Road Investment Strategy

M25 J10 / A3 Wisley Interchange Improvements

Environmental Study Report

October 2016

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The Project Manager is responsible for production of this document, based on the contributions made by his/her team existing at each Stage.

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Author	Sarah Wallis/Neil Watson
Owner	Hugh Coakley
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Reviewer List

Name	Role
Victoria Allen	Technical Review - Environmental
Graham Bown	Atkins Project Manager
Henry Penner	Highways England PTS Environmental Advisor
Hugh Coakley, Oleh Blyznyuk	Integrated project team

Approvals

The Project SRO is accountable for the content of this document

Name	Signature	Title	Date of Issue	Version
Andy Salmon		HE Project SRO		

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Glossary

AADT	Annual Average Daily Traffic
AAWT	Annual Average Weekly Traffic
ALC	Agricultural Land Classification
AOD	Above Ordnance Datum
AQMA	Air Quality Management Area
AQS	Air Quality Strategy
ARN	Affected Road Network
ASR	Appraisal Specification Report
BAP	Biodiversity Action Plan
BCR	Benefit Cost Ratio
BGS	British Geological Society
BNL	Basic Noise Level
BS	British Standard
CEMP	Construction Environmental Management Plan
CO_2	Carbon Dioxide
CMS	Continuous Monitoring Stations
CRTN	Calculation of Road Traffic Noise
CSR	Client Scheme Requirements
dB	Decibel
DCO	Development Consent Order
DEFRA	Department for Environment, Food and Rural Affairs
DDA	Disability Discrimation Act
DfT	Department for Transport
DMRB	Design Manual for Roads and Bridges
DM	Do Minimum
DS	Do Something
EA	Environment Agency
ESR	Environmental Study Report
EAST	Early Assessment Sifting Tool
EBC	Elmbridge Borough Council
ELC	European Landscape Convention
ECI	Early Contractor Involvement
EFT	Emission Factor Toolkit
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EIS	Environmental Impact Statement
EQS	Environmental Quality Standards

FRA	Flood Risk Assessment
GLVIA	Guidelines for Landscape and Visual Impact Assessment
GEML	Great Eastern Mainline
GBC	Guildford Borough Council
HE	Historic England
HER	Historic Environment Records
HDV	Heavy Delivery Vehicle / Heavy Duty Vehicle
HGV	Heavy Goods Vehicle
IAN	Interim Advice Note
IEEM	Institute of Ecology and Environmental Management
IEMA	Institute of Environmental Management and Assessment
IPC	Infrastructure Planning Commission
LAQMA.TG	Local Air Quality Management Technical Guidance
LBAP	Local Biodiversity Action Plan
LCA	Landscape Character Assessment
LEP	Local Enterprise Partnership
LDF	Local Development Framework
LPA	Local Planning Authority
LNR	Local Nature Reserve
LVIA	Landscape and Visual Impact Assessment
MAGIC	Multi-Agency Geographic Information for the Countryside
MMP	Materials Management Plan
Mph	Miles per hour
NCAP	National Character Area Profile
NE	Natural England
NPPF	National Planning Policy Framework
NMR	National Monuments Record
NMU	Non-Motorised User
NCRN	National Cycle Route Network
NN NPS	National Networks National Policy Statement
NNR	National Nature Reserve
NO_2	Nitrogen Dioxide
NOEL	No Observed Effect Level
NPSE	Noise Policy Statement for England
NSIP	Nationally Significant Infrastructure Project
NVZ	Nitrate Vulnerable Zone
OAR	Options Appraisal Report
PCF	Project Control Framework

PCM	Pollution Climate Model
PINS	Planning Inspectorate
$PM_{2.5}$	Particulate Matter with a diameter of 2.5 micrometres or less
PM_{10}	Particulate Matter with a diameter of 10 micrometres or less
PPGs	Pollution Prevention Guidelines
PPG	Planning Policy Guidance
PRoW	Public Right of Way
RBMP	River Basin Management Plan
RIGS	Regionally Important Geological / Geomorphological Site
RIP	Regional Investment Programme
RIS	Road Investment Strategy
SAC	Special Area of Conservation
SNCI	Site of Nature Conservation Importance
SOAEL	Significant Observed Adverse Effect Level
SPA	Special Protection Areas
SPZ	Source Protection Zone
SRN	Strategic Road Network
SSSI	Site of Special Scientific Interest
SUP	Shared Use Paths
SWMP	Site Waste Management Plan
TAME	Traffic Appraisal Modelling and Economics
TAG	Transport Appraisal Guidance
TPO	Tree Preservation Order
TRA	Traffic Reliability Area
UKBAP	UK Biodiversity Action Plan
WBC	Woking Borough Council
WFD	Water Framework Directive
ZVI	Zone of Visual Influence

1 Introduction and Context

1.1 Background

In December 2014 the Department for Transport (DfT) published its Road Investment Strategy (RIS) for 2015-2020. The RIS sets out the list of schemes that are to be delivered by Highways England over the period covered by the RIS (2015 – 2020). Highways England responded to the RIS with the Highways England Delivery Plan (2015) and a number of schemes have been identified to be constructed within the plan period including the improvement to M25 J10 / A3 Wisley Interchange.

Possible design solutions for schemes named in the RIS were identified through the route strategies process run by Highways England. That process included the collation of evidence of network performance issues, and local stakeholders and interested parties were engaged to explore the problems, issues and the potential range of solutions.

In 2015, Atkins was commissioned by Highways England to compile existing and new information and to produce the necessary documentation for Project Control Framework (PCF) Stage 0 (Strategy, Shaping and Prioritisation). This work culminated in the recommendation of developing the preferred strategic-level option i.e. online improvements to the existing junction.

Atkins was subsequently commissioned to undertake PCF Stage 1: Option Identification which commenced in November 2015. Highways England provided an updated 'Client Scheme Requirements' (CSR) document dated 14 March 2016 which highlights the needs and objectives of the scheme.

PCF Stage 1: Option Identification entails the identification of options from the solutions developed in PCF Stage 0 to be taken to stakeholder consultation, the assessment of those options in terms of environmental impact, traffic forecasts and economic benefits and the refinement of the cost estimate for the options (including an allowance for risk).

The purpose of this document is to report the environmental assessment of the options in PCF Stage 1 and comprises an Environmental Study Report (ESR).

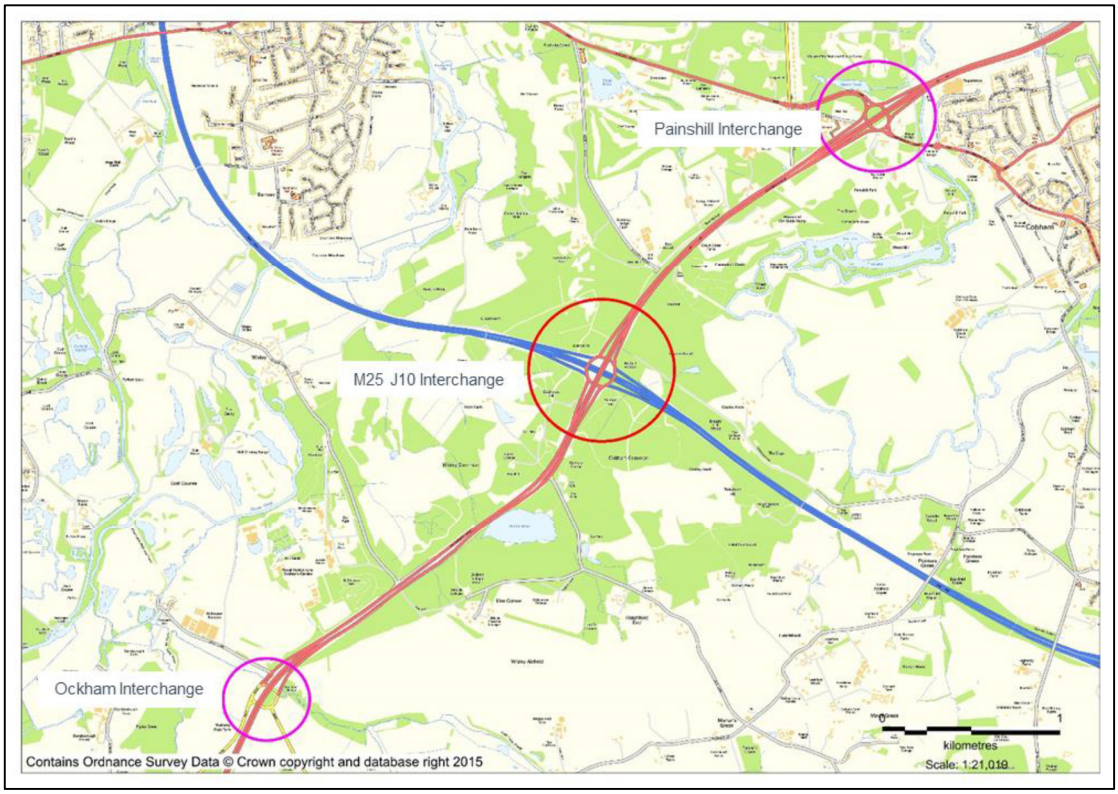
1.2 Geographical Context

The location of the junction is shown on Figure 1.1 below and also in Appendix A. M25 J10 / A3 Wisley Interchange forms the confluence of a number of radial routes between Surrey, Hampshire and Greater London with orbital routes between Kent, East and West Sussex, Surrey, Berkshire and beyond. RHS Gardens Wisley is located off the A3 just to the south of the M25 J10 / A3 Wisley Interchange. The junction itself does not serve an immediate urban conurbation, but proposed future developments in the area such as the proposed residential development at Wisley Airfield adjacent to the A3 at Ockham will add significant trips to the network.

M25 J10 / A3 Wisley Interchange sits on the eastern edge of the Borough of Guildford, and is also close to the boroughs of Elmbridge and Woking. Together, these boroughs have a population of over 375,000. These boroughs have strong and diverse economies, all containing offices of multi-national companies as well as local retail and business centres. In addition, there are relatively high levels of commuting into London; and Heathrow and its surroundings also serve as a major source of employment.

In the broader strategic context, the M25 J10 / A3 Wisley Interchange area is on the eastern side of the Enterprise M3 Local Enterprise Partnership (LEP) area which has a population of 1.6 million and sustains 740,000 jobs. High levels of housing and employment growth are planned for the wider area.

Figure 1.1: Study Area



1.3 Overview of Current Situation

The area around M25 J10 / A3 Wisley Interchange has the highest recorded collision rate across the network nationally. There are daily queues and congestion at the three main junctions:

M25 J10: Queueing on the mainline northbound A3 on a daily basis on the approach to M25 J10 causes knock-on impacts on junctions to the south of M25 J10 and as far back as Ripley. Traffic has a problem accessing the clockwise M25 due to congestion on the M25 mainline but this is being addressed through a separate RIS scheme.

A3 Painshill interchange: Traffic then queues at the next junction going north on the A3 at Painshill. Traffic often queues back on to the main carriageway at the Painshill junction where traffic leaving the A3 at Painshill is often prevented from doing so because of local network congestion tail backs from the A245 Seven Hills Road junction that is signal controlled. These are all on the London bound carriageway and predominately throughout the whole am peak period.

A3 Ockham interchange: There is a tidal effect on the A3 southbound during the pm peak period with traffic joining the A3 from the A245. There are similar issues with traffic entering and leaving the A3/M25 at Wisley.

There are several heavily used (HGV's mostly) laybys along this stretch of the A3 and some areas, both north and south of M25 J10 / A3 Wisley Interchange, where HGV's park illegally.

1.4 Environmental Overview

The junction is set within a predominantly wooded area to the south of Cobham and Byfleet and it is an attractive area despite the presence of the A3 and M25. Much of the area around M25 J10 / A3 Wisley Interchange is covered by international/national ecological designations including the Thames Basin Heaths Special Protection Area (SPA), Site of Special Scientific Interest (SSSI), as well as designation as a Local Nature Reserve. The Royal Horticultural Society's headquarters are located at Wisley gardens to the south west and Painshill Park is to the north east; both are designated as Registered Parks and Gardens of Historic Interest. There are a number of Noise Important Areas at the M25 J10 / A3 Wisley Interchange. No Air Quality Management Areas (AQMA) have been declared by the local authorities for the area immediately around the junction and there are few human health receptors nearby.

There are three Scheduled Monuments in the area immediately around the M25 J10 / A3 Wisley Interchange and a number of Listed Buildings in the study area. There are no Source Protection Zones or groundwater water abstractions near the junction and flooding is not an issue although both the River Mole and River Wey are nearby. There are a number of disused landfill sites that accepted inert waste in the study area and the sand and gravel geology means that the area is sensitive to pollution incidents. The area immediately round the M25 J10 / A3 Wisley Interchange is designated as Common Land and/or Access Land and these areas, along with RHS Wisley and Painshill Park, are well used by the public. There are some facilities for walkers/cyclists along the A3 on the southbound carriageway but they are in a poor state and a submission has been made to the Highways England Environment Designated Fund (Walking and Cycling) team to fund an upgrade to the facilities and provide a Disability Discrimination Act (DDA) compliant footbridge to replace the existing one at Elm Corner. There are at-grade, controlled pedestrian and equestrian crossings at the M25 J10 / A3 Wisley Interchange and a number of Public Rights of Way in the surrounding area. These key environmental constraints are shown on the environmental constraints drawings in Appendix B.

1.5 Overseeing Organisation

Highways England is the project sponsor for the M25 J10 / A 3 Wisley Interchange. Highways England is a government company charged with modernising and maintaining the highways, as well as running the network and keeping traffic moving.

The overseeing organisation is: Highways England, Agency, Bridge House, 1 Walnut Tree Close, Guildford, Surrey, GU1 4LZ.

The designer is Atkins, Woodcote Grove, Ashley Road, Epsom, Surrey, KT18 5BW.

1.6 Purpose of the Environmental Study Report

As a Major Project for Highways England, this Environmental Study Report (non-statutory) (ESR) forms part of the Project Control Framework's (PCF) Stage1: Options Identification (Options Phase). This report follows on from and is underpinned by the Stage 1: Environmental Study Scoping Report (April 2015).

The ESR has been prepared to provide a broad overview of the environmental constraints on the project and the relative environmental benefits and potential adverse effects associated with the proposed scheme options. It also identifies likely further assessment and mitigation requirements. The purpose of this document is to provide decision makers with an accessible document

1.7 Scope and Content

This ESR considers the three proposed options that have been identified to date. These are detailed in in Chapter 3, and the proposed scheme option plans are provided in Appendix C. The baseline information has primarily been obtained through desk studies from readily available information sources. Some site visits have also been undertaken to obtain further information. Further monitoring and survey work will be required at a later stage in the design process, in order to close data gaps, and the requirements for this are set out in the topic sections of this ESR. It is anticipated that the recommended further survey information will be incorporated into a revised version of the ESR at PCF Stage 2 and more detailed information is available on the option designs.

This ESR covers the following Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3 topics:

- Air Quality
- Cultural Heritage
- Landscape
- Ecology and Nature Conservation
- Geology and Soils
- Materials (to include Waste)
- Noise and Vibration
- People and Communities
- Road Drainage and the Water Environment

1.8 Structure of Environmental Study Report

Section 2 of the Report describes the background to the current situation at the M25 J10 / A3 Wisley Interchange including the current problems experienced leading to the set of scheme objectives.

Section 3 describes the proposed options being considered.

Section 4 describes the alternatives considered.

Sections 6 to 14 considers each of the environmental topics, identifies the baseline conditions, potential effects, scope and level of assessment and presents the assessment of potential effects in the ESR.

Section 15 outlines the cumulative effects of the scheme.

Section 16 gives initial details of the Environmental Management Plan.

Section 17 provides conclusions and a summary table comparing the options considered in the environmental assessment.

Figures and other information that support the environmental assessments are saved in named appendices.

2 Description of Current Situation

2.1 Existing Junction Characteristics

The M25 J10 / A3 Wisley Interchange lies in the south west quadrant of the M25 London Orbital Motorway. At J10 the A3, a key radial route from London to Portsmouth, crosses the M25 motorway. In addition to M25 J10 itself, it has been recognised that adjacent junctions on the A3, Painshill Interchange to the north and Ockham Interchange to the south, are also pinch-points. Together with M25 J10/A3 Wisley Interchange, these junctions in the current configurations restrict traffic flow through the area and a holistic package of interventions targeting all these junctions is likely to be required to improve junction performance.

M25 J10 / A3 Wisley Interchange

The M25 is a dual 4 motorway (D4M) (dual carriageway with 4 lanes in each direction) either side of Junction 10, although the section of the motorway between the slip-roads through the junction is of D3M standard (3 lanes in each direction). The A3 is a dual 3 road (D3) (dual carriage way with 3 lanes in each direction) either side of the junction, but only dual 2 (D2) between the slip-roads.

The junction itself is a signal controlled roundabout junction with no free-flow left-turn lanes. The roundabout has 3 lanes on the circulatory carriageway, although it has four lanes at the stop lines with the M25 westbound off-slip and with the A3 southbound off-slip.

All slip-roads have two lanes; with the A3 northbound off-slip and M25 westbound off-slip having four lanes at the stop-line and the A3 southbound off-slip and M25 eastbound off-slip have three lanes at the stop-line.

There are at grade, signal controlled pedestrian, cycle and equestrian crossings on the roundabout.

Painshill Interchange

Painshill Interchange is approximately 2km to the north of the M25 J10 / A3 Wisley Interchange on the A3, where it crosses the A245. The Painshill Interchange is the principle access point to the trunk road network for many surrounding settlements, including Cobham (via A245 east), Byfleet and Brooklands (via A245 west) and the southern parts of Weybridge and Walton-on-Thames via B365 Seven Hills Road. The A3 is a D3 road (dual carriage way with 3 lanes in each direction) either side of, and through, the junction. The A245 has a two lane approach in each direction from the west and a single lane approach in each direction from the east. The junction consists of a signalised two-lane roundabout with two lanes at each stop line.

To the west of Painshill, the A245 is a D2 dual carriageway for a short stretch until it crosses Seven Hills Road (Seven Hills Junction). Seven Hills Junction is a signalised junction. West of Seven Hills, both the A245 towards Byfleet and Seven Hills Road towards Weybridge are single carriageways.

Ockham Interchange

Ockham Interchange is approximately 2.5km to the south of the M25 J10 / A3 Wisley Interchange where it provides local access from Ripley, Ockham and surrounding areas as the next junction to the south (Clandon) has only northbound off-slips and southbound on-slips.

The A3 is a D3 road (dual carriage way with 3 lanes in each direction) either side of, and through, the junction. This junction itself is a non-signalised roundabout with a footway/cycleway round the perimeter.

Along the A3

The A3 is a D3 road (dual carriage way with 3 lanes in each direction) throughout the study area. There are a number of minor junctions along the A3 between the M25 J10 / A3 Wisley Interchange and Ockham Interchange. Southbound, there is a junction with Old Lane on the southbound on-slip road. A layby is located just before the turn-off into Old Lane. Just to the south of Old Lane is the junction with Elm Lane. Elm Lane provides access to a small number of dwellings and is signed as a no-through route. There is access only between Elm Lane and the southbound A3. There is no diverging lane at Elm Lane, and turning traffic has to slow down on the main carriageway; there is also no merge lane onto the A3 from Elm Lane.

Immediately after Elm Lane is a bus stop, presently served by Route 515 between Kingston and Guildford. Buses serving this stop must decelerate and accelerate on the main carriageway. On the northbound carriageway between the Ockham Interchange and M25 J10 / A3 Wisley Interchange there is a junction with Wisley Lane, which leads to RHS Wisley Gardens. There is no access between Wisley Lane and the southbound A3. There is only a short length of diverging lane off the A3 into Wisley Lane. Traffic coming from Wisley Lane travels some 100m on a ‘slip-road’ before merging with the A3 northbound. This slip-road is also used as a bus stop and a layby. On the northbound off-slip there is an access road to Park Barn Farm.

Between M25 J10 / A3 Wisley Interchange and Painshill Interchange there are a number of residential accesses on to the A3 on both north and southbound carriageways.

2.2 Current Problems

The current challenges for the M25 J10 / A3 Wisley Interchange include:

- Congestion and delay disrupting journeys on the strategic road network.
- Poor resilience resulting in frequent disruption and unreliable journey times.
- Safety concerns due to this area having the highest recorded collision rate nationally.
- High use of lay-bys, including illegal stopping on A3.
- Congestion causing a barrier to growth. Enterprise M3 Local Enterprise Partnership (LEP) has highlighted M25 J10 / A3 Wisley Interchange as a part of the transport network where projected increases in traffic would cause further congestion and delays.

An overview of each of the problems is outlined below.

Congestion and Delay Disrupts Journeys on the Strategic Road Network

M25 J10 is a heavily used junction, with 133,000 vehicles per day moving through it on the M25 and 58,000 vehicles per day on the A3; there is a further 104,000 per day are using it to interchange from one SRN link to the other (all data relating to neutral months in 2014). The interchange at J10 accommodates 35% of all passing vehicles.

In the weekday peak hours of 06:00 to 09:59 and 16:00 to 19:59 the M25 and A3 links that are served by M25 J10 were congested 67% of the time over the five year period

from 2010/11 to 2014/15. The M25 J11 to J10 Eastbound was the worst affected by congestion with 93 – 94% of peak journeys experiencing some congestion.

All four of the M25 links have experienced congestion in at least 75% of weekday peak journeys. There is a less significant problem with congestion on the M25 links westbound in the evening, however this is still the majority of peak time periods.

Notably, the A3 links north of J10 have more of a problem with congestion than the roads south of J10, which have higher AADTs. The A3 links north of J10 both experience congestion in the majority of weekday peak time periods.

The data has revealed that the approaches to the junction from both sides of the A3 are slow for the straight-on movement (approx. 25mph), suggesting that vehicles which are leaving the A3 for the M25 and are queuing back onto the main carriageway and causing delay to straight-on movements both north and south of J10. Average morning peak journey time from Ockham Interchange to Painshill Interchange is over six minutes, compared with an average of three minutes off-peak. Journey time variability for this movement is high, with journey times of 16 minutes, not uncommon in the morning peak hour.

Safety Concerns

Highways England has supplied reported accident data for five years between 2009 and 2013. During the period of 2009-2013 (inclusive), there have been 239 accidents in total (just under 50 per year on average) on and around M25 J10 and the A3 between Painshill and Ockham. It is likely that a number of collisions not resulting in injury go unreported, although the number of such events is unknown.

Of these reported accidents over the five year period, approximately 160 accidents were on either M25 or A3 main carriageways (just under 30 per year on average and over the same five year period the other 80 accidents happened on or near Junction 10, 57 of which were on the M25 and A3 slip roads or on the circulatory High Use of Lay-bys, including Illegal Stopping on A3

There is a high frequency of lay-by use during the day and overnight, including illegal parking. The key causes of this are:

- The A3 being a key HGV corridor with limited availability of, and capacity for HGVs at, services along the route.
- Inappropriate location of lay-bys.

Further details of these problems are contained in the Stage 0 report and the Technical Appraisal Report (TAR).

2.3 Constraints

As noted above in Section 1.4 there are a number of sensitive areas adjacent or close to the M25 J10 / A3 Wisley Interchange including SSSIs, SPA, Common Land/Access Land, Ancient Woodland, Scheduled Monuments, Listed Buildings and Registered Parks and Gardens. A number of Important Areas for noise are designated on the M25 J10 / A3 Wisley Interchange.

The design and construction of the improvements to the M25 J10 / A3 Wisley Interchange will need to keep disruption to the M25 and A3 to a minimum and continue to provide access to important local attractions including RHS Wisley. Works required for the Wisley Airfield development should be programmed to coordinate with the improvement works at M25 J10 / A3 Wisley Interchange.

2.4 Regulatory Framework

National Policy

In December 2014 the Government adopted a National Networks National Policy Statement (NN NPS), which sets out the Government's policies to deliver Nationally Significant Infrastructure Projects (NSIPs) on the national road and rail networks in England. The Secretary of State will use the NN NPS as the primary basis for making decisions on development consent applications for national networks NSIPs in England.

The NN NPS states that improvements on the highways network are vital to alleviate congestion, particularly in the South East. Paragraph 2.17 states that:

"It is estimated that around 16% of all travel time in 2010 was spent delayed in traffic, and that congestion has significant economic costs: in 2010 the direct costs of congestion on the Strategic Road Network in England were estimated at £1.9 billion per annum."

The NN NPS indicates that options testing need not be considered by the examining authority or the decision-maker if projects have been subject to full options appraisal in achieving their status within Road or Rail Investment Strategies, or other appropriate policies or investment plans. For national road and rail schemes, proportionate consideration of alternatives will have been undertaken as part of the investment decision-making process.

The Department for Transport's (DfT's) Command Paper 'Action for Roads' 2013 sets out its vision for the future of the road network and explains that the Government is making a transformational investment in the road network to support the economy and the environment, and to build a network that is fit for the future.

The proposal to address problems at J10 was announced within the Roads Investment Strategy (2015-2020) and the scheme is included in the Highways England Delivery Plan 2015 – 2020. The Delivery Plan indicates that Highways England expects to make a recommendation on the preferred route for this scheme in 2017

2.5 Scheme Objectives

The scheme objectives are as follows:

- **Route Operation:** support any projected traffic increases from other committed schemes on the strategic road network.
- **Capacity:** reduce the average delay (time lost per vehicle per mile) on the mainline A3 and smooth the flow of traffic by improving journey time reliability on the mainline A3.
- **Safety**: reduce annual collision frequency and severity ratio on the mainline A3 and slip roads and M25 J10 / A3 Wisley Interchange.
- **Social**: support the projected population and economic growth in the area.
- **Environment:** Treat noise important area's (IA's) where practical. Support sustainable travel routes promoted by Surrey County Council and Developers. Improve biodiversity within the scheme if the opportunity exists.

In addition to the scheme objectives outlined above, the following additional objectives are also considered in order to consider optimising value for money and considering deliverability:

- Where possible, make best use of existing infrastructure by providing additional capacity within the existing highway boundary.
- The scheme should provide good value for money with an efficiencies register as standard.
- The scheme should be feasible and deliverable within the RIS timeframe.
- The scheme should look to minimise the impact on the surrounding highway network whilst providing the best solution to the issues.
- The scheme should consider provision of a viable winter service plan for all complex solutions and liaise with service providers for both Area 5 and Area 3.
- Avoid the need for further capacity interventions for at least ten years after opening and accommodate projected traffic demand for this period (to 2032, based on an opening year of 2022).
- Ensure that activities already funded and carried out on the network by the M25 DBFO contactor and Area 3 ASC are not duplicated in the funding of the design, delivery and operation of the project.
- Ensure that Network Delivery & Development (including Connect Plus) are consulted and agree with the design and operation.
- Consider no return within a minimum of 5 years for major carriageway interventions. This could be achieved through design and costing of a fully resurfaced network within the constraints of the scheme with funding contributions from NDD and Service Providers where the cost would be outside of the committed RIS I funding.

2.6 Highways England Strategic Performance Indicators / Key Performance Indicators

Highways England has published its Delivery Plan, 2015 -2020 and Strategic Business Plan (SBP). It states that:

"Government has made a strong commitment to an ongoing improvement in environmental outcomes through the operation, maintenance and modernisation of the strategic road network. We are committed to ensuring that all activity on the network is delivered in a manner that does not harm the environment; but instead delivers long term benefits to the natural and built environment, creating a sustainable future for all".

Section 6: Improving the Environment, sets out a number of environmental interventions to meet this commitment which are transposed into Performance Indicators (PIs) and Key Performance Indicators (KPIs) to measure how Highways England are delivering better environmental outcomes across the network over the next five years.

An extract from the Delivery Plan Annex B: Key performance indicators and performance indicators is provided below. Where relevant, the proposed scheme will aim to contribute to meeting these PIs and KPIs.

There is an additional relevant KPI for People and Communities.

"The number of new and upgraded crossings is a KPI in The Highways England Delivery Plan (2015-2020)".

The development of new indicators which demonstrate improved facilities for cyclists, walkers, and other vulnerable users is identified as a requirement in the Delivery Plan. The Delivery Plan sets out Highways England's commitments for improving integration

and accessibility through the network including a commitment to work with local communities, to listen to local people to identify how to improve the physical or environmental quality of a place, or the economic or social well-being of a community.Highways England have developed an Operation Metrics Maual which sets out the parameters for measuring and monitoring Highways England's performance.

Table 2-1: Delivery Plan Annex B: Key performance indicators

Performance Specification				Delivery Plan		
Topic		Measure	KPI target	Highways England Output	Delivery Date	Section number
Delivery better environmental outcomes	KPI	Noise: Number of Noise Important Areas mitigated	At least 1,150 Noise Important Areas over RP1	1,150 Noise Important Areas mitigated	By 31st March 2020	6.1.1
	KPI	Biodiversity: Delivery of improved biodiversity, as set out in the Company's Biodiversity Action Plan	Publish Biodiversity Action Plan by 30 June 2016 & report annually against the Plan to reduce net biodiversity loss on ongoing annual basis	Biodiversity Action Plan (BAP) to include method for demonstrating impact on biodiversity, and subsequent reporting progress against this plan	Publish BAP by 30 June 2016, report progress annually	6.1.4
	PI	Suite of PIs to provide additional information about environmental performance. These should, at a minimum, include: - Air Quality;	N/A	Undertake 10 Air Quality Pilot Studies to test the feasibility of 'Air Quality Intervention Measures'	Complete all 10 studies by 31 March 2018	6.1.2
	PI	Suite of PIs to provide additional information about environmental performance.'- Carbon dioxide, and other greenhouse gas emissions for the Company and its supply chain that occur as they carry out work on the SRN.	N/A	Monitor carbon dioxide equivalents in tonnes associated with the company's activities, and separately activities associated with the supply chain	Report annually	6.13
	Requirement	Demonstrate what activities have been undertaken, and how effective they have been, to improve environmental outcomes	N/A	Produce a programme and monitor progress against it	Programme by 31 March 2016, then annually report progress	6.0
	Requirement	Develop metrics covering broader environmental performance. These should include: - a new or improved biodiversity metric	N/A	Produce a programme, collect data to develop biodiversity baseline and monitor against it; by the end of RP1, develop and a biodiversity metric.	Programme by 31 March 2016, annual progress reports, new 'env capital' metric by 31 March 2020	6.1.4
	Requirement	Develop metrics covering broader environmental performance. These should include: - carbon dioxide, and other greenhouse gas emissions arising from the use of the network.	N/A	Produce a programme, collect data to develop baseline and monitor against it; by the end of RP1, develop a network carbon metric.	Programme by 31 March 2016, annual progress reports, new network carbon metric by 31 March 2020	6.1.3

2.7 Environmental Impact Assessment

On 12 March 2014, the European Parliament voted to adopt substantive amendments to the Environmental Impact Assessment ("EIA") Directive 2011/92/EU. These amendments made by EIA Directive 2014/52/EU will be transposed into UK legislation in 2017 (subject to any alterations as a result of the result of the EU referendum decision) and therefore will be relevant to this Scheme if it is deemed that the EIA Regulations are applicable.

If it is deemed that the Scheme is not to be subject to the Development Consent Order (DCO) process then non-statutory environmental reporting will be required.

2.8 Development Consent Order

The Planning Act 2008 introduced a streamlined decision-making process for nationally significant infrastructure projects (NSIP) that will require 'development

consent' through the Development Consent Order (DCO) process. The 2008 Act was amended by the Localism Act 2011, under which the Planning Inspectorate (PI) became the agency responsible for operating the planning process for NSIPs following the abolition of the Infrastructure Planning Commission (IPC) on 1 April 2012.

NSIP Thresholds for Highways Schemes

The thresholds for determining whether the construction, alteration or improvement of a highway scheme constitutes an NSIP are set out in the Planning Act 2008 (Part 3, Section 22), as amended by the Highway and Railway (Nationally Significant Infrastructure Project) Order 2013 (S.I. 1883, Article 3) and the Infrastructure Act 2015 (Chapter 7, Schedule 1, Part 2).

The thresholds can be summarised as follows:

- The construction, alteration or improvement works are wholly within England, and the Secretary of State or a strategic highways company will be the highway authority for the highway.
- For the construction or alteration of a motorway, the area of development is greater than 15ha.
- For the construction or alteration of a highway, other than a motorway, where the speed limit for any class of vehicle is expected to be 50 miles per hour or greater, the area of development is greater than 12.5 hectares.
- In relation to the construction or alteration of any other highway, the area of development is greater than 7.5 hectares.
- For improvements to a highway, it is where they are likely to have a significant effect on the environment.

In terms of the area of development, in relation to the construction of a highway, this means the land on which the highway is to be constructed and any adjoining land expected to be used in connection with its construction. In relation to the alteration of a highway, this means the land on which the part of the highway to be altered is situated and any adjoining land expected to be used in connection with its alteration.

Development Consent Order Process

DCO applications for NSIP are considered by the PI which, having examined the application, makes a recommendation to the relevant Secretary of State, who will make the decision on whether to grant or to refuse 'development consent'. The key stages in the DCO process are set out on the National Planning Infrastructure webpage and are summarised below.

Table 2-2: DCO Process Key Steps

Pre-Application	Having informed the PI of the intention to submit an application, there is a requirement to undertake extensive consultation on the proposals prior to submission. The length of time taken to prepare and undertake consultation varies depending upon the scale and complexity of the project. The PI considers that the pre-application stage is the best time for those being consulted to influence a project.
Acceptance	This stage commences when a formal application for development consent is submitted to the PI. The PI, on behalf of the Secretary of State, determines whether the application meets the standards required to be formally accepted for examination. This stage can take up to 28 days.
Pre-Examination	The public can now register with the PI and provide a summary of their views of the application in writing. At this stage, all those that have registered and made a relevant representation will be invited to attend a preliminary meeting

	run and chaired by an Inspector. This stage of the process takes approximately 3 months from formal notification and publicity of an accepted application.
Examination	During this stage, all those that have registered are invited to provide more details of their views in writing. Careful consideration is given to all the important and relevant matters as part of the examination, including representations of all interested parties, any evidence submitted and answers provided to questions set out in writing and explained at hearings. The PI has six months to carry out the examination.
Decision	The PI prepares a report on the application to the relevant Secretary of State, including a recommendation, within 3 months of the six month examination period. The Secretary of State then has a further 3 months to make the decision on whether to grant or refuse development consent.
Post Decision	A six week period follows the issue of a decision by the Secretary of State, in which the decision may be challenged in the High Court through Judicial Review.

Further consideration will be given to the requirements of the relevant consenting regime (i.e. either the Town and Country Planning Act 1990 or the Planning Act 2008) during PCF 2.

2.9 Construction, Operation and Long Term Management

Specific construction, operational and long term management arrangements are not known at this stage of the project. The following assessments assume best practice, based on industry guidance and professional experience.

3 Description of Proposed Options

3.1 Overview

Following the scheme review in PCF Stage 0 the following options were taken forward for further design and assessment during PCF Stage 1. These are shown in Appendix C.

3.2 Option 9

This option is based on providing half of the movements of the standard 4 level free flow interchange and would require 17ha of land to accommodate the proposed layout. The option consists of free flow right turns from the A3 Northbound to the M25 anticlockwise and from the A3 southbound to the M25 clockwise. Free flow left turns from the A3 northbound to the M25 clockwise and the A3 southbound to the M25 anticlockwise are also provided. The right turns are provided on a large long span viaduct passing close to the centre of the existing junction with intermediate supports to fit within the constraints of the existing layout. All other vehicle movements will be carried out on the existing roundabout. New segregated NMU routes would be required. This option would be provided with dual 4 (D4) upgrade to the A3 carriageway. The proposed A3 dual 4 all purpose (D4AP) upgrade option would also include widening of the A245 from two to three lanes between the Painshill Interchange and the junction with Seven Hills Road. The widening would take place symmetrically on the existing line of the A245.The Painshill improvements would also improve conditions on the A3 northbound.

3.3 Option 14

This option modifies the existing roundabout by creating new structures over the M25 and reusing the existing structures under the A3 and would require 8ha of land to accommodate the proposed layout. The circulatory carriageway under the A3 would be widened to 4 lanes, 5 lanes of circulatory carriageway would be provided where unconstrained by the existing structures. Right turns would be carried out on the modified roundabout and left turns would use dedicated left filter lanes. Slip roads would be realigned to aid construction sequencing. NMU facilities would remain largely unchanged but minor upgrades may be required. The D4AP would aid weaving and merging on the A3 as all as providing an opportunity to address side road access, lay-by provision and walking and cycling routes. The proposed A3 D4AP upgrade option would also include widening of the A245 from two to three lanes between the Painshill Interchange and the junction with Seven Hills Road. The widening would take place symmetrically on the existing line of the A245. The Painshill improvements would also improve conditions on the A3 northbound.

