south across Wisley Common to boundary of Foxwarren Park. Where the park has been landscaped into gardens, some of the earthworks appear to have been reused as garden features. The hollows forming the ponds (now dry) surrounded by Pulamite stone appear to have reused these earthworks. Elsewhere, they continue north beyond the common. The earthworks on the far west side are low to begin with, being little over 1m high and about 5m across each hollow. However, they quickly become much larger. About 80m west of the first earthworks, there is a very large ridge over 4m high and many metres wide. It is possible its size is exaggerated because soil has been dumped on top of a natural ridge here. The ridges continue into a narrow valley between Foxwarren Park and Redhill Road, but do not extend beyond the steep

Reference (HER)	Name	Description
		east side of this valley. They are nearly all parallel to one another, and average 2-3m high in the centre of the earthworks.
MSE14776	Dam and pond site, Wisley Pond	Wisley Pond is first mentioned in the 1590s in both documents (GMR LM 348/232) and on Norden's County Map (SRO). On Seller's map of circa 1680, two iron mills are shown on the stream leaving the pond on the north side. Nothing else is known about the pond, its uses or management. In the first years of the 19th century Lord King drained it and turned it into farmland. The original extent of the pond was about 50 acres.
MSE14777	Bank and ditch feature, Wisley Common	Bank with ditch on east side. Known by local farm as Wisley Common Ditch. This feature runs parallel with the west edge of the former Wisley Pond, being about 100m further west from the former edge. The feature is not shown on the 1896 OS 25"map (sheet xvii.7), and so may be a relatively recent feature.
MSE14778	Pond site, Chatley Wood, Cobham	The pond is presently dry, and appears to have been for the last two or three years. The pond bed is now rough grassland, with some minor invasion by alder scrub. The stream bed that once fed the pond is traceable, but no longer running. There is evidence that this pond has been artificially created as there are clear traces of a dam at the eastern end. This is a bank about 1.6m high and between 10-15m broad. There is a large gap near the centre where the now dry stream channel leaves the pond.
MSE14779	Quarry, Chatley Wood	Quarry hollow, about 70m by 40m, on the west side of an enclosure bank thought to have been put up following the 1793 enclosure. The pit stands within the area designated for the poor cottagers of Cobham in 1793. The Court Book of 1805 states that this land was left to the cottagers so they could have rights to grazing, collecting fuel and dig 'sand and gravel'. (SRO 181/17/2). The position of the quarry, abutting a 1793 enclosure bank, suggests that this quarry may have been created after 1793.
MSE14780	Farmhouse, Pond Farm, Wisley	Brick farmhouse. Built as a 'cottage' by Lord King between circa 1800-1804. The original building can be seen on the east side of the present house. Extension has been added on from just west of a line through the back door and chimney stack on the ridge. This was probably added later in the 19th century.
MSE14781	Barn, Pond Farm, Wisley	Barn with lean-to on north side. Brick west and south sides, weather boarded on east with tile roof. Roof hipped at north end, half-hipped at south end. Central wagon door. Internal root, slanted queen post.

Reference (HER)	Name	Description
MSE14782	Boundary bank, Clearmount, Wisley	The bank itself is about 1m high, and about 2.5m wide. It has a slight ditch on the common side. In places, it has oak trees on the bank of some antiquity. As most of these are beginning to shed branches, and many are stag-headed, they are at least 200-250 years old thereby giving a minimum possible age for the bank. These trees are clearly shown on the 1870 OS 25" map. Clearmont was still farmland at this time.
MSE14783	Lord King's ditch, Pond Farm, Wisley	Deep ditch, up to 1.3m deep and about 2m wide with signs of regularly recutting. Local tradition ascribes it as the ditch cut by Lord King to drain Wisley Pond circa 1800.
MSE14784	Ockham sand pit, Red Hill, Ockham	Extensive and deep quarry, listed as over an acre in the 19th century. It is shown as a sand pit on the 19th century enclosure map of Ockham (SASRC M14/OCK/7). OS 25" map of 1870 shows it extending over the Cobham boundary. The access track from Pointers Road still visible as a footpath.
MSE14785	Enclosure bank, Chatley Wood, Cobham	Bank up to 1.2m high and 2.5m wide forming boundary between surviving portion of Chatley Heath and private enclosure created by Thomas Page in 1793. The private enclosure turned into plantations by Page and these have subsequently merged into the common, although a barbed wire fence on the bank still indicates its private nature. Traces of ditch on common (west) side.
MSE14786	Enclosure bank, Red Hill, Wisley	Boundary bank 1m high and up to 2.5m wide. It forms the boundary bank between Cobham and Wisley, possibly following the line of the 14th century Cobham bounds (...et inde usque Redehelde et inde usque quondam quercum super cursum aquae de Emble...). On the Wisley tithe map it was the south-east boundary of field number 160, nine acres plus of woodland held in hand by Lord Lovelace. Until the enclosure of part of Chatley Heath in 1793, it adjoined the heath. Afterwards it adjoined a private plantation of Thomas Page.
MSE14787	Enclosure bank, Red Hill, Wisley	Bank running alongside of hill and prone to some hill slip on south-west side. Some old trees on the bank, and traces of a ditch on the south-west side. Bank up to 1m high in places ad 3m wide. Some severe erosion noted in places. This was formerly an enclosure bank between a piece of private woodland (tithe plot 160) and an enclosed part of Wisley Heath (tithe plot 159).
MSE14788	Holloway, Hatchford Wood, Cobham	Traces of holloway between Mausoleum and Elm Cottage along southern edge of Hatchford Wood. The hollow is very considerable in places, with a bank up to 3m high on the south side. The hollow section is only about 50m in length. In 1774 a proposal was made to divert (both?) a highway and a footpath over Breach Hill Common from near Hatchford to Ockham (SRO 181/16/23a). In 1793 Hatchford Wood was detached from Chatley Heath as a private enclosure. It is possible these diversions were a prelude to this enclosure so that old ways over the heath did not continue to go

Reference (HER)	Name	Description
		over private lands. It is possible that one of these tracks could be the holloway here under discussion.
MSE14789	Enclosure bank, Ockham Village Green	Semi-circular bank and ditch surrounding “Ockham Village Green”, The bank is low, about 0.5m high and about 1.5m across. The internal area has been deliberately planted up with firs to form a plantation. It is not thought that the designation “village green” has any great antiquity. The land was enclosed from the common circa 1869-76, probably at the time of the Ockham Enclosure Map (SASRC M14/OCK/7). On this map it is marked 'Recreation Ground' at 4-0-6 acres, with an empty plot of 0-1-6 alongside that now contains Fellside Cottage. It is not thought that the enclosure existed before 1869-76.
MSE14790	Site of Hut Public House, Wisley	Site of public house known as the Hut. New buildings were erected in 1884 and leased by Lord Lovelace to James Moscrop, hotel keeper. Prior to this it was thought the original public house was started up by George Bradshaw, a dispossessed royalist minister in 1655. A lease of adjoining Bolder Mere in 1784 refers to it as the “Alehouse called the Hut” (GMR 165/267/2/2). An unnamed building is shown on the site on Rocque's map of 1768 (Ravenhill 1974). The hotel and its adjoining buildings were all destroyed following the widening of the A3 circa 1980.
MSE14791	Road, Pointer's Road, Cobham and Ockham	This road is now a tarmaced road that terminates near the A3/M25 interchange. It once extended west of this point. There are no obviously historic features to this road now that it has been modernised, but it follows an earlier alignment. How old this alignment is cannot be said with certainty, as, in 1782, an application was made to divert it (SRO 181/16/24). It is possible that this was to ensure that it kept out of the proposed new enclosures that were made in part of Chatley Heath following the 1793 enclosure. Rocque's map of 1768 seems to suggest that the old route followed the line of Redhill Road (Ravenhilll974), but this was abandoned as the thoroughfare from Weybridge to Poynters in 1793. This seems to suggest the current alignment dates from 1782 or alter.
MSE14792	Site of Oldpond House, Wisley	Site of house, now overgrown by nettles and scrub, and partly used as dumping site for farm manure. The house is shown on Rocque's map of 1768 (Ravenhill 1974). It was plot 130 on the Wisley Tithe Map, given as 0 -2-10 acres, a cottage, orchard and garden owned by Lord King, and m the tenure of James Woolger. The OS 25"map of 1870 refers to it as Oldpond House, showing a house and a large outbuilding. They had both gone before the M25 was built, the motorway just missing the site by about 50m.
MSE14793	Linear earthworks, Red Hill, Cobham and Wisley	A series of linear earthworks crossing the various parish boundaries, and surrounding conventional quarries in the area (HER 3310, 14779, 14785). They are similar to earthworks identified on Ockham

Reference (HER)	Name	Description
		Common (HER 3243) and south of Foxwarren Park (HER 14775). They are frequently parallel to one another, and cover a considerable area. The estimate of two hectares covers only those areas where the earthworks are clearly visible, and up to 2m in height. There are also other areas of less distinct earthworks on the fringes. The association of these earthworks with the adjoining quarries suggests they may be connected with this activity. Gardener (1911 115-16) reports a local oral tradition that they were dug as ironstone quarries to supply local iron mills, but this has been questioned by Potter (1982), who has suggested an Iron Age date.
MSE14794	Mound and linear earthworks, possible barrow, Ockham Heath	Large sub-circular mound, about 40m diameter and up to 3m high, on north of track on Ockham Heath. This feature has been exposed by clearance of area to regenerate heathland. It has some similarities to other “barrows” in the area, and is here included to pre-empt its later “discovery” as a genuine barrow. This is made all the more possible by what appears to be the remains of a ditch on the west and east sides.
MSE14795	Parish boundary bank, Ockham Heath	Old parish boundary between Ockham and Cobham. It may be related to the early Saxon boundary called Fullingdic (see HER 3195), to which this monument should be cross-referenced, as they may be one and the same). Its survival is intermittent particularly in the north where its line is much disturbed by quarry workings and other earthworks (see HER 3243). In fact it is difficult to find the line shown on the ground in places. However the Cobham/Ockham boundary is mentioned in a boundary document of the 14th century (SASRC 177/40), and the present alignment seems to follow the earlier line fairly closely.
MSE14796	Quarry pit, Chatley Wood Quarry, Cobham	Small quarry pit circa 40m by 30m, set in conifer woodland between Wisley/Cobham Boundary and Chatley Wood Pond. Within 80m of Redhill Quarry (HER 3310), and other quarry sites and linear earthworks (HER 14784, 14793). There are numerous explanations for quarrying in this area most favouring ironstone workings or sand pits. Different sources have suggested dates ranging from Iron Age (Potter 1982), Roman (HER 3310), and post-medieval (Gardner 1921). This pit is set in land that was enclosed from common for a private plantation in 1793. It is shown as a 'sand pit' in 1870 (OS 25" map, sheet XVII.8; 1870 ed.), with an access route leading up from Pointer's Road.
MSE14998	Negative Evidence: Chatley Farm Estate, Pointers Road, Cobham	Watching brief (and associated Historic Building Recording) by Wessex Archaeology during alterations and conversion to Chatley Farmhouse and associated farm buildings. No significant finds or features of archaeological interest were recorded during monitoring of the groundworks involved in the development (see HER 7369 for Historic Building recording).
MSE15844	Ring ditch cropmark	An irregular ring ditch with short lengths of linear ditches.
MSE16852	Claygate to Guildford Milestone	Milestone, Wisley Common near RHS Gardens, north-east of footbridge.

Reference (HER)	Name	Description
MSE16887	Claygate to Guildford Milestone	South of junction with M25 on slip road (old lane).
MSE17075	Cropmarks	A number of small circular and sub-circular cropmarks.
MSE17084	Cropmarks	Cropmarks.
MSE18141	Earthworth bank, Cobham	Earthworth bank of unknown date, at the edge of a copse with a slight ditch and adjacent pathway. Veteran Field Maple adjacent to path.
MSE18143	Post-medieval hollow, Cobham	Hollow about 40m across. May be associated with flood meadow management.
MSE18144	Woodland edge, Cobham	Woodland edge marked by Field Maple. May indicate edge of copse or walkway.
MSE18181	The Lodge and Lodge Wood, Cobham	This was the Lodge at the north entrance to Hatchford Park, which was severed from the rest of the estate by the construction of the M25. The woodland to the east of the Lodge appears to be secondary. The Lodge was not visited but is presumed to be 19th century.
MSE18182	The Bogs: semi-ornamental woodland, Cobham	This is a substantial area of semi-ornamental woodland, first labelled as such in 1876. The name on the OS map appears to apply only to the woodland northwest of Pointers Pond. The woodland to the southwest was called Breach Hill Wood. The Bogs appears to have been cultivated land in 1768 and 1793 and was perhaps developed as woodland as part of the landscaping associated with Poynters in the early 19th century. This is certainly almost the case for the woodland on the east side of Pointers Road. Today the woodland is characterised by an understorey of rhododendron, well-spaced Sweet Chestnut and Oak with frequent Ash and patches of Bracken. If there was wet ground here originally it is no longer evident from the vegetation.
MSE19515	Saucer Brooch, Wisley	Saucer Brooch, Wisley.
MSE20867	War Memorial, RHS Headquarters, Wisley	War memorial. Bronze panel surrounded by a frame of Hoptonwood stone. Above the panel is the crest of the Royal Horticultural Society. At the upper corner dexter side is a national symbol of the shield bearing the three English lions. On the sinister side is the emblem of the passion cross. The panel is inscribed: in grateful remembrance of the Wisley students who laid down their lives for their country in the Great War 1914-1919 (20 names). It was unveiled on 3rd June 1921 by the President of the Royal Horticultural Society and dedicated by local clergy and dignitaries. The architect was Sir Robert Lorimer and the cost was £235. First World War.
MSE20868	War Memorial, RHS Headquarters, Wisley	Wisley students. War memorial, bronze panel surrounded by a frame of Hoptonwood stone. Second World War.