3.4 Option 16

Junction 10 free flow (similar to the arrangements at M25 J12) with A3 Ockham to Painshill as D4 plus Painshill improvements and would require 48ha of land to accommodate the proposed layout. This would provide free flow opportunities for all movements, thus potentially removing all delay from the junction. The design is ‘compact’, thus minimising land take and environmental impact compared with less compact layouts.

The D4AP would aid weaving and merging on the A3 as all as providing an opportunity to address side road access, lay-by provision and walking and cycling routes. The

proposed A3 D4AP upgrade option would also include widening of the A245 from two to three lanes between the Painshill Interchange and the junction with Seven Hills Road. The widening would take place symmetrically on the existing line of the A245. The Painshill improvements would also improve conditions on the A3 northbound.

The reconstructed junction would also provide an opportunity to further address walking and cycling provision across the A3 and M25.

4 Alternatives Considered

4.1 Option Development and Assessment Approach

Atkins undertook a two-stage approach in developing options for PCF Stage 0 of the scheme. Firstly, rather than simply reviewing and enhancing the list of previously considered options, a number of high-level, strategic solutions were developed which considered ways to solve the problems identified. Secondly, with the strategic option selected more detailed scheme options were developed and assessed.

To summarise, the option development and assessment methodology was as follows:

- Strategic solutions – Strategic solutions were identified which could lead to solving the known transport problems. These represented various modal choices or techniques and are only at a high level of detail.
- Strategic assessment and sifting – The strategic solutions were assessed against the known transport problems and against the elements of the five cases of a transport business case (Strategy, Economy, Managerial, Financial and Commercial) using a reduced version of the Early Assessment Sifting Tool (EAST).
- Detailed scheme options – various alternative forms of the preferred strategic solution were identified in greater detail. First, a long list was developed containing a wide range of combinations of discreet options. From this list, five options covering a wide spectrum of scale were short-listed for further scheme development.
- Scheme option assessment and sifting – The five scheme options were considered against the Highways England KPIs and EAST headings to take into account cost and risk aspects.

Following the scheme option assessment and sifting five options were identified for further consideration. The rest of this report provides further information about the environmental effects of these three options.

During the early stages of PCF Stage 1, traffic modelling using LINSIG (a junction modelling software) was used to assess the capabilities of the five options. This assessment found that only two of the five options would operate within capacity and consequently Atkins was asked by Highways England to devise a number of further options for consideration.

Atkins derived a new long list of options which fell into three main groups:

- Keeping the existing roundabout and adding other infrastructure
- Modifying the existing roundabout
- Removing the roundabout

The 21 options were categorised into one of these groups and assessed using junction modelling software (LINSIG and Arcady) to establish which would work operationally. Following this assessment, the 10 options forecast to provide sufficient capacity for approximately 10 years of operation were assessed at an Options Workshop on 1st February 2016, involving Highways England's Major Projects management team, the PTS Environmental Specialist and a representative from Connect Plus Services, in addition to key staff from the Atkins project team.

In the workshop each of the 10 options were considered in detail and assessed by the group as to the likely impact of each of the options. A multi-criteria assessment

framework based loosely around the DfT's Early Appraisal and Sifting Tool (EAST) guidance was used to undertake the assessment.

Based on the scoring developed through the workshop the following options were selected for further design and assessment:

- Option 16 which obtained the highest overall score despite being one of the most costly
- Options 9 which achieved the next highest score.
- Option 14 which scored marginally less than the other chosen options. However it is the most affordable of all options and for that reason it was agreed that it should be taken forward for further evaluation.

Further details of the option generation and assessment are contained in the Stage 0 report and the TAR.

5 Environmental Assessment Methodology

5.1 General Approach

This section sets out the approach taken to the ESR. Although there are methods and requirements specific to each assessment topic, the approach set out below is common to all topics and is in accordance with relevant guidance and best practice.

The ESR follows the assessment approach in the DMRB Volume 11 (Highways Agency, 2009). Sections 1 and 2 of DMRB Volume 11 were updated in August 2009 to describe the approach to Scoping, Simple and Detailed Environmental Assessment. Section 3 of DMRB Volume 11 provides guidance on topic specific assessment. Guidance on four topics (Air Quality, Cultural Heritage, Noise and Vibration, and Road Drainage and the Water Environment) in Volume 11, Section 3 has been updated. In addition, IANs have been produced providing guidance on the assessment of Landscape and Visual Effects, Ecology and Nature Conservation and Materials. This guidance was followed in the assessment of the relevant environmental topics in the ESR.

The environmental topic headings described in Section 3 of Volume 11 of the DMRB were amended most recently in 2015 IAN 125/15 (Table 5-1). Highways England has not yet issued environmental topic advice notes to reflect all the new topic headings. For those topics that have not been updated, DMRB guidance as published in Section 3 will be used as relevant. Where this is no longer considered appropriate, the methodology has been set out in the topic chapter.

Table 5-1: Comparison of Environmental Topics between the Revised Version of the DMRB Volume 11 (October 2015), Section 3 and the Previous Version

PREVIOUS ENVIRONMENTAL TOPIC HEADING	REVISED ENVIRONMENTAL TOPIC HEADING (OCTOBER 2015)	CHANGES TO THE CONTENT OF EACH TOPIC AT THE TIME OF WRITING
Air Quality	Air Quality	Individual Policies and Plans and Disruption due to Construction sections required as part of each topic.
Cultural Heritage	Cultural Heritage	
Landscape Effects	Landscape	
Ecology and Nature Conservation	Nature Conservation	
Geology and Soils	Geology and Soils	
	Materials (to include waste)	
Noise and Vibration	Noise and Vibration	
Vehicle Travellers	People and Communities	Vehicle travellers, Pedestrians, Cyclists, Equestrians, Land Use and Community Effects assessments have been merged to become “People and Communities”. Individual Policies and Plans and Disruption due to Construction sections required.
Pedestrians, Cyclists, Equestrians and Community Effects		
Land Use		
Road Drainage and the Water Environment	Road Drainage and the Water Environment	Individual Policies and Plans and Disruption due to Construction sections required as part of each topic
Policies and Plans	N/A	To be included in every topic.
Disruption due to Construction	N/A	To be included in every topic.

5.2 Scoping

An initial DMRB scoping exercise was undertaken as part of PCF Stage 0 to determine the level of assessment that was appropriate at this early stage in the design process, and consider whether any topics could be scoped out. As this ESR has been undertaken to support early design work all topics have been scoped into this assessment at this stage. The findings of this assessment will therefore be used to scope out topics at a future assessment stage. This is discussed further within Chapter 17 Conclusions of this ESR.

Simple assessments were proposed to provide proportionate assessments for the large number of options, and in view of the limited design information that was available. The simple assessments are undertaken at a high level in view of the limited design and traffic information available. The summary (Chapter 17) provides a recommendation as to the topics, and subtopics, that could potentially be scoped out at PCF Stage 2 (Option Selection), due to either the identified options being unlikely to have significant effects on these topics, or the effects being similar for all the proposed options.

The level of assessment and proposed approach for each topic is summarised in Table 5-2.

Table 5-2: Findings from Scoping Exercise

Topic	Proposed Level of Assessment	Comments	Summary of Proposed Methodology
Cultural Heritage	Simple	A simple assessment to determine whether the proposed scheme options would be likely to be granted Scheduled Monument Consent (SMC) given the anticipated significant effects on scheduled sites.	The Simple Assessment will follow the guidelines set out in DMRB Volume 11, Section 3, Chapter 5, and Annex 5 and 6 in relation to archaeological remains and built heritage, respectively.
Landscape character	Simple	Effects on character at local level only	Assessment in accordance with IAN135/10 and reference to GLVIA 3
Visual impact	Simple	Visual effects constrained by woodland	Assessment in accordance with IAN135/10 and reference to GLVIA 3
Water quality and drainage	Simple	A site walkover is proposed for the ESR, no water quality tests to be undertaken at this stage.	The assessment will be based on guidance contained in the DMRB Volume 11, Section 3, Part 10 HD45/09 - Road Drainage and the Water Environment (November 2009).
Noise – construction	Qualitative	As baseline noise monitoring will be undertaken at a future design stage, a full construction noise assessment using BS5228-1:2009+A1:2014 will be deferred until baseline noise monitoring data is available.	The assessment at this design phase will be qualitative.
Noise - operation	Proportionate / basic	The assessment will not provide detailed noise level predictions required for a WebTAG assessment or to	To provide a proportionate level of assessment for PCF Stage 1, an operational noise assessment will be undertaken generally in line

Topic	Proposed Level of Assessment	Comments	Summary of Proposed Methodology
		meet the requirements of a 'Simple' or 'Detailed' level assessment described in DMRB. Noise level predictions at individual noise sensitive receptors will be deferred to a future design stage. A basic quantitative noise assessment will be undertaken to identify areas that may exceed DMRB's threshold levels and trigger the need for a detailed assessment in a future design stage.	with the guidance in DMRB 11:3:7.
Air quality - construction	Simple	A simple assessment approach will be undertaken for the air quality assessment at PCF Stage 1 using a proportionate risk assessment approach	Construction impacts will be assessed qualitatively in accordance with relevant guidance given in DMRB HA207/07.
Air quality - operation	Simple	A simple assessment approach will be undertaken for the air quality assessment at PCF Stage 1 using a proportionate risk assessment approach. Limitations in the availability of traffic data preclude completion of any quantitative assessment of potential air quality effects associated with each option.	Further air quality assessment will be undertaken in accordance with HA207/07 DMRB Volume 11, Section 3, Part 1, IAN 170/12 v3, IAN 174/13, IAN 175/13, and Defra's Local Air Quality Management Technical Guidance (LAQM.TG(09)), where appropriate.
Designated sites	Detailed	Potential for significant effects.	Breeding bird survey and consultation with Natural England.
Notable habitats and protected species	Detailed	Potential for significant effects.	A targeted Extended Phase 1 Habitat survey will inform the scope for further habitat and protected species survey work. Habitats with greater botanical interest will be subject to NVC surveys. A search for evidence of invasive species subject to legal control will also be undertaken to inform plans for site clearance. Field surveys will be carried out for legally protected species where there is potential that a licence could be required and/ or the presence of a species could have a substantial effect on the design, planning or programming of site works. An ecological assessment will be undertaken to determine the value of receptors, characterise potential impacts and determine the significance of effects that

Topic	Proposed Level of Assessment	Comments	Summary of Proposed Methodology
			may arise from the construction and operation phases of the M25 J28 Improvements.
Geology, Soils and Materials	Simple	No comment	In accordance with DMRB Volume 11, Section 3, Chapter 11
People and Communities	Simple	Effect on Common/Access Land has been covered in a separate report	The assessment will use published guidance provided in DMRB Volume 11 – combining the NMU component of DMRB 11.3.8 - Pedestrians, Cyclists, Equestrians and Community Effects, and DMRB 11.3.9 - Vehicle Travellers, DMRB 11.3.6 for Land Use (DMRB 11.3.6) and the Community Effects component of DMRB 11.3.8 (Pedestrians, Cyclists, Equestrians and Community Effects) as set out in IAN 125/15.

5.3 Significance Criteria

The assessment will identify the potential impacts that might occur due to the construction and operation of the M25 J10 Improvements. Impacts may be adverse/negative or beneficial/positive, direct, indirect, secondary or cumulative, temporary or permanent, short, medium or long term. The proposed scheme options can affect the environment in a variety of ways. The differing parts of the environment affected by a proposed scheme option are known as receptors (i.e. those things that receive an impact from a scheme). Receptors can range from individual plants, animals or human beings living in or passing through the area, through to the landscape as a whole and the physical, ecological and cultural elements within it.

Chapter 2 of DMRB Volume 11 Section 2 Part 5 introduces the general principle underlying the assessment process, which can be summarised generally, although not necessarily for every topic, as a three-step process:

- The evaluation of the value, importance or sensitivity of the receptors.
- Assessment of the magnitude of the impact of the scheme on the receptor, be it adverse or beneficial.
- Determination of the significance of the effect resulting from combining the impact (of a certain magnitude) on a receptor (of a particular value).

Significance criteria are set out for each assessment topic following this three step approach. Table 5-3 sets out an assessment matrix to determine the value or sensitivity of receptor and the magnitude of impact to determine the significance of effect. Moderate and major effects are considered ‘significant’ for the purposes of EIA regulations and might indicate the need for a statutory Environmental Impact Assessment Report (EIAR) later in the project lifecycle.

Table 5-3: Arriving at the Significance of Effects

		MAGNITUDE OF IMPACT (DEGREE OF CHANGE)				
		No Change	**Negligible**	**Minor**	**Moderate**	**Major**
Environmental Value (Sensitivity)	**Very High**	Neutral	Slight	Moderate or Large	Large or Very Large	Very Large
	High	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or Very Large
	Medium	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
	Low	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate
	Negligible	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight

5.4 Mitigation Enhancement

Mitigation is defined as ‘measures intended to avoid, reduce and, where possible, remedy significant adverse environmental effects’ (DMRB Volume 11, Section 1, Part 7 (HA 218/08)). Enhancement measures are defined as 'measures over and above normal mitigation' (IAN 125/15).

Some initial mitigation and enhancement measures have been identified in the topic chapters. However, further measures will be considered at a later stage in the design process, once further design information is available. During construction the responsibility for further environmental mitigation and the adherence to environmentally responsible working practices will fall to the contractor. A Construction Environmental Management Plan (CEMP) will be prepared by the contractor and will detail these practices.

6 Landscape

6.1 Introduction

The Scoping Report (HE551522-ATK-EGN-1-RP-EN-0001, V 2.0, 10th June 2016) determined that the Scheme is likely to give rise to landscape and/or visual effects of varying degrees of change (or levels of change). It was anticipated that some of these landscape and/or visual effects may potentially be significant. In accordance with IAN 135/10 Landscape and Visual Effects Assessment, a simple Landscape and Visual Effects Assessment has been produced as part of this ESR to assess the current options, and whether it is likely that effects would be significant. This will contribute to the identification of potential options in accordance with Highways England Project PCF procedures.

The Simple Assessment approach will be adapted, at an appropriate level of detail for the current Stage. The assessment will be informed by desk study information and initial site visits. The approach has also been informed by the Guidelines for Landscape and Visual Impact Assessment, Third Edition, Landscape Institute and Institute of Environmental Management & Assessment, 2013 (GLVIA3).

Should significant effects be anticipated then a recommendation for a Detailed Assessment will be made for future Stages, stating the reasons for this decision and an outline of anticipated future work.

6.2 Assessment Methodology

The assessment of landscape and visual effects was preceded by a review of baseline information to inform the landscape and visual context. This included also analysis of the planning framework, statutory designations using variety of information sources i.e.: the Defra website magic.defra.gov.uk and relevant local planning authority documents.

The Guidelines for Landscape and Visual Impact Assessment 3rd edition (GLVIA) state that:

"*LVIA must address both effects on landscape as a resource in its own right and effects on views and visual amenity...An assessment of landscape effects should consider how the proposal will affect the elements that make up the landscape, its aesthetic and perceptual aspects, its distinctive character and the key characteristics that contribute to this....An assessment of visual effects deals with the effects of change and development on the views available to the people and their visual amenity*."

The approach to the assessment is outlined below, the full methodology and associated criteria are provided in Appendix D.

Landscape Sensitivity

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 GLVIA3).

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"

Visual Sensitivity

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 GLVIA3).

Magnitude of landscape impact

The magnitude of landscape impact is determined by taking into consideration size, scale, geographical extent, duration and reversibility of the improvement's works on the landscape resource.

Magnitude of visual impact

The magnitude of visual impact is determined by taking into considerations a degree of change in the composition of the view in comparison to the baseline of the view. In determining the magnitude of visual impact, the following has been considered; scale of change, nature of change, duration of change, distance, screening, direction of the view, removal of vegetation, whether the receptor is static or moving, and the numbers and type of receptor. The magnitude of visual impact is assessed by taking into consideration the potential for introduction of environmental design measures or mitigation measures. These factors help inform the magnitude of the visual impact as shown in Table 6-4, which can be adverse or beneficial.

Significance of effects

The significance of landscape or visual effects has been determined by taking into consideration both the magnitude and sensitivity of landscape resource or visual receptors. The effects can be both adverse, neutral and beneficial. The assessment is determined using professional judgement, which relies on a consistent reasoning based on the current guidance including IAN 135/10 and GLVIA3.

Landscape or visual effect are generally considered as significant when moderate of higher level adverse effects have been identified.

6.3 Study Area

The desk top study informed 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 proposed scheme options, however consideration of landscape effects will be given to the wider area within 500m from the area of proposed works.

It is considered that majority of visual receptors that might experience potentially significant effects are located within a 500m buffer of the proposed scheme options. The assessment would also consider the effects on sensitive visual receptors beyond 500m, but no further than 2km from the proposed scheme options.

6.4 Baseline conditions

A desktop study has been undertaken to identify landscape and visual receptors. This included review of aerial imagery, OS maps and other public sources of information to define the potential study area and identify a range of possible landscape and visual effects.

Landscape

The identification of landscape receptors was preceded by analysis of the existing landscape character and identification of elements and features of landscape character that may be affected. Key characteristics and value attached to landscape and landscape designations, along with identification of interactions with the proposed scheme Options were also considered to inform identification of receptors.

The M25 J10 / A3 Wisley Interchange is located within the registered Common Land (Wisley Common and Chatley Heath, between Cobham and Ripley to the south west of London.

The effects on landscape character at regional and national level were scoped out from the assessment in the scoping report.

Landscape character

The proposed scheme options are located at the border of Guildford and Elmbridge Borough Council.

The landscape character of Guildford Borough has been described in Guildford Landscape Character Assessment and Guidance (January 2007), prepared by Land Use Consultants. The Proposed Scheme Options are located wholly within Wisley Wooded and Settled Heath (G2) Landscape Character Area that forms part of Wooded and Settled Heath Landscape Character Type. The key characteristic and attributes of this Landscape character area are summarised in Table 6-1 below.

Table 6-1. Summary of attributes and key characteristics of relevant landscape character areas within Guildford Borough Council.

Guildford Borough Council		
Landscape Character Types	**Landscape Character Areas**	**Key attributes and qualities of landscape character**
Woodland and Settled Heath	**G2:Wisley Wooded and Settled Heath**	▪ A secluded, enclosed landscape of heathland commons lying between the Mole and Wey Rivers, now largely overgrown by secondary woodland; ▪ Substantial areas of mixed woodland and scrub are interspersed with heathland, open water bodies, pasture, parkland and gardens; ▪ Wisley and Ockham Commons are Open Access Land with a network of footpaths and rides through the woodland; ▪ There are few rural roads but the major transport corridors of the A3 and M25 cross the area fragmenting the commons and bringing noise and views of moving traffic; ▪ Sparse settlement pattern of a few farmsteads and cottages plus large houses at Wisley and Foxwarren; ▪ Presence of designed landscapes of Royal Horticultural Gardens at Wisley and Foxwarren Park to the north; ▪ Intermittent views into and through the woodland to pastures, and: ▪ Presence of heathland.

The landscape character of Elmbridge Borough Council is described in the Surrey Landscape Character Assessment (April 2015), prepared by HDA. As this landscape character assessment covers the entire Surrey County, the boundaries of landscape character areas extend beyond Borough or District Councils boundaries. The assessment distinguishes between Landscape Types reflecting the dominant influences on landscape character and Landscape Character Areas which are discrete geographic areas that possess the common characteristics described for the

landscape type. Three relevant Landscape Character Areas were identified to inform the baseline of landscape character for the proposed scheme options:

- RE10 Lower Mole River Floodplain (Character Area)
- SS9 Weybridge South Settled and Wooded Sandy Farmland (Character Area)
- SW5 Wisley Sandy Woodland (Character Area)

The key characteristic and attributes of this Landscape character area are summarised in Table 6-2 below.

Table 6-2. Summary of attributes and key characteristics of relevant landscape character areas within Guildford Borough Council.

Elmbridge Borough Council	
Landscape Character Areas	**Key attributes and qualities of landscape character**
RF10 Lower Mole River Floodplain	▪ Flat, low lying flood plain of the River Mole; ▪ River forms wide meanders, and multiple channels. The valley floor also contains small watercourses, streams, lakes and water bodies often linked to the river; ▪ Consists of a mixture of pastoral and arable fields, with riparian vegetation and occasional blocks of woodland. Incorporates occasional remnant parkland, including areas of large individual mature trees within fields; ▪ Limited areas of ancient woodland; ▪ Irregular, medium scale fields, with moderate hedgerow network (particularly to the south), ditches and tree lines; ▪ The sense of enclosure varies along the character area, although vegetation helps reduce views of urban influence from adjacent settlements; ▪ Major roads, including the M25, A3 and A244, the Waterloo to Woking railway line, and the Waterloo to Guildford via Cobham railway line, cut across the character area; ▪ Public access into the character area and to the river are relatively limited, with only a small number of rights of way crossing the character area; ▪ Settlement within the character area is also limited, mainly consisting of the occasional farmstead, and; ▪ Limited settlement and public access aid the sense of tranquillity, although the sense of remoteness is reduced by surrounding urban influence to the north.
SS9 Weybridge South Settled and Wooded Sandy Farmland	▪ A largely wooded area, but with significant areas of golf course cut from the woodland to the north-west, north-east, and south-east; ▪ In between the golf courses is a pattern of small, mainly pastoral, rectilinear fields with thick boundary vegetation. A number of these fields are subdivided for paddocks or horticultural uses; ▪ There are a few small areas of ancient woodland, mainly towards the west of the character area, in particular to the north of Foxwarren Park; ▪ Views across this relatively low-lying landscape are highly constrained by woodland and vegetation along boundaries and roads; ▪ The A3 dual carriageway and A245 main road cross through the character area; ▪ Painshill Park is located above the Mole Valley to the south, at the south-eastern end of the character area, and; ▪ Limited public access limits opportunity for public appreciation of the intimate landscape.
SW5 Wisley Sandy Woodland	▪ The character area consist of extensive tracts of mixed woodland and scrub, some areas of common land, open water bodies, and a pocket of small pastoral fields; ▪ Includes a relatively large block of ancient woodland at the south-east corner of the character area; ▪ The Royal Horticultural Society gardens at Wisley are within the south-west corner of the character area, and Foxwarren Park is to the north; ▪ Tree cover confines views generally, however there are distinctive views through the woodland along tracks, clearings within the woodland and across Bolder Lake;

Elmbridge Borough Council	
Landscape Character Areas	**Key attributes and qualities of landscape character**
	▪ Views of moving vehicles are possible within the vicinity of road corridors through the woodland; ▪ The M25 motorway and A3 cut through the woodland, and form Junction 10 of the M25 where they meet, towards the centre on the character area; ▪ Wisley and Ockham Commons are Open Access Land, with a number of informal tracks through the woodland connecting to a network of public rights of way, there are small car parks and other basic facilities for recreational use of the woodlands; ▪ There are a very limited number of isolated dwellings, including a few farmsteads, cottages and large houses at Wisley and Foxwarren, but the character area is mostly unsettled; ▪ Large tracts of the character area are registered as Common Land and Wisley is noted as a historic garden and centre of horticulture, and; ▪ Busy roads, including the M25 motorway, fragment the character area and disturb the peace locally. But away from detracting activity, the majority of the wooded character area is peaceful, intimate, and has a sense of remoteness.

As the proposed scheme options are located on the border of various landscape character areas this assessment takes into consideration combined characteristic of key qualities, and attributes of landscape character to judge its sensitivity in the assessment section of the report. The geographical extent of landscape character areas is shown on the Figure 6.2 Landscape Character in Appendix D.

Designations

The proposed scheme options are located relatively close to the Painshill Park, Grade I Registered Park and Garden (approximately 800m to the north east from the M25J10 junction).

The Painshill Park is located to the north east of the M25 J10, immediately adjacent to the A3 road. The main purpose of this designation is to *"celebrate designed landscapes of note, and encourage appropriate protection."*

The RHS Wisley Grade II* Registered Park and Garden is located to the south west (approximately 1.6km from the centre of the M25J10 junction). The designated area includes the Royal Horticultural Society Gardens at Wisley, formal and informal decorative gardens, several glasshouses and an extensive arboretum and small scale gardens.

Visual

Visual receptors are the people who live in or visit the landscape, and who would experience views of the proposed scheme options. M25 J10 / A3 Wisley Interchange is located within an area that is well contained by dense woodland cover and the visibility of the proposed scheme options would be restricted. There are relatively few visual receptors in the close proximity that could experience potentially significant effects.

The following five groups of people are considered to be the applicable visual receptors:

- Local communities (e.g. villages and settlements) and isolated residential properties;
- People in their places of work;

- People using nationally designated or regionally promoted footpaths, cycle routes, bridleways, users of the local rights of way network and areas of open access or Common land;
- Visitors at publicly accessible sites including, for example, the Registered Parks and Gardens, historic sites, and other visitor attractions, and;
- Road users.

At scoping stage the following receptors were scoped out of the assessment:

- Views from residential properties on Redhill Road and Bramley Hedge Farm (approximately 800m to the north of the junction) and due to the screening provided by mature woodland along Redhill Road and the A3;
- Views from Foxwarren Park (approximately 700m to the north east of the junction) due to the screening provided by dense and mature woodland, and;
- Birchmere Scout Campsite (approximately 600m to the west of the junction) due to the screening provided by adjacent mature woodland and landform.

The baseline studies identified the following receptors to represent different groups of people, who may experience views of the proposed scheme options and nature of the views:

1. Views from Painshill Park Grade I Registered Park and Garden.

Views from Painshill Park are fully blocked from majority of locations. A key role in screening plays belt of trees along the A3 road as well as woodland blocks and belts of trees within the Park. The terrain within the park undulates which combines with the existing vegetation to obstruct the views, however some partial views into adjacent landscape are likely to be available from more elevated and open areas of grassland.

2. Views from Wisley and Chatley Heath Common.

Views from Wisley Common are blocked largely by a dense woodland areas within the Common and by undulating landform. There are some large and open areas of grassland within the Common, where from some partial views into the adjacent landscape are likely to be available.

3. Views from the network of PRoW's within the study area.

The majority of public rights of way within the study area is located within densely wooded and undulating terrain that combine to restrict the views. It is expected there will be no views of the M25J10 with the exception of the short section of the footpaths that provides a link between Chatley Farm and woodland within the Foxwarren Park.

4. Views from Chatley Farm.

Views from Chatley Farm are restricted by adjacent woodland and there will be no views to the north and east and south, however open views towards the rural landscape to the west are afforded from this location and therefore the effects on views from Chatley Farm are not considered further in this report.

5. Views from Hurt Hill Cottage.

Views from Hurt Hill cottage are blocked by adjacent trees within Wisley Common and therefore the effects on views from Hurt Hill Cottage are not considered further in this report.

6. Views from Pond Farm.

Views from Pond Farm are blocked by adjacent mature belt of trees and therefore the effects on views from Pond Farm are not considered further in this report.

7. Views from RHS Wisley Grade II* Registered Park and Garden.

The views from the RHS Wisley are heavily screened by landscape elements present within the Site as well as by adjacent woodland belts and perimeter vegetation. The views to the north and east are blocked completely by adjacent landform and woodland blocks within Wisley Common, whilst some partial views to the south and west are likely to be available.

6.5 Regulatory/Policy Framework

European Union and national legislation and policies

Key relevant legislation for the Scheme includes The Town and Country Planning Act 1990, Countryside and Rights of Way Act 2000, and the Planning Act 2008, 'Part 7 – Orders granting development consent', including Public Rights of Way (PRoW) and Green Belt, as well as 'Schedule 8 – Tree Preservation Orders: further amendments'. Legislation of specific relevance to this chapter is outlined below.

The European Landscape Convention (ELC) sets out an internationally agreed definition of landscape and key actions that countries should follow. The ELC provides an integrated, holistic approach and international context for landscape, under the headline banner that "All Landscapes Matter". The convention is a treaty between states (not an EU Directive) and seeks to influence governments' decisions rather than direct them. It was signed by the UK government in 2006, and came into effect in March 2007.

The National Planning Policy Framework (NPPF) was published in March 2012 and sets out the Government planning policies for England and how these are expected to be applied.

The NPPF sets out a clear presumption in favour of sustainable development, which should be seen as a 'golden thread' running through plan-making and decision-taking.

The NPPF sets out 13 aspects relating to the delivery of sustainable development, including 'Conserving and enhancing the natural environment' which is of particular importance to the proposed development. These core aims are designed to guide and influence local authorities in developing their local plans, demonstrating the government's commitment to ensure the planning system does everything it can to support sustainable economic growth. See also End Note on European Landscape Convention and explained relevance.

Local policies

At a local level, development is controlled through local planning policy prepared in accordance with national policy. Local Plans set out a vision and a framework for the future development of the area within boundaries of the local authorities.

The study area is located within boundaries of Elmbridge Borough Council and Guildford Borough Council.

The Borough of Elmbridge has adopted Elmbridge Core Strategy in July 2011. This document sets out a long-term vision, spatial strategy and core policies for shaping the development. More detailed policies that planning applications can be assessed against are included in the Development Management document adopted in April 2015.

Whilst the new local plan is being currently prepared, the saved policies of the adopted in 2003 Local Plan form the basis for determination of planning applications.

Table 6-3 below includes relevant policies of Elmbridge and Guildford Borough Council.

Table 6-3: Summary of relevant planning policies

Planning Policies	Summary of Policy Content
National Planning Policy Framework (NPPF)	Promotes conservation and enhancement of the natural and local environment, protection of valued landscapes and AONB areas.
Core Strategy Adopted (20 July 2011)	**Borough of Elmbridge Local Plan**
Policy CS14 Green Infrastructure	"The Council will protect, enhance and manage a diverse network of accessible multifunctional green infrastructure by: 1. Continuing to give a high level of protection to and improving the Borough's green infrastructure assets including Suitable Accessible Natural Greenspace (SANG) and those sites designated for their biodiversity value in accordance with Policy CS15-Biodiversity(1)… 2. Ensuring new development protects and enhances local landscape character (2), strategic views and key landmarks as shown on the proposals map, and takes account of their setting, intrinsic character and amenity value… Developing green links within and across borough boundaries in particular by supporting the Green Arc initiative, the development of a network of SANG, and identifying green corridors. Safeguarding important trees, woodlands and hedgerows and securing provision of soft landscaping measures in new development, focusing on the use of native species, particularly trees, which are an important feature of the Elmbridge landscape, and taking opportunities to create links with the wider green infrastructure network…;
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. The consideration of sustainable design should be considered as an integral part of the design process (see CS27-Sustainable Buildings) In order to provide a positive strategic design framework that protects and enhances that environment, the Council's forthcoming development Management policies and the Design and Character SPD will take into account the following key principles. Local Character New development will be required to deliver high quality and inclusive sustainable design, which maximises the efficient use of urban land whilst responding to the positive features of individual locations, integrating sensitively with the locally distinctive townscape, landscape, and heritage assets, and protecting the amenities of those within the area…"
Development Management Plan (Adopted April 2015)	
Policy DM2 Design and Amenity	"All new development should achieve high quality design, which demonstrates environmental awareness and contributes to climate change mitigation and adaptation. The Council will permit development proposals that demonstrate that they have taken full account of the following: a. All development proposals must be based on an understanding of local character including any specific local designations4 and take account of the natural, built and historic environment. Development proposals will be expected to take account of the relevant character assessment companion guide in the Design and Character SPD. b. Proposals should preserve or enhance the character of the area, taking account of design guidance detailed in the Design and Character SPD, with particular regard to the following attributes: • Appearance • Scale • Mass • Height • Levels and topography

Planning Policies	Summary of Policy Content
	• Prevailing pattern of built development • Separation distances to plot boundaries • Character of the host building, in the case of extensions5 c. Proposals should take account of landform, layout, building orientation, massing and landscape to minimise energy and water consumption…"
Policy DM6 Landscape and trees	"Development proposals should be designed to include an integral scheme of landscape, tree retention, protection and/or planting that: a. Reflects, conserves or enhances the existing landscape and integrates the development into its surroundings, adding scale, visual interest and amenity, b. Contributes to biodiversity by conserving existing wildlife habitats, creating new habitats and providing links to the green infrastructure network, c. Encourages adaptation 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 elements, d. 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, e. Adequately protects existing trees including their root systems prior to, during and after the construction process, f. Would not result in the loss or deterioration of irreplaceable habitats including ancient woodland and ancient or veteran trees, unless in exceptional circumstances the benefits would outweigh the loss, and g. Includes proposals for the successful implementation, maintenance and management of landscape and tree planting schemes. To ensure high quality landscape schemes and depending on the scale, nature and location of the development, the Council will seek appropriate conditions attached to planning permissions to secure various improvements. These may include tree retention and protection, the submission and implementation of a landscape or treeplanting 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 regard to the reasons put forward in support of it. Trees in conservation areas In considering works to trees protected by virtue of their location within a conservation area the Council will assess the amenity value of the tree or woodland and the likely impact of the proposal on the amenity of the area. The Council will then either: i. Make a TPO if justified in the interests of amenity. The proposal would then have to be the subject of a formal application under the TPO, or ii. Decide not to make a TPO and allow the six week period to expire, at which point the proposed work may go ahead as long as it is carried out within two years from the date of the notice."
Local plan (adopted 2003)	**Guildford Borough Council**
Policy G1 (3) Protection of amenities enjoyed by occupants of buildings	"The amenities enjoyed by occupants of buildings are protected from unneighbourly development in terms of privacy, access to sunlight and daylight, noise, vibration, pollution, dust and smell."
Policy G1 (8) Light pollution	"External lighting is designed to minimise glare and the spillage of light from the site."

Planning Policies	Summary of Policy Content
Policy G1 (12) Safeguarding and enhancement of the landscape and existing natural features.	"Development is designed to safeguard and enhance the characteristic landscape of the locality and existing natural features on the site, such as hedgerows, trees, watercourses and ponds which are worthy of protection."
Policy G5(9) Landscape design	"A high standard of landscape design, to include walls, enclosures and paving schemes, as well as trees and other planting is provided to ensure that new development integrates into the existing townscape and landscape."
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."
Policy NE5 Development affecting trees, hedges and woodlands.	"Development will not be permitted if it would damage or destroy trees protected by a Tree Preservation Order or in a conservation area unless the removal would: 1. Be in the interests of good arboricultural practice; or 2. 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 new locally native trees be planted either on or near the site."

6.6 Design Mitigation and Enhancement Measures

Currently, the assessment deals with potential scheme options and therefore at this stage potential generic environmental design or mitigation measures have been identified. The assessment takes into consideration the potential for reduction of adverse effects through the introduction of environmental design or mitigation measures. Below there is a list of potential mitigation measures that could be applied to the considered schemes:

- Avoid the loss of trees and hedgerows through selection of the option that would result in minimal loss of trees and hedgerows of high quality or prefer alignment in which the loss of trees could potentially be avoided or mitigated;
- Where possible there may be potential to provide mitigation measures for screening consisting of planting or mounds;
- The field pattern, where affected should be replaced with new one that would aim to recreate the existing field pattern. Reinstatement of field pattern may require addition of woodland copses, tree belts, or planting of hedgerow with trees;
- Where earth mounding or cuttings are proposed their profile should be modelled to fit with the local landscape character. The shallow gradients of slopes and shallow crests of embankments and cuttings would be generally preferred;
- The scheme may give an opportunity for opening up or screening of the views into and from the altered sections of the network where appropriate;
- Introduction of new vegetation could help absorb the junction into the landscape and provide wildlife corridor which links into the surrounding areas, and;
- New planting should include species appropriate to the locations favouring long lived tree species located at safe distance from the road but also hedgerows and woodland edge planting that are located outside constraints of sight lines to improve landscape quality and safety.

6.7 Potential effects

Landscape

In general an assessment of landscape effects deals with the effects of change and development on landscape as a resource. The nature of potential effects on each receptor will be assessed for both construction and operational phase of the proposed scheme options.

It is expected that potential significant landscape effects would be restricted to the land required or directly adjacent to the proposed scheme options. The proposed scheme options are centred on the existing M25 J10.

Key effects

Key effects associated with the proposed scheme options will include the loss of land and removal of vegetation required to accommodate the scheme during construction stage.