Reference (HER)	Name	Description
MSE20871	War Memorial, RHS Headquarters, Wisley	War memorial in the form of a clock with gilded numerals and red hands above the entrance, and a rectangular plaque with a black line border inside the main laboratory building. An inscription reads: The memorial clock erected over the main door of this building was given by the RHS Gardens Club in grateful memory of the men from Wisley Gardens who lost their lives in the two World Wars. 1914-1918. 1939-1945. First World War. Second World War.
MSE21230	Anti-Aircraft Site, Wisley Common	A unarmed Anti-Aircraft Site at Wisley Common.
MSE21976	The Hermitage at Painshill Park	Site of an 18th century hermitage created by Charles Hamilton as part of his pleasure grounds at Painshill Park. Reconstructed in 2004 as part of the wider Painshill Park restoration project. The site of the original hermitage was established from archive research and a program of archaeological work undertaken in 1986. The Painshill archives contain contemporary sketches and descriptions by visitors to the park and these were used to inform the reconstruction. There are a number of historical descriptions of the Painshill Hermitage, the building was approached from the north along one of the paths from Alpine Valley.
MSE22004	Chippings Farm	Chippings Farm. Site of an Historic Farmstead. Information on this site is currently being compiled as part of a project researching important historic farmsteads and associated buildings within the current administrative county of Surrey.
MSE22157	Highlands Farm	Building; unknown date.
MSE22158	Long Orchard Farm	Farm; unknown date.
MSE22159	Silvermore Farm Estate	Farm; unknown date.
MSE22160	Pains Hill House Farm	Farm; unknown date.
SMR4619	London to Winchester Roman Road	An East-West Roman Road, presumably London to Winchester, passes through Neatham. The surface has been exposed during excavations at Neatham (summer 1976) and consists of a layer of tightly packed flints with a parallel ditch running along the southern edge. The north edge was not examined. The course of the road can be followed between Alton and Farnham but is elsewhere uncertain.

Appendix H. Materials and Waste

H.1 Planning and policy context

H.1.1 All European directives applicable to the Scheme have been transposed into national legislation. However, a number of legislative proposals on waste have been adopted as part of the Circular Economy Package (as supported by the Circular Action Plan), which focuses on *"closing the loop of product lifecycles through greater recycling and re-use, and bring benefits for both the environment and the economy"*. Regarding the Scheme, the relevant legislative proposals include:

- Proposed directive on waste;
- Proposed directive on packaging waste;
- Proposed directive on landfill; and
- Proposed directive on electrical and electronic waste, on end-of-life vehicles, and batteries and accumulators and waste batteries and accumulators.

National legislation and policy

H.1.2 It should be noted that The NPPF does not contain specific waste policies and so it is not included in the section below. The Waste Management Plan for England 2013, summarised below is considered as most relevant to the Scheme.

Environmental Protection Act 1990 (c. 43)

H.1.3 The Environmental Protection Act 1990 (c. 43) as amended in 1996 and 1999 implements integrated pollution control for the disposal of waste to air, land and water, including solid waste disposal.

H.1.4 As part of this, under Section 34, the Act imposes Duty of Care on anyone who produces, imports, keeps, stores, transports, treats or disposes of waste.

H.1.5 This will mean that Highways England and all contractors must take all reasonably practical steps to ensure that:

- Waste is consigned only to a registered waste carrier, licensed waste contractor, local authority waste collector or person dealing with waste in ways that are exempt from licensing;
- Waste that is disposed of is accompanied by a detailed written description of the waste to ensure its safe handling, treatment and disposal (waste transfer notes are to be kept for a minimum of two years and hazardous waste consignment notes are to be kept for a minimum of three years);
- Waste is securely contained to prevent it escaping to the environment;
- Appropriate measures are taken to ensure that others involved in the handling and disposal of waste do so in accordance with the all applicable Regulations;
- Copies of registration certificates should be obtained for all waste contractors and waste carriers used as part of the Scheme and it should be ensured that they are on the Environment Agency's 'Public Register of Waste Carriers, Brokers and Dealers'; and

- Checks should be made on the final destination of each waste, ensuring that each waste disposal facility is licensed to accept the waste. Duty of Care audits of carriers and waste disposal facilities are advisable.

H.1.6 The generation of waste from the Scheme shall be managed in accordance with all applicable legislation and policy and in accordance with good practice.

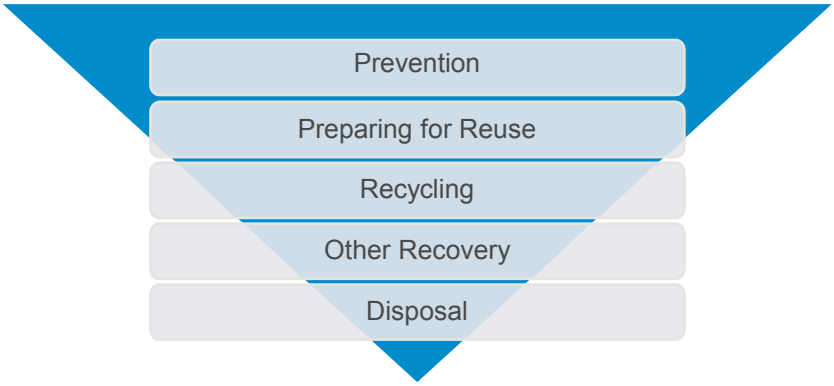
Clean Neighbourhoods and Environment Act 2005 (c. 16)

H.1.7 Chapter 16 of the Clean Neighbourhoods and Environment Act 2005 (c. 16) prescribes the correct transportation, collection, disposal and management of waste and prohibits fly tipping.

Waste (England and Wales) Regulations 2011 (SI 2011/988)

H.1.8 The Regulations 2011 (SI 2011/988), as amended in 2012 (SI 2012/1889) and in 2014 (SI 2014/656), transpose the Revised EU Waste Framework Directive (2008/98/EC) into English law and require organisations to manage waste in alignment with the waste hierarchy (see Figure H.1), in order to prevent waste going to landfill.

Figure H.5: Waste Hierarchy



H.1.9 Waste management contractors working on the Scheme will be required to provide evidence that the waste hierarchy has been applied. This evidence can be in the form of waste transfer notes and hazardous waste consignment notes, which themselves must be kept for two and three years, respectively.

The Hazardous Waste (England and Wales) Regulations 2005 (SI 2005/894)

H.1.10 The Regulations, as amended in 2009 (SI 2009/507), 2015 (SI 2015/1360) and 2016 (SI 2016/336) applies to all wastes listed as hazardous in the European Waste Catalogue (2000/532/EC) and the CLP (Classification, Labelling and Packaging) Regulation (EC 1272/2008). Hazardous waste will be produced throughout all lifecycle stages of the Scheme. Hazardous waste should be disposed of in accordance with the Regulations. including a hazardous waste consignment note.

Waste Electrical and Electronic Equipment (WEEE) Regulations 2013 (SI 2013/3113)

H.1.11 The Regulations revoke the previous WEEE Regulations (2006 (SI 2006/3289), 2007 (SI 2007/3454), 2009 (SI 2009/2957) and 2010 (SI 2010/1155)) and have a key objective to reduce the amount of WEEE that goes to landfill. This is to be

achieved by making producers responsible for the collection, treatment and recovery of WEEE, including the associated costs.

H.1.12 For the Scheme, all WEEE produced in the CD&E and operational phases must be segregated and managed separately from other wastes, with relevant paperwork provided as described above.

The Waste Batteries and Accumulators Regulations 2009 (SI 2009/890)

H.1.13 The Regulations, as amended in 2015 (SI 2015/1935), main requirements are that producers of batteries and accumulators must either take back waste batteries and accumulators, or fund the collection and recycling of them. The 2015 amendment removed several additional requirements, inclusive of the provision of operational plans and independent audit reports.

H.1.14 For the Scheme, all batteries produced in the CD&E and operational phases must be segregated and managed separately from other wastes.

The CLP (Classification, Labelling and Packaging) Regulation (EC 1272/2008)

H.1.15 The CLP Regulation (within the UK and EU) was introduced in a staggered manner between 1999 and 2015. It should be noted that within the UK and EU, the CLP Regulation, has replaced the Dangerous Substances Directive (67/548/EEC) and the Dangerous Preparations Directive (1999/45/EC). To summarise, the Regulation provides guidance on the application of the CLP criteria for hazards (physical, health and environmental). With specific reference to the Scheme, the Regulation should be used to support the classification of both waste and materials. All waste should be classified by a six-digit code, which must be recorded on all waste transfer notes and hazardous waste consignment notes for the movement of waste from the CD&E and operational phases of the Scheme.

Environmental Protection (Disposal of Polychlorinated Biphenyls and other Dangerous Substances) (England and Wales) Regulations 2000 (SI 2000/1043)

H.1.16 The Regulations, as amended in 2000 (SI 2000/3359), require the safe disposal or decontamination of all equipment that contains polychlorinated biphenyls (PCBs). Contaminated equipment containing over 5 litres or more of PCB substance or mixture is also covered by the Regulations. PCBs are often present in areas of historical industrial use.

The Environmental Permitting (England and Wales) Regulations 2016 (SI 2016/1154)

H.1.17 The Environmental Permitting Regulations 2016 (SI 2016/1154) replace the 2010 Regulations (SI 2010/675) (as amended in 2011 (SI 2011/2043), 2012 (SI 2012/630) and 2014 (SI 2014/255)). The Regulations put in place requirements to ensure that sites that produce certain materials and undertake certain activities (such as the storage, use or treatment of waste) have a permit or exemption from the regulator (i.e. the Environment Agency).

Environmental Damage (Prevention and Remediation) Regulations 2009 (SI 2009/153)

H.1.18 The Regulations, as amended in 2010 (SI 2010/587), introduce obligations to ensure the polluter pays for any environmental damage caused. The Regulations are applicable to all economic activities and therefore cover businesses. The Regulations require caution to be taken when managing sites in order to prevent damage to water, land and biodiversity. Such damage could be caused by poor waste management practices and as such the generation of waste from the Scheme must be managed in accordance with all applicable legislation and policies and in accordance with good practice.

The Control of Asbestos Regulations 2012 (SI 2012/632)

H.1.19 The Regulations require notification to the appropriate authority of all notifiable asbestos works (as specified in the Regulations), the medical surveillance (from April 2015) and health records for employers dealing with asbestos, the provision of the correct equipment and training for working with asbestos; and the documentation of the method, storage and disposal of asbestos waste. Any waste containing asbestos (e.g. insulation or lagging) must be stored and disposed of, in suitable packaging to prevent fibre release, in line with the Regulations. All asbestos must be removed by a licensed contractor who has undergone the appropriate training for the removal of asbestos and must wear the appropriate Personal Protective Equipment (PPE). Written records must be kept of the workers and the likely level of exposure. The asbestos must only be disposed of at an appropriately permitted disposal site.

H.1.20 These regulations will be adhered to during the construction of the Scheme in order to minimise harm to human health due to asbestos exposure. Information relating to asbestos contaminated soils (ACS) is provided in Chapter 10 Soils and Geology.

Waste Management Plan for England 2013

H.1.21 Defra drew on issues from the previous Waste Strategy for England (WS2000), the Waste Strategy for England (WS2007), European Directives and Legislation to create the Waste Management Plan for England 2013. The Plan continues to focus on the importance of driving waste management up the waste hierarchy and states the importance of considering the Government's ambition of achieving a zero-waste economy. The Plan puts a strong emphasis on waste prevention through making products using fewer natural resources. The targets outlined in WS2007 remain relevant, including the target to recover 70% of construction and demolition waste by 2020. This target shall be considered a minimum requirement the Scheme.

National Planning Policy for Waste 2014

H.1.22 The National Planning Policy for Waste is the formal replacement for Planning Policy Statement 10 (PPS10). It follows the principles set out in PPS10, which states that waste should be managed in line with the principles of the waste hierarchy. It is important to ensure that, where possible, waste production is minimised to reduce environmental impacts and to ensure an assessment is made of the local waste infrastructure type and capacities, to include, but not be limited to, an assessment of the local policies.

Waste Planning Practice Guidance 2015

H.1.23 The PPG website details how to adhere to the National Planning Policy for Waste 2014. The guidance should be followed in order to satisfy the LPA that impacts introduced by a proposed development on the existing waste management facilities are acceptable and do not prejudice the implementation of the waste hierarchy (see Figure H.1).

National Policy Statement for National Networks

H.1.24 The NPSNN outlines of the importance of managing resources and wastes in order to prevent and minimise environmental impacts. The resource and waste management measures outlined in the 'Waste Management' chapter should be adhered to and considered throughout all stages of the Scheme. Management measures are inclusive of but not limited to, the implementation of the waste hierarchy (see Figure H.1), the correct management of waste both on-site and off-site and ensuring the appropriate waste infrastructure for waste treatment and disposal.

Regional policy

H.1.25 There are a number of overarching sustainability policies within the region of Surrey. The Surrey Waste Plan 2008, as amended in 2009, is most applicable to material resources and waste and consists of four development plan documents. The Plan, at the time of preparing this chapter, is being reviewed and updated in accordance with the requirements of the NPPF. The reviewed and updated Plan will cover the period 2018 - 2033.

H.2 Methodology

H.2.1 A Detailed Assessment, as defined in IAN 153/11, is considered necessary to assess the impacts of material resources and waste arisings from the Scheme.

H.2.2 For the purposes of the assessment, material resources are defined as per the IAN 153/11 as “the materials and construction products required for the construction, improvement and maintenance of the trunk road network. Material resources include primary raw materials such as aggregates and minerals, and manufactured construction products. Many material resources will originate off-site, purchased as construction products, and some will arise on-site such as excavated soils or recycled road planings”. Whilst waste is defined in line with the Waste Framework Directive (2008/98/EC) as “any substance or object which the holder discards or intends or is required to discard.”