Although some vegetation comprises man made planting along the existing road corridors, some of the proposed scheme options are located within extensive areas of woodland surrounding the, that comprise predominantly pines. The construction activities would require material set down areas, the introduction of the compound with welfare facilities, site office, material set down areas and parking. It is likely that some of the considered options would require temporary land for construction due to a large scale of the proposed scheme options. As the landform around the junction undulates, during construction the formation of earthworks would be required to accommodate the proposed on and off slip roads.

During construction stage depending on the option selected large scale construction operations will take place in some areas and these will be associated mainly with erection of overbridges, underbridges but also with some on and off slip roads.

Generally, in construction stage a temporary pattern of construction activities of varying magnitude depending on the option selected will be introduced. It is expected that this would result in perceptible but temporary change within the local landscape.

Whilst the loss of some of the planting could be compensated through the introduction of environmental design measures the existing pattern of vegetation cover would be permanently altered as new large and small scale elements of the proposed scheme are being in the construction stage.

In operational stage it is expected that environmental design measures would help to integrate partially the proposed scheme options into the existing landscape, however it is expected that some of the existing qualities of the landscape around the junction would be altered permanently. The existing landscape pattern would be altered permanently and connectivity within the network of hedgerows and woodland areas would be lost fully or partially. The introduced elements of the scheme including over and underbridges, on and off slip roads as well as earthworks would extend the pattern of transport infrastructure which could become a dominant feature in the local landscape. Less land would be available for the recreational users within Ockham, Wisley and Chatley Heath Common in case of some of the options. However, it is worth noting that fragmentation of the existing landscape pattern, change of land use and alteration to landform would take place within area that has been already transformed by man-made influences. The change to the landscape character would occupy a relatively small part of the wider landscape character area, but locally some of the proposed scheme options could be seen as a marked change within the local landscape.

There will be no direct or indirect landscape effects on Painshill Park Grade I Registered Park and Garden and on RHS Gardens Wisley – Grade II* Registered Park and Garden as the landscape fabric associated with these Parks will not be affected.

Where the proposed options are located close to these historically important parks there is a good potential for the introduction of environmental design measures that would compensate for loss of vegetation currently linked to these parks or amenity.

The significance of proposed changes will depend on the option selected and potential for implementation of environmental design measures or mitigation measures.

Table 6-4 below considers the effects on landscape character during construction stage. The landscape effects during operational stage are considered in Table 6-5.

The detailed assessment of landscape effects is presented in the Appendix D.

Table 6-4: Effects on potential landscape receptors (Construction)

Potential landscape effects	Option 9	Option 9 with A3 widening	Option 14	Option 14 with A3 widening	Option 16	Option 16 with A3 widening
Effects on landscape character include: -introduction of compounds, parking and welfare facilities; - loss of vegetation; - alteration to landform; (introduction of earthworks); -requirement for temporary construction land; and - temporary presence of material set down areas and stock piles.	**Sensitivity:** The sensitivity of landscape character is considered at medium level.					
	Magnitude					
	Moderate	Major	Minor	Major	Major	Major
	Potential effects					
	Moderate adverse (significant adverse)	Large adverse (significant adverse)	Slight adverse (not significant)	Large adverse (significant adverse)	Large adverse (significant adverse)	Large adverse (significant adverse)

Table 6-5: Effects on potential landscape receptors (Operation)

Potential landscape effects	Option 9	Option 9 with A3 widening	Option 14	Option 14 with A3 widening	Option 16	Option 16 with A3 widening
Effects on landscape character including: -Introduction pf permanent viaducts, overbridges and underbridges, on and off slip roads and earthworks; -Introduction of gantries and other smaller elements of highway infrastructure e.g. signage; retaining structures and others. -Introduction of new footways and footbridges; -Realignment of kerb lines and -Introduction of new planting and other mitigation measures.	**Sensitivity:** The sensitivity of landscape character is considered at medium level.					
	Magnitude					
	Moderate	Moderate	Negligible	Moderate	Moderate	Moderate
	Potential effects					
	Moderate adverse (significant adverse)	Moderate adverse (significant adverse)	Slight adverse (not significant)	Moderate adverse (significant adverse)	Moderate adverse (significant adverse)	Moderate adverse (significant adverse)

Visual

Visual effects will occur during both the construction and operational stage. During construction, effects are likely to occur as a result of the introduction of construction machinery, compounds and loss of the existing vegetation. The change in the views is likely to include earthmoving operation, formation of temporary spoil areas, road formation and creation of earthworks. The visual receptors will also be affected by views of HGV vehicles and other tall machinery used on the construction site. The effects of construction activities would be temporary, short term and reversible.

Although there are relatively few receptors within the study area, they are highly sensitive. The proposed scheme options is set within a large scale woodland area, which combine with undulating landform to restrict the views.

During construction, views of construction activities will be prominent for majority of the receptors, due to their scale. During construction, formation of earthworks and erection of tall structures like overbridges and underbridges would be the most prominent operations. An increase in construction traffic and dust is expected. Large compound areas will be fenced and some of the proposed scheme options would require temporary access routes or large areas of material set down areas and stock piles. Although these changes will be temporary, their cumulative effects combined with potential night time lighting and construction signage would be prominent to majority of the receptors.

During operational stage the implemented environmental design measures will help to integrate the proposed scheme options into the existing landscape, however some of the features would remain prominent such as proposed overbridges and underbridges as well as prominent on and off slip roads with associated earthworks. The proposed signage, gantries and other small elements of transport infrastructure would be perceptible for some receptors located in the close vicinity.

Depending on the option selected the significance of effects will vary between receptors located around the junction. The operational effects will be long term and permanent.

Table 6-5 below considers the effects on visual receptors during construction stage. The landscape effects during operational stage are considered in Table 6-6.

The detailed assessment of visual effects is presented in the Appendix D.

Table 6-5: Effects on potential visual receptors (Construction)

Receptors	Options	Option 9	Option 9 with A3 widening	Option 14	Option 14 with A3 widening	Option 16	Option 16 with A3 widening
Receptor 1 Views from Painshill Park Grade I Registered Park and Garden. Sensitivity: High	Magnitude	Major	Major	Minor	Major	Major	Major
	Potential effects	Moderate adverse (significant)	Large adverse (significant)	Moderate adverse (significant)	Large adverse (significant)	Very large adverse (significant)	Very large adverse (significant)
Receptor 2 Views from Wisley and Chatley Heath Common. Sensitivity: High	Magnitude	Major	Major	Minor	Major	Major	Major
	Potential effects	Large adverse (significant)	Large adverse (significant)	Moderate adverse (significant)	Large adverse (significant)	Very large adverse (significant)	Very large adverse (significant)
Receptor 3 Views from the network of PRoW's within the study area. Sensitivity: High	Magnitude	Major	Major	Minor	Major	Major	Major
	Potential effects	Large adverse (significant)	Large adverse (significant)	Moderate adverse (significant)	Large adverse (significant)	Very large adverse (significant)	Very large adverse (significant)
Receptor 4 Views from Chatley Farm. Sensitivity: High	Magnitude	Moderate	Moderate	No change	No change	Major	Major
	Potential effects	Moderate adverse (significant)	Moderate adverse (significant)	Neutral	Neutral	Very large adverse (significant)	Very large adverse (significant)
Receptor 7 Views from RHS Wisley Grade II* Registered Park and Garden. Sensitivity: Very high	Magnitude	No change	Minor	No change	Minor	Minor	Minor
	Potential effects	Neutral	Moderate adverse (significant)	Neutral	Moderate adverse (significant)	Moderate adverse (significant)	Moderate adverse (significant)

Table 6-6: Effects on potential visual receptors (Operation)

Receptors	Options	Option 9	Option 9 with A3 widening	Option 14	Option 14 with A3 widening	Option 16	Option 16 with A3 widening
Receptor 1 Views from Painshill Park Grade I Registered Park and Garden. Sensitivity: High	Magnitude	Moderate	Major	Minor	Major	Major	Major
	Potential effects	Moderate adverse (significant)	Large adverse (significant)	Slight adverse (not significant)	Large adverse (significant)	Large adverse (significant)	Large adverse (significant)
Receptor 2 Views from Wisley and Chatley Heath Common. Sensitivity: High	Magnitude	Major	Major	Minor	Major	Major	Major
	Potential effects	Large adverse (significant)	Large adverse (significant)	Slight adverse (not significant)	Large adverse (significant)	Large adverse (significant)	Large adverse (significant)
Receptor 3 Views from the network of PRoW's within the study area. Sensitivity: High	Magnitude	Major	Major	Minor	Major	Major	Major
	Potential effects	Large adverse (significant)	Large adverse (significant)	Slight adverse (not significant)	Large adverse (significant)	Large adverse (significant)	Large adverse (significant)
Receptor 4 Views from Chatley Farm. Sensitivity: High	Magnitude	Minor	Minor	No change	No change	Moderate	Moderate
	Potential effects	Moderate adverse (significant)	Moderate adverse (significant)	Neutral	Neutral	Large adverse (significant)	Large adverse (significant)
Receptor 7 Views from RHS Wisley Grade II* Registered Park and Garden. Sensitivity: Very high	Magnitude	No change	Minor	No change	Minor	Minor	Minor
	Potential effects	Neutral	Moderate adverse (significant)	Neutral	Moderate adverse (significant)	Moderate adverse (significant)	Moderate adverse (significant)

6.8 Summary of landscape and visual effects

Landscape effects

Construction

Significant effects are expected for all considered options with the exception of Option 14.

All of considered options would result in the loss of vegetation. The greatest loss of existing vegetation is expected in Option 16, but large scale loss would be also associated with Option 9, Option 9 with the A3 widening and Option 14 with the A3 widening. During construction stage there will be a requirement for a compound area, material set down areas, site office, welfare facilities, and parking area. A temporary increase in construction traffic as well as increase in level of dust close to the junction are also expected. The construction activities although temporary would form a perceptible change within the local landscape but within the wider scale of identified landscape character areas are unlikely to affect key qualities and attributes of the landscape character areas.

Operation

Significant effects are expected for all considered options with the exception of Option 14.

During the operational stage the Proposed Scheme Options would be partially integrated through the implementation of the environmental design measures. It is expected that over a time the proposed vegetation would mature to partially accommodate the Proposed Scheme Options into the existing landscape. Some of the proposed elements of the scheme including bridges and viaducts and on and off slip roads would permanently alter landscape pattern resulting in further fragmentation within adjacent woodland areas. Some of the considered options would adversely transform the existing landscape in the vicinity of the M25 J10, whilst it is expected that widening of the A3, could be mitigated to some degree through planting that would partially compensate for the loss of vegetation.

Visual

Construction

During the construction stage significant effects are expected as a combination of adverse effects like the introduction of uncharacteristic elements of the views including formation of earthworks, construction of the bridges, overbridges as well as views of the compound with associated construction traffic. Visual receptors are likely to have full or partial view of construction operations, construction traffic, and compound area with material set down areas, welfare facilities, site office and parking areas. As the construction activities would be of large scale, most of identified visual receptors would be significantly albeit temporarily affected as a result of high sensitivity and the close proximity to the construction activities of high magnitude.

Below there has been prepared a list of receptors that are likely to sustain significant effects during construction stage:

Option 9

Significant effects are expected for receptors nos.1, 2, 3, and 4.

Option 9 with the A3 widening

Significant effects are expected for receptors nos.1, 2, 3, 4 and 7.

Option 14

Significant effects are expected for receptors nos. 1, 2, 3.

Option 14 with the A3 widening

Significant effects are expected for receptors nos.1, 2, 3 and 7.

Option 16

Significant effects are expected for receptors nos.1, 2, 3, 4 and 7.

Option 16 with A3 widening

Significant effects are expected for receptors nos.1, 2, 3, 4 and 7.

Operation

During operational stage potential significant effects are expected as a result of deterioration to the view through the introduction of uncharacteristic and detracting features that could dominate the views. The views would include relatively large scale alterations to the existing junction including the proposed viaducts, overbridges, underbridges, on and off slip roads, earthworks with introduced planting. It is expected that maturing vegetation will blend partially into the existing landscape with some elements of the remaining prominent in the view.

Below there has been prepared a list listed receptors that are likely to sustain significant effects operational stage:

Option 9

Significant effects are expected for receptors nos.1, 2, 3, and 4.

Option 9 with the A3 widening

Significant effects are expected for receptors nos.1, 2, 3, 4 and 7.

Option 14

No significantly affected receptors were identified.

Option 14 with the A3 widening

Significant effects are expected for receptors nos.1, 2, 3, 4 and 7.

Option 16

Significant effects are expected for receptors nos.1, 2, 3, 4 and 7.

Option 16 with A3 widening

Significant effects are expected for receptors nos.1, 2, 3, 4 and 7.

6.9 Recommendations for future assessment stages

It has been established that all options would have some visual receptors affected significantly in construction or/and operational stage and some options would affect significantly local landscape character. Therefore a Detailed Assessment is recommended for all considered options at the stage II of the assessment according to the Highways England Project Control Framework (PCF) procedures.

At stage II of the assessment further work will be required including detailed desk and fieldwork to identify the character of the landscape, including its condition and value, and the nature and sensitivity of the visual receptors that may be affected by the project.

Further potential refinements to the design, should be considered in sufficient detail to establish a range of potential landscape and visual effects. At this stage the assessment will take into the consideration specific landscape and visual environmental and design measures.

Prior to stage II of the assessment a production of outline landscape design drawings would be necessary to show the proposed environmental design or agreed mitigation measures to enable full assessment of landscape and visual effects.

The stage I assessment will be extended in stage II to explain any additional evaluation methodologies with differentiation of construction and operational stages and will be accompanied by illustrative plans showing:

- Topography (1:25000)
- Landscape Character (1:25000)
- Viewpoint location plans (1:25000)
- Photographic Viewpoints (1:25000)
- Landscape Designations (1:25000)
- Outline Landscape Design (1:2500)

6.10 Limitations to assessment

The following limitations have been identified in production of this report:

- The assessment is based on professional judgement and takes into account both the adverse and beneficial contribution that new development can have upon the existing landscape character and on the visual resource of surrounding receptors.
- The report provides broad indication of effects, reporting on the potential landscape and visual effects based on simple assessment;
- Limited field survey was undertaken to gain broad understanding of landscape and visual constraints. The visibility from visual receptors have been established from publicly accessible places with some locations being restricted due to the safety considerations e.g. motorways or some other locations along the highway network;
- Landscape character description in baseline section refers to the landscape character assessment at the local level; and
- At this stage, where options are explored there is no detailed information available on the construction stage and therefore the assessment is based on assumptions.

7 Cultural Heritage

7.1 Introduction

This chapter assesses potential impacts on the cultural heritage resource from each option. From examining the proposed works and the location of heritage assets, an assessment has been made of any potential significant effects upon the cultural heritage resource and recommendations provided for further assessment or mitigation.

This chapter of the ESR assesses potential impacts on the built heritage resource and on archaeological remains. Information on designated and non-designated heritage assets was sourced from the following locations:

- Historic England's National Heritage List for designated assets[1]; and
- Surrey Historic Environment Record for both designated and non-designated heritage assets and previous investigations.

Heritage assets are associated with a unique ID, for National Heritage List entries (NHLE) and the Historic Environment Record (HER).

7.2 Baseline Conditions

The study area of 500m around the scheme contains forty-eight designated heritage assets of high or medium value. In summary, these comprise:

- Four Scheduled Monuments
- One Grade I registered park and garden
- One Grade II* registered park and garden
- Five Grade II* listed buildings
- Thirty-five Grade II listed buildings
- Two Conservation Areas

Eleven of these designated assets are located within the scheme options boundaries. These are indicated in the table below.

There are no World Heritage Sites or Registered Battlefields within the Study Area.

The designated assets located within the study area are listed below in Table 7-1. They are also mapped in Figures 7.1 in Appendix E

Table 7-1: Designated Heritage Assets within the Study Area

Reference	Name	Description	Location to Scheme	Value (refer to 7-2)
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	Approximately 200m south-east	High

[1] https://www.historicengland.org.uk/listing/the-list/

Reference	Name	Description	Location to Scheme	Value (refer to 7-2)
		contain important archaeological information.		
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.	Within scheme options boundary	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.	Within scheme options boundary	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.	Within scheme options boundary	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.	Within scheme options boundary	High
1029372	The Talbot (Grade II* Listed Building)	16th century coaching inn, with an 18th century front with timber framing, now restaurant and bars.	Approximately 500m south-west	High
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	Approximately 200m south	High
1189110	Foxwarren Park (Grade II* Listed Building)	Victorian Gothic country house, 1860.	Approximately 250m north	High
1191694	The Gothic Tower (Grade II* Listed Building)	Mid-19th century brick four stage tower. Located within Painshill Park Registered Park and Garden	Within scheme options boundary	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.	Approximately 50m south	High

Reference	Name	Description	Location to Scheme	Value (refer to 7-2)
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.	Within scheme options boundary	High
1029368	Elm Tree House (Grade II Listed Building)	Late 16th century house, extended to the rear in 19th century and restored in 20th century.	Approximately 500m west	Medium
1029369	Ryde House (Grade II Listed Building)	Late 18th century house, extended to right and rear in 19th century.	Approximately 500m west	Medium
1029370	Foot Bridge House (Grade II Listed Building)	17th century house with early 19th century extensions.	Approximately 400m west	Medium
1029371	Yew Tree House (Grade II Listed Building)	Late 18th century house, possibly with older core or origins.	Approximately 500m west	Medium
1029373	Sage Antiques, The Green Cottage (Grade II Listed Building)	Mid-18th century house, now divided and part given over to shop (Sage Antiques).	Approximately 500m west	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.	Approximately 300m south	Medium
1029404	Bridgefoot Farmhouse (Grade II Listed Building)	Mid-17th century house, extended in 19th century and 20th century.	Approximately 300m west	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.	Approximately 250m west	Medium
1030053	Foxwarren Cottage (Grade II Listed Building)	Estate cottage, c.1860 with late 20th century additions on left.	Within scheme options boundary	Medium
1030122	Chestnut Lodge (Grade II Listed Building)	House, c.1830 with 20th century extension to rear.	Approximately 150m north	Medium
1030125	The Mausoleum (Grade II Listed Building)	Mid-late 18th century mausoleum	Approximately 450m south	Medium
1030126	The Water Wheel (Grade II Listed Building)	Water wheel, c.1830, timber frame on brick plinth.	Approximately 300m south	Medium
1030133	Belfry House Stable Cottage (Grade II Listed Building)	Early 19th century former stable block, now divided, with clock tower. 20th century alterations.	Within scheme options boundary	Medium
1030140	Hatchford Park School (Grade II Listed Building)	House, now school. Original house of 1850, encased and remodelled in c.1890.	Approximately 300m south	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.	Approximately 300m south	Medium
1030254	Lodge, 15 yards east of Feltonfleet School (Grade II Listed Building)	Lodge, c.1860 with 20th century extensions.	Within scheme options boundary	Medium

Reference	Name	Description	Location to Scheme	Value (refer to 7-2)
1188416	Millstream House Ockham Mill (Grade II Listed Building)	Mill house, with mill attached, four storey mill dated 1862.	Approximately 500m north	Medium
1188497	Nos 1 and 2 Bridgefoot Farm Cottages (Grade II Listed Building)	17th century house, now divided into two cottages.	Approximately 300m west	Medium
1188506	Gate and gate piers/walls at Ockham Park (Grade II Listed Building)	Late 19th century brick walls and iron gates.	Approximately 350m west	Medium
1188563	Talbot Cottage (Grade II Listed Building)	Early 17th century (c.1630) with 20th century single storey wing extension	Approximately 500m west	Medium
1188574	Barn across rear of The Talbot (Grade II Listed Building)	17th century rectangular barn, now store.	Approximately 500m west	Medium
1189118	Royal Horticultural Society Offices, Wisley Gardens (Grade II Listed Building)	Offices, 1914, in picturesque Vernacular style.	Approximately 400m north-west	Medium
1191624	Old Cottage Post Boys (Grade II Listed Building)	Early 18th century row of cottages, with 20th century additions and alterations.	Approximately 150m south	Medium
1191776	The Old House Vine House (Grade II Listed Building)	Late 18th century office terrace.	Approximately 500m south	Medium
1191800	The Round House (Grade II Listed Building)	Early 19th century former outbuilding, now house.	Approximately 150m south	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.	Within scheme options boundary	Medium
1286910	Chatley Farm House (Grade II Listed Building)	16th century house with 18th century front, brick with timber framed core.	Approximately 200m east	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.	Approximately 500m south	Medium
1294963	Feltonfleet School (Grade II Listed Building)	House, circa 1860, now school. 20th century alterations and wing addition.	Within scheme options boundary	Medium
1365888	Service Courtyard to Hatchford Park School (Grade II Listed Building)	Stable court, 1890. Includes brick walls and pavilions.	Approximately 300m south	Medium
1377487	Entrance Lodge to Chestnut Lodge (Grade II Listed Building)	Entrance lodge, c.1830, with 20th century addition to the rear.	Approximately 50m north	Medium
1377488	Cobham Bridge (Grade II Listed Building)	Bridge, red brick with stone coping, 1792, parapets rebuilt in 1914.	Approximately 200m south	Medium

Reference	Name	Description	Location to Scheme	Value (refer to 7-2)
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.	Approximately 500m west	Medium
1377830	J Hartley Antiques Ltd (Grade II Listed Building)	House, circa 1700, now shop, with late 20th century extension.	Approximately 500m west	Medium
1377855	Water Tower in Foxwarren Park (Grade II Listed Building)	Brick water tower, c.20 feet high, c.1860.	Approximately 150m north	Medium
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.	Approximately 500m north	Medium
CA1	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.	Approximately 150m west	Medium
CA2	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.	Approximately 400m north	Medium

In addition to the designated assets, the study area also contains sixty non-designated assets. These non-designated assets are of medium, low or negligible value. The non-designated assets are listed in a gazetteer in Appendix E. Non-designated assets are referred to with their HER asset numbers which correspond to those used in the gazetteer in Appendix E and Figure 7.1 in Appendix E.

The non-designated assets recorded on the HERs within the study area consist of a mixture of non-designated historic buildings and archaeological sites. In summary, these include:

- Possible Prehistoric earthworks, including possible barrows (HER 14794);
- The London to Winchester Roman Road (HER 4619);
- A possible Roman quarrying site (HER 3310);
- Medieval or post-medieval enclosure and parish boundaries and holloway earthworks (HERs 2812, 14774, 14782, 14783, 14785, 14786, 14787, 14788, 14789, 14793, 14795, 18141) and ponds and dams (HERs 14766, 14767, 14768, 14771, 14778);
- Post-medieval dwellings and farmsteads (HERs 14780, 14781, 14792, 18181, 22004, 22156, 22157, 22158, 22159, 22160), mill (HER 3462), parklands (HERs 2813, 13563), ice house (HER 1898), ornamental hermitage (HER 21976), quarries (HERs 14779, 14784, 14796), parish boundary stones (HER 3464) and semi-ornamental woodland (HER 18182);

- Post-medieval and modern gardens or parkland (HERs 3715, 13579), and milestones (HERs 3463, 3575, 16852, 16887);
- Modern war memorials and military emplacements (HERs 6886, 20867, 20868, 20871, 21230);
- A field system or mineral extraction site of unknown date (HER 3243); and
- Earthworks and cropmarks indicating potential archaeological features of unknown date (HERs 495, 14312, 14775, 14777, 15844, 17075, 17084).

In addition, the HER also records a number of archaeological findspots and previous archaeological investigations. Findspots include Prehistoric tools (HERs 496, 746, 2109, 2455, 4133), pottery (HER 3269) and flint scatters (HERs 503, 3270, 3502, 3695); Bronze Age pottery (HERs 2451, 4739, 13861); Romano-British pottery (HERs 236, 3271) and brooches and metalwork (HERs 3913, 3914); and Medieval pottery sherds (HERs 3272, 4738) and brooch (HER 19515). Findspots are not assets in themselves, as there cannot be impacts on archaeological finds which have been removed. However, they provide evidence of the potential for unknown archaeological deposits within the study area. Similarly, records of previous archaeological investigations provide evidence of the potential for archaeology within the study area, as well as providing context for the previous assessment of archaeological sites or findspots.

The Surrey HER also records entries of Areas of High Archaeological Potential. These were identified based on archaeological sites and findspots as being areas where there is considered to be a higher likelihood of previously undiscovered archaeological deposits, and are considered to be of medium, low or negligible value. These areas were first recorded on the HER in the 1980s, and as a result some are out of date; subsequent excavations have resulted in the removal of deposits, or the re-defining of features as being natural rather than archaeological.

7.3 Assessment Methodology

This assessment has been carried out in accordance with the methodology set out in the Design Manual for Roads and Bridges, Volume 11 Section 3, Part 2, HA208/07 (DMRB)[2]. It also reflects guidance for assessing impacts on the setting of heritage assets contained in 'Historic Environment Good Practice Advice in Planning Note 3: The Setting of Heritage Assets' (Historic England, 2015).

Sensitivity of Resource

The value of each heritage asset is assessed, and determined to be Very High, High, Medium, Low or Negligible. Heritage value is determined by professional judgement, grounded in established criteria. These criteria are elaborated in English Heritage's (now Historic England) Conservation Principles (2008), which sets out four values: evidential, historical, aesthetic and communal. These encapsulate architectural, historic and archaeological interest and are consistent with the DMRB methodology. 7-2 sets out the criteria for assessing the value of historic environment assets.

[2] http://www.standardsforhighways.co.uk/dmrb/vol11/section3/ha20807.pdf

Table 7-2: 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 o longer warrant designation.
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.	

As consistent with DMRB methodology, the magnitude of effect on the cultural heritage baseline is determined by consideration of a combination of the magnitude of the impact and the value of each asset with a level of professional judgement in the determination. The magnitude of impact to a heritage asset is identified by the degree of change that would be experienced by the asset and its setting if the scheme were to be completed as compared to a 'do nothing' situation. The definition of the magnitude of impact, and the matrix for determining the significance of effect, can be found in DMRB (Volume 11 Section 3, Part 2, HA208/07, 5/5).

7.4 Regulatory/Policy Framework

The National Planning Policy Framework (NPPF) was introduced in March 2012. It sets out national policy for the determination of planning applications and for plan making. Section 12 of the NPPF contains specific policy relating to the historic environment. It discusses how the importance of a heritage asset should be considered in the light of new development proposals. In any proposal there should be:

- A description of the significance of heritage assets, where the level of detail should be proportionate to the assets' significance and no more than is sufficient to understand the potential impact of the proposal on significance (NPPF, paragraph 128);
- Minimisation of any conflict between the preservation of the significance of the heritage asset and the proposal (NPPF, paragraph 129);

- Provision of a clear and convincing justification for the development (NPPF, paragraph 132); and
- Where there are potential adverse impacts to an asset, the harm should be weighed against the public benefits of the proposal (NPPF, paragraph 134).

Both the local planning authorities in which the scheme options are located have planning policy (adopted or emerging) which is of relevance to the assessment of significant effects on cultural heritage. In summary, there are:

- Guildford Borough Council Local Plan (2003):
    - Policy HE4 'New Development which affects the Setting of a Listed Building'. This identifies that development should not adversely affect the setting of a listed building by virtue of design, proximity or impact on significant views.
    - Policy HE6 'Locally Listed Buildings'. This identifies that development proposals will be assessed considering their effect on the architectural and historic interest on locally listed buildings and their settings.
    - Policy HE10 'Development which affects the Setting of a Conservation Area'. This states that development should not harm the setting of a conservation area or the views out of that area.
    - Policy HE12 'Historic Parks and Gardens'. This states that development should not detract from the character or appearance of a park or garden of special historic interest, or its setting.
- Elmbridge Borough Council Local Plan Core Strategy (2011):
    - Policy CS17 'Local Character, Density and Design'. This includes the policy approach to the historic environment, identifying that development should be sensitive to local character particularly in relation to potential effects on heritage assets.

Guildford Borough Council are currently in the process of public consultation regarding a new Local Plan. The Proposed Submission Local Plan includes:

- Policy D3 'Historic Environment'. This states that the historic environment will be conserved and enhanced in a manner appropriate to its significance, and development should be encouraged to conserve and enhance the special character and significance of the Borough's heritage assets and their settings.

7.5 Design Mitigation and Enhancement Measures

There are opportunities to introduce mitigation and enhancement measures into the scheme design, and the management of the scheme. These include:

- The maintenance, enhancement or replacement of existing vegetation screening along the M25 and A3 to ensure that any operational impact following completion of the scheme on the setting of heritage assets is reduced.
- Minimising the size of signage along the route, and ensuring it is sympathetic to any surrounding screening, which can prevent the introduction of further impacts on the setting of heritage assets within view of the scheme route. This could constitute the installation of roadside signage as opposed to gantry signs, or the painting of highways equipment to complement vegetation screening.
- The installation of noise fencing along the scheme route which could reduce the level of harm from increased traffic noise on the setting of heritage assets.

- Compliance with best practice guidance during the construction phase to reduce the level of harm to the setting of heritage assets. For example, keeping construction plant and hoardings to a minimum within the vicinity of assets would reduce the temporary impacts of such work on their settings.

Prior to construction, a Construction Environmental Management Plan (CEMP) would be compiled to provide guidance on specific areas during the construction process. This would detail both generic and specifically targeted instructions to enable construction to be undertaken with minimal impact on the environment, including the cultural heritage resource.

7.6 Potential Effects

As per the DMRB methodology, impacts are defined as changes to the cultural heritage resource caused by the mitigated scheme. It should be noted that while details of the construction activities are not currently available at this stage, an indicative assessment of the construction stage impacts has been made below.

Option 9

The construction and operation of Option 9 would have the potential to negatively impact on the setting of the scheduled Bell barrow on Cockrow Hill (NHLE 1012204), an asset of high value. Though the existing junction already forms part of the monument's setting, the scheme would expand the junction with the new slip road from the eastbound A3 onto the M25 meaning the monument would be surrounded by the junction on all sides. This would sever surviving landscape links between the barrow and its surrounding landscape, from which it derives significance. This would constitute temporary and permanent major adverse impacts, resulting in large adverse effects, which are significant.

The construction and operation of Option 9 would have the potential to negatively impact on the setting of the scheduled Bowl barrow west of Cockrow Hill (NHLE 1012205), an asset of high value. Though the existing junction already forms part of the monument's setting, the scheme would expand the junction with the new slip road from the eastbound A3 onto the M25 bringing the junction infrastructure within 200m of the barrow, and severing the surviving landscape link between the barrow and the Bell Barrow to the south east. This would constitute temporary and permanent moderate adverse impacts, resulting in moderate adverse effects, which are significant.

The construction and operation of Option 9 would have the potential to negatively impact on the setting of the scheduled Hengi-form monument at Red Hill (NHLE 1007905), an asset of high value. The scheme would expand the junction with the new slip road from the westbound A3 onto the M25 bringing the junction infrastructure within approximately 300m of the monument, increasing the presence of such infrastructure in its setting. This would constitute temporary and permanent minor adverse impacts, resulting in moderate adverse effects, which are significant.

The construction of Option 9 would have the potential to negatively impact on the setting of the Painshill Park registered park and garden (Grade I NHLE 1000125), an asset of high value. The construction of the scheme would be adjacent to the western boundary of the park, and would potentially be visible from the parkland, with noise and dust during construction further detracting from the park's setting. This would constitute a temporary moderate adverse impact, resulting in a temporary moderate adverse effect, which is significant.

The construction of Option 9 would have the potential to negatively impact on the setting of the Gothic Tower (Grade II* NHLE 1191694), an asset of high value. Construction of the new slip road from the westbound A3 onto the M25 would take

place within views from the tower, with the setting of the listed building further degraded by noise and dust during construction. This would constitute a temporary moderate adverse impact, resulting in a temporary moderate adverse effect, which is significant.

The operation of Option 9 would also have the potential to negatively impact on the setting of the Gothic Tower. The junction already forms a major presence in the setting of the listed building, though the completed scheme would be visible in views from the tower, with the movement of traffic brought closer to the listed building to the west. This would constitute a permanent minor adverse impact, resulting in a permanent slight adverse effect, which is not significant.

The construction of Option 9 would have the potential to negatively impact on the setting of Chatley Semaphore Tower (Grade II* NHLE 1286699), as asset of high value. The construction of the new slip road from the westbound A3 onto the M25 may be visible in distant views from the tower, with the setting of the listed building further degraded by noise and dust during construction. This would constitute a temporary minor adverse impact, resulting in a slight adverse effect, which is not significant.

The construction of Option 9 would have the potential to negatively impact on the setting of two Grade II listed buildings, assets of medium value. These are:

- Chatley Farm house (Grade II NHLE 1286910); and
- Foxwarren Cottage (Grade II NHLE 1030053).

The construction of the scheme would be visible from these assets in filtered or long distance views, and the setting of the listed buildings would be further degraded by noise and dust during construction. In the case of Foxwarren Cottage, though the construction work is within 200m of the listed building, road infrastructure already forms a major presence in its setting. For both assets, this would constitute a temporary minor adverse impact, resulting in a temporary slight adverse effects, which are not significant.

The construction of Option 9 would have the potential to result in the truncation or removal of non-designated archaeological remains. These are:

- The London to Winchester Roman road (HER 4619), an asset of medium value;
- Quarry, Chatley Wood (HER 14779), an asset of low value;
- Ockham sand pit (HER 14784), an asset of low value;
- Enclosure bank, Chatley Wood (HER 14785), an asset of low value;
- Pointers Road (HER 14791), an asset of negligible value; and
- Parish boundary bank, Ockham Heath (HER 14795), an asset of low value.

The expansion of the junction would potentially result in the truncation or removal of any archaeological remains. Further evaluation is required to determine the level of survival of these features, and consequently the magnitude of impact. However, there is the potential for the adverse effect to be significant.

There is the potential for impacts on unknown buried archaeology within the areas of land take and construction associated with the scheme. Where construction takes place within the existing road corridor, it is likely that archaeological remains will have already been removed. However, for Option 9 there is the potential for previously undiscovered archaeological remains around the junction, considering the known archaeological features and deposits within the area.

Option 14

The construction of Option 14 would have the potential to negatively impact on the setting of the scheduled Bell barrow on Cockrow Hill (NHLE 1012204), an asset of high value. The construction of the expanded junction would take place within 100m of the scheduled monument, and the setting of the monument would be further degraded by noise, dust and vibration during construction. This would constitute a temporary major adverse impact, resulting in a temporary large adverse effect, which is significant.

The operation of Option 14 would also have the potential to negatively impact on the setting of the Bell barrow. Though the junction already forms part of the monument's setting, the completed scheme would bring the movement of traffic closer to the monument to the east, further degrading its setting. This would constitute a permanent moderate adverse impact, resulting in a permanent moderate adverse effect, which is significant.

The construction of Option 14 would have the potential to negatively impact on the setting of the scheduled Bowl barrow west of Cockrow Hill (NHLE 1012205), an asset of high value. The construction of the expanded junction and M25 slip roads to the north of the junction may be visible in filtered views from the monument, and the setting of the monument would be further degraded by noise and dust during construction. This would constitute a temporary minor adverse impact, resulting in a temporary slight adverse effect, which is not significant.

The construction of Option 14 would have the potential to negatively impact on the setting of Chatley Semaphore Tower (Grade II* NHLE 1286699), as asset of high value. The construction of the slip road onto the anticlockwise M25 would be visible from the tower, and the setting of the listed building would be further degraded by noise and dust during construction. This would constitute a temporary moderate adverse impact, resulting in a temporary moderate adverse effect, which is significant.

The construction of Option 14 would have the potential to negatively impact on the setting of Foxwarren Park (Grade II* NHLE 1189110), an asset of high value. Though intervening woodland would screen any views of the construction of the scheme from the listed building, its setting would be degraded by noise and dust during construction. This would constitute a temporary minor adverse impact, resulting in a temporary slight adverse effect, which is not significant.

As with Option 9, the construction of Option 14 would have the potential to result in the truncation or removal of non-designated archaeological remains. These are:

- The London to Winchester Roman road (HER 4619), an asset of medium value;
- Enclosure bank, Chatley Wood (HER 14785), an asset of low value;
- Parish boundary bank, Ockham Heath (HER 14795), an asset of low value; and
- Pointers Road (HER 14791), an asset of negligible value.

The expansion of the junction would potentially result in the truncation or removal of any archaeological remains. Further evaluation is required to determine the level of survival of these features, and consequently the magnitude of impact. However, there is the potential for the adverse effect to be significant.

As with Option 9, there is the potential for impacts on unknown buried archaeology within previously undisturbed areas of land take and construction associated with the scheme. For Option 14 there is the potential for previously undiscovered archaeological remains around the junction, considering the known archaeological features and deposits within the area.

Option 16

The construction and operation of Option 16 would have the potential to negatively impact on the setting of the scheduled Bell barrow on Cockrow Hill (NHLE 1012204), an asset of high value. Though the existing junction already forms part of the monument's setting, the scheme would expand the junction meaning the monument would be surrounded by the junction on all sides. This would sever surviving links between it and its surrounding landscape, from which it derives significance. This would constitute temporary and permanent major adverse impacts, resulting in large adverse effects, which are significant.

The construction and operation of Option 16 would have the potential to negatively impact on the setting of the scheduled Bowl barrow west of Cockrow Hill (NHLE 1012205), an asset of high value. Though the existing junction already forms part of the monument's setting, the scheme would expand the junction bringing the road infrastructure within 150m of the barrow, and severing the surviving landscape link between the barrow and the Bell Barrow to the south east. This would constitute temporary and permanent major adverse impacts, resulting in large adverse effects, which are significant.

The construction and operation of Option 16 would have the potential to negatively impact on the setting of the scheduled Hengi-form monument at Red Hill (NHLE 1007905), an asset of high value. The scheme would expand the junction bringing the road infrastructure within approximately 200m of the monument, increasing the presence of such infrastructure in its setting. This would constitute temporary and permanent moderate adverse impacts, resulting in moderate adverse effects, which are significant.

The construction and operation of Option 16 would have the potential to negatively impact on Painshill Park registered park and garden (Grade I NHLE 1000125), an asset of high value. The construction of the expanded junction would result in the removal of a section of the registered parkland at its north west corner. This would constitute temporary and permanent major adverse impacts, resulting in large adverse effects, which are significant.

The construction and operation of Option 16 would have the potential to negatively impact on the setting of the Gothic Tower (Grade II* NHLE 1191694), an asset of high value. Though existing road infrastructure already forms part of the setting of the listed building, the construction of the expanded junction would bring the road infrastructure within 50m of the tower. This would constitute temporary and permanent major adverse impacts, resulting in large adverse effects, which are significant.

The construction and operation of Option 16 would have the potential to negatively impact on the setting of Foxwarren Park (Grade II* NHLE 1189110), an asset of high value. The construction of the expanded junction would bring the road infrastructure within approximately 300m of the listed building. Additionally, the setting of the listed building would be further degraded by noise and dust during construction. This would constitute temporary and permanent moderate adverse impacts, resulting in moderate adverse effects, which are significant.

As with Option 14, the construction of Option 16 would have the potential to negatively impact on the setting of Chatley Semaphore Tower. This would result in the same temporary moderate adverse impact on the listed building, resulting in a temporary moderate adverse effect, which is significant.

The construction and operation of Option 16 would have the potential to negatively impact on the setting of the Water Tower in Foxwarren Park (Grade II NHLE 1377855), an asset of medium value. The construction of the expanded junction would bring the road infrastructure within approximately 300m of the listed building. This would

constitute a permanent minor adverse impact, resulting in a slight adverse effect, which is not significant. Additionally, the setting of the listed building would be further degraded by noise during construction. This would constitute a temporary moderate adverse impact, resulting in a moderate adverse effect, which is significant.

The construction of Option 16 would have the potential to negatively impact on the setting of Chatley Farm house (Grade II NHLE 1286910), an asset of medium value. The construction of the expanded junction would be visible in filtered views, and the setting of the listed building would be further degraded by noise and dust during construction. This would constitute a temporary moderate adverse impact, resulting in a moderate adverse effect, which is significant.

As with Option 9, the construction of Option 16 would have the potential to result in the truncation or removal of non-designated archaeological remains. As a result of the construction of the expanded junction, these are:

- A possible Roman quarrying site (3310), an asset of low value;
- The London to Winchester Roman road (HER 4619), an asset of low value;
- An anti-aircraft gun emplacement (HER 6886), an asset of low value;
- The site of a pond (HER 14771), an asset of low value;
- Linear earthworks, Foxwarren Park (HER 14775), an asset of low value;
- A boundary bank (HER 14782), an asset of low value;
- Lord King's ditch, Pond Farm (HER 14783), an asset of low value;
- Ockham sand pit (HER 14784), an asset of low value;
- Enclosure bank, Chatley Wood (HER 14785), an asset of low value;
- Enclosure bank, Red Hill (HER 14787), an asset of low value;
- Site of Oldpond House (HER 14792), an asset of low value;
- Parish boundary bank, Ockham Heath (HER 14795), an asset of low value;
- Anti-aircraft site, Wisley Common (HER 21230), an asset of low value; and
- Pointers Road (HER 14791), an asset of negligible value;

The construction related to the expansion of the junction would potentially result in the truncation or removal of any archaeological remains. Further evaluation is required to determine the level of survival of these features, and consequently the magnitude of impact. However, there is the potential for the adverse effect to be significant

As with Option 9, there is the potential for impacts on unknown buried archaeology within previously undisturbed areas of land take and construction associated with the scheme. For Option 16 there is the potential for previously undiscovered archaeological remains and around the junction, considering the known archaeological features and deposits within the area. The option would involve construction work within an Area of High Archaeological Potential (AP4), though the potential of this area has been reassessed since designation and is only of negligible value.

A3 D4AP Upgrade

The A3 D4AP upgrade of the A3 has the potential to cause further impacts on the historic environment, when constructed in conjunction with any one of the three Options.

The construction and operation of the D4AP upgrade of the A3 would have the potential to negatively impact on Painshill Park registered park and garden (Grade I NHLE 1000125), an asset of high value. Though existing road infrastructure already has a presence in the park's setting, the widening of the A3 would immediately border the northern edge of the park, further degrading the setting of the registered park by noise and dust during construction. This would constitute a temporary major adverse impact, resulting in a large adverse effect, which is significant.

The construction of the D4AP upgrade of the A3 would have the potential to impact on the setting of Painshill House (Grade II* NHLE 1030132), an asset of high value. The widening of the A3 may be visible in distant views from the house, including significant views from the front façade across the parkland, and the setting would be further degraded by noise and dust during construction. This would constitute a temporary moderate adverse impact, resulting in a temporary moderate adverse effect, which is significant.

The construction and operation of the D4AP upgrade of the A3 would have the potential to impact on the Royal Horticultural Society's Gardens, Wisley registered park and garden (Grade II* NHLE 1000126), an asset of high value. The widening of the A3 would result in the removal of a small strip of the southern edge of the registered park and garden. This would constitute a permanent moderate adverse impact, resulting in a moderate adverse effect, which is significant. Additionally, the widening of the A3 would be visible from other areas of the gardens, and the setting would be further degraded by noise and dust during construction. This would result in a temporary major adverse impact, resulting in a large adverse effect, which is significant.

The construction and operation of the D4AP upgrade of the A3 would have the potential to negatively impact on the setting of Foxwarren Cottage (Grade II NHLE 1030053), an asset of medium value. The construction of the widening of the A3 would be visible from the house, and the setting of the listed building would be further degraded by noise and dust during construction. This would constitute a temporary major adverse impact, resulting in a large adverse effect, which is significant. While the completed scheme would introduce further road infrastructure into the setting of the listed building, the A3 already forms a major presence in its setting. As a result, this constitutes a permanent minor adverse impact, resulting in a slight adverse effect, which is not significant.

The construction of the D4AP upgrade of the A3 would have the potential to impact on the setting of seven Grade II listed buildings, assets of medium value. The widening of the A3 would be visible in direct or filtered views from such listed buildings, and their settings would be further degraded by noise, dust and vibration during construction. Though the A3 already forms part of the setting of a number of these assets, adverse impacts would still arise from the construction of the scheme.

These would constitute temporary major adverse impacts, resulting in temporary moderate adverse effects, which are significant, on four assets:

- Feltonfleet School (Grade II NHLE 1294963);
- Lodge, 15 yards east of Feltonfleet School (Grade II NHLE 1030254);
- Westwood House (east) and west lodge to Painshill Park (Grade II NHLE 1191810); and
- Entrance lodge to Chestnut Lodge (Grade II NHLE 1377587).

These would constitute temporary moderate adverse impacts, resulting in temporary moderate adverse effects, which are significant, on two assets:

- Belfry House Stable Cottage (Grade II NHLE 1030133); and
- Chestnut Lodge (Grade II NHLE 1030122).

These would constitute a temporary minor adverse impact, resulting in a temporary slight adverse effect, which is not significant, on one asset:

- Old Cottage Post Boys (Grade II NHLE 1191624)

As a result of the construction of the D4AP upgrade of the A3, these are:

- A parish boundary stone (HER 3464), an asset of low value;
- The dam of Bolder Mere (HER 14766), an asset of low value;
- Bolder Mere pond (HER 14767), an asset of low value;
- A milestone (HER 16852), an asset of low value; and
- Cropmarks (HER 17075), an asset of low value

The construction related to the A3 upgrade would potentially result in the truncation or removal of any archaeological remains. Further evaluation is required to determine the level of survival of these features, and consequently the magnitude of impact. However, there is the potential for the adverse effect to be significant.

Conclusion

Potential temporary and permanent significant adverse effects are recorded in relation to the cultural heritage resource from all three Options.

Error! Reference source not found.-3 shows a summary of the effects arising from the scheme options on heritage assets.

Table 7-3: Summary of effects

Asset Name	Significance of Effect							
	Option 9		Option 14		Option 16		A3 D4AP Upgrade	
	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation
Bell barrow on Cockrow Hill (Scheduled Monument NHLE 1012204)	Temporary Large Adverse	Permanent Large Adverse	Temporary Large Adverse	Permanent Moderate Adverse	Temporary Large Adverse	Permanent Large Adverse	n/a	n/a
Bowl barrow west of Cockrow Hill (Scheduled Monument NHLE 1012205)	Temporary Moderate Adverse	Permanent Moderate Adverse	Temporary Slight Adverse	n/a	Temporary Large Adverse	Permanent Large Adverse	n/a	n/a
Hengi-form monument at Red Hill (Scheduled Monument NHLE 1007905)	Temporary Moderate Adverse	Permanent Moderate Adverse	n/a	n/a	Temporary Moderate Adverse	Permanent Moderate Adverse	n/a	n/a
Painshill Park (Grade I Registered Park and Garden NHLE 1000125)	Temporary Moderate Adverse	n/a	n/a	n/a	Temporary Large Adverse	Permanent Large Adverse	Temporary Large Adverse	n/a

Asset Name	Significance of Effect							
	Option 9		Option 14		Option 16		A3 D4AP Upgrade	
	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation
Painshill House (Grade II* Listed Building NHLE 1030132)	n/a	n/a	n/a	n/a	n/a	n/a	Temporary Moderate Adverse	n/a
Foxwarren Park (Grade II* Listed Building NHLE 1189110)	n/a	n/a	Temporary Slight Adverse	n/a	Temporary Moderate Adverse	Permanent Moderate Adverse	n/a	n/a
The Gothic Tower (Grade II* Listed Building NHLE 1191694)	Temporary Moderate Adverse	Permanent Slight Adverse	Temporary Slight Adverse	n/a	Temporary Moderate Adverse	Permanent Moderate Adverse	n/a	n/a
Chatley Semaphore Tower (Grade II* Listed Building NHLE 1286699)	Temporary Slight Adverse	n/a	Temporary Moderate Adverse	n/a	Temporary Moderate Adverse	n/a	n/a	n/a
Royal Horticultural Society's Gardens, Wisley (Grade II* Registered Park and Garden NHLE 1000126)	n/a	n/a	n/a	n/a	n/a	n/a	Temporary Large Adverse	Permanent Moderate Adverse
Foxwarren Cottage (Grade II Listed Building NHLE 1030053)	Temporary Slight Adverse	n/a	n/a	n/a	Temporary Large Adverse	Permanent Slight Adverse	Temporary Large Adverse	Permanent Slight Adverse
Chestnut Lodge (Grade II Listed Building NHLE 1030122)	n/a	n/a	n/a	n/a	n/a	n/a	Temporary Slight Adverse	n/a
Belfry House Stable Cottage (Grade II Listed Building NHLE 1030133)	n/a	n/a	n/a	n/a	n/a	n/a	Temporary Slight Adverse	n/a
Lodge, 15 yards east of Feltonfleet School (Grade II Listed Building NHLE 1030254)	n/a	n/a	n/a	n/a	n/a	n/a	Temporary Moderate Adverse	n/a
Old Cottage Post Boys (Grade II Listed Building NHLE 1191624)	n/a	n/a	n/a	n/a	n/a	n/a	Temporary Slight Adverse	n/a
Westwood House (East) and West Lodge to Painshill House, including gate piers	n/a	n/a	n/a	n/a	n/a	n/a	Temporary Moderate Adverse	n/a

Asset Name	Significance of Effect							
	Option 9		Option 14		Option 16		A3 D4AP Upgrade	
	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation
(Grade II Listed Building NHLE 1191810)								
Chatley Farm House (Grade II Listed Building NHLE 1286910)	Temporary Slight Adverse	n/a	n/a	n/a	Temporary Moderate Adverse	n/a	n/a	n/a
Feltonfleet School (Grade II Listed Building NHLE 1294963)	n/a	n/a	n/a	n/a	n/a	n/a	Temporary Moderate Adverse	n/a
Entrance Lodge to Chestnut Lodge (Grade II Listed Building NHLE 1377487)	n/a	n/a	n/a	n/a	n/a	n/a	Temporary Moderate Adverse	n/a
Water Tower in Foxwarren Park (Grade II Listed Building NHLE 1377855)	n/a	n/a	n/a	n/a	Temporary Moderate Adverse	Permanent Slight Adverse	n/a	n/a

For all the Options, there is the potential for impacts on known and unknown buried archaeology in areas of land take and construction which have not been developed previously. While the majority of the work is being conducted within the existing road corridor, and therefore unknown deposits are likely to have been removed, the presence of known buried archaeology within the vicinity of the existing junction, and find spots along the route of the A3, is evidence of the potential for further undiscovered deposits. This has the potential to result in significant adverse effects.

7.7 Limitations to assessment

The assessment of impacts on the setting of designated and non-designated assets has been conducted pending on site assessment in the form of walkover surveys.

The baseline assessment has been undertaken using existing data. The assessment of impacts and effects on this baseline is reliant on the sources of data outlined above. We are not responsible for the accuracy of this data, and though no errors within the data available have been identified, the assessment in this chapter is still reliant on its accuracy. There were limitations to the sources consulted for the baseline: paper records and grey literature held by the Surrey HER have not been consulted for this stage of the scheme assessment.

The extent of survival of the non-designated archaeological remains, as recorded on the Surrey HER, is not accurately known. The assessment of impact on these non-designated assets is based on current knowledge of the assets' survival.

The Surrey HER are still in the process of clarifying the position of a number of findspots within their records. As a result, there is the potential for further findspots to be located within the study area. At further stages of assessment, an updated version of the HER data would be acquired in order to account for any additions.

7.8 Summary and Recommendations

Temporary and permanent significant adverse effects are recorded in relation to the cultural heritage resource for all three Options. These arise largely as the result of the construction of the scheme impacting on the setting of designated assets, although Option 16 also involves the removal of small areas of registered parks and gardens.

Temporary or permanent large adverse effects are recorded in relation to:

- One asset for Option 9
- One asset for Option 14
- Four assets for Option 16
- Three assets for the A3 D4AP upgrade

Temporary or permanent moderate adverse effects are recorded in relation to:

- Four assets for Option 9
- Two assets for Option 14
- Six assets for Option 16
- Six assets for the A3 D4AP upgrade

Mitigation, in the form of vegetation or other screening of construction works and the operation of the completed scheme, could reduce the scale of impact and harm on the setting of designated assets. Adherence to best practice, and the inclusion of such within the Construction Environmental Management Plan (CEMP), can ensure impacts on the setting of designated assets during the construction phase of the scheme is minimised where practicable.

For all the Options, there is the potential for impacts on unknown buried archaeology in areas of land take and construction which have not been previously disturbed. In the case of Options 9 and 14, this may be in relation to undisturbed areas of land around the existing junction. In the case of Option 16 and the A3 D4AP upgrade, in addition to the potential for archaeological remains around the junction, there may also be unknown buried archaeology within the wider A3 road corridor.

It is recommended that a PCF Stage 2 assessment for cultural heritage includes the following scope:

- Impact assessment of the frozen scheme design options;
- Updating of the HER data, to account for any additional HER entries relating to find spots or non-designated assets;
- Built heritage setting assessment for both designated and non-designated built heritage assets, Scheduled Monuments and Registered Parks and Gardens;
- Assessment of historic mapping to inform the potential for archaeology within anticipated areas of undisturbed ground;
- Assessment of any available geotechnical data and reports for previous archaeological investigations to inform the potential for buried archaeology; and
- Consultation with Historic England in regard to the Scheduled Monuments and Grade I and II* Listed Buildings and Registered Parks and Gardens; with the Local Authority Conservation Officer on settings issues; and with the Archaeological Advisor, in regard to the Archaeological Priority Areas and the survival and value of non-designated archaeological remains.

8 Nature Conservation

8.1 Introduction

This section describes the ecological baseline and evaluates the nature conservation value of ecological receptors (hereafter referred to as features) present with the Ecological Zone of Influence (EZoI) for the proposed scheme options, characterises the potential impacts and effects on ecological features, sets out methods of avoidance, mitigation, compensation and enhancement, and assesses the significance of the residual effects of the proposed scheme options on these features. Ecological information was obtained from a desk-study undertaken in January 2016 and a targeted walkover survey undertaken in July 2016.

This assessment presented in this section has been undertaken with reference to current good practice for Ecological Impact Assessment (EcIA) [3]as well as DMRB.

8.2 Assessment Methodology

This preliminary report takes account of indicative options and the results of surveys undertaken to date. Further survey and assessment is required. While formal ecological assessment has not been undertaken the methodology that would be applied at a later stage and has been included for future reference. Limitations of surveys are discussed in more detail in Section 8.6 below.

Desk Study

In January 2016, the MAGIC website[4] was used to obtain information on statutory designated sites and desk study records of non-statutory designated sites of nature conservation importance, ancient woodland, notable habitats, notable and legally protected species were requested from Surrey Biodiversity Information Centre (SBIC). In addition, records were requested from West Surrey Badger Group and Surrey Bat Group for badgers and bats specifically.

Ordnance Survey (OS) maps[5] and the Where's the Path website[6] were used to identify the presence of waterbodies within 500 m of the extent of the proposed scheme options, in order to establish if great crested newts are potentially present on land within and immediately surrounding the proposed improvements. This species typically uses suitable terrestrial habitat up to 500 m from a breeding pond. However, there is a notable decrease in great crested newt abundance beyond a distance of 250 m from a breeding pond[7].

The extent of the Study Area for ecological features used during the desk study is defined in Section 8.2. The records collated for this baseline have been used to give an indication of the likely presence of notable and / or protected species within the Ecological Zone of Influence (EZoI, as defined in section 8.2).

A review of local planning policy relevant to the proposed scheme options was also undertaken as part of the desk study.

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[3] *Chartered Institute of Ecology and Environmental Management (2016). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal 2nd edition. CIEEM, Winchester*
[4] www.magic.gov.uk
[5] *https://www.ordnancesurvey.co.uk/osmaps/#54.443710447431876,-1.4863022659666185*
[6] *http://wtp2.appspot.com/wheresthepath.htm*
[7] *Natural England (2004). An assessment of the efficiency of capture techniques and the value of different habitats for the great crested newt (ENRR576). http://publications.naturalengland.org.uk/publication/134002.*

Extended Phase 1 Habitat Survey

An ecological scoping walkover survey of the land within Ockham and Wisley Commons Surrey Wildlife Trust nature reserve on each of the four quadrants of Junction 10 was undertaken in February 2016. The scoping survey also included a driven scoping assessment of the A3 between the A3 Ockham Interchange and A3/A245 Painshill Junction to identify the main habitats and potential ecological constraints.

An extended Phase 1 habitat survey was undertaken in July 2016 broadly following the Phase 1 habitat survey methodology as set out in Joint Nature Conservation Committee guidance[8]. The survey was restricted to land within the SWT nature reserve surrounding Junction 10 and did not include all land affected by the proposed A3 widening (see information on the Survey Area in Section 8.2 for extent). The survey was undertaken in accordance with current good practice guidance[9]. Plant names recorded in this survey follow *The New Flora of the British Isles*, Third Edition[10].

The extended Phase 1 habitat survey recorded the following information on notable or protected species within the Survey Area:

- Potential for trees and structures to support bats, identified from the ground only (inspections of individual trees to determine their suitability for roosting bats has not been undertaken at this stage);
- The potential of terrestrial and aquatic habitats to support great crested newts and/or natterjack toad;
- Signs of badger activity such as setts, tracks, forage marks and latrines;
- The suitability of habitats for nesting birds (including any old nests);
- The suitability of habitats for common species of reptile (adder, grass snake, slow worm and common lizard) and rare species including smooth snake and sand lizard;
- The suitability of watercourses for water vole, otter and white-clawed crayfish;
- The suitability of woodland and scrub habitats for hazel dormouse; and
- The suitability of habitats for notable invertebrates.

A full extended Phase 1 habitat map is not included in this report but this report does include a summary of the habitats present and their potential to support notable or protected species and Figure 8.1 in Appendix F includes ecological target notes and photographs of key habitats. Limitations of the surveys are discussed in Section 8.6 below.

Breeding Bird Surveys

Breeding bird surveys were undertaken between late April and late June 2016. Further information on the methodology for these surveys can be found in Appendix F.

[8] *Joint Nature Conservation Committee (2010). Handbook for Phase 1 habitat survey - a technique for environmental audit. JNCC, Peterborough.*
[9] *Chartered Institute of Ecology and Environmental Management (2012). Guidelines for Preliminary Ecological Assessment. CIEEM, Winchester*
[10] *Stace C.E. (2010). New Flora of the British Isles, 3rd edition. Cambridge University Press.*

Nature Conservation Evaluation

At this stage, evaluation of receptors has not been undertaken. This section shows the approach that will be applied at a later stage.

Accepted criteria[11] will be used to assess the nature conservation value of a defined area of land (*e.g.* diversity, rarity and naturalness). The nature conservation value or potential value of an ecological feature will be determined within the following geographic context:

- International – such as Special Area of Conservation (SAC), Special Protection Area (SPA) and Ramsar sites;
- National – such as Site of Special Scientific Interest (SSSI) and National Nature Reserve (NNR);
- Regional/ County – such as Environment Agency regional biodiversity indicators, important features in Natural England Natural Areas, Sites of Nature Conservation Interest (SNCI);
- Local – such as undesignated ecological features such as old hedges, woodlands and ponds;
- The scheme boundary – such as small ponds, marshy grassland, mature trees and species-rich hedgerow ; and
- Negligible e.g. areas of hardstanding and amenity grassland.

Ancient woodland and notable habitats will also been valued on the scale above using the Ratcliffe criteria based on professional judgement. Populations of notable species effected by the proposed scheme are also attributed a value if, based on professional judgement, it is considered appropriate.

Impact Assessment

Surveys are not complete and a full assessment of impacts has not been undertaken. This report includes high level preliminary comments on options, focussing on designated sites. At a later stage the methodology below will be applied.

The assessment of the potential effects of the proposed scheme would take into account both effects within the scheme and those that may occur to adjacent and more distant ecological features. Impacts can be permanent or temporary and can include:

- Direct loss of wildlife habitats;
- Fragmentation and isolation of habitats;
- Disturbance to species from noise, light or other visual stimuli;
- Changes to key habitat features; and
- Changes to the local hydrology, water quality and/or air quality.

Effects are unlikely to be significant where features of low value or sensitivity are subject to small or short-term impacts. However, if a number of small scale effects occur that are not significant alone, an assessment will be made as to whether, cumulatively, these may result in an overall significant effect. Impacts will be assessed as being either negative or positive and significant or not significant.

[11] *set out in Ratcliffe (1977) A Nature Conservation Review. Cambridge University Press.*

For designated sites, effects will be considered significant if the potential effects of a scheme option(s) is likely to either undermine (or support) the conservation objectives or condition of the site(s) and its features of interest.

For habitats, which may constitute either whole or in part an ecosystem, effects will be considered significant if the potential effects of a scheme option(s) is likely to result in a change in ecosystem structure and function.

Consideration will be given to whether:

- Any processes or key characteristics of the ecosystem would be removed or changed;
- There will be an effect on the nature, extent, structure and function of component habitats of the ecosystem; and
- There will be an effect on the population size and viability of component species within an ecosystem.

Functions and processes acting outside the formal boundary of a designated site will also be considered, particularly where a site falls within a wider ecosystem *e.g.* wetland sites.

Some ecosystems can tolerate a degree of minor changes, such as localised or temporary disturbance or changes in physical conditions, without such changes harming their function or value. Ecological effects were considered in the light of any information available about the capacity of ecosystems to accommodate change.

The conservation status of undesignated habitats and species within a defined geographical area is described as follows:

- For habitats, conservation status was determined by the sum of the influences acting on the habitat that may affect its extent, structure and functions as well as its distribution and its typical species within a given geographical area; and
- For species, conservation status is determined by the sum of influences acting on the species concerned that may affect its abundance and distribution within a given geographical area.

The conservation status was used to determine whether the effects of the proposed scheme options on habitat or species are likely to be significant.

In assessing the potential effects on conservation status, the known or likely background trends and variations in status will be taken into account. The level of ecological resilience or likely level of ecological conditions, that would allow the population of a species or area of habitat to continue to exist at a given level, or continue to increase along an existing trend or reduce a decreasing trend, was estimated where appropriate to do so.

The proposed mitigation measures described within Section 8.4 have been taken into account in the initial assessment of the likely residual significance of effects on some key ecological receptors. These mitigation measures include those required to achieve the minimum standard of established good practice together with additional measures to further reduce any negative impacts of the proposed scheme.

The mitigation measures also include those required to reduce or avoid the risk of committing legal offences.

In addition to measures required to ameliorate negative impacts on valued ecological features, the potential for further biodiversity enhancement measures to be incorporated into the proposed scheme as it is progressed will be considered.

8.3 Study Area

The Study Area was determined by the predicted Ecological Zone of Influence (EZoI), which is an area in which there may be ecological features subject to impacts and subsequent effects as a result of the proposed scheme. Where appropriate to do so, the EZoI was reviewed and amended throughout the assessment, and this will continue as assessment and design progress. The air quality assessment will also be reviewed, as statutory sites across wider road corridors may also be considered if the area where air quality could result in impacts may be greater than the initial study area.

An initial desk study requested information from Surrey Biodiversity Information Centre, Surrey Bat Group and Surrey Badger group for a radius surrounding M25 J10 in January 2016. An updated desk study will be undertaken to obtain information based on the extended Scheme Area Boundary (as illustrated in Figure 8.1, which includes the proposed extent of the combined option designs as well as the A3 widening). The MAGIC website[12] was used to obtain information on statutory designated sites from the Scheme Area Boundary in July 2016.

Depending on their relative importance for nature conservation (and the mobility of related species), information on designated sites was sought from within the following search areas:

- 30 km for SACs where bats are one of the qualifying species (DMRB guidance[13] recommends this wide search area due to the mobility of bats).
- 2 km for statutory designated sites of nature conservation importance: (Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Ramsar sites, Sites of Special Scientific Interest (SSSIs), and National Nature Reserves (NNRs).
- 2 km for locally important sites: Local Nature Reserves (LNR) and non-statutory Sites of Nature Conservation Importance (SNCIs) (initial request was from the centre of M25 J10 so an updated desk study will be requested).

Based on the predicted extent of impacts on habitats and species, and the mobility for certain species, information was sought from the following search areas:

- 5 km for records of bat roosts (initial request was from the centre of M25 J10 so an updated desk study will be requested);
- 1 km for notable habitats, and all other notable or legally protected species (initial request was from the centre of M25 J10; and
- 500 m for water bodies that may potentially be used as breeding ponds by great crested newts.

The Survey Area for the extended Phase 1 habitat survey included accessible land within the footprint of the proposed scheme options and adjacent land up to at least 50 m. In some areas the survey extended well beyond 50m e.g. where rare habitats such as heathland were present. The survey area is divided by the M25 and A3 resulting in the land within the Scheme Area Boundary being split into four quadrants – northeast, southeast, southwest and northwest. Further information on these quadrants is

[12] www.magic.gov.uk
[13] *Highways Agency (2009) Design Manual for Roads and Bridges Volume 11, Section 4 Part 1 :Assessment of Implications on European Sites. HD 44/09*

provided below in the Baseline Conditions section. At a later stage, the survey corridor will be increased to include the section of the A3 where widening is required.

The EZoI also encompasses potentially beneficial effects of habitat creation and establishment of new ecological networks, although given the scale of the scheme it is likely that further habitat beyond the currently identified EZoI will need to be identified to provide adequate compensation for habitats lost, disturbed or damaged.

8.4 Baseline Conditions

Designated Sites

There are seven statutory designated sites within 2 km of the scheme boundary for Option 16 (the option with the largest landtake), as summarised in Table 8-1 below and on the Nature Conservation Designated Sites Map in Appendix F. These statutory sites include one internationally designated Special Protection Area (SPA)[14], two nationally designated Site of Special Scientific Interest (SSSI)[15] and four Local Nature Reserves (LNR)[16] (refer to Appendix F for relevant legislation).

Table 8-1: Summary of Statutory Designated Sites within 2 km of M25 J10

Site Name	Approximate Distance and Direction from Scheme Area Boundary	Description	Area ha.	National Grid Reference
Thames Basin Heaths SPA	Directly adjacent to the south of M25 J10 – all the junction options result in habitat loss from this site	Regularly used by 1% or more of the Great Britain populations of the following species listed in Annex 1 of the EU Birds Directive in any season: Nightjar; 7.8% GB population, Woodlark; 9.9% GB population, Dartford Warbler; 27.8% GB population.	8,275 ha.	TQ078590
Ockham Common and Wisley Commons SSSI	Directly adjacent to the southeast, south west and north west of M25 J10. 85m to the north east of M25 J10. - all the junction options result in habitat loss from this site	The site consists of a large tract of heathland lying between the Mole and Wey rivers near Cobham. The site is contains areas of heath, bog, open water, secondary woodland and scrub. The large variety of habitats allows for a rich community of heathland plants and animals, including a large number of rare and local insects.	269 ha.	TQ070585, TQ082585; TQ084592; TQ078595

[14] Designated under Article 4.1 of EC Directive 79/409 on the Conservation of Wild Birds (the Birds Directive)
[15] Sites of Special Scientific Interest (SSSIs) are protected under the Wildlife and Countryside Act 1981 (as amended) and The Countryside and Rights of Way Act 2000.
[16] Local Nature Reserves (LNRs) are protected under the National Parks and Access to the Countryside Act 1949.

Site Name	Approximate Distance and Direction from Scheme Area Boundary	Description	Area ha.	National Grid Reference
Ockham and Wisley LNR	Directly adjacent to the south east, south west and north west of M25 J10. 85m to the north east of M25 J10 - all the junction options result in habitat loss from this site	Declared an LNR in 2005.	332 ha	TQ070585, TQ082585; TQ084592; TQ078595
Old Common LNR (TBC)	Immediately to north and south of A3 960m north of Painshill Junction. Potential direct impact if A3 widening extends beyond road verge	Possibly only a 'proposed LNR'. NE has indicated they have no records to indicate that this site is in fact a legally declared LNR. Elmbridge Council will be contacted to request clarification.	15.65 ha.	TQ106609
Esher Common SSSI	440m NE of A3 widening	Heathland, grassland, scrub, woodland and areas of marsh, bog, and open water, present a rich variety of habitats supporting many species of plants and animals. In particular, this site is famous as an important area for invertebrates and has been studied for many years.	89.93 ha.	TQ132624
West End Common LNR	1km north east of northern extent of A3 widening	Wetland, grassland and woodland habitats providing homes for species such as ancient oak and beech trees, the rare starfruit (*Damasonium alisma*) and over 2,000 species of insects.	70.26 ha	TQ 124 631
Esher Common LNR	1.5km north east of northern extent of A3 widening	Habitats found include heathland, grassland, scrub, woodland and areas of marsh, bog, and open water.	137.15 ha	TQ 129 624

One SAC where bats are listed as one of the qualifying features of the designation was identified within 30 km of M25 J10. Mole Gap to Reigate Escarpment SAC is located approximately 8.4 km, south-east of Junction 10 at national grid reference TQ199533. The SAC is situated within the North Downs and extends 13 km from Leatherhead to Reigate. The site consists of chalk downs supporting the only stable area of box scrub in the UK and priority orchid sites. The site also contains some sections of semi-natural woodland and is deemed important for great crested newts, dormouse and several bat species, including the Bechstein's Bat, which are listed as one of the qualifying features of the designation. The SAC citation states that an old chalk mine is used as a winter roost by several species of bats.

Eight SNCI were identified within 2 km of the centre of M25 J10. Information on these sites is provided in Table 8-2 below. Information to identify any further SNCIs within 2km of the wider Scheme Area Boundary will need to be requested from SBIC.

Table 8-2: Summary of SNCI within 2km of M25 J10

Site Name	Approximate Distance and Direction from M25 J10	Description	Area ha.	National Grid Reference
Manor House SNCI	1 km north west	The site is located within the borough of Woking. The site consists of species-rich flood meadow and includes species such as sweet-grass and lesser spearwort.	3.2 ha	TQ072602
Wisley Airfield SNCI	1 km south	The site consists of a disused airfield surrounded by ancient hedgerows and rough grassland. The west of the site is important for a number of plant species and the east of the site is noted for amphibians and reptiles.	117.5 ha	TQ076578
River Wey Elmbridge SNCI	1 km north west	Approximately 7.5 km of the River Wey, The river supports a number of fish species including bullhead and potentially brook lamprey.	7.5 ha	TQ074656; TQ072601
Hunts Copse SNCI	1.1 km south	The site is coppiced Ancient Woodland. Due to its location the site is considered to act as a buffer to Ockham & Wisley Commons SSSI and an important as an ecological unit within the area.	5.2ha	TQ080580
Manor Farm and Meadows (including Common Meadows Pond) SNCI	1.2 km north west	The site consists an area of wet meadow with value for both invertebrates and birds. Common Meadows pond has been identified as important due to its close proximity to other important sites and high diversity of aquatic species.	5.9 ha	TQ068599
River Wey-Woking (including Pyrford Place Lake) SNCI	1.6km west	Approximately 16.8 km of the River Wey, supporting a wide variety of invertebrate species, amphibians, birds, and a population of water voles.	16.8 ha	TQ008532; TQ072614 (TQ051583)
Elm Corner Woods SNCI	1.8 km south west	The site contains a mixture of woodland with patches of associated wet drainage areas.	10.5 ha	TQ068579
St George's Hill Golf Course SNCI	1.8 km north	The site consists of a large golf course, with a mixture of semi-natural habitats including mixed and coniferous woodland, acid grassland and heath. The site is	94.3 ha	TQ080620

Site Name	Approximate Distance and Direction from M25 J10	Description	Area ha.	National Grid Reference
		noted as important for invertebrates.		

There are two conservation verges within 2 km of the centre of M25 J10. Details of these are provided in Table 8-3. Information to identify any further conservation verges within 2km of the wider Scheme Area Boundary will need to be requested from SBIC.

Table 8-3: Summary of Non-Statutory Conservation Verges within 2km of the M25 J10

CV Number	Site Name	Approximate Distance and Direction from Scheme Area Boundary	Grid Reference	Site Description	Biodiversity Interests
CV005	Bolder Mere	Approximately 90m – road verge close to Bolder Mere car park in south east quadrant	TQ07945825	Both verges, approximately 200 m in either direction from central grid reference. 799.5 m long	Significant population within the county of common toad.
CV058	Wisley Lane 2	500m to west in south west quadrant	TQ06325924	Wisley Lane, Wisley. Southern side of the road opposite Deers Farm from TQ06235932 to TQ06345919. 172.2m long.	Supports County Scarce plants sheep's bit and royal fern.

Ancient Woodland

There are 16 parcels of ancient woodland within 1 km of the Scheme Boundary Area. Four areas are located within the Scheme Area Boundary:

- 0.4 ha woodland adjacent to the A3 approximately 400m south of the Painshill Interchange.
- 1.6 ha woodland strip adjacent to the A3 approximately 600m south of the Painshill Interchange.
- A corner (approximately 0.03ha) of woodland from 14.8 ha Hatchford Wood close to the Semaphore Tower (south east quadrant).
- Approximately half of the 1.4 ha woodland strip adjacent to the A3 200m north of Ockham Interchange.