H.2.3 As noted in section 12.1 Introduction in Volume 1, there is insufficient construction and design information to carry out a full assessment at this stage and as such the assessment will be carried out during the production of the ES. The section below describes the process that will be followed to undertake the assessment.

H.2.4 The following tasks are proposed to determine the impact of material resources and waste from the Scheme:

- Ongoing review of the relevant waste legislation, national, regional and local planning policies and guidance (as summarised previously in paragraphs H.1.1 to H.1.25);
- Review the proposed construction materials and materials quantities, and estimate the quantities and types wastes to be generated during CD&E. Operational wastes will be limited to ad hoc waste arisings and/or scheduled maintenance which cannot be quantified;
- Identify and evaluate the impacts of the Scheme against the national demand for key construction materials, the regional CD&E waste arisings, the national hazardous CD&E waste arisings, the regional CD&E waste infrastructure capacity and the national hazardous CD&E waste infrastructure capacity; and
- Identify opportunities to reduce, re-use, recover and/or recycle materials and wastes through a review of the proposed development (including proposed building materials, construction methods and design, where available) and in accordance with industry best practice.

H.2.5 Whilst not mandatory, it is best practice to produce a Site Waste Management Plan (SWMP) and a Construction Environmental Management Plan (CEMP) during each stage of the design. The SWMP should be updated throughout the Scheme development and include the anticipated types and quantities of waste generated on-site, and actions undertaken to minimise waste generated on-site. A CEMP is an overarching environmental management document. Its purpose is to identify stakeholder requirements, ensure compliance with legislation, and minimise potential adverse environmental impacts during construction via mitigation measures. Both a draft SWMP and a draft CEMP will be produced and cross referenced within the ES.

H.2.6 Table H.1 contains a summary of what is scoped in and out for material resources and waste assessment.

Table H.1: Material Resources and Waste Topics Scoped In and Out of Further Assessment

Effects	Scoped In/Out	Comment/Justification
Change in demand for key construction materials during the CD&E phases.	✓	Assessment required to identify and evaluate the impacts of the Scheme against the national demand for key construction materials during the CD&E phases.
Change in demand for key construction materials associated planned/unplanned maintenance with during the operational phase.	×	Minimal impact is envisaged during the operational stage of the Scheme due to minimal material resource use (associated with planned/unplanned maintenance). Data related to operational material resource use by highway schemes is not readily available and as such will not be assessed.
Change in baseline waste arisings during the CD&E phases.	✓	Assessment required to identify and evaluate the impacts of waste arisings from the Scheme against the waste arisings baseline during the CD&E phases. The baseline for CD&E waste will be on a regional level and the baseline for hazardous CD&E will be on a national level.
Change in baseline regional waste arisings during the operational phase.	×	Minimal impact is envisaged during the operational stage of the Scheme due to minimal waste generation (through littering and planned/unplanned maintenance). Most of these wastes would likely be non-hazardous municipal type wastes during normal operation, and non-hazardous/inert and hazardous wastes from planned/unplanned maintenance. Data related to waste generated by highway schemes is not readily available and as such will not be assessed.
Change in capacity of waste infrastructure during the CD&E phase.	✓	Assessment required to identify and evaluate the impacts of waste arisings from the Scheme against the regional waste infrastructure baseline during the CD&E phases. The baseline for CD&E waste will be on a regional level and the baseline for hazardous CD&E will be on a national level.
Change in capacity of regional waste infrastructure during the operational phase.	×	Operational waste arisings from the Scheme will not be assessed as it is envisaged that this will be minimal and no data related to waste generated by highway schemes is readily available. Therefore, an assessment will not be made of the potential effect of the operational waste arisings on operational waste infrastructure.

H.2.7 The general methodology and criteria described below will be applied during the EIA process to determine the significance of the effects associated with material resources and wastes during the construction phase of the Scheme.

H.2.8 There are a number of assumptions and limitations that will be applicable to the proposed assessment methodology which are outlined below:

- Should a detailed construction programme not be available, it will be assumed that material resource use and waste generation will be spread equally across the construction period;
- Any new/unused equipment will be fed back into the supply chain for use on alternative Schemes and as such will be excluded;

- All material quantities will be converted into tonnes using industry standard conversion rates;
- All material resources will be grouped according to main material types, as shown in Table 12.1 in Baseline conditions, Volume 1;
- Wastage rates, published by the Construction Resources and Waste Platform, will be applied to all material resource tonnages in order to determine the likely waste arisings (offcuts, damaged and surplus materials);
- An additional 1% will be added to the total waste arisings (excluding soil, aggregate and granular fill) to account for packaging waste, based on experience from previous schemes. It will be assumed that 0.01% of all packaging waste arisings will be hazardous in nature (e.g. associated with sealants, paints and solvents);
- Hazardous waste arisings will comprise of oils, sealants, paints, solvents and contaminated soil. Contaminated soil will be considered separately;
- The availability of data within the timeframes of the ES submission (i.e. the availability of Bill of Quantities (or equivalent); and
- The issue of waste infrastructure capacity data by Surrey County Council in advance of the ES submission.

H.2.9 The results of the assessment will be tabulated and presented in the ES, as design data was not available within the timeframes of this PEIR submission. The tables will show:

- The total estimated material resource use and the estimated material resource use per annum; and
- The total estimate waste arisings and the estimated waste arisings per annum.

H.2.10 Additional detail will be provided in the SWMP which will be prepared and cross referenced in the ES, and will contain a more detailed breakdown of waste types.

H.2.11 The magnitude of the anticipated material resources used and waste arisings generated by the Scheme will be determined by assessing the Bill of Quantities (or equivalent). The Bill of Quantities (or equivalent) will include (but will not be limited to) information on the removal of excavated materials, and materials/equipment to be installed by sub-contractors.

H.2.12 The effect on the receptors will be assessed for the Scheme based on sensitivity and magnitude. As mentioned above, operational material resource use and waste arisings cannot currently be estimated and as such a quantitative assessment will not be undertaken.

H.2.13 Table H.2 below summarises how magnitude and sensitivity effects have been defined with regards to material resources, waste arisings and infrastructure capacity. The criteria are based on Atkins' prior experience, given there is no specific industry assessment standard. Sensitivity of key construction materials cannot be assessed due to a lack of publicly available data.

H.2.14 As baseline data relating to operational material resource use and waste generated by highway Schemes is not readily available, it will not be assessed for significance as part of the EIA process.

Table H.2: Criteria for Classifying the Magnitude of Environmental Effects

Level	Sensitivity Criteria	Magnitude Criteria
High	The Scheme meets one of more of the following criteria: • High volumes of waste generated such that it may have a high impact on estimated CD&E waste infrastructure within the regional study area (greater than 10% of the regional baseline); and • High volumes of hazardous waste generated such that it may have a high impact on estimated hazardous waste infrastructure within the national study area (greater than 1% of the national baseline).	The Scheme meets one of more of the following criteria: • Significant volumes of key construction materials required such that it has a high impact on current market demand, greater than 10% of the national baseline (for any one material); • Generation of large volumes of CD&E waste, greater than 10% of the regional baseline; and • Generation of large volumes of hazardous waste, greater than 1% of the national baseline.
Medium	The Scheme meets one of more of the following criteria: • Moderate volumes of waste generated such that it may have a moderate impact on estimated CD&E waste infrastructure within the regional study area (greater than or equal to 5% but less than 10% of the regional baseline); and • Moderate volumes of hazardous waste generated such that it may have a moderate impact on estimated hazardous waste infrastructure within the national study area (greater than or equal to 0.5% but less than 1% of the national baseline).	The Scheme meets one of more of the following criteria: • Moderate volumes of key construction materials required such that it has a moderate impact on current market demand, greater than or equal to 5% but less than 10% of the national baseline (for any one material); • Generation of medium volumes of CD&E waste, greater than or equal to 5% but less than 10% of the regional baseline; and • Generation of moderate volumes of hazardous waste, greater than or equal to 0.5% but less than 1% of the national baseline.
Low	The Scheme meets one of more of the following criteria: • Low volumes of waste generated such that it may have a low impact on estimated CD&E waste infrastructure within the regional study area (greater than or equal to 1% but less than 5% of the regional baseline); and • Low volumes of hazardous waste generated such that it may have a low impact on estimated hazardous waste infrastructure within the national study area (greater than or equal to 0.1% but less than 0.5% of the national baseline).	The Scheme meets one of more of the following criteria: • Low amounts of key construction materials required such that it has a moderate impact on current market demand, greater than or equal to 1% but less than 5% of the national baseline (for any one material); • Generation of low volumes of CD&E waste, greater than or equal to 1% but less than 5% of the regional baseline; and • Generation of low volumes of hazardous waste, greater than or equal to 0.1% but less than 0.5% of the national baseline.
Negligible	The Scheme meets one of more of the following criteria: • Negligible volumes of waste generated such that it may have a	The Scheme meets one of more of the following criteria: • Negligible amounts of key construction materials required such that it has a

Level	Sensitivity Criteria	Magnitude Criteria
	negligible impact on estimated CD&E waste infrastructure within the regional study area (less than 1% of the regional baseline); and • Negligible volumes of hazardous waste generated such that it may have a negligible impact on estimated hazardous waste infrastructure within the national study area (less than 0.1% of the national baseline).	negligible impact on current market demand, less than 1% of the national baseline (for any one material); • Generation of negligible volumes of CD&E waste, less than 1% of the regional baseline; and • Generation of negligible volumes of hazardous waste, less than 0.1% of the national baseline.

1.1.2 The assessment of significance combines the magnitude and sensitivity of the environmental effects to determine whether the effects are high, medium, low or negligible, as shown in Table 4.1 in Assessment of significance, Volume 1. Very large to moderate effects are considered to have the potential to be significant, while slight and neutral effects are not considered significant.

1.1.3 The results of the significance assessment will be tabulated and presented in the ES. The tables will show:

- The estimated percentage change in material resource use against the baseline;
- The estimated percentage change in waste airings against the waste arisings baseline;
- The estimated percentage change in waste airings against the waste infrastructure capacity baseline; and
- The potential significant material resource and waste effects (i.e. sensitivity, magnitude and overall significance).

Appendix I. People and Communities

I.1 Planning and policy context

National Planning Policy

I.1.1 There is no specific legislation or planning policy relating to 'people and communities' assessment, however national and local policy provides direction on relevant issues, particularly transport and land use.

National Policy Statement for National Networks

I.1.2 The NPSNN sets out the need for development of road, rail and strategic rail freight interchange projects on the national networks and the policy against which decisions on major road and rail projects will be made.

I.1.3 The Government's vision and strategic objectives for the national networks include improving overall quality of life, journey quality, reliability and safety and linking up communities. Junction improvement is cited as a measure which will be used to enhance the existing national road network towards this vision (paragraph 2.23).

I.1.4 The NPSNN establishes the expectation that delivery of new schemes will improve quality of life and avoid and mitigate environmental and social impacts in line with the principles set out in the NPPF and the Government's planning guidance (paragraph 3.3). Schemes will also be expected to improve accessibility and inclusivity and reduce community severance, to contribute to a network that provides a range of opportunities and choices for people to connect with jobs, services and friends and family (paragraph 3.19).

I.1.5 Although it does not provide specific guidance for people and communities impacts, the NPSNN outlines the approach to land use which is of relevance to this assessment. Applicants should identify existing and proposed land uses, including Best and Most Versatile (BMV) agricultural land, in the vicinity of the Scheme and the likely effects on these (paragraphs 5.165 and 5.168). Access to high quality open spaces, Public Rights of Way (PRoW), the countryside and opportunities for sport and recreation can be a means of providing mitigation and/or compensation requirements for developments (paragraphs 5.162 and 5.184).

National Planning Policy Framework March 2012

I.1.6 The NPPF establishes national planning policy to achieve sustainable development, through themes which include promoting sustainable transport, supporting a prosperous rural economy and promoting healthy communities, with a presumption in favour of sustainable development.

I.1.7 To support a prosperous rural economy, planning should promote the sustainable growth and expansion of businesses and enterprise in rural areas, the diversification of agricultural and land-based rural businesses, and the retention and development of local services and community facilities (paragraph 28).

I.1.8 The NPPF states that the system needs to be balanced in favour of sustainable transport modes to give people 'a real choice about how they travel' (paragraph 29). Encouragement should also be given to solutions which reduce congestion

(paragraph 30). Paragraph 75 includes a requirement that planning policies should protect and enhance PRoWs and access.

I.1.9 The NPPF emphasises the need to manage patterns of growth by making the fullest possible use of sustainable transport modes including public transport, walking and cycling. Chapter 4 of the NPPF sets out how transport should be considered within the context of planning decisions and sustainable development. This policy encourages solutions that seek to reduce congestion, greenhouse gas emissions and serve to facilitate the use of sustainable transport. Furthermore, LPAs are required to identify and protect, where there is robust evidence, sites and routes which could be critical in developing infrastructure to widen transport choice.

I.1.10 Chapter 8 'Promoting Healthy Communities' describes how access to high quality open spaces and opportunities for sport and recreation can make an important contribution to the health and wellbeing of communities.

I.1.11 Social interaction, health and inclusivity are priorities for communities. Planning should thus promote safe, accessible environments and use of public areas and shared space, and protect valued facilities and services including open space, sports venues, public houses and local shops (Paragraphs 69-70).

I.1.12 Paragraph 75 states policies should protect and enhance PRoW and access. Local authorities should seek opportunities to provide better facilities for users, for example by adding links to existing rights of way networks including National Trails.

I.1.13 The National Planning Policy Framework (NPPF) requires that '…local planning authorities should take into account the economic and other benefits of the best and most versatile [BMV] agricultural land. Where significant development of agricultural land is demonstrated to be necessary, local planning authorities should seek to use areas of poorer quality land in preference to that of a higher quality ...'.