Habitats

Further surveys are required to assess the habitats in the A3 corridor.

Appendix F includes a map with Target Notes (TN, including photographs) of the habitats identified within the survey area. These TNs were taken during the initial scoping walkover survey in February 2016. Additional TNs were added during the extended Phase 1 habitat survey in July 2016 where new features of interest where identified, or where features were noted to have changed since the February site visit. Further to the initial scoping walkover and driven scoping assessment undertaken in February 2016, an extended Phase 1 habitat survey and a National Vegetation Classification (NVC) survey are being undertaken to obtain more detailed information on the habitats present.

The main habitat immediately surrounding M25 J10 is woodland. The woodland blocks vary from plantations of Scot's pine to mixed woodlands and broadleaved semi-natural woodland. Silver birch and oak are the most frequent broadleaved species with sweet chestnut dominating some of the woodland blocks in the north east quadrant. A summary of habitats present in each quadrant (as divided by the M25 and A3 roads) is provided below:

South East quadrant:

Scot's pine plantations and mixed woodland and broadleaved woodland are present adjacent to the A3 and M25. The density of Scot's pine varied between 5 and 99%. Management by Surrey Wildlife Trust to thin the conifers may be responsible for higher proportions of broadleaved species in some of the woodland blocks. Silver birch, oak, sycamore and sweet chestnut were the most common broadleaved species. Bracken ground cover with patches of bramble is present.

A large area of mature lowland heathland is present in this quadrant approximately 450m from the existing M25 J10 (but as close as 70m to the M25 and 215 m to the A3 - see TN6 in Appendix F).

Heathland is Habitats of Principal Importance[17] (HPI).

Bolder Mere is a lake to the south east of the junction being noted as having reedbed habitat around its margins. Ponds and reedbeds are HPI.

South West quadrant:

Scot's pine plantations and mixed woodland and broadleaved woodland are present adjacent to the A3 and M25. The density of Scot's pine varied between 5 and 95%. Silver birch, oak and sweet chestnut were the most common broadleaved species. Bracken ground cover is present.

Set back from the A3 approximately 230m (see TN9 in Appendix F) lowland heathland is regenerating following clearance of conifer plantation. This is a HPI.

Low densities of belted Galloway cattle graze the woodland and heathland habitats in this quadrant.

Two ponds are present close to Pond Farm. Ponds are a HPI.

North West quadrant:

Blocks of broadleaved woodland, mixed woodland and Scot's pine plantations are present. Broadleaved species include oak, silver birch, sweet chestnut and sycamore. Ground flora is more diverse than the woodlands to the south of the M25. A line of veteran oak trees is present (TN14) and an open glade supports heathland habitat (TN17). Lowland mixed deciduous woodland and lowland heathland are HPIs.

[17] Habitat of Principal Importance for the Conservation of Biodiversity on the England Biodiversity List, refer to Appendix for further details.

North East quadrant:

Broadleaved semi-natural woodland with silver birch, oak, Scot's pine and sweet chestnut. Part of the woodland is utilised for BMX jumps and mountain bike tracks. Small ponds are present where the ground has been dug to create the jumps (TN19). To the north mature sweet chestnut coppice is present (TN 20) and to the east blocks of conifer woodland with an understory of rhodendron are present (TN21).

Lowland mixed deciduous woodland and ponds are HPI.

Road widening:

Further surveys are required to assess habitats along the sections of the A3 and A245 Byfleet Road proposed for widening or upgrading.

The desk study has identified three ancient woodland parcels and Old Common LNR (status to be confirmed – possibly only a proposed LNR) within the Scheme Area Boundary adjacent to the A3. An updated desk study is required to identify any non-statutory designated sites or protected or notable species within the EZoI of the proposed road widening.

Notable and Protected Species

Further surveys are required for many species groups. The initial findings and recommendations for further survey are described below.

Notable Plants

The desk study returned records for species of notable plants, such as pillwort, lesser water-plantain and bog hair-grass within 1 km of the M25 J10.

Any areas of potentially high botanical value, such as areas of heathland, will be subject to a NVC survey to confirm or identify the presence of HPI and notable plant species. The recently restored heathland to the south west of M25 J10 was noted as supporting a range of mosses and lichens during the ecological scoping walkover survey and therefore the requirement for a more detailed lower plant surveys would be considered following the results of the NVC survey.

Invertebrates

The desk study provided records of a number of invertebrate groups within 1 km of M25 J10 including the nationally scare scavenger water beetle and various species listed as Nationally Notable A[18], including the brown ant and heath potter wasp.

The Ockham Common and Wisley Common SSSI citation indicates that the open water surrounded by heathland presents an ideal habitat for many dragonflies and damselflies, and over 20 species have been recorded from the site, which is thus of national importance for this group. They include the rare white-faced dragonfly, the local hairy dragonfly and the ruddy darter. The site also supports many other local and rare invertebrates. It is of national importance for true flies (*Diptera)*; rare species include a bee fly *Thyridanthrax fenestratus* and a crane-fly *Tipula livida*, while the crane-fly *Limonia inusta* is among the many local species. A large number of local beetles are also found, including the ground beetle *Amara infima* and the weevil *Byctiscus populi*.

Existing invertebrate reports for Ockham and Wisley nature reserve have been requested from Surrey Wildlife Trust and will be reviewed by invertebrate specialist Colin Plant when received. A scoping assessment will also be undertaken by an invertebrate specialist in July 2016. Once existing information has been reviewed and a scoping site visit undertaken it will be determined if more detailed invertebrate surveys are required.

Amphibians and Reptiles

Great crested newts are listed as Species of Principal Importance (SPI) in England. They are also protected under the Conservation of Habitats and Species Regulations 2010 (as amended) and the Wildlife and Countryside Act 1981 (as amended). The

[18] *Taxa estimated to occur within 16-30 10-kilometer squares of the National Grid System*

desk study returned no records of great crested newts within 1 km of the scheme. Consultation with the Surrey Wildlife Trust warden in May 2016 identified that there had been recent incidental records of great crested newts in the vicinity of Bolder Mere, which is a lake immediately adjacent to the A3 and may be directly affected by the proposed road widening. Surrey Wildlife Trust were proposing to undertake surveys of ponds in this area in spring 2016. At the time of writing this report the outcome of these surveys are not known.

A combination of the desk study and walkover surveys have identified 46 ponds within 500 m of the Scheme Area Boundary. The locations of these ponds are illustrated in Appendix F. Suitable terrestrial habitat, particularly woodland habitat, was also present. The terrestrial habitats provide habitat connectivity to nearby ponds and offer suitable foraging and hibernation opportunities for great crested newts.

Surveys for great crested newts, including Habitat Suitability Index assessment (HSI) and eDNA surveys were undertaken for four accessible ponds within the Surrey Wildlife Trust nature reserve (locations of these ponds is shown in Appendix F). No great crested newt eDNA was found. The results of surveys by Surrey Wildlife Trust at Bolder Mere in spring 206 are not yet known.

The remaining ponds identified in the desk study and extended Phase 1 surveys will require HSI assessments, and potentially presence/ absence surveys (eDNA survey or conventional survey). If great crested newts are confirmed as present additional surveys to determine population size will be required to inform mitigation requirements.

Natterjack toads are a SPI in England. They are also protected under the Conservation of Habitats and Species Regulations 2010 (as amended) and the Wildlife and Countryside Act 1981 (as amended). Whilst heathland is potentially suitable habitat for this species only reintroduced colonies are present in Surrey. The desk study and consultation with Surrey Wildlife Trust indicated this species is not present within the Scheme Area Boundary.

All reptiles are listed as SPI in England. They are also protected under the Wildlife and Countryside Act 1981 (as amended). The rare sand lizard and smooth snake are also protected under the Conservation of Habitats and Species Regulations 2010 (as amended).

The desk study identified records of common lizard, grass snake, slow worm, adder and sand lizard within 1 km of the scheme. In addition, Wisley Airfield SNCI is identified in the citation as being bounded by areas of long grass which is suitable habitat for common foraging reptiles. The east of the SNCI has been identified by Surrey Amphibian and Reptile Group (SARG) as ‘exceptional’ for reptiles. Grass snake, slow worm and common lizard have all been recorded on site.

Areas of heathland are present at Ockham Common. This habitat has high suitability for reptiles, and is likely to support the common reptile species, as well as sand lizard, which were identified in the desk study as being present within the Wisley and Ockham Commons Surrey Wildlife Trust nature reserve. The Surrey Wildlife Trust warden confirmed that sand lizards had been re-introduced to the nature reserve and were now widespread within the heathland in the southeast quadrant. This heathland is outside, but close to the Scheme Area Boundary (approximately 50m away).

Whilst heathland habitat suitable habitat for smooth snakes is present within the southeast quadrant the Surrey Wildlife Trust warden informed Atkins that SARG undertakes reptile monitoring at the site and smooth snakes have not be identified as present.

The ecological scoping survey identified that the main habitat within the footprint of the scheme options was woodland. Due to the heavy shading of woodland this habitat has

low suitability for reptiles. However, log piles and gaps around tree roots could potentially be used as reptile hibernating sites, particularly where they are on located on the edge of a woodland. Two common lizards were seen within the heathland glade in the northwest quadrant during the extended Phase 1 habitat survey in July 2016. This glade is located within the Scheme Area Boundary.

SARG undertake monitoring for reptiles within the habitats present within the scheme and therefore copies of their survey data will be requested and a reptile survey will be undertaken in 2017.

Birds

The desk study identified a number of protected and rare species of bird within 1 km of the scheme, including woodlark, nightjar, Dartford warbler and nightingale.

The Thames Basin Heaths SPA supports important breeding populations of a number of birds of lowland heathland, especially nightjar and woodlark, both of which nest on the ground, often at the woodland/heathland edge, and Dartford warbler, which often nests in gorse.

The ecological scoping survey and driven habitat assessment also identified that the woodland and scrub within the survey area offers suitable nesting opportunities for birds. Swans and ducks were present on the larger waterbodies and the reedbed fringes to Bolder Mere may provide habitat for birds associated with reedbeds, such as reed bunting. The River Mole could provide suitable habitat for kingfisher.

A breeding bird survey was undertaken in spring/summer 2016. A total of 45 bird species were recorded within the survey area, of which 36 were thought to have bred within the survey area, based on breeding behaviour observed and/or habitats present. Of the 45 species recorded, 12 are notable for their Schedule 1[19], Annex 1[20] and/or their Red or Amber List Bird of Conservation Concern (BoCC)[21] status. Breeding was confirmed for seven notable species (common tern, Dartford warbler, dunnock, mute swan, nightjar, song thrush and spotted flycatcher). In addition, mistle thrush and stock dove were thought to probably breed within the survey area. Further information on the notable species, their breeding status and locations within the Study Area can be found in Appendix F.

Bats

A number of bat species are listed as SPI in England including: Barbastelle, Bechstein's bat, noctule, soprano pipistrelle, brown long-eared, lesser horseshoe and greater horseshoe. All bat species are protected under the Conservation of Habitats and Species Regulations 2010 (as amended) and the Wildlife and Countryside Act 1981 (as amended).

The desk study returned records from Surrey Bat Group which identified at least nine bat species within 5 km of M25 J10: common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, Natterer's, brown long-eared, noctule, serotine, Daubenton's and Leisler's bats. Records include Natterer's and brown long eared bats at Hatchford Woods Ice

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[19] *All wild birds are protected under the Wildlife and Countryside Act (WCA) 1981 (as amended), making it illegal to kill, injure or take any wild bird or take, damage or destroy a nest (whilst being built or in use) or their eggs. Birds listed on Schedule 1 of the Act have special protection against disturbing these birds at their nests, or their dependent young 20Birds species listed under Annex 1 of the Birds Directive 79/409/EEC are considered endangered or important migratory species in Europe. These species have been protected by the establishment of a coherent network of Special Protection Areas (SPAs), forming an integral part of the NATURA 2000 ecological network, and comprising all the most suitable habitats to ensure the survival and reproduction of these species in their area of distribution.*

[21] *The UK's leading bird conservation organisations have worked together on the latest review of the status of the birds that occur regularly in the UK. Bird species have been assessed against a set of objective criteria to place each on one of three lists – green, amber and red – indicating an increasing level of conservation concern.*

House (presumably hibernating bats) approximately 250m from the Scheme Area Boundary, soprano pipistrelle and noctule bats roosting in Ockham Common bat boxes and several roosts that are likely to be in houses. All the roosts are outside the Scheme Area Boundary. The SBIC desk study also includes a record of whiskered bat from the ten kilometre square (TQ05) which covers part of the search area requested. In addition, Mole Gap to Reigate Escarpment SAC is located approximately 8.4 km, south-east of Junction 10 and includes Bechstein's bat as a qualifying species.

Trees with features suitable for roosting bats, such as splits and cavities, were noted in the woodlands surrounding Junction 10. An inspection of all trees that could potentially be felled will be undertaken from the ground to identify if any potential roosting features are present. Some trees may be identified as requiring more detailed surveys, such as a climbing inspection or dusk emergence/dawn return surveys. Bat activity surveys will also be undertaken in accordance with Bat Conservation Trusts Good Practice Guidelines[22].

Dormouse

Dormice are listed as an SPI in England. They are also protected under the Conservation of Habitats and Species Regulations 2010 (as amended) and the Wildlife and Countryside Act 1981 (as amended).

The desk study returned no records of dormice within 1 km of the site. The ecological scoping survey identified woodland (broadleaved semi-natural, mixed and plantation woodlands) as main habitat present immediately surrounding the M25 J10. 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 Junction 10, where species such as bramble, honeysuckle, holly, birch, gorse and sweet chestnut are present. A dormouse survey commenced in May 2016. To date dormice have not been found, but it takes time for dormice to start utilising the survey tubes that have been erected at the site and therefore the survey will continue until at least November 2016.

Otter and Water Vole

Water vole and otter are both listed as SPI in England. They are protected under the Wildlife and Countryside Act 1981 (as amended). Otters are also protected under the Conservation of Habitats and Species Regulations 2010 (as amended) and the Wildlife and Countryside Act 1981 (as amended).

The desk study returned no records of otters or water voles within 1 km of the site, although the River Wey (Woking) SNCI, located approximately 1.6 km to the west, is listed as supporting water voles.

The River Mole passes under the A3 a short distance to the north of the Painshill Interchange. Should any of the proposed improvements involve alterations of this river crossing or have potential impacts on the river a survey to identify if otters or water voles are present will be required.

Badger

Badgers are protected under the Protection of Badgers Act (1992).

West Surrey Badger Group supplied records of nine badger setts within 1 km of the centre of Junction 10 of the M25. Whilst the majority of these setts are located outside the footprint of the proposed scheme options there is potential that one or two of these setts may be directly impacted by the scheme. Consultation with the Surrey Wildlife

[22] *Bat Conservation Trust (2016). Bat Surveys for Professional Ecologists. Good Practice Guidelines*

Trust warden confirmed the presence of a badger sett close to the A3 in the SW quadrant. This sett was not found during the extended Phase 1 survey in July 2016 (probably due to the very dense vegetation present at this time of year) although badger latrines were found within the woodlands in this quadrant.

The ecological scoping survey identified that the woodlands on all sides of Junction 10 of the M25 provided suitable habitat for badgers. Active badger setts were confirmed to the north west and south east of M25 J10 in locations identified by the West Surrey Badger Group desk study during ecological surveys in 2016.

A search for badger setts is recommended in the autumn as it was difficult to undertake a thorough survey during the summer months due to the dense and tall bracken ground cover restricting access in many areas.

An expanded desk study, and where access can be obtained, a walkover survey will be required along the proposed A3 widening.

Deer

Roe deer were identified as present in the desk study and a group of four roe deer were seen during the scoping walkover survey in February 2016. No deer species are included as SPI and they are not legally protected species, however the presence of deer has relevance to the scheme in relation to road safety issues if they attempt to cross the carriageway and therefore the scheme design should take account of the presence of this species (i.e. consider the need for deer fencing).

Other notable species

The site warden stated that harvest mice are present within the Ockham and Wisley Commons nature reserve. Harvest mice are listed as a SPI in England because they are thought to have become much scarcer in recent years and they require conservation plans to reverse the decline.

Non-Native Invasive Species

The SBIC desk study did not include records of invasive species.

During the ecological scoping survey undertaken in February 2016, rhododendron was noted as present in several of the woodlands. A public information board in the woodland to the north west of Junction 10 indicated that conservation work to remove invasive Turkey oak had been undertaken.

Indian balsam (also known as Himalayan balsam) was noted as present in July 2016 close to the east end of the Scheme Area Boundary (near the bridge over the M25) to both the north and south of the M25.

The four ponds subject to eDNA surveys were all noted as supporting the non-native invasive New Zealand pygmyweed (also known as Australian Swamp stonecrop) and large amounts of Peri Peri Burr were recorded around one of the ponds near Pond Farm (SW quadrant).

Rhododendron, indian balsam and New Zealand pygmyweed are listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) which means it is illegal to plant or otherwise cause these species to grow in the wild.

8.5 Regulatory/Policy Framework

National Planning Policy Framework 2012

The National Planning Policy Framework (NPPF)[23] 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.

The paragraphs within Chapter 11 relevant 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 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.*

[23] *Department of Communities and Local Government (March 2012). National Planning Policy Framework.*

118 When determining planning applications, local planning authorities 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 Site of Special Scientific Interest likely to have an adverse effect on a Site of Special Scientific Interest (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 Sites of Special Scientific Interest;*
- *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; and,*
- *Planning permission should be refused for development resulting in the loss or 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 Special Protection Areas and possible Special Areas of Conservation;*
  - *listed or proposed Ramsar sites; and*
  - *sites identified, or required, as compensatory measures for adverse effects on European sites, potential Special Protection Areas, possible Special Areas of Conservation, 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

Table 8.4 below provides a summary of relevant local planning policy.

Table 8-4 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.

Planning Policies	Summary of Policy Content
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 Special Protection Area (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; • Promoting and encouraging the economic use of woodlands and wood resources, including wood fuels as renewable energy source; 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 Site of Special Scientific Interest (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. 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:

Planning Policies	Summary of Policy Content
	a. Reflects, conserves or enhances the existing landscape and integrates the development into its surroundings, adding scale, visual interest and amenity; b. Contributes to biodiversity by conserving existing wildlife habitats, creating new habitats and providing links to green infrastructure network; c. 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; d. 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, e. Adequately protects existing trees including their root systems prior to, during and after construction process; f. Would not result in the loss or deterioration of irreplaceable habitats including ancient woodland and ancient or veteran trees, unless in exceptional circumstances the benefits would outweigh the loss, and g. 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 b. 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. c. Development affecting designated international sites of biodiversity importance and compensatory sites will be considered against Core Strategy policies CS13- Thames Basin Heaths Special Protection Area, CS15- Biodiversity, the Framework and relevant legalisation d. 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. e. 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

Planning Policies	Summary of Policy Content
	significant harm to the nature conservation value of the site or feature. f. 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.
Guildford Borough Council	**Guildford Borough Local Plan (2003)**
Policy NE1 Potential Special Protection Areas and Candidate Special Areas of Conservation	Planning permission will not be granted for proposals which are likely to destroy or have an adverse effect directly or indirectly on the nature conservation value of potential Special Protection Areas (pSPA) and candidate Special Areas of Conservation (cSAC), as shown the Proposals Map.
Policy NE5 Development affecting trees, hedges and woodlands	Development will not be permitted if it would damage or destroy trees protected by a Tree Preservation Order or in a conservation area unless the removal would: 1. Be in the interests of good arboriculture practice; or 2. 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.
Policy R1 Loss of land and facilities for sport and recreation	The Borough Council will resist the loss of land and buildings used for recreation purposes or with the potential for recreational use unless: 1. A suitable alternative is provided nearby; 2. There is an excess of recreation land and buildings in the area; and 3. Sports and recreation facilities can best be retained and enhanced through the redevelopment of a small part of the site.

Biodiversity Action Plans

Biodiversity Action Plans have been produced by The Surrey Biodiversity Partnership and Highways Agency which providing action plans for priority habitats and species.

Summary of Relevant Ecological Legislation

A summary of UK wildlife legislation relevant to the proposed scheme is provided in Appendix F.

Section 40 of the Natural Environment and Rural Communities (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 as identified by the Secretary of State for England, in consultation with Natural England, are referred to in Section 41 of the NERC Act 2006 for England. The list of Habitats of Principal Importance (HPI) and Species of Principal Importance (SPI) was based on UK BAP priority habitats and species and was updated in 2008. It is known as the 'England Biodiversity List'.

8.6 Design Mitigation and Enhancement Measures

Ecological mitigation will be incorporated into the detailed design of the scheme and the programme and methods for site works, particularly any works involving vegetation clearance. Mitigation will be designed to avoid or minimise potentially significant impacts which may affect the favourable conservation status of habitats and notable species indicated by the ESR and Assessment of Impacts on European Sites Screening matrix report (AIES), and also take account of legal requirements regarding protected species. Compensation may be required as the last step in the mitigation hierarchy. Likely mitigation measures (relevant to all options) will include:

- Avoiding, or if this is not possible, minimising habitat loss from designated sites and ancient woodland. Habitats outside the working area would be protected from accidental incursion by high visibility fencing.
- Minimisation of other habitat loss, particularly more established habitat such as mature trees, and any species-rich habitat areas.
- Protection of mature trees following standard practice (Construction BS 5837:2012 Trees in relation to design, demolition and construction. Recommendations).
- Maintenance and where possible, enhancement of habitat connectivity.
- Retention of features with potential to provide bat roosting sites where possible, and consideration of bat commuting and foraging corridors.
- Habitat creation and enhancement as compensation for areas of habitat loss, using native species appropriate to the local area, where possible.
- Creation of log piles and other potential wildlife refuges using material from site clearance where practical.
- Mitigation measures under licence if habitats or features afforded legal protection due to their use by protected species such as sand lizards, great crested newts, bats, otters, dormice; badgers (setts), or water vole (burrows) would be damaged during the works.
- Precautions during work to minimise risk to individual animals of protected species where licences would not be required such as (1) badgers (avoiding leaving trenches open overnight) (2) nesting birds (timing vegetation clearance to avoid the bird nesting season or programming ecological checks prior to clearance if this cannot be avoided), and (3) common reptiles (undertaking clearance under a Precautionary Method of Working including destructive searches of suitable habitat or, if necessary, reptile capture and translocation).
- A Construction Environmental Management Plan (CEMP), would be followed for all construction operations.
- Monitoring during site clearance and construction works to alert contractors to any new or altered ecological issues.

Mitigation measures will be implemented as set out in Chapter 9 to reduce the significance of any potential effects caused by air pollution.

There is potential for significant habitat enhancement by felling areas of young silver birch woodland or conifer plantations to create heathland habitat or more diverse broadleaved woodlands. Appropriate locations for these enhancements would need to be identified in consultation with local stakeholders, including Surrey Wildlife Trust and Natural England.

Site clearance methods would also be informed by the results of a search for evidence of invasive species subject to legal control, such as Japanese knotweed, Indian balsam and rhodendron to ensure they are not spread into the surrounding habitats. .

Mammal fencing to prevent deer and badgers entering the road carriageway will also be considered.

The M25 and A3 fragment the internationally and nationally designated sites surrounding M25 J10. Consideration will be given to improving habitat connectivity across these major roads. In particular, if the scheme were to involve the replacement of the pedestrian footbridge over the A3 to the south of the junction there could be potential for a more substantial structure that could provide pedestrian access in combination with improving habitat connectivity for wildlife. The risks of increasing visitor numbers to less disturbed areas of heathland supporting qualifying bird species of the Thames Basin Heaths SPA will need to be considered as this may offset any benefits from increasing habitat connectivity for less mobile species.

8.7 Potential Effects

All the options will result in habitat loss from Thames Basin Heaths SPA, Ockham and Wisley Commons SSSI and LNR. The scale of the impact will be dependent on the scheme option chosen, but some options, such as Option 16, would involve significant habitat loss from these sites. In addition to the potential direct adverse impacts on the SPA/SSSI/LNR resulting from habitat loss, there are likely to be indirect impacts such as noise disturbance to the qualifying SPA bird species. At this stage exact details of land take for each option are not known as details such as earthwork solutions and requirements for haul roads and temporary diversion roads during the construction phase need to be developed. Approximate estimates of land take are provided below.

There are three options being considered: Option 9, Option 14 and Option 16.

Option 9

This scheme will involve approximate land take of 17 ha, of which

- 11.00ha is designated as Thames Basin Heaths SPA
- 16.27 ha is designated as Ockham and Wisley Commons SSSI (the landtake from the SPA is also designated as SSSI)

Land designated as SPA and SSSI in the south west quadrant will be lost. This includes woodland habitat and a small area of recently regenerated heathland habitat. This regenerated heathland area has the potential to support all three qualifying Thames Basin Heaths SPA bird species (Dartford warbler, nightjar and woodlark). In addition, the removal of woodland that acts as a sound buffer between the M25/A3 and the regenerating heathland area is likely to lead to increased noise levels within the SPA habitat, and decrease the potential value of the newly regenerated heathland area.

The habitat loss in the north east quadrant would involve some land designated as SSSI but the woodland block immediately to the north of the M25 is outside the SSSI boundary. The woodland within the SSSI boundary in the scheme footprint is damaged and disturbed by users of the BMX jumps in this location.

The south east quadrant, which supports the established heathland habitat, where all qualifying SPA species were recorded would be avoided.

Option 14

This scheme will involve approximate land take of 8 ha, of which:

- 3.90 ha is designated as Thames Basin Heaths SPA
- 6.85 ha is designated as Ockham and Wisley Commons SSSI

This option would involve the smallest amount of land take from within SSSI and SPA of the three options. Woodland habitat would be lost from within all four quadrants.

There may be the loss of a small number of veteran trees that form a tree line in the northwest quadrant.

No heathland habitat will be lost as a result of this option, but it will require the removal of some of the woodland that acts as a sound buffer between the 25/A3 and the heathland areas. This is likely to increase noise levels within the SPA habitat, and may cause a reduction in breeding density of SPA qualifying species (Dartford warbler and nightjar) and a decrease in the potential value of the newly regenerated heathland area.

Option 16

This scheme will involve approximate land take of 48 ha, of which:

- 22.98 ha is designated as Thames Basin Heaths SPA
- 41.69 ha is designated as Ockham and Wisley Commons SSSI

This option will involve the loss of a significant amount of habitat within all four quadrants.

Large areas of woodland habitat would be lost or isolated within the junction. This option would also require loss of a heathland glade in the northwest quadrant and a part of the regenerating heathland in the southwest quadrant.

There would be removal of a significant amount of the woodland that acts as a sound buffer between the M25/A3 and the heathland areas. This is likely to lead to increase noise levels within the SPA habitat, and may cause a reduction in breeding density of SPA qualifying species (Dartford warbler and nightjar) and a decrease in the potential value of the newly regenerated heathland area.

Summary

Based on the information available at this stage, it is considered that Option 16 would have the greatest negative impact on the Thames Basin Heaths SPA. Option 14 may have the lowest negative impact due to the smallest land take and loss of the least amount of buffering habitat between the roads and heathland habitat supporting SPA qualifying bird species.

All the options could contravene national and local planning policies on development due to the potential impact on designated sites. If impacts cannot be avoided through engineering design and ecological mitigation, it must be demonstrated that the benefits of the scheme clearly outweigh the impacts on the SPA, and that such benefits are of Imperative Reasons of Over-riding Public Interest. Any impacts that cannot be mitigated will require adequate compensation.

There is also potential for impacts on Bechstein's bats which are a qualifying feature of the Mole Gap to Reigate Escarpment SAC. Woodland habitats surrounding M25 Junction 10 have the potential to provide roosting, foraging and/or commuting habitat for Bechstein's bats, but insufficient information on the use of the site by Bechstein's bats is currently available. While the distance from the SAC, existing major roads and extensive areas of similar habitat present suggest that impacts on the bats of the SAC may be concluded to be unlikely, further investigation is required before this conclusion is confirmed with confidence.

Further studies are required to assess the impacts of the A3 widening. Esher Commons SSSI is within 1km and downstream of the Proposed Scheme Area and is immediately adjacent to the River Mole and therefore potential pollution risks associated with the aquatic environment will need to be considered. Other designated sites, including Old Common LNR (status to be confirmed) are present adjacent to the A3 and could be directly or indirectly impacted by the scheme.

A full and robust assessment of the impacts of the proposals on ecological features is required. This will include assessment regarding species as well as designated sites and habitats. Species of Principal Importance and legally protected species are likely to be present and further habitat and species surveys are ongoing to identify the location of protected and notable species and areas of ecological value. To date it has been identified that the woodlands support bats and badgers and the heathlands support SPA qualifying bird species and reptiles, with the southeast quadrant known to support the rare sand lizard.

Impacts from air pollution are considered in Section 9, noise in Section 10 and hydrological and aquatic pollution in Section 12

8.8 Limitations to Assessment

The extended Phase 1 Habitat Survey was undertaken from within Surrey Wildlife Trusts Ockham and Wisley Commons nature reserve which covers all the land directly affected by the junction options. Permission to undertaken these surveys was granted by Surrey Wildlife Trust. In some instances, the presence of dense vegetation made some areas inaccessible.

All three options include proposals to widen the A3 to four lanes in each direction between Painshill and Ockham and an upgrade of the A245 Byfleet Road to three lanes in each direction. Land access was not granted outside the Ockham and Wisley Commons nature reserve and therefore only a driven scoping inspection has been undertaken of these areas.

Ecological surveys are limited by factors which affect the presence of plants and animals such as the time of year, migration patterns and behaviour. The extended Phase 1 habitat survey undertaken to support this assessment has not therefore produced a complete list of plants and animals, and the absence of evidence of any particular species should not be taken as conclusive proof that the species is not present or that it will not be present in the future. However, the results of the desk study and extended Phase 1 habitat survey are considered to be sufficient to undertake the assessment for this stage in the proposed scheme.

The breeding bird surveys started on the 28th of April 2016, three days after the recommended survey window for the second (of three) woodlark species-specific survey visits. Although the surveys started part way through the woodlark breeding season, it is considered likely that any woodlarks within the survey area would have been recorded over the five visits. However, it is recommended that woodlark-specific surveys of the heathland habitat are carried out in 2017 in order to ensure that this species is surveyed for correctly.

The survey for great crested newt eDNA surveys at Bolder Mere was below standard for this size of waterbody (only surveyed with 2 eDNA kits) as it was known that further surveys of this waterbody were being undertaken in 2016 by Surrey Wildlife Trust, following a great crested newt being found during maintenance the boardwalk on the edge of this waterbody. The results of these surveys are not currently known.

8.9 Summary and Recommendations

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The following further surveys are required:

- Extended Phase 1, NVC surveys, notable and invasive plant species surveys (currently ongoing)
- Bats (currently ongoing)
- Dormice (currently ongoing)
- Great crested newts (additional access required to enable further surveys in 2017)
- Reptiles – to be undertaken in 2017
- Breeding birds – specifically woodlark for which the optimal survey season was not covered in 2016 and potentially further surveys to assess the A3 corridor.
- Otter and water voles of any watercourses to be impacted
- Invertebrates – scope of surveys to be agreed following initial scoping assessment
- Badgers – several setts have been confirmed but an additional survey will be required when the vegetation has died back in the autumn.

9 Air Quality

9.1 Introduction

This chapter describes air quality constraints in the study area and presents the findings of a preliminary air quality study of the potential air quality effects associated with each of the proposed scheme options as described in Chapter 3 of the ESR.

9.2 Assessment methodology

Construction

In line with a proportionate and appropriate approach for PCF Stage 1 construction impacts have not been assessed at this stage, on the assumption that these can usually be mitigated by following best practice. Construction effects will be considered in later PCF stages.

Operation

For the assessment of operational impacts, DMRB HA207/07[24] provides methodologies for undertaking simple and / or detailed levels of assessment. A simple assessment has been undertaken for the air quality assessment at PCF Stage 1 using an appropriate and proportionate risk assessment approach. A review of baseline air quality conditions has been undertaken and potential constraints identified. The PCF Stage 1 Saturn traffic model[25] provided indicative AADT variables (flow, composition and speed) for a baseline year (2014) and opening year (2022) for the Do-Minimum (DM) and Do-Something (DS) scenarios associated with each proposed scheme option (Options, 9, 14 and 16). The assessment is based on the opening year as the influence of the vehicle exhaust emissions standards is likely to be greater than any additional growth in traffic in subsequent assessment years. The data have been considered in accordance with traffic change criteria defined in the DMRB HA207/07 Volume 11 Section 3 Part 1 (Air Quality) to determine a broadly defined affected road network (ARN) for each option.

The DMRB HA207/07 traffic change criteria are as follows:

- Road alignment will change by 5 metres or more; or
- Daily traffic flows will change by 1,000 Annual Average Daily Traffic (AADT) or more; or
- Heavy Duty Vehicle (HDV) flows will change by 200 AADT or more; or
- Daily average speed will change by 10 kilometres per hour (km/hr) or more; or
- Peak hour speed will change by 20 km/hr or more.

The changes are applied to roads (not links), and so where relevant are determined under two-way traffic conditions.

Qualitative commentary, in the context of existing air quality conditions, on the potential risk of air quality impact associated with each option has been given. Calculation of air pollutant concentrations at receptors and of regional emissions across the ARN are not included in this PCF Stage 1 air quality assessment.

[24] *Design Manual for Roads and Bridges Volume 11 Section 3 Part 1 HA 207/07 Air Quality* http://www.standardsforhighways.co.uk/
[25] *V1.1, provided by Atkins Transportation in July 2016*

9.3 Study area

For the PCF Stage 1 air quality assessment, the air quality study area has been defined as the area within 200 metres of the proposed scheme options and associated ARN. This is industry best practice screening criteria, specified in HA207/07, which is derived from calculations using atmospheric dispersion modelling. These dispersion profiles have also been reviewed in a series of field measurements[26].

The extent of the ARN determined for each option has been limited by the spatial extent of the traffic data manipulated for air quality assessment at PCF Stage 1 which is focussed on Junction 10 and approaches on the M25 and on the A3 between Ockham Interchange and Painshill Interchange. The air quality assessment at this stage focusses on the area directly in the vicinity of the scheme.

Receptors

Sensitive human health receptors for the purposes of air quality assessment 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.

In addition, designated ecological sites may contain features that are sensitive to air pollutants, whereby vegetation may be adversely affected by elevated pollutant concentrations. HA207/07 requires assessment of air quality effects on ecological designations (SACs, SPAs, SSSIs and Ramsar sites) within 200 metres of any road affected by the proposed scheme.

Sensitive human health receptors within 200 metres of the scheme and roads which form the ARN with all options are provided in Table 9.1 and shown in Figure 9-1. There are no human health receptors within 200 metres of M25 J10 / A3 Wisley Interchange, however there are several isolated residential properties located within 200 metres of the A3 carriageway between J10 to the A245 Painshill Interchange.

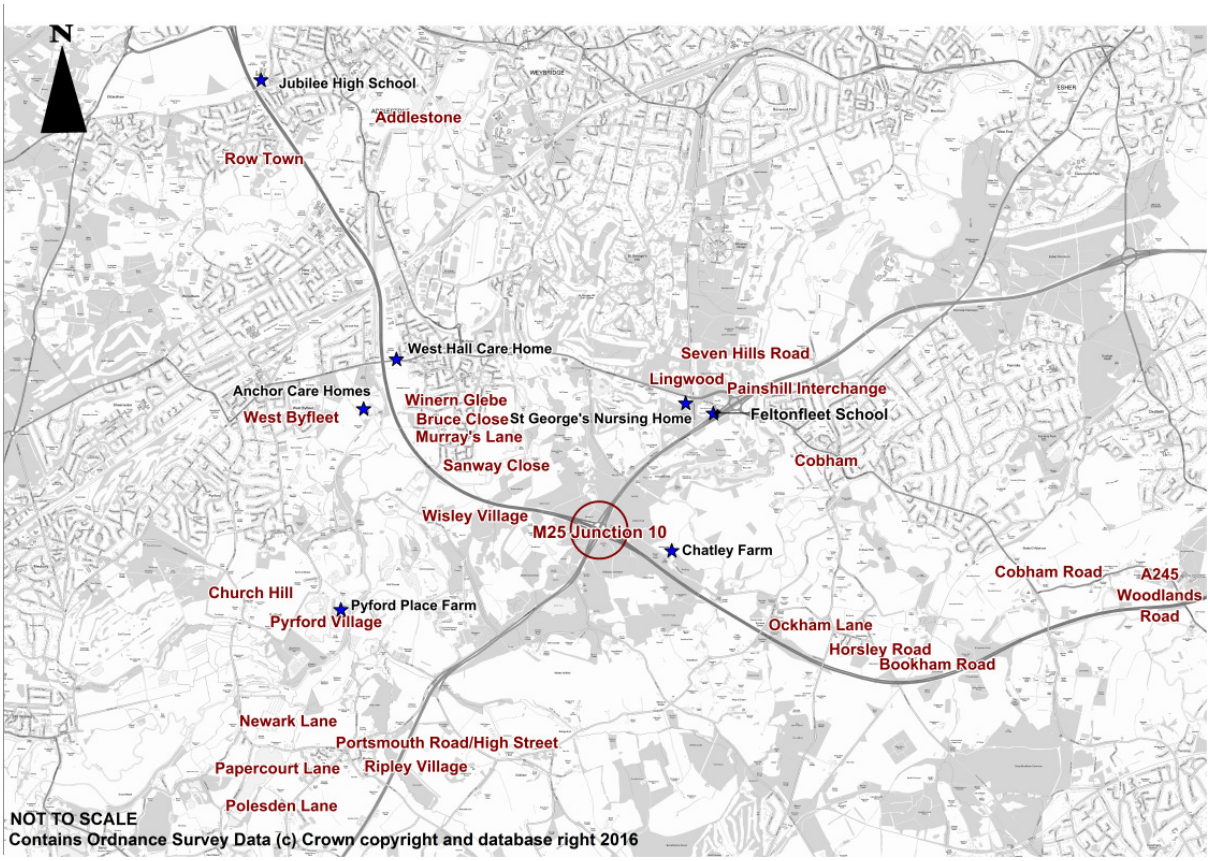
Adjacent to the northbound off-slip at Painshill Interchange is Feltonfleet School. A number of isolated properties are located within 200 metres of the Painshill Interchange and the A245 Portsmouth Road, and on the Seven Hills Road.

[26] *HA207/07 DMRB Volume 11 Section 3 Part 1, May 2007 Paragraph C3.1*
http://www.standardsforhighways.co.uk/dmrb/

Table 9-1: Sensitive human health receptors in the vicinity of the Scheme and affected roads

Affected Road	Sensitive human health receptors
A3 north of Junction 10	Isolated residential properties between Junction 10 and the Painshill Interchange. Residential properties at the western end of Cobham.
A3 south of Junction 10	Residential properties to the east of Ripley village.
A245 Portsmouth Road between the Painshill interchange and Seven Hills Road.	Feltonfleet School, St George's Nursing Home and properties on Seven Hills Road and Lingwood.
M25 east of Junction 10	Isolated properties along the M25 corridor including Chatley Farm and those along Ockham Lane, Horsley Road, Bookham Road, Cobham Road, and the A245 Woodlands Road.
M25 west of Junction 10	Residential properties at the west and south of Byfleet, including Winern Glebe, Bruce Close, Murray's Lane and Sanway Close, Kings Lodge Care Centre, West Hall Care Home, Anchor Care Home. The easternmost properties within West Byfleet. Residential properties within 200 metres of the M25 within Row Town and Addlestone including Jubilee High School.
Wisley Lane	Residential properties in Wisley village.
Lock Lane	Pyrford Place Farm and nearby properties
B2215 Portsmouth Road / High Street	Residential properties along the B2215 Portsmouth Road / High Street within Ripley
B367 Newark Lane/ Church Hill	Residential properties off Newark Lane and Church Hill adjacent to the River Wey. Residential properties along Paprecourt Lane, Newark Close and Polesden Lane. Residential properties within Ripley village and Pyrford village.

Figure 9-1 Sensitive receptors in the vicinity of the scheme and ARN



In terms of designated ecological sites, the M25 J10 / A3 Wisley Interchange is surrounded on all sides by the Ockham and Wisley Commons Site of Special Scientific Interest (SSSI) which also incorporates the Thames Basin Heaths Special Protection Area (SPA), designated for its heathland habitat. The Esher Commons SSSI, designated for its rich variety of habitats and importance for invertebrates, is within 200 metres of the A3 north of the Painshill junction, determined to be an affected road with all options. In addition, the Papercourt SSSI, designated for its wetland habitats, lies within 200 metres of the B367 Newark Lane, deemed to be an affected road with all options.

9.4 Baseline conditions

Information on existing ambient air quality i.e. baseline conditions, and identification of potential air quality constraints to the proposed scheme options have been determined through reference to the following sources:

- Air Quality Management Area (AQMA) mapping[27];
- Department for Environment, Food and Rural Affairs (DEFRA) Pollution Climate Mapping (PCM) model data for the latest available year (2014)[28];

[27] *http://uk-air.defra.gov.uk/aqma/maps*
[28] *http://uk-air.defra.gov.uk/data/gis-mapping*

- Local Authority Local Air Quality Management (LAQM) Reports[29];
- Local authority monitoring data;
- Highways England project specific NO_2 diffusion tube survey data[30,31]
- Ordnance Survey base mapping to identify locations of sensitive receptors (residential properties, schools, hospitals and elderly care homes); and
- DEFRA MAGIC website[32] to identify boundaries of designated ecological sites.

Baseline data has been collated for the area directly in the vicinity of the scheme only, although information has been provided for AQMAs in the wider study area around the ARN.

Air Pollutants

Vehicle exhausts contain a number of pollutants including oxides of nitrogen (NO_x), carbon monoxide (CO), hydrocarbons, carbon dioxide (CO_2) and particles. The quantities of each pollutant emitted depend on the type and quantity of fuel used, engine size, speed of vehicle and abatement equipment fitted. Once emitted, the pollutants disperse and subsequently are diluted in the ambient air. Pollutant concentrations in the air can be measured or modelled and then compared with ambient air quality criteria (discussed below).

The air pollutants of concern in the context of the air quality assessment for the M25 J10 / A3 Wisley Interchange are nitrogen dioxide (NO_2) and fine particulate matter (PM_{10}). These pollutants are most likely to be present in ambient air at concentrations close to or above statutory limit values at receptors near to roads, and are hence the focus of the assessment of vehicle emissions associated with the proposed scheme options.

National assessments have demonstrated that there is no risk of exceedance of the air quality objectives set for 1,3-butadiene, benzene, and carbon. These pollutants are therefore not considered further as there is not considered to be a potential for significant effects associated with these pollutants.

Nitrogen Dioxide

Nitrogen dioxide (NO_2) is a secondary pollutant produced by the oxidation of nitric oxide (NO). NO and NO_2 are collectively termed nitrogen oxides (NO_x). Almost a third of the UK NO_x emissions are from road transport[33]. The majority of NO_x emitted from vehicles is in the form of NO, which oxidises rapidly in the presence of ozone (O_3) to form NO_2. In high concentrations, NO_2 can affect the respiratory system and can also enhance the response to allergens in sensitive individuals, whereas NO does not have any observable effect on human health at the range of concentrations found in ambient air. Elevated concentrations of oxides of nitrogen can have an adverse effect on vegetation, including leaf or needle damage and reduced growth. Deposition of pollutants derived from oxides of nitrogen emission contribute to acidification and/or eutrophication of sensitive habitats.

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[29] Elmbridge Borough Council (2015) Updating and Screening Assessment, Woking Borough Council (2015) Updating and Screening Assessment, Runnymede Borough Council (2014) Air Quality Action Plan, Guildford Borough Council (2014) Air Quality Progress Report and Mole Valley District Council (2015) Updating Screening Assessment.
[30] Atkins (2015) M25 DBFO Air Quality Monitoring (Quarter 4): Connect Plus Services.
[31] Atkins (2016) M25 DBFO Air Quality Monitoring 2014 – 2015 Annual Report: Connect Plus Services.
[32] http://www.magic.gov.uk/

Particulate Matter

The principal sources of 'primary' polluting particles are combustion processes, which include traffic and industry. Diesel engines produce the majority of particulate emissions from the vehicle fleets. Approximately a fifth of primary PM_{10} emissions in the UK are derived from road transport[34]. Finer fractions of particulate matter appear to be associated with a range of symptoms of ill health including effects on the respiratory and cardiovascular systems, on asthma and on mortality. .

Local Air Quality Management

The physical extent of each scheme option, lies within the boundaries of Guildford Borough Council (GBC) and Elmbridge Borough Council (EBC). The ARN at PCF Stage 1 further extends into the local authority area of Woking Borough Council (WBC) for all three options. The ARN further extends into Runnymede Borough Council (RBC), and to the east, Mole Valley District Council (MVDC).

A summary of local air quality conditions in each of these local authority areas is provided below, providing context in proximity to Junction 10 and the wider area.

There are no AQMAs declared within the GBC and MVDC areas.

EBC has declared seven AQMAs for exceedances of the annual mean UK AQS objective for NO_2. Of these the Cobham High Street AQMA could potentially be affected as it is within 200m of the ARN for options 9 and 14.

WBC has declared one AQMA for exceedances of the annual mean UK AQS objective for NO_2, which is more than 10 kilometres from M25 J10 / A3 Wisley Interchange, and is unlikely to be affected.

RBC has declared two AQMAs: along the M25 corridor within the RBC administrative area; and in Addlestone Town Centre, which is unlikely to be affected as it is not currently within proximity to the ARN for any of the options. The M25 AQMA was declared for exceedances of both the annual and 24-hour mean UK AQS objective for PM_{10} as well as the annual mean UK AQS objective for NO_2 and is within the air quality study area.

The two AQMAs within the area surrounding the air quality study area are described below in Table 9-2 and shown on the Environmental Constraints Plan in AppendixG.

Table 9-2: AQMAs in the area surrounding the air quality study area

Local Authority	Name	Air Quality Criteria Exceeded	Description
Runnymede BC	M25 AQMA	NO_2 annual mean PM_{10} annual and 24-hour mean	AQMA combining 2 areas. Area 1 extending 70m east and west of the centre line of the M25 between Junction 11 and the southern boundary of the Borough at New Haw/Byfleet. Area 2 extending 55m east and west of the centre line of the M25 between Junctions 11 and 13.
Elmbridge BC	Cobham AQMA	NO_2 annual mean	An area along the High Street, Cobham.

[34] *NAEI (2015) Pollutant Information: $PM_{2.5}$, PM_{10} and $PM_{0.1}$ (Finer Particulates). Retrieved from National Atmospheric Emissions Inventory: http://naei.defra.gov.uk/overview/pollutants?pollutant_id=PMFINE*

DEFRA mapping

Pollution Climate Mapping (PCM)

Further information on areas exceeding the EU limit values is available from DEFRA's PCM model. This model provides estimates of roadside concentrations of pollutants, including annual mean NO_2 and PM_{10}, which are used in annual reporting to the EU regarding compliance with the limit values. The modelled roadside concentration comprises a background component together with a roadside increment. Not all roads are included within the PCM model. The PCM model shows that for 2014, the only roads included within the model within the vicinity of the air quality study area were the A318 and A245 to the north west of M25 Junction 10, and the A245 and A307 to the north east of the M25 Junction 10. In 2014, none of the roadside annual mean PM_{10} or NO_2 concentrations for these roads exceeded the EU limit values of 40 µg/m^3.

DEFRA PCM links and exceedances are illustrated on Figure 9.1 in Appendix G.

Background Mapping

Estimates of current and future year background pollutant concentrations in the UK are available on the DEFRA UK-Air website. The background estimates, which are a combination of measured and modelled data, are available for each one kilometre grid square throughout the UK for a base year of 2013, which is the basis for the future year estimates up to 2030. These background estimates include contributions from all source sectors, e.g. road transport, industry, and domestic and commercial heating systems.

Estimated annual mean background concentrations for the grid squares covering the M25 Junction 10 air quality study area for the current year (2016) are presented below in Table 9-3 for the pollutants NO_2 and PM_{10}.

Background concentrations of NO_2 and PM_{10} were expected to be below relevant air quality criteria shown in Table 9-3, in 2016. This indicates that concentrations at background locations in the vicinity of the proposed scheme and associated ARN are likely to currently meet relevant air quality criteria for these pollutants.

Table 9-3: DEFRA Background Air Quality Mapping Pollutant concentrations for 2016 (µg/m^3)

Grid Square x,y	NO_2	PM_{10}
513500, 162500	16.31	15.17
514500, 162500	17.35	15.75
510500, 161500	16.50	16.03
511500, 161500	17.48	15.71
512500, 161500	16.79	15.43
508500, 160500	16.67	15.83
509500, 160500	18.44	16.33
510500, 160500	17.60	15.73
508500, 159500	22.85	17.75
508500, 158500	17.34	16.55
509500, 158500	20.23	17.26
513500, 158500	18.97	17.69
510500, 157500	17.76	16.87
511500, 157500	18.35	17.41

Grid Square x,y	NO_2	PM_{10}
506500, 159500	21.16	17.47
507500, 159500	22.67	17.79
506500, 158500	14.84	14.76
507500, 158500	18.55	16.35
505500, 157500	13.41	14.66
506500, 157500	17.29	16.12
504500, 156500	13.33	14.41
505500, 156500	16.68	15.82
504500, 155500	15.00	15.04
505500, 155500	15.21	15.80
503500, 154500	16.49	15.85
504500, 154500	16.16	16.00
503500, 153500	14.46	15.51
504500, 164500	22.00	17.87
504500, 163500	22.54	17.67
505500, 162500	23.47	18.15
505500, 161500	22.74	17.99
505500, 160500	19.81	17.24
506500, 160500	17.12	15.97
504500, 159500	13.62	14.67
505500, 159500	13.53	14.30
514500, 158500	19.33	17.15
512500, 157500	18.08	17.58
Average	17.84	16.32

Air Quality Monitoring

Highways England Monitoring

Connect Plus measure NO_2 concentrations using diffusion tubes at a number of sites around the M25 on behalf of Highways England. The survey started in September 2013 and has continued for a further two years. Four of the sites are located in close proximity to the scheme as shown in Figure 9.1 in Appendix G. The annual mean NO_2 concentrations for these monitoring sites between September 2013 and 2015 are presented in Table 9-4. The results show that there were no recorded exceedances of the NO_2 annual mean air quality criterion at any of these sites over the two year period. Concentrations were highest at site 4, located to the north west of M25 Junction 10 on the south west side of the M25 corridor, and lowest at site 8, south of Junction 10.

Table 9-4: Connect Plus annual mean diffusion tube monitoring results (µg/m^3)[35,36]

Location	Bias Adjusted Annual Mean	
	Sept 2013 – Sept 2014	Sept 2014 – Sept 2015
4	32.8	33.4
8	21.3	21.7
9	25.1	28.6
10	22.5	23.9

Local Authority Monitoring

GBC, EBC and WBC all undertake monitoring of NO_2 in the vicinity of the scheme, however, there is no monitoring of PM_{10} in this area.

Continuous Monitoring

None of the local authorities operate a continuous monitoring station (CMS) within the air quality study area.

Passive Monitoring

Passive monitoring of NO_2 using diffusion tubes has been undertaken by GBC, EBC and WBC. Figure 9.1 in Appendix G presents an overview of the locations of monitoring sites within the locality of the air quality study area. The monitoring sites are colour coded by the concentration measured during the base year 2014.

Annual mean concentrations recorded at sites within the locality of the air quality study area are tabulated for the period of 2011 to 2014 inclusive in Table 9-5 below.

The four key areas and traffic corridors where exceedances or near exceedances of the annual mean AQS objective for NO_2 were measured in 2014 near the scheme include:

- The A3 southbound on slip at M25 J10;
- The junction between M25 / A245 Parvis Road; and
- The roundabout junction between the A3 Esher Bypass and A244 Copsem Lane; and
- A245 High Street, Cobham.

Table 9-5: Annual Mean Nitrogen Dioxide Diffusion Tube Monitoring results (µg/m^3)

Local Authority	Site ID	Site Name	Grid Ref	Site Type	2011	2012	2013	2014
Guildford BC	G_6	GD5 Wisley	507947, 159099	Kerbside	**44.0**	**44.0**	**45.0**	**40.0**
Elmbridge BC	E_3	Cobham 1	510828, 159996	Roadside	**42.2**	39.8	**40.4**	**42.2**
Elmbridge BC	E_4	Cobham 6	510814, 160099	Roadside	31.2	34.3	33.2	32.8
Elmbridge BC	E_5	Cobham 7	510861, 159906	Roadside	38.2	**41.9**	38.0	**42.5**

[35] *Atkins: M25 DBFO: Air Quality Monitoring (Quarter 4). February 2015.*
[36] *Atkins: M25 DBFO: Air Quality Monitoring, 2014-2015 Annual Report (draft). February 2016*

Local Authority	Site ID	Site Name	Grid Ref	Site Type	2011	2012	2013	2014
Elmbridge BC	E_6	Downside 3	511429, 157606	Rural background	31.4	30.3	32.0	31.4
Elmbridge BC	E_9	Esher 5	514150, 162470	Roadside	**49.2**	**52.7**	**49.6**	**51.8**
Woking BC	Wk_3	M25	505611, 161180	Roadside	**66.3**	**50.4**	**52.1**	**50.3**
Woking BC	Wk_4	Church Road	506401, 160504	Urban background	26.5	**41.1**	**43.9**	19.9
Woking BC	Wk_13	Lincoln Drive	503244, 159659	Roadside	n/a	21.7	19.8	16.3
Woking BC	Wk_18	Dartnell Avenue	504926, 161063	Roadside	26.3	25.7	26.8	23.3
Woking BC	Wk_19	Woodham Lane	502854, 161062	Roadside	33.7	31.7	33.3	26.4

n/a = data is not available.

Exceedances of annual mean NO_2 UK AQS objective are highlighted in **bold**.

Between 2011 and 2014 NO_2 concentrations at G_6 within the GBC area exceeded the annual mean AQS objective for NO_2. However, given that it is a kerbside site located adjacent to the A3 southbound on slip road it is not representative of relevant exposure.

Two out of the three diffusion tube sites operated by EBC (E_3 and E_5) on the A245 High Street, Cobham, recorded exceedances of the annual mean NO_2 air quality criterion in one or more years between 2011 and 2014. Both of these sites are roadside sites within the Cobham AQMA designated for exceedances of the annual mean NO_2 AQS objective. Sites E_4 and E_6 recorded NO_2 concentrations below the annual mean air quality criterion in all years. These sites are located at 2 Anyards Road at the north end of A245 High Street, Cobham and Bookham road to the south east of Junction 10 and within 200 metres of the M25 corridor.

Between 2011 and 2014 WBC recorded exceedances of the annual mean NO_2 air quality criterion at sites Wk_3, a roadside site located on the M25 corridor at the junction with the A245 Parvis Road, and at Wk_4, an urban background site on Murray's Lane approximately 0.5 kilometres to the east of the M25 and just under 2 kilometres from Junction 10. All other sites operated by WBC within the locality of the air quality study area recorded NO_2 concentrations below the annual mean air quality criterion in all years.

9.5 Regulatory / Policy Framework

Air Quality Criteria

For the local air pollutants of concern (NO_2 and PM_{10}), there are two sets of ambient air quality criteria for the protection of public health, namely those set by the EU and

transposed in to UK law by The Air Quality Standards Regulations 2010[37] and those implementing the UK National Air Quality Strategy (AQS)[38,39,40].

The criteria set out in the AQS include standards and objectives for local authorities to work towards achieving. These apply in locations with relevant public exposure which are defined in the DEFRA Technical Guidance LAQM.TG(16)[41].The standards set by the EU are legally binding, mandatory limit values (LV) requiring national Government compliance.

Local air quality criteria relevant to the air quality assessment for the Scheme are summarised in Table 9-6.

Table 9-6: Relevant Air Quality Criteria (Human Health)

Pollutant	Criteria
NO_2	Hourly average 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 concentrations should not exceed 40 µg/m^3

National Planning Policy

The National Planning Policy Framework (NPPF) sets out the Government's requirements of the planning system. The NPPF requires local planning authorities (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."

Highways England Air Quality Policy

The National Networks National Policy Statement (NN NPS), prepared by the Department for Transport (DfT), provides policy and guidance relating to the development of nationally significant infrastructure projects. NN NPS 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 5.9 of the NN NPS). Paragraph 5.11 of the NN NPS states *"Air quality considerations are likely to be particularly relevant where schemes are proposed: within or adjacent to Air Quality Management Areas (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."*.

Furthermore, paragraph 5.13 of the NN NPS, states:

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[37] *The Air Quality Standards Regulations 2010: http://www.legislation.gov.uk/uksi/2010/1001/contents/made*
[38] *The Air Quality (England) Regulations 2000: http://www.legislation.gov.uk/uksi/2000/928/contents/made*
[39] *The Air Quality (England) (Amendment) Regulations 2002: http://www.legislation.gov.uk/uksi/2002/3043/contents/made*
[40] *https://www.gov.uk/government/publications/the-air-quality-strategy-for-england-scotland-wales-and-northern-ireland-volume-1*
[41] *DEFRA (2016) Local Air Quality Management Technical Guidance (TG16) http://laqm.defra.gov.uk/documents/LAQM-TG16-April-16-v1.pdf*

"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 with the Air Quality Directive becoming non-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."

The DfT Road Investment Strategy (RIS) published in 2015 sets out the DfT's aspirations for the Strategic Road Network 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"*.

The Highways England Delivery Plan 2015-2020 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"*. Key Performance Indicators (KPIs) and Performance Indicators (PI) are also identified including the following PI performance specification in relation to air quality: *"Suite of PIs to provide additional information about environmental performance. These should, at a minimum, include: - Air Quality"*. The Delivery Plan includes a commitment to develop a PI for vehicle derived emissions of carbon dioxide, and other greenhouse gases arising from the use of the Strategic Road Network by March 2016.

Local Planning Policy

The EBC Local Plan Core Strategy[42] notes that "*air pollution will need to be tackled through a combination of measure to reduce the need to travel; promote walking and cycling; and increase the attraction of travelling by rail in order that their negative effect on the area is reduced over time."* Core Strategy 25 (CS25 – Travel and Accessibility) also states that the council will *"will seek to mitigate the detrimental environmental effects cause by transport, particularly with regards to HGVs, through a variety of measures, which may include…improving air quality…Support will be given to schemes that help to meet the commitments contained in the Elmbridge Air Quality Strategy."*

The EBC Air Quality Action Plan (AQAP)**Error! Bookmark not defined.** details the council's proposed measures for improvement of air quality within the borough. The AQAP identifies the primary source of air pollution within the borough as road traffic and as such recognises the need to support sustainable travel options and the importance of raising public awareness on the issue of air quality. The AQAP also briefly details other key documents that address the issue of air pollutants; these documents include the Surrey County Council Local Transport Plan (LTP3)[43] and Elmbridge's Local Development Framework (LDF).

The GBC Local Plan[44] was adopted in 2003 as the appropriate planning framework. Similarly to EBC it identifies road traffic as the primary source of air pollution within the borough.

The Guildford Borough Transport Strategy 2016[45] recognises the M25 J10 / A3 Wisley interchange as a site of significant, recurrent traffic congestion during peak hours and has committed to its improvement. Within this document the air quality strategy details

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[42] *Elmbridge Borough Council (2011) Elmbridge Core Strategy. Elmbridge Borough Council, Esher.* http://www.elmbridge.gov.uk/planning/local-plan/

[43] http://www.surreycc.gov.uk/roads-and-transport/surrey-transport-plan-ltp3/surrey-transport-plan-executive-summary

[44] http://www.guildford.gov.uk/newlocalplan/CHttpHandler.ashx?id=1068&p=0

[45] *Guildford Borough Council (2016) Guildford Borough Transport Strategy 2016* http://www.guildford.gov.uk/media/21135/Guildford-Borough-Transport-Strategy-2016/pdf/Item_04_1_-_Guildford_Borough_Transport_Strategy_-_App_1_-_The_Strategy_April_2016.pdf

the borough's pollutants of concern as particulate matter and NO_2. The Road Investment Strategy is a committed improvement of GBC as well as plans for improvements on the bus and rail networks. GBC also aspires to install a network of electric vehicle charging points.

The Woking Core Strategy[46] also recognises as a Core Strategy Objective the need to *"maintain and improve air [quality]".* As WBC has not designated an AQMA there has been no need to produce an AQAP, however the Woking Local Action 21 (LA21)[47] is a community-led initiative supported by WBC which has pledged to achieve a *'healthy environment with clean air'* through establishing an air quality information helpline, raising public awareness of air pollution sources and an individual's responsibility.

The Surrey Transport Plan (LTP3): Air Quality Strategy[48] also identifies road traffic as one of the main contributors to air pollution in Surrey's AQMAs. This document proposes the identification and enforcement of parking and loading regulations, supporting travel choices that are beneficial for air quality and the consideration of air quality issues in planning.

9.6 Design, Mitigation and Enhancement Measures

Construction

Construction impacts will be assessed and mitigation measures proposed at a later PCF stage, in line with a proportional assessment.

Operation

The main route for mitigation is to influence the scheme option design to reduce potential impacts on air quality once a scheme is complete. This could include such measures as realignment of roads away from receptors, and maximising the benefits of free-flow traffic conditions to reduce vehicle emissions near receptors.

The need for and the effectiveness of any design suggestions would be investigated with further air quality modelling at PCF Stage 2 if required.

Mitigation measures during operation will be considered at PCF Stage 2.

9.7 Potential significant effects

The proposed scheme options have the potential to affect local air quality, both during construction and once in operation in the following ways:

- There could be increased emissions of dust during construction of the proposed scheme option from dust-raising activities on site;
- Air quality could be affected by changes in traffic flows during construction, as a result of temporary traffic management measures and / or additional vehicles travelling to and from the construction site transporting materials, plant and labour;

[46] *Woking Borough Council (2012) Woking Local Development Document: Woking Core Strategy* http://www.woking2027.info/corestrategy/adoptedcorestrategy.pdf
[47] https://wokingla21.wordpress.com/
[48] http://www.surreycc.gov.uk/__data/assets/pdf_file/0004/29974/Surrey-Transport-Plan-Air-Quality-Strategy.pdf

- Once operational, air quality could be affected (positively or negatively) by changes in vehicle activity (flows, speeds and composition) as a result of the route options; and
- Operationally, air quality could also be affected by any changes to the distance between sources of emissions and air quality sensitive receptors.

Construction

Demolition and construction activities can give rise to dust emissions under particular circumstances, if not effectively managed. Construction of any of the proposed scheme options has the potential to affect nearby receptors either due to dust from demolition and construction activities, or the tracking out of dust from heavy goods vehicles (HGV) onto the local road network. Implementation of best practice mitigation measures will generally control construction dust and minimise any short term adverse effects.

In addition, the local highway network may experience changes in traffic flows and speeds during construction as a result of temporary traffic management measures and / or additional vehicles travelling to and from the construction site transporting materials, plant and labour. However, any effects on air quality would be short term and temporary (i.e. during the period of construction works only).

Operation

Once operational, air quality could be affected (positively or negatively) by changes in vehicle activity (flows, speeds and composition). Air quality could also be affected by any changes to the distance between emission sources and air quality sensitive receptors as a result of the proposed widening to the A245.

Three proposed scheme options (Options 9, 14 and 16) have been considered for the PCF Stage 1 air quality study. In all options, road links immediately around the junction meet specified ARN criteria for either increased or reduced traffic volume. These are described for each option in turn below.

All three options include proposals to widen the A3 to four lanes in each direction between Painshill and Ockham and an upgrade of the A245 Byfleet Road between the Painshill junction and Seven Hills Road, to three lanes in each direction. This widening would reduce the distance between the emissions source and sensitive receptors, and would potentially have an adverse effect on air quality at these locations, although this may be offset by the improved free flow conditions achieved by the options. Any improved vehicle flow (a positive impact) might reduce pollutant concentrations at nearby sensitive receptors such as Feltonfleet School and residential properties on Seven Hills Road.

Option 9

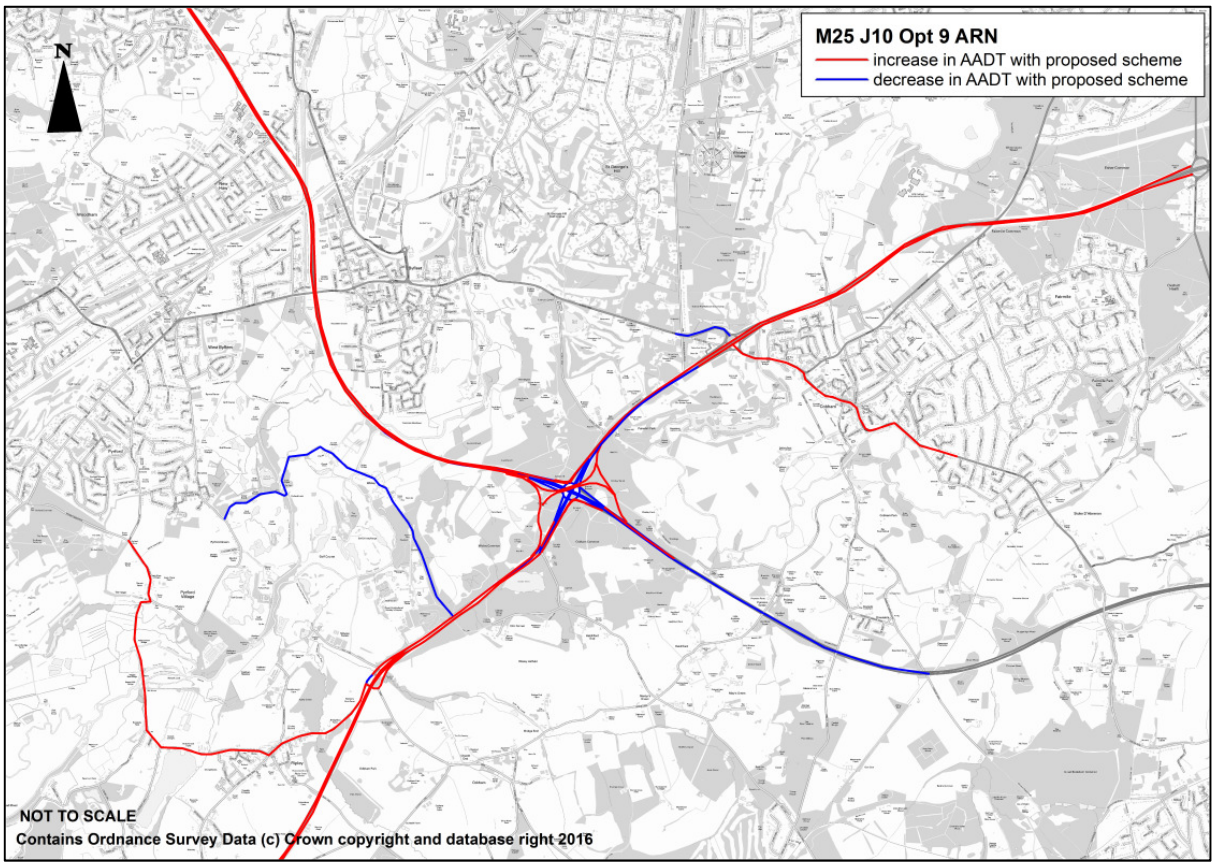
Option 9 introduces free flow links between the M25 and A3, which requires land take to the south-west and north-east of the existing M25 J10 / A3 Wisley Interchange. Figure 9-2 shows the affected road network (ARN) within the study area including the proposed scheme links. Links in red are expected to experience an increase in AADT with the scheme, and those in blue are expected to experience a decrease. Any road links that are not shown in red or blue do not meet the DMRB HA207/07 traffic change criterion for AADT. Adverse air quality impacts on designated ecological sites are potentially likely as new emissions sources will be introduced within designated site boundaries. The new road links will also reduce the distance between the road and the isolated residential properties within the south-west quadrant of M25 J10 / A3 Wisley Interchange, though they will remain at a distance of over 200 metres from these

emissions sources. The free flow links may offset any adverse effects due to reduced distance between the emissions source and sensitive receptors by improving vehicle flow resulting in a reduction in emissions.

As seen in Figure 9-2 there is expected to be an increase in AADT with the proposed scheme on the majority of links included in the ARN including the three arms of Junction 10 to the northeast, northwest and south west; the ARN extends outwards to the study area extents. Receptors could potentially be affected by an increase in pollutant concentrations where they are located near the A3 north and south of J10; the A245 east of the Painshill Interchange (including those within Cobham AQMA); the M25 west of J10 (including those within the M25 AQMA); the B2215 Portsmouth Road / High Street and the B367 Newark Lane in Ripley.

Receptors could potentially be affected by a decrease in pollutant concentrations where they are located near the M25 east of J10, the A245 west of Painshill Interchange, and Wisley Lane (south west of J10).

Figure 9-2: M25 J10 Option 9 Affected Road Network

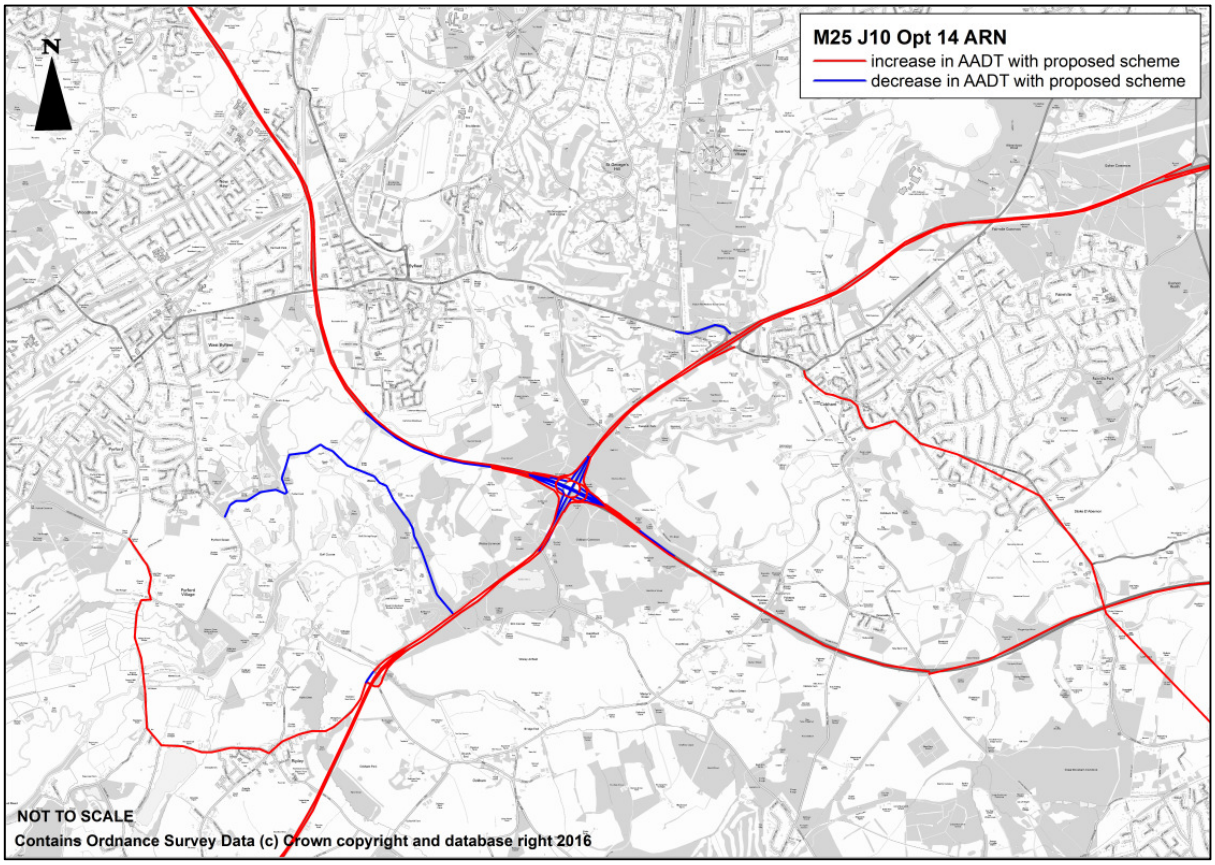


Option 14

Option 14 is a modification and elongation of the existing roundabout at M25 J10 / A3 Wisley Interchange The circulatory carriageway at the roundabout would be widened and slip roads realigned which would require land take in all four quadrants around the junction. The widening of the junction would reduce the distance between the road and sensitive receptors. The sources of vehicle emissions would be brought within the boundaries of designated ecological sites, with the potential to adversely impact on vegetation. The widening of the junction would also reduce the distance between the road and isolated residential properties, although they will remain at a distance of over 200 metres from the emissions source. The adverse impacts from moving the

emission source closer to sensitive receptors may be offset by improving vehicle flow resulting in a reduction in emissions. Figure 9-3 shows the ARN for Option 14 within the study area, including the proposed scheme links. The majority of roads within the ARN are expected to experience an increase in AADT with the scheme. The extent of the affected links are similar to that for Option 9 however all arms of Junction 10 are expected to experience an increase of AADT with this option variant, meaning that receptors near the M25 east of Junction 10 (including those within the M25 AQMA) could potentially experience an increase in pollutant concentrations. In addition, a larger extent of the A245 east of Painshill junction could be affected by an increase in AADT, which could affect more receptors near this road, including those within Cobham AQMA.