I.1.14 In December 2012 Natural England published Technical Information Note 049 (TIN049), 'Agricultural Land Classification: protecting the best and most versatile agricultural land'. This states that for planning applications, specific consultations with Natural England are required under the Development Management Procedure Order in relation to BMV agricultural land. These are for non-agricultural development proposals that are not consistent with an adopted local plan and involve the loss of 20 ha or more of BMV land.

Planning Act 2008

I.1.15 The Planning Act 2008 sets out, inter alia, the DCO process and land acquisition procedures for NSIPs. This M25 project at Junction 10 would require the acquisition of areas of Registered Common Land and other Access Land as defined under the Countryside and Rights of Way Act 2000. Such land is defined as Special Category Land.

I.1.16 The compulsory purchase of land is covered in Sections 122-132 of the Planning Act, of which Sections 122 and 131 are relevant to compulsory acquisition of Special Category Land. Section 132 covers the compulsory acquisition of rights over Special Category Land.

I.1.17 The identification and selection of appropriate locations for use as Replacement Land must satisfy the definition given in the 2008 Planning Act:

> *"replacement land" means land which is not less in area than the order land and which is no less advantageous to the persons, if any, entitled to rights of common or other rights, and to the public."*

Countryside and Rights of Way Act 2000

I.1.18 The Countryside and Rights of Way Act 2000 (CRoW) regulates all PRoW and ensures access to them. It requires local highway authorities to publish a Rights of Way Improvement Plan (RoWIP), which should be reviewed every 10 years. The Act also obliges the highway authority to recognise the needs of the mobility impaired when undertaking improvements.

I.1.19 There is guidance within the Surrey County Council Rights of Way Improvement Plan (2014) which sets out how PRoW meet the present and likely needs of the public; the opportunities provided by local rights of way for exercise and other forms of recreation and enjoyment; and the accessibility of local rights of way to blind or partially sighted person and others with mobility issues.

I.1.20 The document also identifies that built development can be a threat to the rights of way network but it also offers opportunities for enhancements and creation of new routes. The document also states that high levels of road traffic have had negative impacts on users across RoW across Surrey and that the County Council will use its powers under the Highways Act to create and divert PRoW to improve connectivity.

I.1.21 Access land (land in England to which open access is provided under the powers of the CRoW Act) includes registered common land, mountain, moor, down, heath and other forms of public open space, although not all public open space is defined as access land registered common land and 'open country' which is not registered common land.

The Commons Act 2006

I.1.22 The Commons Act 2006 (the Act) protects registered Common Land and Town or Village Greens. Although the Commons Act 2006 establishes regulations for registering common land, until further notice the registers of Common Land and Town and Village Greens within Surrey County continue to be maintained under the 1965 Commons Registration Act

I.1.23 Under the 1965 Commons Registration Act, Common Land is:

(a) land subject to rights of common;

(b) waste land of a manor not subject to rights of common.

but does not include a town or village green or any land which forms part of a highway. Town or Village Greens are registered based upon use by a significant number of inhabitants of a locality for lawful sports and pastimes at present and dating back at least 20 years.

I.1.24 Protection of this land includes maintaining existing rights and protections against abuse, encroachment and unauthorised development. The Act recognises that the protection of Common Land must be proportionate to the harm caused and that some specified works can be carried out without the need

for consent. The Act provides for the release of common land providing there is a provision of suitable exchange (or replacement) land.

Local Policy

I.1.25 Local policy which has indirect relevance for people, community use and enjoyment are set within adopted local planning policy for Elmbridge Borough Council (EBC), Guildford Borough Council (GBC) and Woking Borough Council (WBC).

Elmbridge Borough Council

I.1.26 The Elmbridge Core Strategy (2011) include spatial policy CS10 'Cobham, Oxshott, Stoke D'Abernon and Downside' promotes improved access to and within the area for pedestrians and cyclists, public transport users and those with impaired mobility.

I.1.27 Policy CS16 'Social and Community Infrastructure' resists the loss of existing social and community facilities or sites.

I.1.28 Policy CS25 'Travel and Accessibility' seeks the protection of existing footpaths, cycleways and bridleways; and promotes the delivery of new cycling and walking schemes including development that increases permeability and connectivity within and outside the urban area.

I.1.29 The Elmbridge Local Plan Development Management Plan (2015) policy DM19 'Horse-related uses and development' supports proposals to extend and or enhance the recreational value of the bridleway network. Policy DM20 'Open Space and views' promotes the protection of these spaces.

I.1.30 Elmbridge have commenced reviewing their Local Plan and a Strategic Options Consultation took place from December 2016 to February 2017. The document set out in para 2.16 that they are aware of 'hot-spots' in the road network and at junctions across the Borough and this will be a key issue for any new Local Plan.

I.1.31 A Consultation on Preferred approach to Spatial Strategy Policies - including Site Allocations and Designations is expected shortly and it is anticipated that the Local Plan will be adopted in September 2018 after an Examination in Public.

Guildford Borough Council

I.1.32 In the GBC saved policies Local Plan (2003) Policy M6 'Provision for cyclists and pedestrians' promotes safe and accessible routes for pedestrians and cyclists and encourage increase use.

I.1.33 Policy R1 'Loss of Land and Facilities for Sport and Recreation' resists the loss of land and buildings used for or potential for recreation purposes. Policy R5 'Protection of Open Space' seeks to protect existing open spaces in the borough.

I.1.34 Policy CF2 'Loss of Community Facilities' resists the loss of community buildings.

I.1.35 A new Local Plan for Guildford has been consulted on and a Proposed Submission Local Plan has been produced. A Proposed Submission Local Plan: strategy and sites 2017 consultation then took place from 9 June to 24 July 2017.

I.1.36 Traffic congestion and Junction 10 of the A3/M25 is specifically referenced in paragraph 2.14a of the Transport and Accessibility section.

I.1.37 Guildford Borough Council have since published their Submission Local Plan: strategy and sites (December 2017) which has been submitted to the Secretary of State. Paragraph 216 of the National Planning Policy Framework (DCLG, March 2012) states that 'From the day of publication, decision-takers may also give weight to relevant policies in emerging plans according to:

- the stage of preparation of the emerging plan (the more advanced the preparation, the greater the weight that may be given);
- the extent to which there are unresolved objections to relevant policies (the less significant the unresolved objections, the greater the weight that may be given); and
- the degree of consistency of the relevant policies in the emerging plan to the policies in this Framework (the closer the policies in the emerging plan to the policies in the Framework, the greater the weight that may be given).

I.1.38 The PEIR has not taken into account the Guildford Borough Council Proposed Submission Local Plan: strategy and sites (Guildford Borough Council, June 2017), but the policy document will be reviewed for the ES. An Examination of the Submission Local Plan is expected in Spring/Summer 2018, with adoption currently programmed for late 2018.

Woking Borough Council

I.1.39 WBC's Core Strategy was adopted in October 2012.

I.1.40 Policy CS16 'Infrastructure delivery' states that the Council will work in partnership with infrastructure service providers to ensure that the infrastructure needed to support development is provided in a timely manner and will support in principle the development of infrastructure projects if they can be justified to support the delivery of the Core Strategy and meet all other requirements of the Development Plan for the area.

I.1.41 Policy CS17: 'Open space, green infrastructure, sport and recreation' identifies that development involving the loss of open space will not be permitted unless alternative and equivalent or better provision is made available in the vicinity or the development is directly related to the enhancement of the open space. The Council encourages the improvement of the quality and quantity of the Green Infrastructure network and the protection and enhancement of physical access, including PRoW to open space and green infrastructure is supported.

I.1.42 Policy CS18 'Transport and accessibility' sets out that the Council seeks to develop a sustainable transport system which connects people to jobs, services and community facilities, and minimises impacts on biodiversity. The Council supports proposals that deliver improvements and increased accessibility to cycle, pedestrian and public transport networks and interchange facilities, ensuring that changes made to transport infrastructure or increase in road vehicle usage will not have an adverse effect on the integrity of an SPA, SAC or Ramsar site.

I.1.43 Policy CS19 'Social and community infrastructure' resists the loss of existing social and community facilities or sites unless the Council is satisfied that there is no identified need for its original purpose and that it is not viable for any other social or community use, or adequate alternative facilities will be provided in a location with equal (or greater) accessibility for the community it is intended to

serve, there is no requirement from any other public service provider for an alternative facility that could be met through change of use or redevelopment.

I.1.44 Policy CS21 ‘Design’ seeks proposals which should be designed in an inclusive way to be accessible to all members of the community, regardless of any disability and to encourage sustainable means of travel. Incorporate landscaping to enhance the setting of the development, including the retention of any trees of amenity value, and other significant landscape features of merit, and provide for suitable boundary treatments.

I.1.45 Policy CS24 ‘Woking’s landscape and townscape’ seeks proposals which will provide a positive benefit in terms of landscape and townscape character, development will be expected to conserve, and where possible enhance existing character. The policy protects and encourages the planting of new trees where it is relevant to do so.

I.1.46 Within the Development Management Policies Development Plan Document (October 2016), Policy DM1 ‘Green Infrastructure Opportunities’ identifies that the Council supports (i) the creation of footpaths and 'cycle greenways' and (ii) the provision of new green infrastructure assets within the Green Belt.

I.1.47 Policy DM2 ‘Trees and landscaping’ promotes trees, hedgerows and other vegetation of amenity and/or environmental significance or which form part of the intrinsic character of an area must be considered holistically as part of the landscaping treatment of new development.

I.1.48 Policy DM3’ Facilities for outdoor sport and outdoor recreation’ identifies that opportunities should be taken to connect to and enhance the surrounding Green Infrastructure Network.

I.1.49 Policy DM5 ‘Environmental pollution’ seeks proposals should ensure that there will be no unacceptable impacts on (i) Air quality; (ii) Surface and ground water quality; (iii) Land quality and condition; and (iv) Health and safety of the public. Development which has the potential, either individually or cumulatively, for an unacceptable impact on environmental amenity, biodiversity or water quality by reason of pollution but is considered desirable for reasons of economic or wider social need will be expected to provide an appropriate Scheme of mitigation.

I.1.50 Policy DM17 ‘Public realm’ seeks development which creates or contribute to a safe, attractive, high quality, inclusive and legible public realm which contributes to local character and which encourages appropriate levels of activity and social interaction.

I.2 Methodology

I.2.1 The people and communities impact assessment will assess a range of potential impacts. The method of assessment for these potential impacts will vary according to the nature of each impact and receptor type. Assessment criteria is presented below for the assessment of the following receptors:

- Private dwellings;
- Community assets;
- Local businesses;
- Agricultural land;
- Development land;
- Non-motorised users (NMU); and
- Vehicle travellers (VT).

I.2.2 In each case, the proposed methodology makes use of guidance provided in DMRB Volume 11 where applicable.

I.2.3 Due to the preliminary nature of the PEIR and the lack of available design information and traffic data, it is not possible in all circumstances to apply in full the methodology that will be used in the main ES at this stage, in particular identifying significance of effects. The assessment within this PEIR follows the methodology proposed for the ES where possible and sets out preliminary findings and expectations for each sub topic area.

I.2.4 It is acknowledged in the NPSNN that new or enhanced national networks infrastructure can have direct (paragraph 4.79) and indirect impacts (paragraph 4.80) on health, well-being and the quality of life of the population. An Equalities Impact Assessment (EqIA) is being prepared for the Scheme as part of the documentation to be submitted with the DCO application and this will assess the effects of the Scheme on health, well-being and quality of life where relevant.

Private Dwellings: Land Take and Severance

I.2.5 Advice on assessing impacts from the demolition of private property and associated land-take is provided in DMRB Section 3, Part 6 (Land Use), however this does not include sufficient detail upon which to base assessment criteria beyond reporting the approximate number of units that may be lost. Professional judgement is therefore applied in order to set out criteria against which magnitude and significance shall be assessed.

I.2.6 Subject to Scheme design, the Scheme may result in loss of land, or impairment of access to one or more private dwellings. The Scheme is not currently expected to result in demolition of any dwelling.

I.2.7 All dwellings, including their access and curtilage, are considered to be receptors of high sensitivity. Loss of access to a dwelling without the provision of an alternative access will be considered equivalent to demolition; re-provision of access via a longer or otherwise poorer route will be considered equivalent to large loss of curtilage; re-provision of access along a broadly equivalent route will be considered equivalent to small loss of curtilage.

I.2.8 Demolition, loss of land, and alterations to access will be considered as a Land Take effect. Land take effects may either result in temporary impacts during construction, or permanent impacts occurring during construction. No Land Take impact would occur during operation. Impact will be assessed according to the criteria set out in Table I.1 and loss of land is considered adverse in all cases.

Table I.1: Impact to Private Dwellings Assessment Criteria

Impact Description	Magnitude	Significance
Loss of access or substantially poorer replacement access to 5+ dwellings.	Major (adverse)	Large (adverse): Significant at a community level
Loss of access or substantially poorer replacement access to 1-4 dwellings; small loss of curtilage for 5+ dwellings or large loss of curtilage for 1-4 dwellings.	Moderate (adverse)	Moderate (adverse): Locally significant
Re-provided but less advantageous access for 1-4 dwellings or small loss of curtilage for 1-4 dwellings.	Minor (adverse)	Minor (adverse): Not significant
Negligible loss of curtilage or broadly comparable re-provided access for 1-4 dwellings.	Negligible (adverse)	Neutral adverse: Not significant

Private Dwellings: Amenity

I.2.9 Construction of the Scheme has the potential to adversely affect amenity for residents of properties near the Scheme. Amenity effects e.g. noise or visual impact will be assessed elsewhere in the ES; however, where a property or properties are likely to receive a combination of two or more significant traffic or amenity effects, the People and Communities chapter will consider the likely impact of these effects on residents and the local community. Impact will be assessed according to the criteria set out in Table I.2. All dwellings, including their access and curtilage, are considered to be receptors of high sensitivity.

Table I.2: In-combination Amenity Effect Impact Assessment Criteria

Impact Description	Magnitude	Significance
Adverse or beneficial alteration in amenity (including two or more significant amenity effects) for 5+ dwellings.	Major (adverse or beneficial)	Large (adverse or beneficial): Locally significant
Adverse or beneficial alteration in amenity (including two or more significant amenity effects) for 1-4 dwellings.	Minor (adverse or beneficial)	Slight (adverse or beneficial): Not significant

Community Assets: Land Take and Severance

I.2.10 Advice on assessing impacts from the loss land used by members of the public is included in Section 3 (Environmental Assessment Techniques), Part 6 (Land Use). DMRB guidance requires assessment of the impact of loss of land used by the community. It requires the undertaking of sufficient assessment to identify the location, status and importance of land used by the public.

I.2.11 In order to asses this, guidance requires assessors to obtain information about the number of users. It is suggested that in many cases it will be necessary to visit the site and, depending on its importance, either make an estimate of usage or undertake a formal count. The site visit should take place on one or more 'typical' days (for example, a weekday during the school term or at the weekend).

I.2.12 Common Land and Access Land covers a significant area of land surrounding the existing M25/A3 road junction, particularly to the south and south-west of the junction. The public has right of access to all of this land. There are also distinct Public Rights of Way within the area, including Bridleways, a Byway, and Footpaths.

I.2.13 There are various potential access points into the Common Land and Access Land, including the Rights of Way network and a number of roads.

I.2.14 Key highway approaches to the Scheme include Old Lane, Wisley Lane, and Redhill Road. There are three public car parks within the Common Land and Access Land. These are:

- Ockham Common, Boldermere Car Park;
- Ockham Forest Old Lane Car Park; and
- Wisley Common Car Park.

I.2.15 Given the importance of Common Land to the community and the potential for the Scheme to impact upon users of the site, the user count data collected has been used to establish typical user numbers and to test the usage assumptions outlined above. This has helped to influence the design of the proposed mitigation replacement land. Re-providing replacement Common Land/PRoW is a legal requirement, regardless of the numbers using it.

I.2.16 Common Land and Access Land user surveys were undertaken in September 2017, comprising one mid-week day and one weekend day survey in line with DMRB methodology. The size and nature of the Common Land and Access Land areas makes it difficult to comprehensively and quantitatively survey the entire area. Therefore, the surveys were undertaken in a proportionate manner using a quantitative and qualitative approach. Findings of these surveys will inform the assessment of effects on users of the open space and Common Land. Survey teams in pairs visited specific points at set intervals in the day to observe whether anybody was in the areas affected by the Scheme. Interviews were also undertaken with users. The findings of these surveys will be reported in full in the main ES.

I.2.17 The sensitivity or value of land used by the community will be classified as either High, Medium, Low or Negligible. The value is determined by professional judgement and the criteria for assessing receptor value is set out in Table I.3.

Table I.3: Criteria for Assessing Receptor Sensitivity/Value

Sensitivity/ Value	Criteria
High	Community facility or recreational asset that provides a valuable service to the community, a community group, or individual or is otherwise considered to be of high value to the community.

Sensitivity/ Value	Criteria
	Frequent or continuous use of a resource, no suitable equivalent alternative resources used by the receptor are reasonably available.
Medium	Community facility or recreational asset which is one of several facilities providing the same of similar service to the community, community group, or individual, or is otherwise considered to be of medium value to the community. Moderate or occasional use of a resource, limited equivalent alternative resources used by the receptor are reasonably available.
Low	Community facility or recreational asset which is one of many providing the same of similar service to the community, community group, or individual, or is otherwise considered to be of low value to the community. Low or infrequent use of a resource, suitable alternative resources are readily available.
Negligible	Community facility or recreational asset which does not provide an essential service to the community, community group, or individual, or is otherwise considered to be of negligible value to the community. Very infrequent use of resource, multiple equivalent or better alternatives are freely and easily available.

I.2.18 The magnitude of impact will be assessed based upon professional judgement, taking into account any agreed mitigation. The criteria used to determine the magnitude of any change in baseline conditions is presented in Table I.4 below. The magnitude of change is primarily derived from the following:

- Geographical scale of impact;
- Duration of impact; and
- Whether the impact is reversible or irreversible.

Table I.4: Criteria for Assessing Magnitude of Impact

Magnitude	Criteria
Major	A substantial part of the receptor will be lost. Loss is long term or irreversible.
Moderate	A substantial part of the receptor will be lost. Loss is short term. Or Some of the receptor will be lost. Loss is long term or irreversible.
Minor	A small part of the receptor will be lost. Loss is long term. Or A very small part of the receptor will be lost. Loss is irreversible.
Negligible	A small part of the receptor will be lost. Loss is short term. Or A very small part of the receptor will be lost. Loss is long term but reversible.

I.2.19 Significance is the product of and the sensitivity of receptors magnitude of impact. The significance of effects within this assessment is measured according to Table I.5 below.

I.2.20 Of the effects described, moderate and major effects will be considered 'significant'.

Table I.5: Significance of effects matrix

Environmental Value (Sensitivity)	Magnitude of impact (degree of change)				
	Major	Moderate	Minor	Negligible	No change
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 Source: DMRB Volume 11, Section 2, Part 5, HA 205/08, Table 2.4

Community Assets: Amenity

I.2.21 The Scheme may result in changes in amenity experienced at community facilities or land used by the community. Amenity and traffic effects (including air quality, noise, vibration, and visual impact caused either directly by the Scheme itself or by changes in traffic flows brought about by the Scheme) will be considered individually in detail elsewhere in the ES. The People and Communities chapter will consider instances where users of a community facility or land used by the community may experience a combination of such effects, leading to a cumulative deterioration in amenity.

I.2.22 A qualitative assessment of the potential impact of the Scheme on the amenity of community facilities and land used by the community during construction and operation is proposed. This assessment will draw upon the conclusions of the traffic, air quality, noise, vibration and visual impact assessments.

I.2.23 The sensitivity or value of land used by the community will be classified as either High, Medium, Low or Negligible. The value is determined by professional judgement and the criteria for assessing receptor value is set out in Table I.5 above.

I.2.24 The method for the assessment of magnitude is based on a bespoke set of assessment criteria, which have been developed using professional judgement to assign a level of significance to effects arising from the impacts, based on the criteria set out in Table I.6.

Table I.6: Community Facilities Assessment Criteria

Impact Description	Magnitude
Substantial and permanent changes in environmental amenity for a large number of people.	Major (adverse or beneficial)
A substantial change to a modest number of people's environmental amenity or a moderate change in many people's environmental amenity. Impacts can be temporary or permanent but do not significantly affect the overall functioning of the land use in the longer term.	Moderate (adverse or beneficial)
A detectable but non-material change to environmental amenity for a small or large number of people. Changes might be noticeable, but the beneficial or adverse impacts fall within the range of normal variation.	Minor (adverse or beneficial)
Changes that are unlikely to be noticeable (i.e. well within the scope of natural variation).	Negligible (adverse or beneficial)

I.2.25 Of the effects described in Table I.6, moderate and major effects will be considered 'significant'. The significance matrix in Table 4.1 in Assessment of significance, Volume 1, will be used, repeated in Table I.5 above.

Local businesses

I.2.26 The Scheme has potential to effect existing local businesses. Possible impacts include isolation or disruption to access and changes in local amenity, which may diminish trading conditions. In order to assess possible effects on local businesses, a schedule of properties that could reasonably be affected by the Scheme have been compiled based upon desktop research.

I.2.27 Having identified potential receptors, likely impact will be assessed according to a qualitative approach, evaluating the Scheme's potential impact (and the duration of any impact), during both construction and operation, on each receptor. The assessment will consider the likely effects arising from each impact the sensitivity of a receptor to each impact and the magnitude of any identified effect, to determine the significance of effects.

I.2.28 The relative sensitivity of local business receptors to potential impacts such as demolition, land take, and disruption to access is assessed in line with the definitions provided in Table I.7 below.

Table I.7: Sensitivity of Local Businesses

Receptor sensitivity	Definition
High	Business viability likely to be permanently jeopardised by a short disruption to access or worsening of trading conditions.
Medium	Business profitability may be harmed by a short or medium term disruption to access or worsening of trading conditions.
Low	Business could continue to operate without substantial injury if affected by a disruption to access or worsening of trading conditions.

I.2.29 Magnitude of impacts on local businesses will be classified as Major, Moderate, Minor, or Negligible, in line with the definitions provided in Table I.8 below.

Table I.8: Magnitude of Impact on Local Businesses

Impact magnitude	Definition
Major	The Scheme would have a very adverse/beneficial effect on the function or operation of the business for a prolonged period of time.
Moderate	The Scheme would have a very adverse/beneficial temporary effect on the function or operation of the business for a short period of time (e.g. <3 months during peak construction period); or The Scheme would have a modest adverse/beneficial effect on the function or operation of the business for a prolonged period of time.
Minor	The Scheme would have a modest adverse/beneficial temporary effect on the function or operation of the business for a short period of time (e.g. <3 months during peak construction period); or The Scheme would have a slight adverse/beneficial effect on the function or operation of the business for a prolonged period of time.
Negligible	The Scheme would have little or no adverse/beneficial effect on the function or operation of the business.

I.2.30 Significance is the product of and the sensitivity of receptors magnitude of impact. The significance of effects within this assessment is measured according to Table I 9 below.

Table I.9: Significance of Impact upon Local Businesses

Significance (sensitivity of receptor)	Impact magnitude		
	Major	Moderate	Minor
High	Large adverse/ beneficial - significant	Large adverse/ beneficial - significant	Moderate adverse/ beneficial - significant
Medium	Large adverse/ beneficial - significant	Moderate adverse/ beneficial - significant	Slight adverse/beneficial - not significant
Low	Moderate adverse/ beneficial - significant	Slight adverse/ beneficial - not significant	Negligible - not significant

Agricultural Land

I.2.31 The assessment follows the approach of the DMRB Volume 11, Section 3 Part 6 Land Use. This identifies six main areas which need to be covered in any assessment of effects on agricultural land. These are agricultural land quality, designated agricultural areas, land take, type of husbandry, severance and major accommodation works for access, water supply and drainage.

I.2.32 No fieldwork was done at this stage and soils and the presence of BMV land are assessed using data from a published soil map.

I.2.33 The significance criteria address both magnitude of impact and sensitivity of the resource and consideration of the characteristics of the impact and the receptor, namely:

- Type of impact - direct or indirect;
- Nature of impact - beneficial, adverse or neutral;

- Duration of impact - short or long term, reversible or not;
- Frequency of impact - continuous or intermittent, changing with time or constant.

I.2.34 There is no nationally recognised set of criteria for assessing the impact of infrastructure schemes on loss of BMV land and so a bespoke system has been developed to reflect the issues significant to this project. All Scheme effects are considered to be adverse.

I.2.35 Impact on agricultural holdings will be assessed as follows. The sensitivity of agricultural holdings can be assessed as 'High', 'Medium', 'Low' or 'Negligible' are shown in Table I.10.

I.2.36 The magnitude of the predicted impact on agricultural holdings may be assessed as 'Major', 'Moderate', 'Minor' or 'Negligible' following the criteria given in Table I.11 below. These criteria were used successfully in the EIA of HS2 Phase 1[91].

I.2.37 In general terms, larger farm holdings have a greater capacity to absorb impacts and are less sensitive. However, the scale of the land holding is reflected in the magnitude of impact and the percentage land-take from the farm. For example, the loss of 100 hectares from a 400-hectare (1,000 acre) farm would be a high impact (25%), whereas the same land-take from a 1,000-hectare farm would be low (10%).

Table I.10: Sensitivity of Receptors - Agricultural Holdings

Value	Receptors
High	Farm types in which the operation of the enterprise is dependent on the spatial relationship of land to key infrastructure, and where there is a requirement for frequent and regular access between the two, or dependent on the existence of the infrastructure itself, e.g.: • Dairying, in which milking cows must travel between fields and the parlour at least twice a day; • Irrigated arable cropping and field-scale horticulture, which are dependent on irrigation water supplies; • Intensive livestock or horticultural production which is undertaken primarily within buildings, often in controlled environments; • Marginal agricultural holdings; • Horses; • Fruit crops; • Land in agri-environmental schemes (Higher Level Stewardship); • Land in agri-environmental schemes (Organic Entry Level Stewardship); • Land with organic/organic conversion status; • Land with Notifiable Weeds; • Land with Notifiable Scheduled Diseases; • Land in woodland/forestry grant schemes; and • Statutory rural land designations, e.g. Nitrate Vulnerable Zones (re EU Nitrate Directive (91/676/EC)).
Medium	Farm types in which there is a degree of flexibility in the normal course of operations, e.g.:

[91] HS2 Ltd. Environmental Impact Assessment of HS2 Phase 1 (2013). Available online @ https://www.gov.uk/government/collections/hs2-phase-one-environmental-statement-documents Last viewed May 2016

Value	Receptors
	• Combinable arable farms; • Grazing livestock farms (other than dairying); • Unimproved pasture; • High value crops; and • Land in agri-environmental schemes (Entry Level Stewardship).
Low	Large agricultural holdings. Farm types and land uses undertaken on a non-commercial basis. Land farmed on an annual grazing licence or other short-term agreement, i.e. where the long term-tenure of the affected land is not secure.
Negligible	Non-agricultural land, including woodland, access tracks and hard-standing.