Figure 9-3: M25 J10 Option 14 Affected Road Network

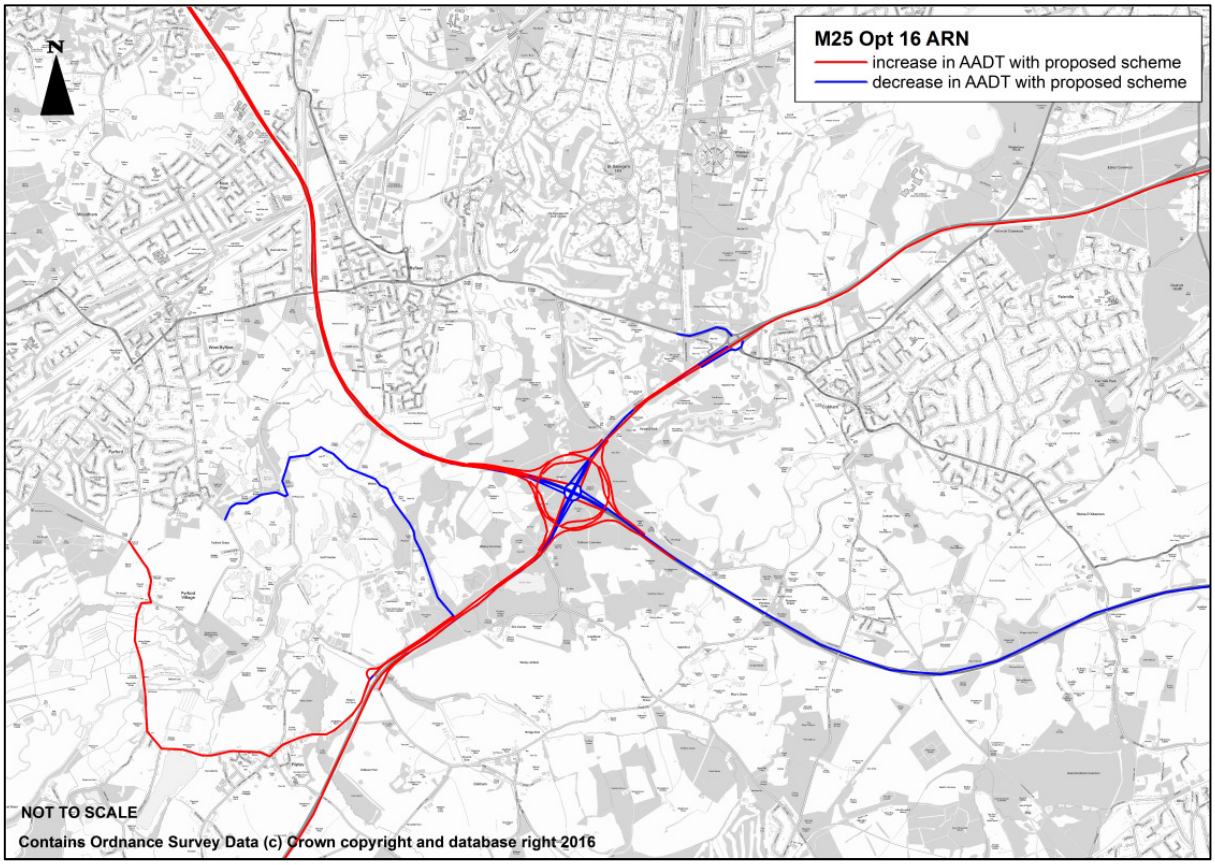


Option 16

Option 16 consists of free flow opportunities for all movements whereby there are dedicated links from the M25 eastbound and westbound to the A3 south and northbound and from the A3 southbound and northbound to the M25 west and eastbound. Although these proposals introduce new road links in closer proximity to nearby residential receptors (Redhill Road), they have the potential to positively affect local air quality conditions through reduced congestion and removal of idling vehicles in the area. Air quality effects on designated ecological sites are potentially likely as new emissions sources will be introduced within designated site boundaries. Figure 9-4 shows the ARN associated with Option 16 within the study area, including the proposed scheme links. The majority of roads within the ARN are expected to experience an increase in AADT with the scheme. The extent of the affected links are similar to that for the other two options and as with Option 9, three arms of Junction 10 are expected to experience an increase of AADT with the scheme, including at

receptors in the M25 AQMA, while the M25 east of Junction 10 is expected to have a decrease in traffic. With this option, the A425 east of Painshill Interchange is unlikely to be affected, meaning that there is expected to be little effect at receptors within Cobham AQMA.

Figure 9-4: M25 J10 Option 16 Affected Road Network



9.8 Limitations to assessment

The primary assumption for PCF Stage 1 lies in the use of the SATURN traffic model[25]. For the purposes of determining the ARN at this stage, traffic data has been selected from within a defined area in the vicinity of the scheme. It is likely that the affected road network could potentially be extended. This will be reviewed at PCF stage 2.

Assessment in accordance with relevant Highway England Interim Advice Notes (IAN) has not been completed in this PCF Stage 1 assessment as quantitative assessment of air quality has not been undertaken. Requirements for further, detailed quantitative modelling of pollutant concentrations from which significance of effects may be determined will be reviewed at PCF Stage 2.

Designated ecological sites have been identified within 200 metres of M25 J10 / A3 Wisley Interchange (refer to Chapter 8 of the ESR: Nature Conservation) and the impact of oxides of nitrogen (NO_x) concentrations on vegetation would need to be considered further, in quantitative analysis of the preferred Option Variant in a future Stage of PCF reporting, in order to address this limitation at PCF Stage 1.

9.9 Summary and recommendations

The scheme is located within the boundaries of Guildford Borough Council and Elmbridge Borough Council, although the ARN extends into the boundaries of Woking Borough Council, Runnymede Borough Council and Mole Valley District Council. There are two AQMAs within the air quality study area: the Cobham High Street AQMA declared by Elmbridge Borough Council for exceeding the annual mean NO_2 AQS objective, which is within 200 m of the ARN for options 9 and 14; and the M25 AQMA declared by Runnymede Borough Council for exceeding the annual mean NO_2 AQS objective and the annual mean and 24-hour mean PM_{10} AQS objectives, and could be affected by all three options.

Defra PCM mapping shows that there are no roads exceeding the annual mean NO_2 or PM_{10} EU limit value within the study area. However, NO_2 monitoring data shows exceedances of the annual mean criterion within a number of traffic corridors including the M25, A3 and A245.

There are a number of ecologically designated sites in the vicinity of the scheme and affected road network which could be affected by any change in traffic including the Ockham and Wisley Commons Site of Special Scientific Interest (SSSI) which also incorporates the Thames Basin Heaths Special Protection Area (SPA), the Esher Commons SSSI, and the Papercourt SSSI.

The traffic model for the opening year has shown that there are likely to be a number of roads affected with each option. In all cases the following roads are expected to have an increase in traffic, indicating a potential increase in pollutant concentrations: M25 west of J10; A3 south and north of J10; A245 east of Painshill Interchange; B2215 Portsmouth Road / High Street; and B367 Newark Lane. In addition with option 14 the M25 east of J10 is expected to have an increase in traffic.

In all cases the following roads are expected to have a decrease in traffic, with a potential decrease in pollutant concentrations: A245 west of Painshill Interchange; Wisley Lane. In addition with options 9 and 16 the M25 east of J10 is expected to have a decrease in traffic.

At this stage, all options are considered likely to pose a risk of a potentially significant adverse effect at nearby receptors, particularly those within the M25 AQMA and within the Cobham AQMA with options 9 and 14.

It is recommended that a simple air quality assessment at PCF Stage 2 is undertaken which should include calculation of air pollutant concentrations at representative receptors for the scheme opening year using the DMRB screening tool to allow the potential significant effects to be determined for each option.

10 Noise and Vibration

10.1 Introduction

This chapter provides an indication of the potential noise and vibration impacts resulting from a number of options for the improvement of J10 of the M25. The options are described in full in Chapter 3. Traffic data has been supplied for Options 9, 14 and 16. These are the 3 options being taken forward for more detailed assessment.

10.2 Assessment methodology

Construction

As baseline noise monitoring will be undertaken at a future design stage (PCF Stage 3), a full construction noise assessment using BS5228-1:2009+A1:2014[49] will be deferred until baseline noise monitoring data is available.

The significance criteria for construction noise will be confirmed at a future design stage as the significance criteria used in BS5228-1:2009+A1:2014 are set depending on the ambient noise levels measured at noise sensitive receptors in proximity to the proposed construction works.

The assessment at this design phase will be qualitative. The construction assessment will identify those activities which have the highest potential to cause disturbance at nearby noise sensitive receptors.

Operation

Noise impacts arising from the design options for the Proposed Scheme have been assessed in accordance with the guidance provided in the Design Manual for Roads and Bridges Volume 11, Section 3, Part 7 (DMRB 11:3:7) HD213/11.

DMRB 11:3:7 presents the threshold criteria that could trigger a detailed traffic noise assessment if the criteria are likely to be met or exceeded, which are:

- A change in daytime traffic noise impacts in the short term (opening year) of 1 dB $L_{A10,18h}$. This can be caused by traffic flow increases of 25% or decreases of 20%, provided that the traffic speed and composition remains constant, or where there is a new or altered road alignment.
- A change in daytime traffic noise impacts in the long term (typically 15 years after the project opening) of 3 dB $L_{A10,18h}$. A change of 3 dB $L_{A10,18h}$ is equivalent to doubling or halving the traffic flow, provided that the speed and proportion of heavy vehicles remains constant, or where there is a new or altered road alignment.
- A change in night-time traffic noise impacts of 3 dB $L_{night,outside}$ in the long term where $L_{night,outside}$ is predicted to be greater than 55 dB $L_{night,outside}$ in any scenario.

The short term and long term impact magnitude criteria from DMRB 11:3:7 are reproduced below:

[49] *British Standards Institution (2014) BS5228:2009 + A1:2014 Code of practice for noise and vibration control on construction and open sites, Part 1: Noise. London BSI.*

Table 10-1: Classification of magnitude of noise impacts in the short term and the long term

Short Term Noise Change $L_{A10,18h}$ dB	**Long Term Noise Change $L_{A10,18h}$ dB**	**Magnitude of Impact**
0	0	No Change
0.1 – 0.9	0.1 – 2.9	Negligible
1.0 – 2.9	3.0 – 4.9	Minor
3.0 – 4.9	5.0 – 9.9	Moderate
5+	10+	Major

It is important that an appropriate and proportionate approach is taken throughout the design process of the Proposed Scheme. At this design stage (PCF Stage 1), a basic quantitative noise assessment has been undertaken to identify areas that may exceed DMRB's threshold levels and trigger the need for a detailed assessment in a future design stage. This has been achieved using traffic data obtained through microsimulation of the M25 J10. Any baseline noise monitoring in the study area will be carried out at a future assessment stage.

The noise assessment has been completed by computing the Basic Noise Level (BNL) at 10m from the edge of the carriageway for each traffic link within the study area, using the calculation methodology presented in the Calculation of Road Traffic Noise[50] (CRTN). The BNL is calculated using the following output from the traffic model for each road link:

- 18 hour (06:00 to 24:00) Annual Average Weekday Traffic Flows (AAWT),
- Traffic speed,
- Percentage of Heavy Duty Vehicles defined as all vehicles with an unladen weight greater than 3.5 tonnes.
- The road surfacing of the traffic link.
- The gradient of the road link.

In the absence of better information at this stage, the road gradient and road surfacing corrections have been assumed to be zero.

No information is currently available about existing mitigation in the study area and therefore this has not been taken into account in the assessment.

It has not been possible to indicate the number of properties affected by the predicted BNL changes as detailed property data is currently not available. Noise level predictions will be performed at PCF Stage 2 for a selection of properties and detailed noise modelling at PCF Stage 3 when a preferred option is selected.

Road traffic noise levels will be calculated for four traffic scenarios for both the Opening Year (2022) and Design Year (2037). Comparisons will be made for each design option against the Do Minimum in the Opening Year. This is in line with DMRB.

The traffic scenarios that have been assessed are:

- Do Minimum Opening Year
- Do Minimum Design Year
- Option 9 Opening Year

[50] *Department of Transport and the Welsh Office (1988). Calculation of Road Traffic Noise. London: HMSO.*

- Option 9 Design Year
- Option 14 Opening Year
- Option 14 Design Year
- Option 16 Opening Year
- Option 16 Design Year

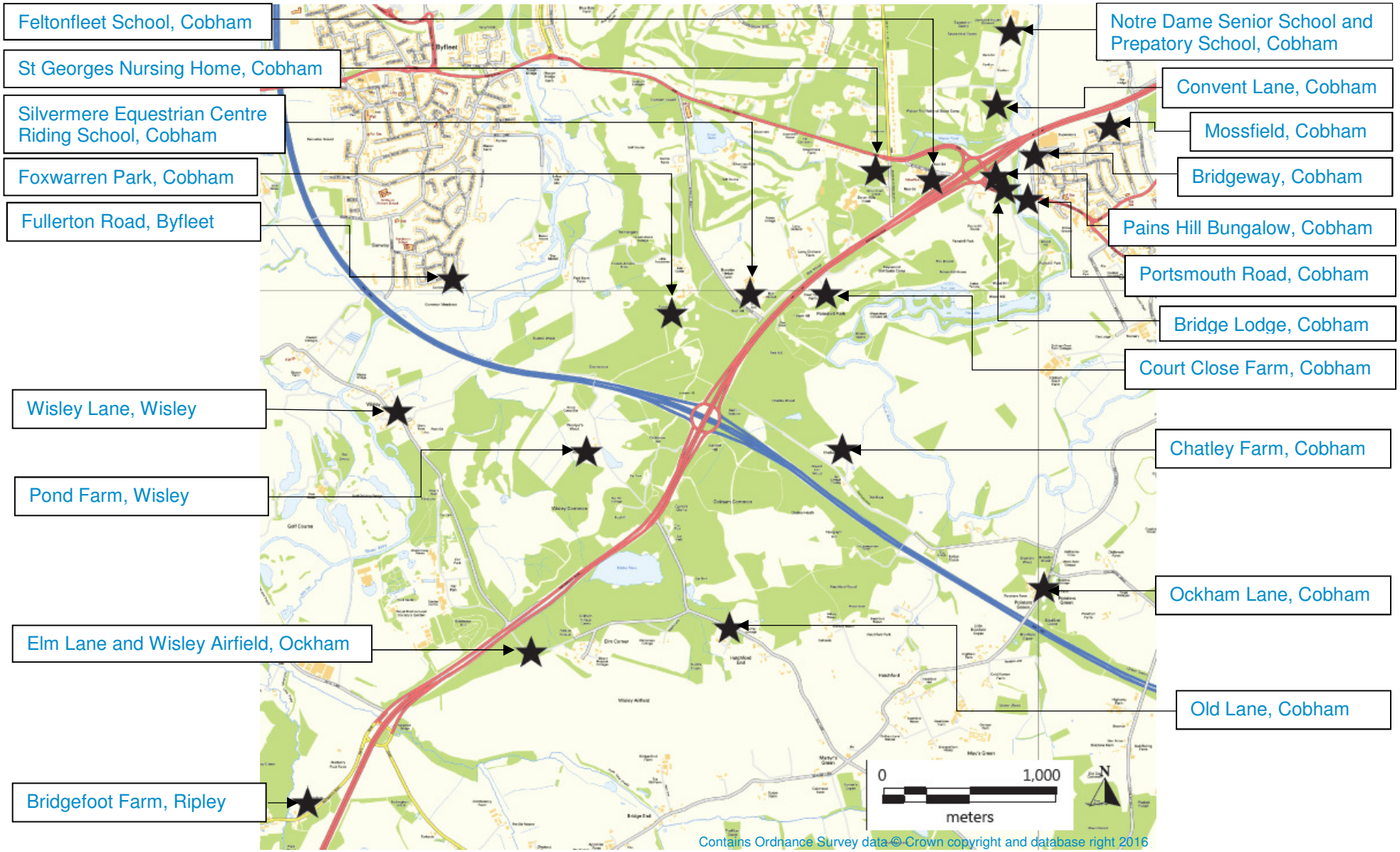
10.3 Study area

The study area for the assessment is defined in the DMRB[51] as 600m from the carriageway edge of any proposed new routes and existing routes to be bypassed or improved, and 600m from any other affected routes within 1km of the proposed new routes or altered existing routes. An affected route is where there is a possibility of a change of 1dB $L_{A10,18h}$ in the short term and 3dB $L_{A10,18h}$ in the long term.

The land use within 600m of the M25 J10 is generally rural. With the majority of residential areas being around the Painshill Interchange. A map showing the location of both residential and non-residential noise sensitive receptor around J10 are shown in Figure 10.1.Error! Reference source not found.

[51] *Highways Agency, Transport Scotland, Welsh Government and The Department for Development Northern Ireland (2011). Noise and Vibration, Design Manual for Roads and Bridges 11:3:7 Revision 1. London: The Stationery Office.*

Figure 10.1: Noise Sensitive Receptors around M25 J10



Baseline Conditions

The M25 J10 / A3 Wisley Interchange is located between the urban areas of Ockham and Cobham in Surrey. The land use within 600m of the proposed scheme options consists mostly of green space, including Chatley Wood, Ockham Common and Wisley Common. The majority of the noise sensitive receptors are located close to the Painshill Interchange to the north east of the study area.

The closest buildings to the Proposed Scheme are in proximity to the Painshill Interchange and include Pains Hill Bungalow (45m), Pains Hill (50m), and Feltonfleet School (50m). There is a mixed use development between the A3 and A245 within 300m of the Painshill Interchange, and further residential buildings located at Seven Hills Road, approximately 430m from the Painshill Interchange. The land south west of the Painshill Interchange towards the M25 and beyond, is sparsely populated with few noise sensitive receptors located within 600m of the proposed scheme options in this area. The locations of the nearest noise sensitive receptors to the proposed scheme options are shown in Figure 10.1 .

In addition to the existing noise sensitive receptors located close to the proposed scheme options, it is understood that there are proposals to develop the land occupied by the former Wisley Airfield into residential housing. The redevelopment proposals are to construct a new settlement consisting of up to 2,100 homes, which if approved, would introduce more noise sensitive receptors to the study area that could be affected by the proposed scheme options.

The following non-residential noise sensitive receptors have been identified within 600m of the M25, A3, and A245 Byfleet Road: Feltonfleet School, St George's Nursing Home, Hilton Hotel, Notre Dame Senior School, Notre Dame Preparatory School, Cobham Free School, Painshill Fire Station, Silvermere Equestrian Centre's Riding School, and Royal Horticultural Society's Garden.

At this stage of the assessments, a noise survey has not been undertaken and will be undertaken at PCF Stages 3 to ascertain the baseline noise levels at noise sensitive receptors within the study area. However, based on aerial imagery it is expected that road traffic noise from the M25 and the A3 are the main noise sources influencing noise levels in the study area. There is potential for aircraft noise to contribute to the noise climate as the study area is positioned between Heathrow and Gatwick airports. There are no railways or heavy industrial sources in proximity to the proposed scheme options.

Strategic noise maps were published during 2015 by Defra for major road and railways sources to meet the requirements of the Environmental Noise Directive (Directive 2002/49/EC) and the Environmental Noise (England) Regulations 2006 (as amended). The strategic noise maps for road traffic noise during the daytime (07:00-23:00) and night-time (23:00-07:00) periods are shown in Appendix L. These noise maps represent the annual average noise levels from road traffic sources during 2012, in areas with populations of 100,000 people (agglomerations) and along major traffic routes. The noise levels shown were calculated for a receptor height of 4m above ground level, using the $L_{Aeq,T}$ (A-weighted equivalent continuous sound pressure level during time period T) and L_{night} (outdoor sound pressure level defined in the Environmental Noise Directive that is equivalent to $L_{Aeq,8h}$) noise indices.

Important Areas for noise were identified to highlight any particular constraints on the design options. Important Areas are the locations where the 1% of the population are affected by the highest noise levels from major roads and railways according to the strategic noise mapping undertaken by Defra. The locations of these Important Areas are also shown in Appendix L.

The strategic noise maps for road traffic noise indicate that the average noise levels exceed 60dB $L_{Aeq,16h}$ during the daytime and 55dB L_{night} at the majority of locations within 600m of the extents of the proposed scheme options. Areas with higher noise levels are close to the M25 J10 / A3 Wisley Interchange, where the land use is mainly rural with isolated buildings.

The following proposed scheme options (detailed in Section 3, above) are considered in this report:

- Option 9 – Dedicated left turns at the J10 roundabout and free-flow right turns from the A3 northbound to the M25 eastbound and the Am southbound to the M25 westbound.
- Option 14 – Elongation of the existing roundabout at J10.
- Option 16 – Cyclic free-flow configuration at J10.

For all options, road widening is proposed in the following locations:

- The A3 from the Ockham Park Interchange to the Painshill Interchange, and
- The A245 at the Painshill Interchange.

10.4 Regulatory / Policy framework

General

Current noise policy in England is based on the Noise Policy Statement for England (NPSE)[52], 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
- contribute to improvements to health and quality of life, where possible.

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)[53] and Planning Practice Guidance concerning noise[54].

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.
- SOAEL – significant observed adverse effect level. This is the level above which significant adverse effects on health and quality of life occur.

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.

NPSE also states that sustainable development is a core principle underpinning all government policy. The goal is pursued in ways that protect and enhance the physical and natural environment, and that use resources and energy as efficiently as possible.

[52] *DEFRA (2010). "NOISE POLICY STATEMENT FOR ENGLAND (NPSE).*
[53] *DEPARTMENT FOR TRANSPORT (DEC 2014). "NATIONAL POLICY STATEMENT FOR NATIONAL NETWORKS".*
[54] *DEPARTMENT FOR COMMUNITIES AND LOCAL GOVERNMENT, PLANNING PRACTICE GUIDANCE (http://planningguidance.planningportal.gov.uk/).*

The Highways England Licence states that Highways England should ensure the best practicable environmental outcomes across its activities, while working in the context of sustainable development and delivering value for money.Section 5(2) of the Infrastructure Act 2015 and the Highways England Licence seek to minimise the environmental impacts of projects, protect and enhance the quality of the surrounding environment and conform to the principles of sustainable development.

In line with this, the Department for Transport RIS 2015-2020 aspires to the target that by 2040 over 90% fewer people are impacted by noise from the strategic road network. The target for the first Road Period 2015-2020, is to mitigate at least 1,150 noise Important Areas expecting to reduce the number of people severely affected by noise from the strategic road network by at least 250,000.

The legislation and policies considered in undertaking this noise assessment are detailed in Table 10-2 and Table 10-3 for construction and operation respectively.

Table 10-2: Regulatory and policy framework for construction noise and vibration

Regulation/policy	Summary of requirements
NPSE NPPF Planning Practice Guidance Noise to NPPF (PPGN) National Policy Statement for National Networks (NPSNN)	Within the context of Government policy on sustainable development: i. Avoid significant adverse effects as a result of the scheme. ii. Mitigate and minimise adverse effects as a result of the scheme. iii. 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 10-3: 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 PPGN NPSNN	Within the context of Government policy on sustainable development: i. Avoid significant adverse effects as a result of the scheme. ii. Mitigate and minimise adverse effects as a result of the scheme. iii. 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.

10.5 Design mitigation and enhancement measures

Construction

The need for temporary noise mitigation during the construction phase will be determined at a future design stage by undertaking a BS5228-1:2009+A1:2014[55] assessment that takes into account the following factors:

- The ambient noise environment are the closest noise sensitive receptors to the construction works;
- The distance between the nearest noise sensitive receptors and the construction works;
- The duration and time of day that the construction works occur; and
- The noise produced by the plant or equipment involved in the construction activities, which is influenced by the sound power of the equipment and its usage pattern.

To mitigate any potential noise problems during the construction phase, the construction contractor should consult with the Environmental Health Departments at the relevant Local

[55] *BRITISH STANDARDS INSTITUTION (2014) BS5228:2009 + A1:2014 CODE OF PRACTICE FOR NOISE AND VIBRATION CONTROL ON CONSTRUCTION AND OPEN SITES, PART 1: NOISE. LONDON BSI.*

Planning Authorities to obtain guidance on their requirements for managing and controlling noise and vibration from construction works.

A Construction Environmental Management Plan (CEMP) should be created and implemented by the contractor and be approved by the Local Authorities prior to the commencement of construction works. The CEMP should outline the following:

- Environmental management and responsibilities;
- Monitoring and auditing processes;
- Procedures that will be used to complete different construction activities;
- Complaints response procedures; and
- Community and stakeholder liaison processes.

The contractor may also be required to submit a Section 61 application under the Control of Pollution Act 1974 for some construction works, especially if night-time working is proposed.

The contractor should also be encouraged to join (if not already a member) the Considerate Contractors Scheme that is recognised by industry and the Government for encouraging firms to be sensitive to the environment.

Good stakeholder relations are often the most effective way to manage potential noise impacts on site. Therefore, the contractor should keep local residents and other affected parties informed of the progress of the works, including when and where the noisiest activities will be taking place and how long they are expected to last. All noise complaints should be effectively recorded, investigated and addressed.

In addition, the contractor should use the following good working practices:

- All vehicles and plant should be fitted with effective exhaust silencers which should be maintained in good and efficient working order;
- All compressors and generators should be ‘sound reduced’ models fitted with properly lined and sealed acoustic covers which should be kept closed whenever the machines are in use;
- All ancillary pneumatic percussive tools should be fitted with mufflers or suppressors as recommended by the manufacturers which should be kept in a good state of repair;
- Machines in intermittent use should be shut down when not in use or where this is impracticable, throttled down to a minimum;
- The site compound and static machines should be sited as far as is practicable from noise sensitive buildings;
- Where practicable, plant with directional noise characteristics should be orientated to minimise noise at nearby properties;
- Plant should be certified to meet the current EU legislation and should be not be louder than the noise levels provided in Annex C and D of BS5228-1;
- Where appropriate, temporary noise barriers or other noise containment measures should be installed to minimise construction noise levels;
- The loading or unloading of vehicles and the movement of equipment or materials should be undertaken in a manner that minimises noise generation;
- Concrete mixers should not be cleaned by hammering the drums; and
- When handling materials, care should be shown not to drop materials from excessive heights.

In addition to the above good working practices, if piling is required to construct the retaining wall, the piling method should be selected carefully to minimise noise and vibration impacts at noise sensitive receptors. Where practicable, piling methods that result in low levels of vibration, such as rotary bored piling should be used. Methods that cause much higher levels of vibration, such as percussive piling, can cause cosmetic damage to buildings within 50m of the construction works and should be avoided wherever possible.

Even with appropriate mitigation in place, it may not be possible to eliminate all noise impacts. However, best practice, considerate working hours as well as frequent and open communications with stakeholders will help to reduce the residual impact of construction noise.

Operation

Due to the new infrastructure, all of the proposed scheme options have the potential to increase noise levels at noise sensitive receptors and therefore noise mitigation may be required to reduce noise levels or improve noise levels generally, noting the presence of several Important Areas and residential communities in the vicinity of Junction 10. The assessment of impacts in Section 10.6 has indicated that Option 9 is likely to require the least noise mitigation and Option 16 is likely to require the most, due to the increasing scale of the proposed scheme.

Noise mitigation can consist of noise barriers, earth bunds, or low noise road surfacing, and may include any existing noise mitigation in situ that will be retained by the proposed scheme options. Further assessments of mitigation options will be undertaken at a future design phase.

10.6 Potential significant effects

Construction

The main construction activities that are likely to take place are site preparation, demolition, earthworks, retaining wall construction and road works. All activities have the potential to cause some disturbance at nearby noise and/or vibration sensitive receptors. Demolition works and piling works (for new viaducts and retaining walls) are likely to cause some of the highest noise levels dependent on the methods chosen.

All options propose the construction of new retaining walls adjacent to Silvermere Equestrian Centre and the southbound A3 on slip road at Painshill Interchange. Careful selection of piling technique will be required by the contractor to minimise noise impacts on receptors close to these locations.

A construction programme detailing the specific activities that will take place, phasing and duration of each activities, and a plant list are not yet available for the proposed scheme options.

Operation

The main factors that can cause a short term or long-term change in noise level at nearby noise-sensitive receptors are:

- Changes to the traffic flow, speed or composition. Any alleviation to congestion caused by the proposed scheme options is likely to increase the average traffic speeds on the M25, the A3, and connecting roads, leading to an increase in noise levels.
- Changes to the road alignment and layout. This includes changes to the horizontal or vertical alignment of existing carriageways and adding new sections of road. Realignment or rerouting traffic can also cause decreases in

areas where it was rerouted from and noise increases in areas it will be rerouted to.

- Changes to the road surfacing. The installation of low-noise road surfacing can reduce road traffic noise level by 2.5dB or more compared with Hot Rolled Asphalt surfaces, due to differences in the composition of the road surface.

At present only Basic Noise Level calculations have been undertaken on the available traffic data available for the proposed scheme. Assessment of the change in noise levels at individual properties will be deferred to a PCF Stage 2 for a selection of noise sensitive receptors, with detailed noise modelling proposed for PCF Stage 3.

Option 9

Figure 10.2 and Figure 10.3 illustrate the change in Basic Noise Level on each road due to changes in traffic in the Opening and Design Years of the scheme for Option 9, relative to the Do Minimum scenario.

Major decreases in traffic noise are predicted in both the Opening and Design years on the existing A3 off slip roads and M25 on slip roads as traffic uses the new right hand turn links. However, the new links, with major increases, are situated closer to the properties than those with predicted major decreases, so it is unlikely that these decreases will be realised when considering all road links.

Major increases in the Opening and Design years are predicted on the new links from the A3 to M25, and the M25 eastbound off slip road. The receptors most likely to be affected by these impacts are Pond Farm, Chatley Farm, Court Close Farm, Foxwarren Park and Silvermere Equestrian Centre. The major increases are likely to affect noise levels more than the major decreases as they will be closer to the receptors.

There are moderate increases in noise in the Opening and design year on the southbound on slip road at Painshill Interchange, and the northbound on slip road at Ockham Junction. These changes are likely to impact Painshill Bungalow, Feltonfleet School, and Bridge Lodge.

Figure 10.2: Option 9 Opening Year Impacts

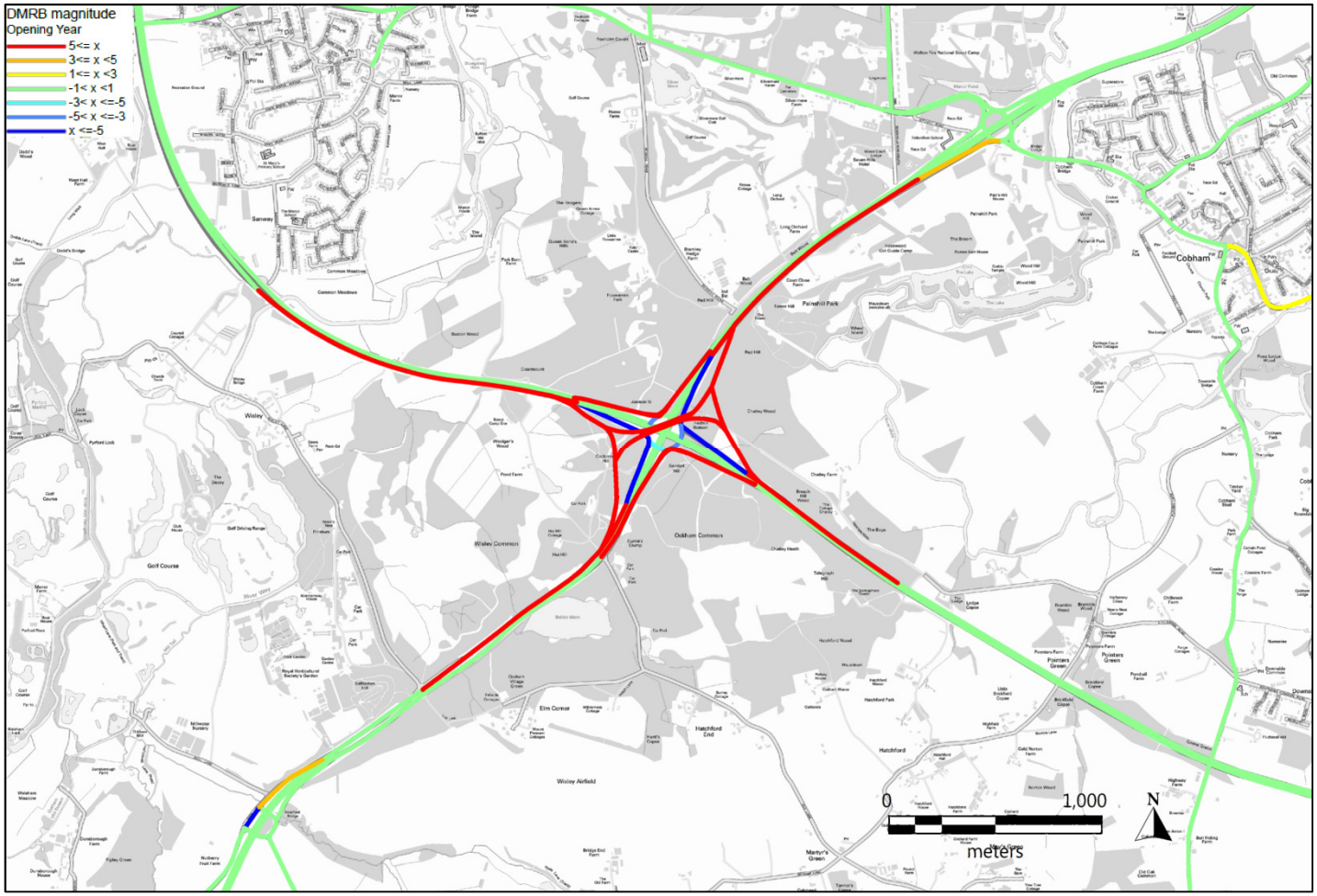
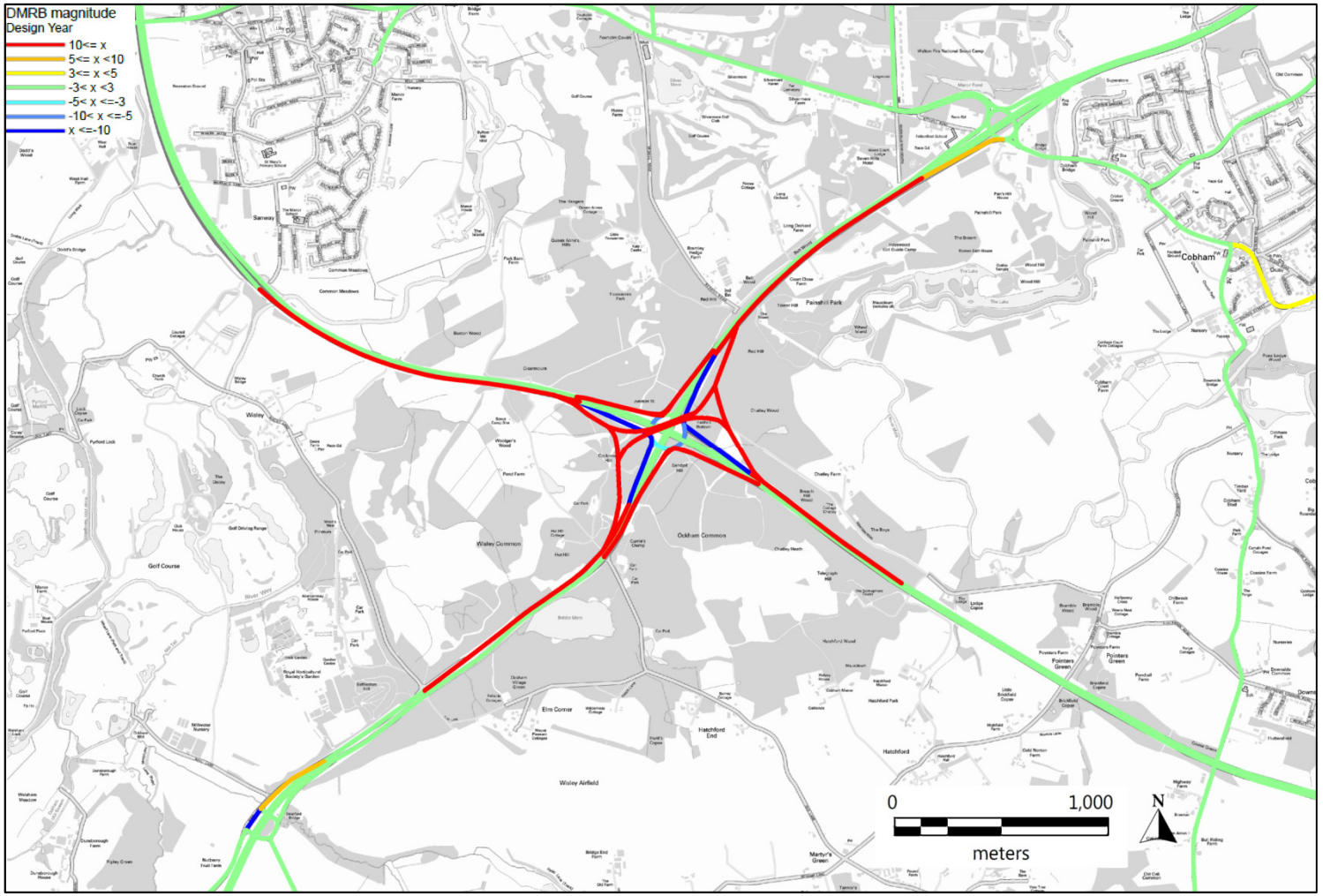


Figure 10.3: Option 9 Design Year Impacts



Option 14

Figure 10.4 and Figure 10.5 illustrate the change in Basic Noise Level on each road due to changes in traffic in the Opening and Design Years of the scheme for Option 14, relative to the Do Minimum scenario.