Table I.11: Magnitude of Impact - Agricultural Holdings

Impact magnitude	Key Agricultural Issues			
	Land-take	Severance	Infrastructure	Nuisance (e.g. noise/dust)
Major	>20% of all land farmed.	No access available to severed land.	Direct loss of farm dwelling, building or structure.	Nuisance discontinues land use or enterprise.
Moderate	>10% to 20% of all land farmed.	Access available to severed land via the public highway.	Loss of or damage to infrastructure affecting land use.	Nuisance necessitates change to scale or nature of land use or enterprise.
Minor	> 5% to 10% of all land farmed.	Access available to severed land via private way.	Infrastructure loss/damage does not affect land use.	Nuisance does not affect land use or enterprise.
Negligible	5% or less of all land farmed.	No new severance.	No impact on farm infrastructure.	No nuisance on land use or enterprise.

I.2.38 Significance is the product of the sensitivity of receptors and magnitude of impact. The significance of effects within this assessment is measured according to Table I.5.

Development Land

I.2.39 The Scheme is likely to result in effects on development land. Assessment of the effects of the Scheme on development land will be based upon guidance set out in DMRB, Volume 11, Section 3, Part 6, Chapter 5: Effects on Development Land.

I.2.40 This guidance suggests that the environmental assessment should take account of, as far as is practicable, future changes in land use due to new development which would be likely to occur in the absence of a scheme. This should be done by considering the impact of a scheme's land-take on any sites covered by local planning authorities' land use planning designations.

I.2.41 In addition, future changes in land use, for which planning permission has been granted may also be relevant to the assessment of a scheme. For example,

where a proposed scheme would run close to an area reserved for housing development it should be recognised that more residences would be affected by noise, visual intrusion, etc. than the current assessment suggests. Alternatively, planned development could reduce the landscape quality of an area, for example.

I.2.42 In order to assess potential effects of the Scheme on development land, a desk based review of local planning policy and associated mapping and a search of planning consents will be undertaken in order to identify potential 'receptors'. The impact of the Scheme will then be assessed using a descriptive approach that considers potential 'land-take' from allocated or consented sites and the effect the Scheme may have on allocated or consented sites nearby. This assessment will consider the extent to which the Scheme would support, depart from, or hinder planning policy aims. The significance of impact on development land will be assessed according to Table I.12 below.

Table I.12: Development Land Impact Assessment Criteria

Assessment Score	Contribution to Achievement of Policy Objectives
Significant Beneficial	The Scheme substantially contributes to the achievement of, or is consistent with, the intended use of identified development land.
Beneficial	The Scheme partially contributes to the achievement of, or is consistent with, the intended use of identified development land.
Neutral	The Scheme does not affect the intended use of identified development land or equally benefits and hinders achievement of the intended use.
Adverse	The Scheme partially hinders or is inconsistent with the intended use of identified development land.
Significant Adverse	The Scheme substantially hinders or is inconsistent with the intended use of identified development land.

Non-motorised users: Journey length & Local Travel Patterns

I.2.43 The assessment for NMU impact will be undertaken in accordance with the guidance in the Pedestrians, Cyclists and Equestrians component of DMRB Volume 11, Section 3, Part 8.

I.2.44 Existing and proposed routes and Rights of Way used by NMUs that may be affected by the Scheme will be identified through a desk based assessment, supported where applicable by the findings of user surveys already undertaken in relation to the assessment of impacts on Community Assets.

I.2.45 The way in which the Scheme might affect the duration or distance of pedestrians' and others' journeys, existing local travel patterns will be established.

I.2.46 The routes likely to be affected and the number of NMUs likely to experience changes in journey times on these routes will be reported. Particular attention will be given to impacts on vulnerable groups.

I.2.47 It is considered likely that the majority of NMU trips in the study area are associated with recreation. Recreational trips are generally considered less sensitive to changes in journey length in that users are not necessarily seeking the fastest or most direct route from their location to a specific destination.

I.2.48 A schedule will be produced showing changes in typical journey lengths and likely changes in travel patterns, with an estimate of the number of people affected in each case and a descriptive commentary of impacts.

Non-motorised users: Changes in Amenity

I.2.49 Amenity is defined as the relative pleasantness of a journey. In assessing amenity for the routes used by pedestrians and others, a descriptive approach will be employed which gives an overall indication of the change in amenity and the number of journeys affected. Reasoning behind this judgement will be provided.

I.2.50 Other factors will also be taken into account where applicable, such as footpath width and distance from traffic, barriers between pedestrians and traffic, and the quality of street furniture and planting. For ramblers, changes in the quality of landscape or townscape will also be relevant. For cyclists, they include positive factors, such as the clear signage of alternative routes for cyclists, and subways or cycle crossings, and negative factors such as junctions where cyclists and vehicles are not separated. For equestrians, landscape quality will generally be an important factor, as may some of those affecting cyclists, depending on the existing and proposed provision for riders. Safety for equestrians crossing a route is a particularly important consideration.

Non-motorised users: Severance

I.2.51 Changes in journey length and journey times and amenity for pedestrians and others may be such that they affect, adversely or beneficially, the degree to which a locality is subject to ‘community severance’.

I.2.52 Community severance is defined here as the separation of residents travelling by non-motorised means from facilities and services they use within their community caused by new or improved roads or by changes in traffic flows. In addition to changes in community severance caused by changes in pedestrians' and others' ability to travel in the locality of a scheme, severance may sometimes be caused by the demolition of a community facility or the loss of land used by members of the public.

I.2.53 In accordance with DMRB Volume 11, Section 3, Part 8, new severance will be described using a three point scale, viz, Slight, Moderate or Severe severance.

- Slight: Generally, in cases of slight severance current journey pattern is likely to be maintained, but there will probably be some hindrance to movement.
- Moderate: In cases of moderate severance some residents, particularly children and elderly people, are likely to be dissuaded from making trips. Other trips will be made longer or less attractive.
- Severe: In cases of severe severance, People are likely to be deterred from making trips to an extent sufficient to induce a re-organisation of their habits. This would lead to a change in the location of centres of activity or in some cases to a permanent loss of a particular community. Alternatively, considerable hindrance will be caused to people trying to make their existing journeys.

I.2.54 These descriptions will be coupled with an estimate of the numbers of people affected, their location and the community facilities from which they are severed.

On this basis, no prescriptive tables for sensitivity, magnitude, or significance are proposed.

Vehicle Travellers: Views from the road

I.2.55 The assessment of travellers' views will be based on the guidance in DMRB 11.3.9 and TAG Unit 4.1 Social Impact Appraisal (November 2014) in the Department of Transport's TAG Guidance.

I.2.56 'View from the road' is taken to be the extent to which travellers, including drivers, are exposed to the different types of scenery through which a route passes. Aspects to be considered are:

- The types of scenery or the landscape character;
- The quality of the landscape;
- Features of particular interest or prominence in the view; and
- The extent to which travellers may be able to view the scene.

I.2.57 The extent to which travellers may be able to view landscape shall be considered according to the following categories in defining sensitivity:

- No View: road in steep cutting or contained by earth bunds, environmental barriers or adjacent structures;
- Restricted View: frequent cuttings or structures blocking the view;
- Intermittent View: road generally at ground level with shallow cuttings or barriers at intervals; and
- Open View: view extending over many miles or only restricted by existing landscape features.

I.2.58 The effects of the Scheme on traveller's views from existing routes and from the carriageway of the Scheme itself will be assessed according to the TAG Social Impact Appraisal guidance. The effect on traveller's views shall be categorised in one of the following three ways:

- Neutral: little or no effect for most views from the road or improvements on some views are generally balanced by deterioration in others;
- Beneficial: views from the road would be, on balance, a change for the better; and
- Adverse: views from the road would be, on balance, a change for the worse.

I.2.59 The significance of effects upon traveller's views will also be assessed according to the TAG Social Impact Appraisal guidance:

- "the assessment is likely to be slight (beneficial or adverse) where the numbers of travellers affected is low (less than 500 a day, say);
- the assessment is likely to be large (beneficial or adverse) where the numbers of travellers affected is high (more than 10,000, say);
- the assessment is likely to be moderate (beneficial or adverse) in all other cases."

Vehicle Travellers: Driver Stress

I.2.60 Driver stress is defined in the DMRB as the adverse mental and psychological effects experienced by a driver traversing a road network. The level of stress experienced by a driver may be affected by a number of factors including; road layout and geometry, surface riding characteristics, junction frequency and speed and flow per lane. Reduction in achievable vehicle speeds resulting from congestion may result in substantially increased journey times, introducing a degree of severance and increasing driver stress.

I.2.61 There are three main components of driver stress: frustration; fear of potential accidents; and uncertainty relating to the route being followed:

- Driver frustration - caused by an inability to drive at a speed consistent with the standard of the road, and increases as speed falls in relation to expectations;
- Driver fear - the main factors are the presence of other vehicles, inadequate sight distances and the likelihood of pedestrians, particularly children, stepping into the road. Fear is highest when speeds, flows and the proportion of heavy vehicles are all high, becoming more important in adverse weather conditions; and
- Driver uncertainty - caused primarily by signing that is inadequate for the individual's purposes.

I.2.62 The measurable aspect of driver stress is associated with frustration due to delays. The level of driver stress has been determined through a qualitative assessment of the above factors, under a three-point descriptive scale, as recommended under DMRB guidance, as Low, Moderate or High.

I.2.63 As per the DMRB guidance, the following tables will be used to guide the assessment of stress in the ES.

Table I.13: Driver Stress - Motorways

Average peak hourly flow per lane, in flow Units/1 hour	Average Journey Speed Km/hr		
	Under 75	75-95	Over 95
Under 1200	High	Moderate	Low
1200-1600	High	Moderate	Moderate
Over 1600	High	High	High

Table I.14: Driver Stress - Dual-Carriageway Roads

Average peak hourly flow per lane, in flow Units/1 hour	Average Journey Speed Km/hr		
	Under 60	60-80	Over 80
Under 1200	High*	Moderate	Low
1200-1600	High	Moderate	Moderate
Over 1600	High	High	High

* "Moderate in urban areas"

Table I.15: Driver Stress - Single Carriageway Roads

Average peak hourly flow per lane, in flow Units/1 hour	Average Journey Speed Km/hr		
	Under 50	50-70	Over 70
Under 600	High*	Moderate	Low
600-800	High	Moderate	Moderate
Over 800	High	High	High

* “Moderate in urban areas”

Appendix J. Climate Change and Disaster Prevention

J.1 Planning and policy context

National Planning Policy Framework (NPPF)

J.1.1 The National Planning Policy Framework (NPPF) was published on 27 March 2012 and replaces the majority of the Planning Policy Statements and Planning Policy Guidance. The Climate Change Act (2008) strengthened the institutional framework in respect of planning policy and managing the impact of climate change. In line with the objectives and provisions of the Climate Change Act (2008), the NPPF states that local authorities should adopt proactive strategies to mitigate and adapt to climate change.

National Policy Statement for National Networks (NPSNN)

J.1.2 The NPSNN (2014) highlights that the impact of road improvements on aggregate emission levels is likely to be small.

J.1.3 However, it requires that applicants should both provide evidence of the carbon impacts of a proposed scheme and undertake an assessment of the Scheme against the Government's carbon budgets. This will be implemented through the methodology presented below.

Climate Change Act (2008)

J.1.4 The Climate Change Act (2008) creates a new approach to managing and responding to climate change in the UK. The Government has established legally binding carbon reduction targets through the Climate Change Act (2008) to drive the reduction requirements required by the Kyoto Protocol, as set out in Table J.1. The overall objective is to reduce emissions by at least 80% of the 1990 base level year by 2050.

Table J.1: UK carbon reduction targets

Carbon Budget	Carbon Budget Level	Reduction Below 1990 Levels
3rd carbon budget (2018 to 2022)	2,544 $MtCO_2e$	37% by 2020
4th carbon budget (2023 to 2027)	1,950 $MtCO_2e$	51% by 2025
5th carbon budget (2028 to 2032)	1,725 $MtCO_2e$	57% by 2030

Table Source: Committee on Climate Change (2017)

The Carbon Plan

J.1.5 The Carbon Plan (2011) sets out how the UK will achieve the emissions reduction commitment of 80% by 2050, made in the Climate Change Act (2008). It sets out how the UK will make the transition to a low carbon economy, maintain energy security and minimise costs to consumers.

J.1.6 The Plan does not relate directly to road improvement schemes, but the Scheme should support implementation of the plan by prioritising low carbon materials and construction and operational energy efficiency, where practicable.

Construction 2025

J.1.7 Construction 2025 (2013) sets out how efficiency improvements will be created in construction covering sustainability and carbon and including a target to reduce emissions by 50%.

J.1.8 The emissions reduction target of 50% is not scheme specific, and the efficiency improvements are broad. In terms of the Scheme and emissions reduction, the reduction target should be taken into account when developing Scheme specific mitigation measures, where relevant.

Infrastructure Carbon Review

J.1.9 HM Treasury produced the Infrastructure Carbon Review (2013) to set out carbon reduction actions required by infrastructure organisations.

J.1.10 In terms of the Scheme and emissions reduction, the reduction actions should be taken into account when developing Scheme specific mitigation measures, where relevant.

Road Investment Strategy: for the 2015/16 - 2019/20 Road Period

J.1.11 The Road Investment Strategy (2015), as amended in 2016, published by the Department for Transport, sets out the strategy for the transformation of the strategic road network (SRN) by 2040 to create a modern SRN that supports a modern Britain. The Strategy also specifies objectives to significantly reduces emissions across the SRN, including emissions reductions from SRN construction activities.

J.1.12 The Scheme should support implementation of the strategy delivering carbon requirements specified as relevant to it.

Highways England

J.1.13 Highways England has a range of strategies, frameworks and tools in place for carbon reduction, including carbon objectives in their Sustainable Development Strategy (2017), and the Highways Agency Carbon Routemap (2014). Such strategies, frameworks and tools provide emission (i.e. carbon) projections and are intended to enable options to be considered.

J.1.14 The Scheme should support the implementation of the strategies, frameworks and tools by delivering mitigation measures of relevance to the Scheme.

Carbon and Energy Policy 2015 to 2019

J.1.15 The Carbon and Energy Policy 2015 to 2019, issued by Surrey County Council and is underpinned by the Surrey Climate Change Strategy (2009), sets out its objectives for managing energy and fuel use and reducing carbon emissions across its estate and activities.

J.1.16 One of the objectives outlined in the Carbon and Energy Policy 2015 to 2019 is to review and consider lifecycle energy and carbon implications for major projects and strategic decisions occurring with the reporting area of Surrey. As part of the preparation of the ES it is proposed that a consultation meeting will be held with Surrey County Council.

Surrey Transport Plan: Climate Change Strategy

J.1.17 The aim of the Surrey Transport Plan: Climate Change Strategy (2011), issued by Surrey County Council, is, with particular reference to this chapter, intended to reduce emissions from transport operations in Surrey, including street lighting and maintenance activities for example.

J.1.18 The Scheme should consider the Surrey Transport Plan: Climate Change Strategy (2011) when specifying mitigation measures of relevance to the Scheme.

Highways Agency Climate Change Adaptation Strategy and Framework

J.1.19 The Highways Agency Climate Change Adaptation Strategy and Framework (2009) has led to modifications in existing standards on the national network. Local roads are maintained by upper tier and unitary local authorities in Great Britain. For local roads, the UK Roads Liaison Group Code of Practice for Well Maintained Highways sets out a regularly updated set of recommendations for dealing with climate change by local authorities.

Amendment to the EIA Directive (2014/52)

J.1.20 The requirement to consider a project's vulnerability to climate change has resulted from the 2014 amendment to the EIA Directive (2014/52). The Directive has been fully transposed into UK law in the Town and Country Planning (Environmental Impact Assessment) Regulations and came into force in the UK on the 16th May 2017. The Directive requires: "A description of the likely significant effects of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change."

J.1.21 Climate resilience and climate change adaptation is fast becoming an established issue in EIA policy, practice and organisational and planning policies. This is in response to legislative and regulatory drivers, but also in response to the nature of the risks and associated costs presented to projects and programmes. The consideration of climate resilience issues for the Project is therefore not only important to demonstrate compliance with these legislative and regulatory requirements, but to also demonstrate and respond to the project's long-term resilience for planning and effective and efficient operation.

J.2 Methodology

Effects of the Scheme on climate change

J.2.1 There is insufficient traffic, design and construction detail to carry out a Scheme specific assessment at this stage, as such the necessary assessment will be undertaken as part of the ES. This methodology section describes the process that will be followed to undertake the assessment. A proxy assessment using this methodology has been carried out for the purposes of this chapter, which is explained in section 14.5 Potential impacts in Volume 1.

J.2.2 Using DMRB terminology, a 'simple' assessment of the Scheme's emissions will be undertaken using a desk based assessment, to quantify the magnitude and determine the significance of the emissions. The level of detail of the Scheme specific assessment will be determined by the data available within the timeframes of the ES.

J.2.3 The scope of assessment comprises the study area as defined in section 14.2 Study area in Volume 1.

J.2.4 The emissions will be quantified according to the methodologies included within:

- PAS 2080:2016 Chapter 7 (as directed by Highways England (2016) Major Projects' Instructions: Environmental Impact Assessment: Implementing the Requirements of 2011/92/EU as amended by 2014/52/EU (EIA Directive)); and
- The IEMA guide, Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance (2017) (as the latest sector guidance for such assessment).

J.2.5 The key tasks that these specify are to:

- Define the overall objective of the assessment;
- Define the scope of emissions assessment (e.g. the activities included, the geographical boundary and the timeframes);
- Decide upon assessment methodology, i.e. how the specific calculation will be undertaken and what data will be used;
- Collect the necessary calculation data; and
- Calculate/determine the emission associated with the Scheme.

J.2.6 Further details on each of the above are provided in the following sections.

Objective

J.2.7 The objective of the proposed assessment is to quantify the emissions from the Scheme, the associated supply chain, and the surrounding road network in order to assess the Scheme's significance, and to identify appropriate mitigation measures.

Scope

J.2.8 The scope covers the direct and supply chain emissions resulting from the construction and operational activities of the Scheme, as appropriate. It also includes emissions from vehicles within the DCO boundary for the Scheme and the surrounding road network.

J.2.9 Details of the scope of the assessment is previously provided in Table 14.3. Further details about the calculation methodologies for each aspect of the scope is provided in the following section.

Calculation methodology

J.2.10 It is proposed that emissions calculations will be undertaken in the Carbon Knowledgebase (CKB) for all lifecycles stages, with the exception of vehicle use of the Scheme (B9) and surrounding road network (D). The CKB contains a detailed library of emissions factors including sources such as the Inventory of Carbon and Energy (ICE) (versions 1.6(a) and 2.0), published by Bath University, the DEFRA Greenhouse Gas Reporting Conversion Factors, and the EMEP/CORINAIR Emission Inventory Guidebook. These factors will be used with the relevant Scheme data to carry out the calculations, using the automated calculation functionality in the CKB. The emissions for B9 and D will be

calculated, as specified in the air quality assessment (Chapter 5 in Volume 1), and will cover the first year of operation (2022) and then 15 years hence (2037). The emission for B9 and D will be included directly in the CKB. The emissions for D will also be geographically mapped using GIS.

J.2.11 The output of the calculations in the CKB is a tabular model/footprint, which presents the quantified emissions as total carbon dioxide equivalents (CO_2e). The output of the emissions calculations for B9 and D also includes a geographical carbon model specifically highlighting the difference in traffic emissions, as a consequence of the Scheme.

J.2.12 The CKB model will be structured in accordance with the study area as defined in Table 14.1: Effect on Climate study area, Volume 1. Table J.2 provides information on the data that will be gathered and the associated emissions factors which are likely to be used for the Scheme specific assessment.

J.2.13 The outputs of the CKB model/footprint will be succinctly presented in tabular format in the ES. In addition, the geographical mapping will be included as a figure/series of figures in the ES.

Table J.2: Emissions assessment methodology

Scheme Specific Lifecycles	Methodology		Emissions Factors
A1-3. Temporary and permanent construction materials.	Temporary and permanent construction materials data will be sourced and defined, where suitable, in alignment with the materials assessment (Chapter 12). If data is not suitable for use proxy engineering data from previous projects and engineering judgement will be used.		Bath Inventory of Carbon and Energy (2.0) emissions factor values will be used to convert the materials data into CO2e.
A4. Materials transport to works site.	The materials quantities calculated for A1-3 will be used to determine quantities to be transported. Transportation distances will be estimated based on either the data presented in the Transport Assessment or an anticipated average distance to/from supplier locations. Together this data will be used to define kilometre and/or tonne kilometre values.		The kilometre and/or tonne kilometre values will be converted into CO_2e using the Defra 2017 vehicle/freight emissions factors.
A5. Construction/ installation process.	Construction plant use.	Plant quantities, sizes and operating hours will be used as presented in the noise assessment (Chapter 6). This will be used to estimated total hours of operation per plant type during the construction phase.	The plant hours of operation will be converted into CO_2e using CORINAR emissions factors.
	Construction water use.	Total water use during construction will be estimated based on either data provided by the design team/ the contractor or industry recognised indices.	Water quantities will be converted into CO_2e quantities using the Defra 2017 water supply emissions factor.

Scheme Specific Lifecycles	Methodology		Emissions Factors
	Construction waste transportation.	The waste quantities which will be calculated as part of the waste assessment (Chapter 12) will be used in combination with the transportation distances presented in the Transport Assessment or an anticipated average distance to/from waste treatment/ disposal facilities. Together these will be used to define tonne kilometre values.	The tonne kilometre values will be converted into CO_2e using the Defra 2017 vehicle/freight emissions factors.
	Construction waste off-site processing.	The waste treatment/ disposal options, which will be estimated as part of the waste assessment (Chapter 12), will be used to establish the likely waste treatment/ disposal route and the associated treatment/ disposal quantities.	The data will be converted into CO_2e using the Defra 2017 waste treatment/disposal emissions factors.
B2-5. Replacement	Maintenance, repair, replacement and refurbishment cycles and the information regarding the planned operational life span will be obtained from the design team, and will be simply and collectively defined as replacement. Unitised emissions factor values for the relevant materials/activities will used as per A1-A5 above.		See methodology and emissions factors for A1-A5 above.
B6. Operational energy use.	Energy consumption and estimated operational hours (e.g. associated with lighting and gantries) will be collected. This will be combined using a total energy use value (kilowatts).		Kilowatts will be converted into CO_2e using the Defra 2017 electricity emissions factors.
B9. In-use traffic on the Scheme.	The CO_2e data quantified using the air quality assessment methodology (Chapter 5), for operational traffic use will be directly used.		CO_2e emission values will be directly displayed in the CKB.
D. In use traffic on wider network.	The CO_2e data quantified using the air quality assessment for the wider road network as determined from the traffic reliability area (Chapter 5) will be directly used, and will also be geographically mapped using GIS.		CO_2e emission values will be directly displayed in the CKB.

Table Source: Interpreted from PAS 2080:2016

Data collection

J.2.14 The specific data necessary to undertake the Scheme specific assessment will be collected directly from the appropriate personnel (e.g. the design team, the contractor(s) and the environmental assessment team).

J.2.15 As aforementioned, the assessment will be dependent upon the availability of design, construction and operational information, in advance of the preparation of the ES, and all information will be taken at face-value. If required information is not available within the timeframes of the assessment the scope of the assessment will be reduced.

Calculation and determination of emissions

J.2.16 The emissions for the specified lifecycle stages will be calculated by entering the Scheme data into the CKB using the appropriate formulas and emissions factors, as detailed in Table 14.3. The emissions for B9 and D will be calculated using the methodology specified in the air quality assessment (Chapter 5). These will then be entered into the CKB directly. The road network emissions for B9 and D will also be geographically mapped using the shape file(s) in GIS.

J.2.17 The Scheme emissions and the emissions changes to the surrounding roads network will be analysed by comparison of the do-minimum and do-something scenarios of the Scheme against:

- Each other;
- Background emissions;
- Emissions reduction targets; and
- Emissions changes to the surrounding road network.

J.2.18 The first year of operation (2022) and the 2037 projected operational year will be considered in the analysis.

J.2.19 The only guidance currently available for EIA assessment of emissions are:

- Chapter 4 of the Department for Transport's TAG Unit A3 Environmental Impact Appraisal; and
- IEMA, Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance (2017).

J.2.20 Whilst TAG can be used for in-use traffic assessments and is commonly applied in that regard through the air quality assessment, it does not apply to the full scope of emissions related to the Scheme. The IEMA guidance addresses the subject, but does not provide any specific detail. It simply identifies that any emissions are significant. Therefore, in the absence of suitable guidance, the assessment will be based on the application of professional technical judgement and expertise.

J.2.21 This will be used to determine whether the effects are positive or negative and major, moderate, minor, negligible or no change, as shown in the matrix Table 4.1 and defined in Table 4.2, Volume 1.

J.2.22 Following the determination of emissions mitigation measures will be identified.

Vulnerability of the Scheme to climate change

J.2.23 The methodology for undertaking the climate change impact assessment for the RIP Schemes is based on the steps set out in the Highways England Major Project Instruction (MPI). Each of these steps is described in detail below. Note, these steps describe the process that will be undertaken for the Environmental

Statement (ES) and, as such, the scoping phase (steps one and two) have been completed here.

J.2.24 The proposed approach for integrating the consideration of climate change into the EIA process aligns with the following UK and international guidance:

- Highways England (2016) Major Projects' Instructions: Environmental Impact Assessment: Implementing the Requirements of 2011/92/EU as amended by 2014/52/EU (EIA Directive);
- IEMA (2015) Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation; and
- European Commission (2013) Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment.

Scoping phase

Step one: Identify receptors and analysis of legal requirements

J.2.25 During this stage, we have identified relevant receptors which may be affected by climate change with consideration for:

- The impact of extreme weather and changes in climate on the project over its lifetime;
- The impact of the project on the climate resilience of wider (social, environmental and economic) systems over time (reflecting on the climate change issues associated with other relevant assessment areas of the EIA); and
- These receptors are likely to comprise both known (for example, receptors affected by historical flooding gleaned from literature review) and unknown (new) receptors.

J.2.26 This stage also includes the assessment and definition of the policy context.

Stage two: Climate vulnerability assessment

J.2.27 A climate vulnerably assessment has been undertaken to clearly identify the primary receptors that are vulnerable and the nature of this vulnerability over the life of the project. These vulnerabilities will then inform the detailed assessment phase.

J.2.28 The vulnerability of a project to extreme weather and climate change depends on:

- The typical sensitivity of the type of the project to climate variables and hazards; and
- The geographic exposure of the project to climate variables and hazards.

J.2.29 The climate vulnerability assessment was informed by a qualitative sensitivity analysis and an assessment of exposure from an evolving baseline. The sensitivity analysis focused on identifying the typical climate sensitivities for receptors to relevant climate variables and climate-related hazards, such as those outlined in Table J.3. The level of exposure of the primary receptors was then determined based on an expert understanding of observed climate,

scenarios for projected future climate and a literature review of climate hazards associated with the prescribed changes.

Table J.3: Typical climate variables and related hazards

Climate variable	Climate-related hazard
Average (air) temperature change (annual, seasonal, monthly)	Sea level rise (plus local land movements), storm surge/tide
Extreme (air) temperature (frequency and magnitude)	Water availability/drought
Average precipitation (annual, seasonal, monthly)	Flood (coastal and fluvial)
Extreme rainfall (frequency and magnitude)	Subsidence and ground stability
Average wind speed change (annual, seasonal, monthly)	Fog
Gales and extreme winds (frequency and magnitude)	Storms (tracks and intensity), including storm surge
Humidity	Snow, ice and hail
Solar radiation	Storms and lightning

J.2.30 A categorisation was then assigned to each climate variable/hazards in relation to each receptor based on the following scale:

- **High**: High climate sensitivity/exposure;
- **Moderate**: Moderate climate sensitivity/exposure; and
- **Low**: No significant climate sensitivity/exposure.

J.2.31 This was a qualitative assessment informed by expert opinion and a supporting literature review. The vulnerability of primary receptors to relevant climate variables and hazards was then determined using the vulnerability matrix below. High and selected Moderate vulnerabilities will then be taken forward to the detailed assessment stage.

Table J.4: Vulnerability rating matrix

Sensitivity	Exposure		
	Low	Moderate	High
Low	Low	Low	Low
Moderate	Low	Moderate	Moderate
High	Low	Moderate	High

Detailed assessment phase

Step three: Baseline conditions

J.2.32 In support of the climate risk assessment an evolving climate baseline will produce a profile of key climate variables and hazards and how they are expected to change over the life of the project. The evolving baseline will be based on local/regional Met Office observed extreme weather and climate data,

UKCP09 climate projections (with consideration for the associated uncertainty) and other relevant sources of climate risks data and information. Note, this methodology will adopt UKCP18 climate projections once they are made available next year.

Step four: Impact assessment

J.2.33 A detailed impact assessment will be undertaken, as required, for selected Moderate and High climate vulnerabilities identified. The foundation for this assessment will be a qualitative assessment based on expert judgment, engagement with project stakeholders and a review of relevant literature. This process will however be supplemented with quantitative data and information where available.

J.2.34 The assessment will focus on identifying and appraising the specific impact of relevant climate variables and hazards on primary project receptors over the life of the project. Taking account of the contribution of incorporated measures to climate resilience, this assessment will outline the level of climate resilience of each receptor to significant climate variable/hazards based on the following rankings:

- **High** - A strong degree of climate resilience, remedial action or adaptation may be required but is not a priority;
- **Moderate** - A moderate degree of climate resilience, remedial action or adaptation is suggested; and
- **Low** - A low level of climate resilience, remedial action or adaptation is required as a priority.

Step five: Avoidance, minimisation, adaptation and compensation measures

J.2.35 Recommendations for supplementary climate change adaptation measures for all Low and selected moderate level of climate resilience will be identified. The identification of possible measures will focus on:

J.2.36 Adaptation actions:

- Design;
- Operational and maintenance;
- Planning; and
- Financial.

J.2.37 Adaptive capacity building:

- Information;
- Supportive social structures; and
- Supportive governance.

Appendix K. Assessment of Cumulative Effects

K.1 Identified Developments

Table K.1: Development Schedule for the Scheme

Development	Distance from site (closest point)	Development Description			Tier (based on 'current' status)[92]	Year specific assumptions - implementation			Source of assumption information/ Notes		Stage 1		
		App No.	Developer	Description		2018	2019	2020	2021	2022	Zone of Influence	Progress to Stage 2?	
Highways England Scheme													
Junction 10 - 16 Smart Motorway Programme (SMP)	Within the red line	N/A	Highways England	M25 Junction 10 to Junction 16 includes upgrading the M25 between Junction 10 (A3) and Junction 16 (M40) through a mixture of enhancements, including hard shoulder running between Junctions 15 and 16.	3C			X	X	X	Scheduled to commence in 2020/21	All topics and included in the Traffic Model	Yes
Guildford Borough Council													
The former Wisley Airfield	Partly within the red line	Site allocation A35	N/A	Residential led mixed use development, allocated for: Approximately 2000 homes (C3), including some specialist housing and self-build plots, and approximately 100 sheltered/Extra Care homes (C3 use), and 8 Traveller pitches, and approximately 1,800 sq m of employment floor space (B1a), and approximately 2,500 sq m of employment floor space (B2/B8), and approximately 500 sq m of comparison retail (A1), and approximately 600 sq m of convenience retail (A1), and approximately 550 sq m services in a new Local Centre (A2 -A5), and approximately 500 sq m of community uses in a new Local Centre (D1), and two form entry primary school (D1), and a secondary school (D1) (four form entry, of which two forms are needed for the housing on the site and two for the wider area).	1C					50	Site allocation A35 in the Submission Local Plan strategy and sites (December 2107) The site was included in the Guildford Borough Land Availability Assessment (LAA) and 2017 Addendum in the Housing Trajectory as a proposed new settlement, to be delivered between 2022/23 to 2033/2034. This document forms part of the evidence base of the Submission Local Plan. An Examination in Public of the Submission Local Plan is due to be held in Spring/Summer 2018, with adoption currently anticipated in December 2018. There is a planning application currently at appeal on this site and is expected to be determined in Summer 2018: App No. 15/P/00012	All topics and included in the Traffic Model	Yes
Land to the East of South Cottage,	650m approx.	16/P/00608	Mr B Bill Burr	Outline planning application for the demolition of existing petrol filling station, car sales buildings and dilapidated workshops and the construction of up to 26 residential units to the rear and 2	1B	X	X				Refused on 22 June 2016 and appeal allowed subject to conditions 23 Aug 2017	Noise and vibration, Biodiversity, Road drainage and the water	Yes

[92] Categories based on Table 3: Other Development for inclusion in CEA Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2015/12/Advice-note-17V4.pdf

White Horse Lane, Ripley, GU23 6BB				retail/commercial units on the High Street frontage (for flexible A1, A2, A3 or A4 use) and associated car parking and landscaping all matters reserved except access.							Assumed that this will commence and be completed before the Scheme commences	environment, Landscape and Materials and waste	
Royal Horticultural Society Gardens, Wisley Lane, Wisley, Woking, GU23 6QS	Parts of the RHS site are within the red line boundary	16/P/01080	The Royal Horticultural Society	Erection of new part single-storey part two-storey building accommodating retail, entrance and visitor facilities and alterations to the car parking and hard and soft landscaping and following the demolition of the existing plant centre, the extensions to the Laboratory building, toilet blocks, Aberconway Cottage and part of Aberconway House.	1B	X	X	X	X		Approved 30 September 2016 The RHS webpages indicate that works will be undertaken from 2017 - 2021 approximately.	All topics	Yes
Royal Horticultural Society Gardens, Wisley Lane, Wisley, Woking, GU23 6QS	Part of the RHS site are within the red line boundary	16/P/00976	The Royal Horticultural Society	Demolition of existing buildings and erection of a two-storey building accommodating science, education, research and restaurant facilities, associated landscaping including a landscape bund and other works associated with the development.	1B	X	X	X	X		Approved 30 September 2016 The RHS webpages indicate that works will be undertaken from 2017 - 2021 approximately.	All topics	Yes
Land adjacent to Waterloo Farm behind Ockham Road North, East Horsley (C14-a)	2.4km approx.	975	N/A	An existing greenfield site. 120 homes are proposed in the site allocation details, including some self-build and custom housing plots.	3B						Site allocation in emerging planning policy documents. Guildford Borough Council (GBC) identify this site under Policy A40 of their Proposed Submission Local Plan: strategy and sites 2017. They expect that an Examination in Public will be held for their submission Local Plan between April and July 2018. The GBC Land Availability Assessment (LAA) identifies it is a deliverable site with realistic prospect of being developed within first 5 years of Local Plan (included here owing to proximity to other sites and the Scheme). Therefore, assumed to be cumulative development.	Biodiversity and included in the Traffic Model	Yes
Elmbridge Borough Council													
Former San Domenico Restaurant	Within the red line boundary	2017/0524	Euro Garages Limited	Demolition of existing main building and the construction of the new petrol filling station (Sui Generis) with ancillary convenience store (Use A1) and food to go outlet (Use Class A5), 4 no. pump islands, canopy, underground tanks, revisions to vehicular access, parking and circulation arrangements, landscaping and associated works.	1C						Validated on 21st March 2017 and still pending decision.	All topics	Yes
Former San Domenico Restaurant	Within the red line boundary	2014/4612	London Investment Holdings Ltd	Revisions to vehicular access and parking arrangements associated with the existing coach house (Use Class A3) and external alterations to facilitate a drive thru cafe.	1B						Approved 19 January 2015	All topics	Yes
Painshill Farm, Portsmouth Road, Cobham Surrey KT11 1DN	Abutting the red line boundary	2016/4204	Cobham Care Home Limited	Redevelopment of the site to provide a 70 bed care home with integrated communal and support facilities, landscaped residents' gardens, staff	1C						Validated 27th February 2017 and still pending decision.	All topics	Yes

				areas, refuse storage and parking following demolition of existing houses.								
Site of 46 Portsmouth Road, Cobham, Surrey, KT11 1HY	600m approx.	2015/0997	Beechcroft Developments	Redevelopment of the site comprising of 4 two/three storey buildings with rooms in the roofspace, dormer windows and balconies to provide 44 retirement flats; conversion of the White Lion building to provide a further 6 flats; along with associated parking, landscaping and access from Between Streets and Portsmouth Road.	1A	X					Approved 17 September 2015 Planning conditions are being discharged and it is assumed this is under construction and will be completed before the Scheme commences.	Noise and vibration, Biodiversity, Road drainage and the water environment, Landscape, Materials and waste.	Yes
Holly Parade, High Street, Cobham, Surrey KT11 3EE	1km approx.	2016/2185	McCarthy & Stone Retirement Lifestyles Ltd	Development comprising 4 units for A1 Shop/A2 Financial use and 1 unit for A1 Shop/A3 Cafe use at ground floor level (790 sqm) and 24 residential units including communal facilities and parking following demolition of existing buildings.	1A	X					Approved 19th January 2017 Planning conditions are being discharged and it is assumed this is under construction and will be completed before the Scheme commences.	Biodiversity, Landscape, Materials and waste.	Yes
Land alongside A3 adjacent to Sainsbury Car Park	450m approx.	Site allocation DEV/COB9	N/A	A largely level vacant site between a housing development/supermarket car park and the A3. Potential to develop up to 70 homes.	3B						The 2013 Elmbridge Draft Settlement Investment and Development (ID) Plans-Cobham, Oxshott, Stoke D'Abernon, Downside considers that the development site may be implemented in 6-10 years (2019-2023).	Noise and vibration, Biodiversity, Road drainage and the Water environment, Landscape, Geology and soils, Cultural heritage, Materials and waste, People and Communities	Yes
Land at Chippings Farm, Portsmouth Road, Cobham, KT11 1EH	1.4km approx.	Site allocation Land Parcel - no 20	N/A	An existing greenbelt site identified as a potential strategic site for a Sustainable Urban Extension (SUE). Approx. 500 dwellings would be proposed.	3B				X	X	Land identified as 'weakly performing' green belt in Elmbridge BC's Green Belt Boundary Review 2016. EBC state they are in the early stages of consultation with regard to the site and few details are yet to be confirmed. The Elmbridge Local Development Strategy identifies that the borough would hope to have adopted a new Elmbridge Local Plan 2035 - Spatial Strategy and Policies including Allocations and Designations in September 2018. It is assumed this site would come forward starting in 2021.	Biodiversity, Landscape, Materials and waste and included in the Traffic Model	Yes
Woking Borough Council													
Land rear of 79-95 Lovelace Drive, Teggs Lane, Pyrford	2.4km approx.	Site allocation GB12	N/A	223 dwellings proposed. The site is 11.64ha.	3B						Site Allocations Development Plan Document (June 2015) Identified as safeguarded to between 2027 - 2040	Biodiversity and included in the Traffic Model	Yes
Land east of Upshott Lane and south of Aviary Road, Pyrford	2.2km approx.	Site allocation GB13	N/A	Green Belt site. 200 dwellings proposed. The site is 11.14ha	3B						Site Allocations Development Plan Document (June 2015) Identified as safeguarded to between 2027 - 2040.	Biodiversity and included in the Traffic Model	Yes
Land surrounding West Hall, Parvis	1.1 km approx.	Site allocation GB15	N/A	Allocated use is residential including affordable house.	3B					X	Site Allocations Development Plan Document (June 2015)	All topics (excluding Air Quality) and included in the Traffic Model	Yes

Road, West Byfleet				592 dwellings proposed. The site is 29.33ha.							Time of delivery is expected to be between 2022 and 2027.		
Broadoaks, Parvis Road, West Byfleet	1.4 km approx.	Site allocation GB16	N/A	Quality offices and research premises, residential including Affordable Housing and housing to meet the accommodation needs of the elderly Proposed land use B1a, 16722 proposed GFA m2 and 1323.8 proposed jobs FTE. The site is 14.7ha.	3B	X	X	X	X	X	Site Allocations Development Plan Document (June 2015) Development Management Policies Development plan Document 2016, Policy DM13: 'Buildings in and adjacent to the Green Belt' references the site. Delivery expected to be between 2017 - 2027	Biodiversity, Road drainage and the water environment, Landscape, Materials and waste and included in the Traffic Model	Yes
Camphill Tip, Camphill Road, West Byfleet	2.3km approx.	Site allocation UA49	N/A	Former tip. Proposed land use B2. 10000 proposed GFA m2 and 263.9 proposed jobs FTE. The site is 4.82ha and allocated for industrial use.	3B	X	X	X	X	X	Site Allocations Development Plan Document (June 2015) Draft policy UA49: Camphill Tip, Camphill Road, West Byfleet, KT14 6EW. Draft allocation - expected to be delivered 2017 - 2027.	All topics and included in the Traffic Model	Yes

Tiers:
1A. Under construction
1B. Permitted but not yet implemented
1C. Submitted but not yet determined
2A. PINS projects where a scoping report has been submitted
3A. PINS projects where a scoping report has not been submitted
3B. Site allocation
3C. Identified as reasonably likely to come forward

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