Major increases in noise in the Opening and Design years are predicted on all slip roads, new links from M25 eastbound to A3 northbound, A3 northbound and westbound M25, and a new section of the M25 eastbound on slip road. The receptors most likely to be affected by these changes are Chatley Farm, Pond Farm and Foxwarren Park. There are moderate increases in noise in the Opening and design year on the southbound on slip road at Painshill Interchange, and the northbound on slip road at Ockham Junction. These changes are likely to impact Painshill Bungalow, Feltonfleet School, and Bridge Lodge.

On the northbound A3 between Ockham Junction and M25 J10, there is a moderate decrease in noise in the opening year. This is likely to affect Elm Lane, Wisely Airfield and Pond Farm. By the design year, this impact will be negligible.

Figure 10.4: Option 14 Opening Year Impacts

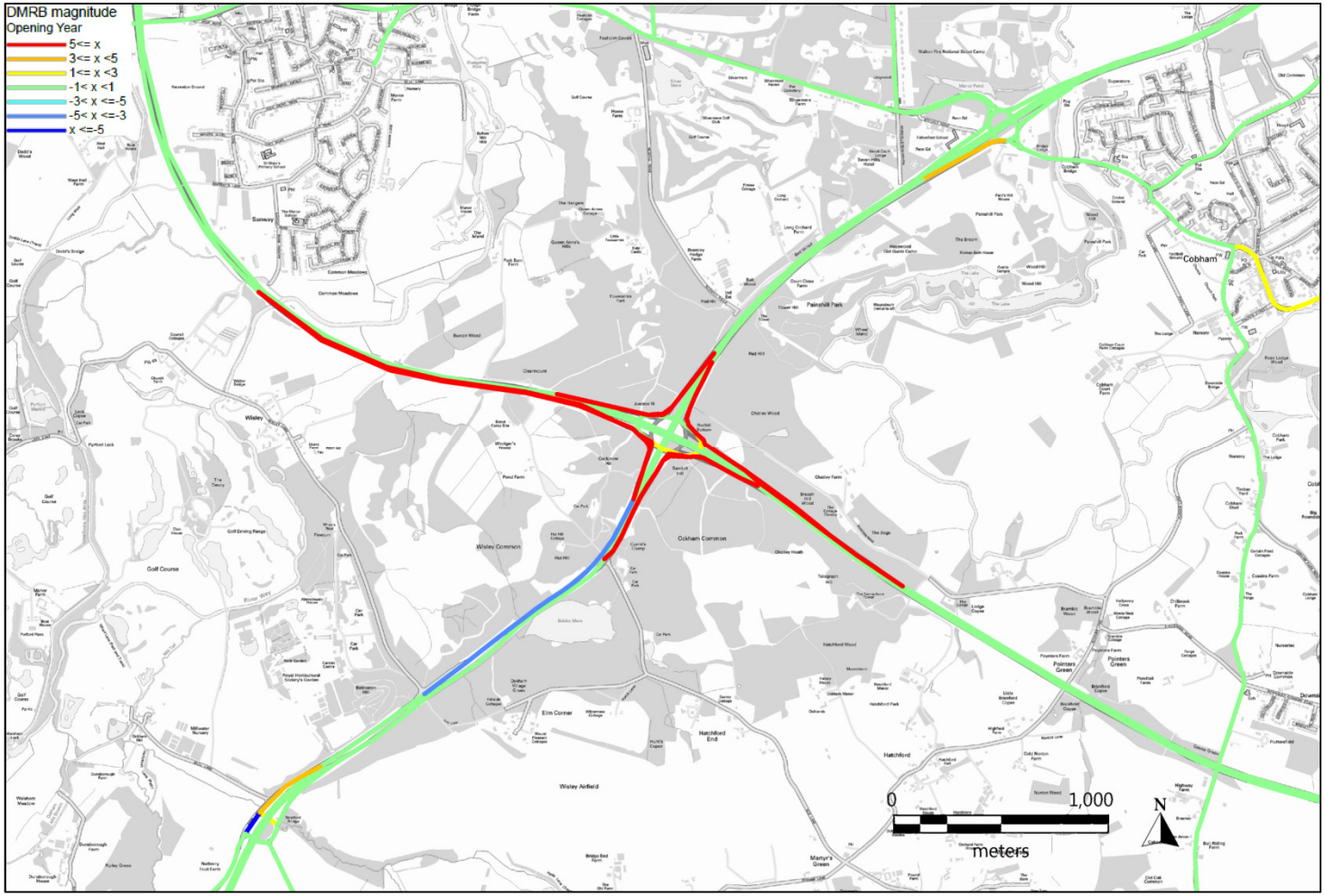
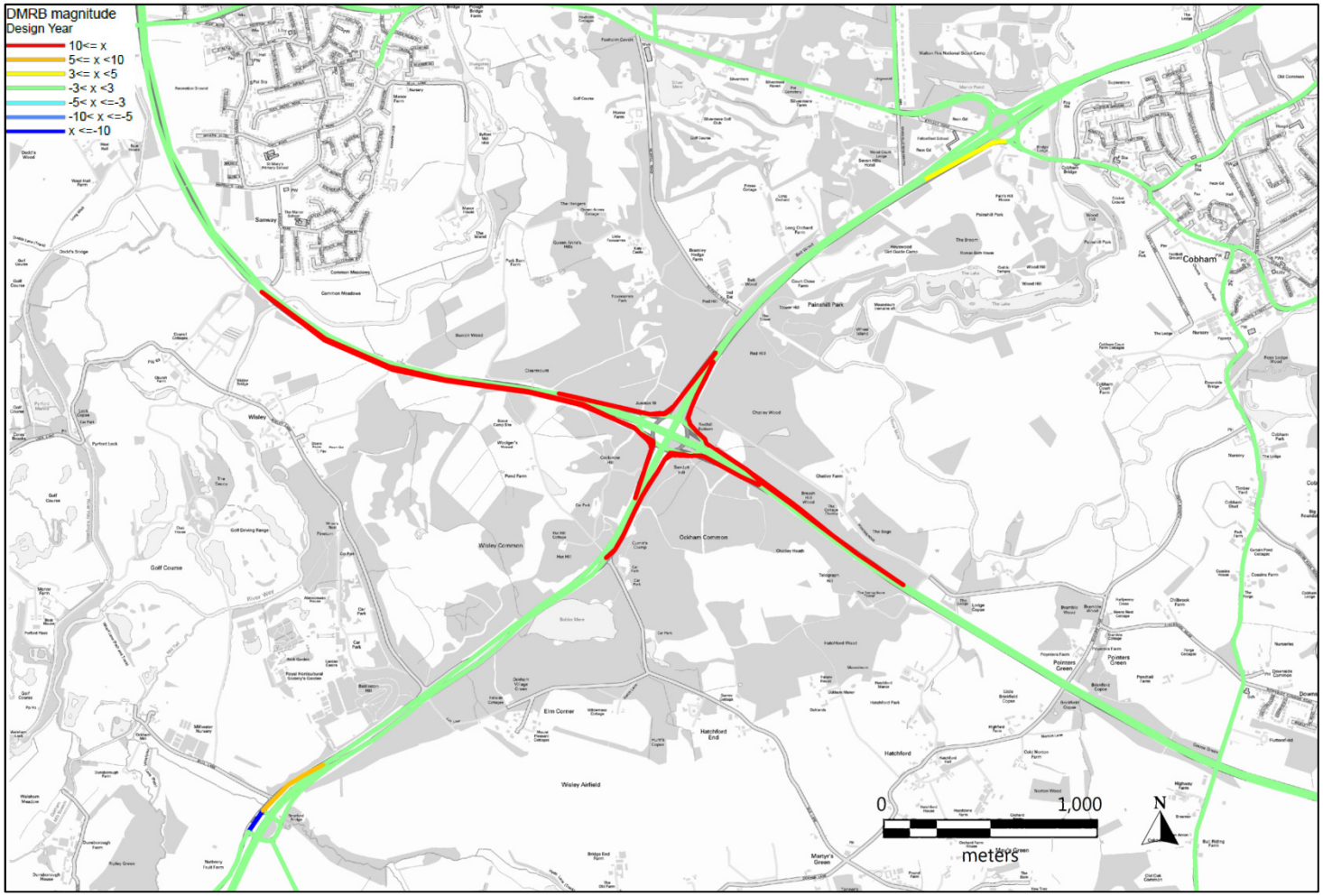


Figure 10.5: Option 14 Design Year Impacts



Option 16

Figure 10.6 and Figure 10.7 illustrate the change in Basic Noise Level on each road due to changes in traffic in the Opening and Design Years of the scheme for Option 16, relative to the Do Minimum scenario.

Minor increases in noise in the Opening year are predicted on the link between the westbound M25 and southbound A3 and the eastbound M25 and northbound A3. Noise sensitive receptors on Old Lane, Foxwarren Park and Silvermere Equestrian Centre are likely to be affected by this change. By the Design year the change between the westbound M25 and southbound A3 is predicted to be negligible. The change between the eastbound M25 and northbound A3 is still predicted to be minor in the Design year.

Moderate increases in noise in the Design year are predicted to be on the links between M25 eastbound and A3 northbound, A3 southbound and M25 eastbound, and A3 northbound and M25 westbound. Receptors likely to be affected by these changes are Pond Farm, Foxwarren Park, Silvermere Equestrian Centre, Chatley Farm and Court Close Farm.

There are moderate increases in noise in the Opening and Design year on the southbound on slip road at Painshill Interchange, and the northbound on slip road at Ockham Junction. These changes are likely to impact Painshill Bungalow, Feltonfleet School, and Bridge Lodge.

In both the Opening and Design years, most of the newly constructed links are predicted to have major increases in traffic noise. This is likely due to traffic not having to slow down at junctions and therefore increase the average speed. The carriageways travelling away from J10 on both A3 and M25 all have major increases in noise. Receptors including Pond Farm, Chatley Farm, Court Close Farm, Foxwarren Park and Silvermere Equestrian Centre are likely to be affected by these impacts.

Option 16 increases the overall footprint of J10 and as such moves road sources closer to sensitive receptors

Figure 10.6: Option 16 Opening Year Impacts

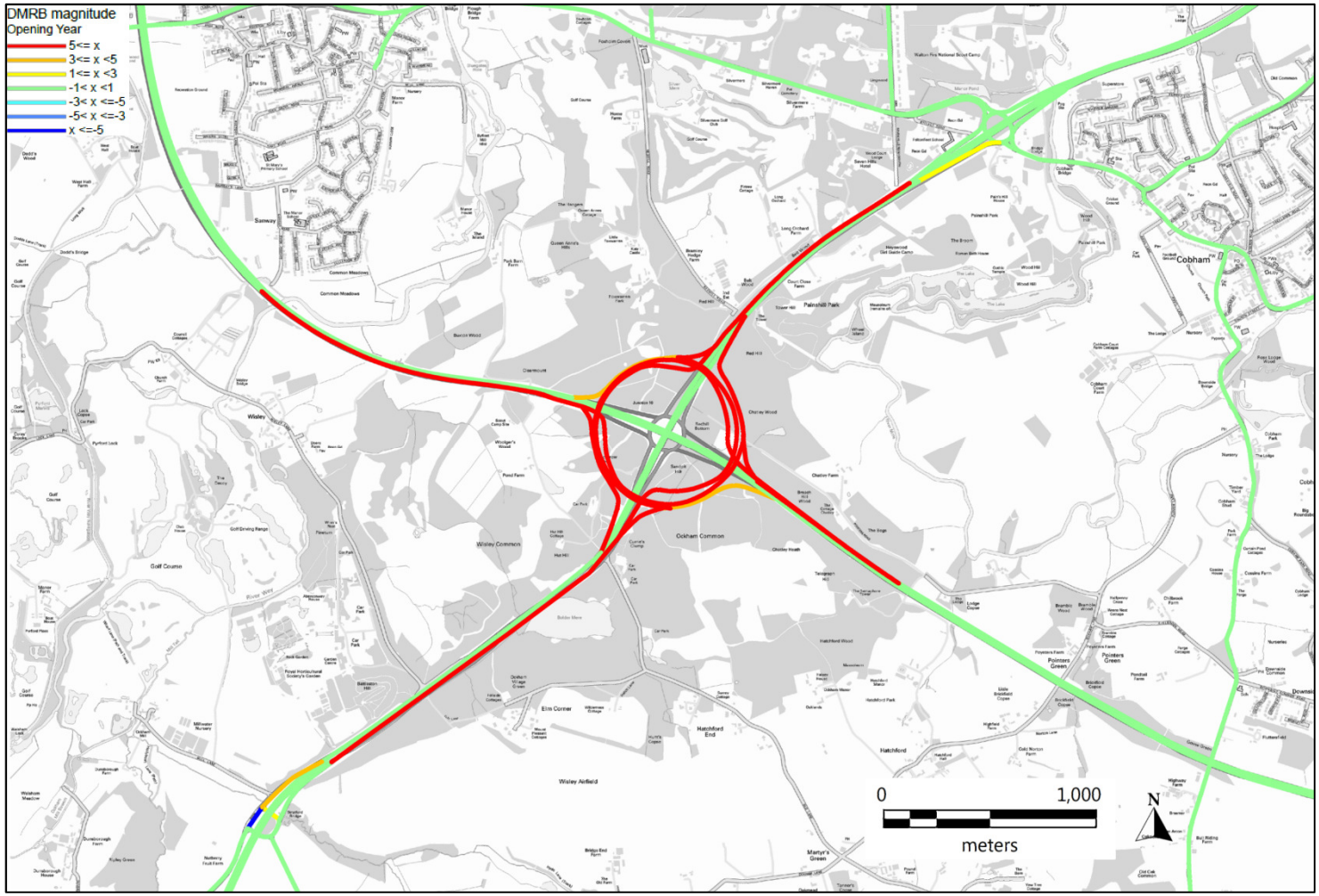
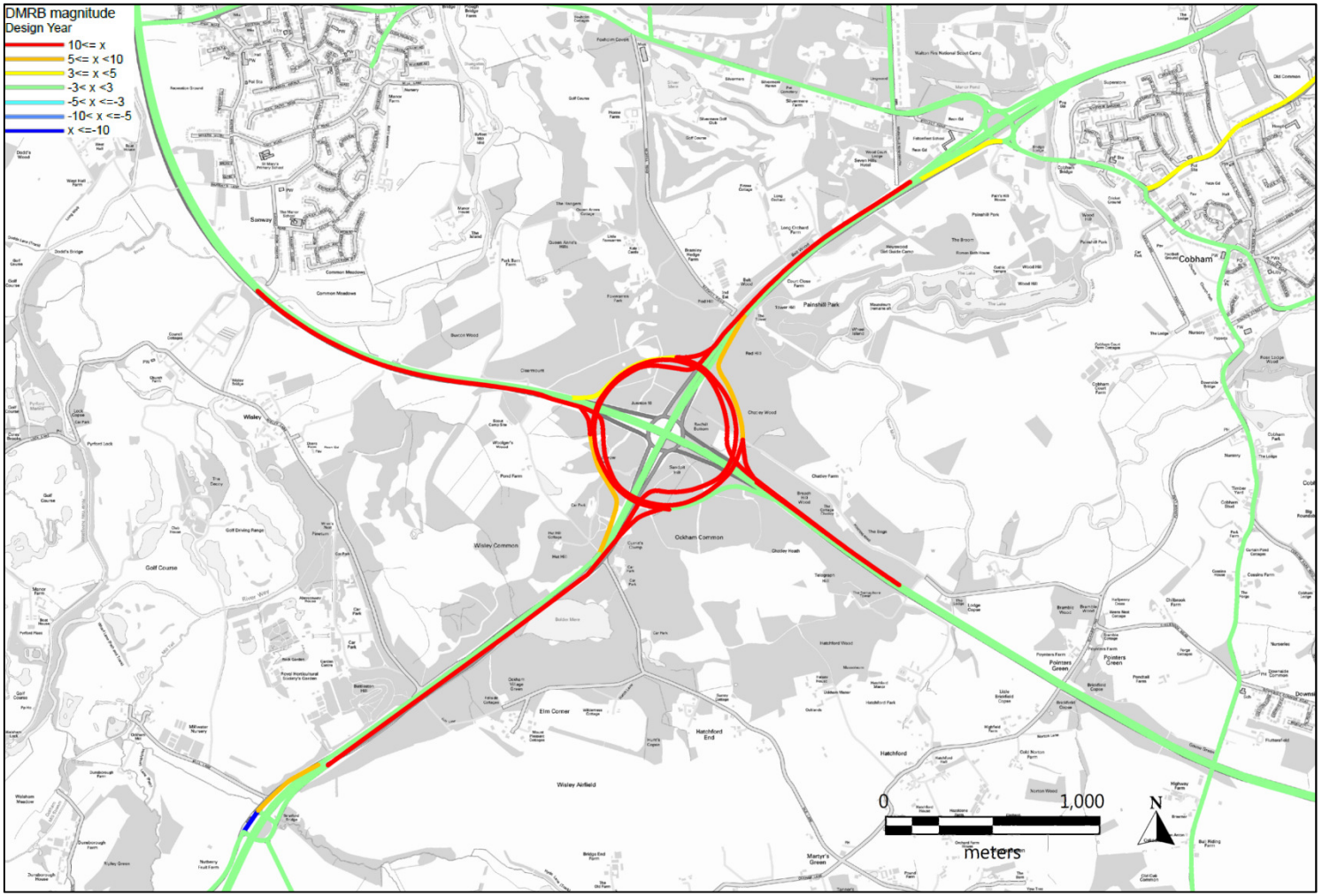


Figure 10.7: Option 16 Design Year Impacts



10.7 Limitations to assessment

At this stage no detailed information about construction methods or timing are available and hence a very high level overview of potential construction impacts has been provided.

No address data identifying the usages of individual properties is currently available and therefore it is not possible to identify where noise level changes are likely to impact upon noise sensitive receptors in close proximity to Painshill Interchange, M25 J10, and the A3 between Ockham Junction and Painshill interchange.

A three-dimensional noise model has not been constructed at present and therefore no account has been taken of ground topography or road gradients in undertaking the basic noise level calculations.

Road surfacing types are not currently available and therefore this has not been taken into account in the basic noise level calculations.

Basic noise level calculations may show an impact on a road link which would in fact be masked by higher noise levels from adjacent links (e.g. where a slip road is adjacent to the main carriageway, it is unlikely that a change in noise on the slip road would have an effect on the overall noise level).

All potential impacts have been identified in the absence of any mitigation. Details of any existing mitigation should be included in a detailed assessment of noise levels at receptors. This will inform the requirements for any new mitigation that should be included in the design.

11 Road Drainage and the Water Environment

11.1 Introduction

This section sets out a review of the water environment relevant to the M25 J10 Improvements. The assessment has used publicly available data and is based on the potential options at the time of reporting. Should any of the options change, baseline conditions may be subject to change.

An overview of the baseline conditions is included, together with descriptions of proposed methods and a scope of the work likely to be required to undertake a detailed assessment of the impact of road drainage on the water environment as part of the Environmental Impact Assessment (EIA).

11.2 Assessment Methodology

Scoping of the environmental assessment for the M25 J10 Improvements was undertaken in June 2016 (Highways England, June 2016)[56], based on a broad understanding of the proposed improvements. Due to the absence of detailed design, information assumptions were made. The scoping exercise was undertaken to identify the water topics requiring consideration in the environmental assessment (and the appropriate level of assessment for these).

The results are presented in the Environmental Scoping Report (Highways England, June 2016) and will not be repeated here. In summary, the following water topics were scoped into further assessment:

- Surface watercourses.
- Lakes and other water features (including WFD lakes).
- Groundwater.
- Abstractions and discharges.
- Flood risk.

The assessment is based on guidance contained in the DMRB Volume 11, Section 3, Part 10 HD 45/09 - Road Drainage and the Water Environment (November 2009) and further notes from the IAN 161/15 - Smart Motorways (November 2015).

The method of assessing the importance, magnitude and significance of effects is stated within tables in the DMRB, HD45/09 (Annex IV, Tables A4.1 to A4.6) and has not been reproduced in this section.

Each option has been categorised/graded based on its alignment but does not take account of the nature of any watercourse crossings shown (e.g. viaducts versus culverts) or the approach to potential river realignments as these are not finalised at this stage in the programme.

At this stage, a high level desk-based assessment has been undertaken using publicly available data.

[56] *Highways England. June 2016. Road Investment Strategy. M25 Junction 10/A3 Wisley Interchange Improvements. Environmental Study Scoping Report. HE551522-ATK-EGN-1-RP-EN-0001*

11.3 Study Area

The spatial scope of the assessment includes as a minimum, features of the water environment within 1km of the improvement work. A 1km study area was chosen as for the assessment of impacts associated with soluble pollutants, research indicates that beyond 1km, it is likely any impacts will be sufficiently diluted, thereby reducing any potential impact. For impacts associated with sediment-bound pollutants, beyond 100m, the sediment, if it settle, is likely to be sufficiently diluted (DMRB, HD45/09) This study area may extend as necessary as the programme progresses, in order to gather relevant data from upstream or downstream of the options

11.4 Baseline Conditions

This section sets out the baseline conditions of the water environment.

Surface Watercourses

Waterbodies within the study area fall within the Thames River Basin District (RBD). The revised Thames River Basin Management Plan (RBMP) was published in February 2016.

Within the study area, the existing alignments of the A3 and M25 (Junction 10) cross three classified reaches under the Water Framework Directive (WFD, 2000/60/EC). The WFD classification details are outlined in Table 11-1. A short commentary of these reaches is provided in this section.

The distance reference point is from Junction 10 on the M25, however, all options entail work on the A3, and therefore the study area 1km buffer accounts for works north and south of this reference point:

- The River Mole - Horley to Hersham (WFD ID GB106039017621) passes under the A3 approximately 2km north of Junction 10 on the M25 and is a tributary of the River Thames, discharging 11km downstream of the study area.
- Stratford Brook (WFD ID GB106039017890) – passes under the A3 approximately 2.6km south of Junction 10 on the M25. This is a tributary of the River Wey - Shalford to River Thames confluence at Weybridge (WFD ID GB106039017630) discharging 400m downstream.
- Guileshill Brook (WFD ID GB106039017880) passes under the A3 approximately 3.6km south of Junction 10 on the M25. This is also tributary of the River Wey - Shalford to River Thames confluence at Weybridge (WFD ID GB106039017630) discharging 1.4km downstream.

Although not directly crossed, a further two WFD classified watercourses are within the study area. These are:

- The River Wey - Shalford to River Thames confluence at Weybridge (WFD ID GB106039017630) is a tributary of the River Thames.
- The Wey Navigation - Pyrford reach (WFD ID GB106039017910) located at Walsham Lock runs adjacent to the River Wey within the study area.

Table 11-1: WFD Watercourse Existing Crossings[57]

Classification Item	Classification (2015)	Predicted Outcome (2027)
River Mole - Horley to Hersham (GB106039017621)		
Morphological designation	Not designated at A/HMWB	
Protected area	Habitats and Species Directive Nitrates Directive Urban Waste Water Treatment Directive	
Overall waterbody	Moderate	Moderate
Ecological overall	Moderate	Moderate
Physico-chemical quality elements	Moderate	Moderate
Biological quality elements	Moderate	Moderate
Hydromorphological Supporting Elements	Supports Good	
Chemical overall	Good	Good
Priority hazardous substances	Good	Good
Priority substances	Good	Good
Specific pollutants		
Copper	High	High
Zinc	High	High
Stratford Brook (WFD ID GB106039017890)		
Morphological designation	Not designated	
Protected area	Nitrates Directive	
Overall waterbody	Moderate	Good
Ecological overall	Moderate	Good
Biological quality	Moderate	Good
Hydromorphological Supporting Elements	Supports Good	Supports Good
Chemical overall	Good	Good
Priority hazardous substances	Good	Good
Specific pollutants	Not monitored	
Guileshill Brook (WFD ID GB106039017880)		
Morphological designation	Not designated	
Protected area	No	
Overall waterbody	Moderate	Good
Ecological overall	Moderate	Good
Physico-chemical quality elements	Moderate	Good
Hydromorphological Supporting Elements	Supports Good	Supports Good
Chemical overall	Good	Good
Specific pollutants	Not monitored	
Within study area (not existing crossing)		

[57] *Environment Agency. 2016. Catchment Planning http://environment.data.gov.uk/catchment-planning*

Classification Item	Classification (2015)	Predicted Outcome (2027)
River Wey - Shalford to River Thames Confluence at Weybridge (GB106039017630)		
Morphological designation	Heavily Modified	
Protected area	Drinking Water Protected Area Nitrates Directive	
Overall waterbody	Moderate	Moderate
Ecological overall	Moderate	Moderate
Biological quality elements	Moderate	Moderate
Physico-chemical quality elements	Moderate	Moderate
Chemical overall	Good	Good
Specific pollutants	Not monitored	
The Wey Navigation - Pyrford Reach (WFD ID GB106039017910)		
Morphological designation	Artificial	
Protected area	Habitats and Species Directive	
Overall waterbody	Moderate	Good
Ecological overall	Moderate	Good
Physico-chemical quality elements	Moderate	Good
Supporting elements (Surface Water)	Moderate	Good
Chemical overall	Good	Good
Priority hazardous substances	Good	Good
Priority substances	Good	Good
Specific Pollutants		
Copper	High	High
Zinc	High	High

Lakes and Other Water Features

There is one WFD designated lake within 1km of the M25 J10 / A3 Wisley Interchange, this is Boldermere Lake and is designated as a Heavily Modified Waterbody (HMWB). Details of this are listed in Table 11-2.

There are numerous ponds within 1km of the M25 J10 / A3 Wisley Interchange, majority are clustered within Ockham Common and Wisley Commons SSSI, and Thames Basin Heaths SPA. their dependence on groundwater is not known. These details should be confirmed at the next stage of the assessment and are considered in an ecological context in the Nature Conservation section.

Table 11-2: WFD 'Lake' Waterbodies

Classification Item	Predicted Outcome (2021)
Boldermere (GB30643218)	
Morphological designation	HMWB
Protected area	No
Overall waterbody	Moderate
Ecological overall	Moderate
Physico-chemical quality elements	Moderate

Classification Item	Predicted Outcome (2021)
Chemical overall	Good

Groundwater

Environment Agency interactive mapping indicates that the study area is underlain by Secondary A bedrock aquifers. Secondary A aquifers are permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. Generally, these were formerly classified as minor aquifers[58].

Principal A superficial aquifers are also present within the study area, the alignment of both the Secondary A bedrock aquifer and the Principal A superficial aquifer reflects the surface hydrology, following the current or historical course of the River Wey and River Mole and is likely to be associated with the presence of river terrace gravels.

There are no groundwater Source Protection Zones (SPZ) within the study area.

The study area is underlain by one WFD ground water body. A summary of the importance of groundwater is shown in Table 11-3. The groundwater body is designated as a Drinking Water Protected Area (DWMPA).

Table 11-3: Groundwater Body within the Study Area

Classification Item	Predicted Outcome (2021)
Chobham Bagshot Beds (GB40602G601400)	
Protected area	DWPA
Overall waterbody	Good
Quantitative	Good
Chemical overall	Good

Abstractions and Discharges

The Environment Agency website indicates that there are numerous surface and groundwater abstractions within the study area. At the time of reporting, no data were available for this license. Confirmation of this is recommended at the next stage of the assessment.

At the time of reporting, no data were available for discharges. Confirmation of numbers and locations is recommended at the next stage of the assessment and therefore discharges are scoped in as further assessment is required.

Of note, spatial data for abstractions and discharges presented on the Environment Agency website can be inaccurate. Therefore, the data reviewed to date should be treated with caution and does not remove the need for a formal data request to be made.

Based on the Highways Agency Drainage Data Management System (HADDMs) there are numerous outfalls within the proposed options area. The status of these ranges from one as ‘very high risk’ to ‘low risk’.

[58] *Environment Agency 2016. Whats In Your Backyard.*

Flood Risk

Environment Agency Flooding from Rivers interactive mapping shows that Flood Zone 2 and 3 areas are present in the study area, indicating that there are areas at risk from flooding. Sources of flood risk include the following watercourses:

- Guileshill Brook.
- Stratford Brook.
- River Mole.
- River Wey.

Areas of surface water flood risk are also present, these include (but not limited to) the watercourse immediately to the east Junction 10, near Redhill Bottom and Sandpit Hill, and Boldermere Lake.

The scale of the proposed works means that it is concluded that further flood risk assessment is required.

Designated Sites

There is one SPA which is dissected by the existing alignment. This is the Thames Basin Heath SPA and a component SSSI. Part of this SPA is also Ockham and Wisley Commons. These sites consist of a large tract of heathland lying between the Mole and Wey Rivers, containing areas of heath, bog, open water, secondary woodland and scrub. In their very nature they have a direct hydrological dependency. Further details of these are described in the Nature Conservation section.

A further site, Esher Commons SSSI, is also within 1km and downstream of the M25 J10 / A3 Wisley Interchange and has a direct hydrological pathway. Further details of these are described in the Nature Conservation section.

Land Contamination

There are historic landfill sites which abut the existing alignment of the improvement works. Further details of these are described in the Geology and Soils section.

11.5 Regulatory/Policy Framework

With regard to the protection of specific water resources, water quality standards and related policy relevant to the proposed improvements these are set out in Table 11-4

Table 11-4: Water Resources Legislation

Legislation	Description
European Legislation	
Water Framework Directive 2000/60/EC)	The Water Framework Directive (WFD) requires that all inland waters within defined river basin districts 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.
Groundwater Directive (2006/118/EC)	The Groundwater Directive 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.
The 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.
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. 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.
Environmental Damage (Prevention and Remediation) Regulations (2009)	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	The Regulations aim 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. Lead Local Flood Authorities 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 • improving reservoir safety • encouraging sustainable urban drainage systems • designation of third party flood management assets • special administration regime for water companies • powers for water companies to control non-essential uses of water • various provisions relating to charging
Highways Act 1980	Where flooding on a highway is caused by another person (e.g. an adjoining landowner), the Highway Authority can take action against the person responsible.

Legislation	Description
Groundwater (England and Wales) Regulations (2009)	These Regulations implement the Groundwater Directive by preventing entry into groundwater of "hazardous substances" and the pollution of groundwater by non-hazardous pollutants. Both direct and indirect (percolation) inputs of pollutants are covered by the Regulations although a discharge which leads to a direct input of such matter is already an offence under Water Resources Act 1991.
NPPF (Department for Communities and Local Government, 2012)	The NPPF sets strict tests to protect people and property from flooding which all local planning authorities are expected to follow.
Water Act 2003	The Act requires that dewatering operations are subject to an abstraction licence except for short term situations where pumping is carried out for emergency purposes.
Water Industry Act (1991) (Amendment) (England and Wales) Regulations (2009)	Section 118 of the Act makes it an offence to discharge trade effluent to public sewers without consent. Companies can discharge their effluents into the public sewer on condition of a trade effluent discharge consent. These consents are granted by the relevant local water and sewage undertaker. The Regulations extend controls on activities to include those which cause harm to controlled waters in addition to activities which risk or cause pollution.
Water Resources Act 1991	Consolidated existing water legislation. Regulated water quality and prevention of water pollution. Created water pollution offences based on the polluter pays principle. Much of this is now covered by the Environmental Permitting Regulations
The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003	Gives effect to the European WFD and introduces a system of river basin management planning with the general aim of achieving good status of surface and ground waters by 2015.
The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015	The new Directions set out the environmental standards to be used for the second cycle of river basin plans. Along with the updated Water Environment (WFD) (England and Wales) Regulations 2003, they transpose Directive 2013/39/EC on environmental quality standards for priority substances.

11.6 Design Mitigation and Enhancement Measures

The risk of pollution during construction can be reduced by the adoption of good working practices. Environment Agency Pollution Prevention Guidelines[59] detail good practice advice for undertaking works which may have the potential to result in water pollution. In general terms, by following these guidelines, there should be no significant impacts to the water environment.

As a general rule, the proposed works should avoid encroaching within 8m[60] of a water feature if possible to avoid potential effects. Where this is not possible, further assessment will be required and there would be a need for permitting[61].

[59] *Pollution Prevention Guidelines (PPGs) with particular reference to PPG1 (general guide to the prevention of water pollution), PPG3 (use and design of oil separators in surface water drainage systems), PPG5 (works near or liable to affect watercourses) and PPG6 (working at construction and demolition sites). The PPGs contain a mix of regulatory requirements and good practice advice. They have been withdrawn by the Environment Agency but are still considered good practice advice to avoid pollution of watercourses. All of the PPGs are available from* http://webarchive.nationalarchives.gov.uk/20140328084622/http://www.environment-agency.gov.uk/business/topics/pollution/39083.aspx

[60] https://www.gov.uk/guidance/flood-risk-activities-environmental-permits

[61] https://www.gov.uk/guidance/changes-to-your-flood-defence-consent-after-6-april-2016

Water Quality

The proposed construction works have the potential to impact water quality in any of the receiving surface or groundwater receptors. This may be due to:

- The excavation, and the subsequent deposition of soils, sediment, or other construction materials.
- Spillage of fuels or other contaminating liquids.
- The mobilisation of contamination following disturbance of contaminated ground or groundwater, or through uncontrolled site runoff.

Providing adherence to best practice mitigation during the construction period, there should be no significant effects to the water environment.

During operation there would be potential impacts to water quality from discharge of polluting runoff through drainage outfalls. However, based on the modest scale of the proposed scheme options and the nature of the water environment, in conjunction with the design provisions outlined in IAN161/15 (November 2015), it is considered there should be no significant effects to the water environment.

There is potential opportunity to improve the status of existing outfalls by incorporating additional mitigation measures where appropriate.

Flood risk

Providing adherence to best practice mitigation during the construction period, there should be no significant effects to the flood risk.

During operation the proposed works have the potential to impact on flood flows in the rivers and on the floodplain because of new or altered river crossings and earthworks on the floodplain. If required, mitigation measures such as floodplain compensation storage should be designed to reduce the impact on flood risk.

The increase in impermeable area would need to be mitigated so as not to increase the risk of surface water flooding. All surface watercourses will be assessed for this impact through the DMRB tests which would also highlight the need for any mitigation measures.

Channel Morphology

All options would require new additional crossings of watercourses and the majority would require river realignments. As noted in Section 11.2, at this stage in the scheme development the nature of the crossings or realignments is uncertain, but mitigation would be required.

Temporary works (during construction) do not require a formal WFD Compliance Assessment. Water quality mitigation measures will ensure no deterioration in water quality during the construction phase and will support WFD legislation.

Direct morphological changes to the watercourses (such as new culverts or realignments) and changes in drainage patterns need to be considered with respect to the WFD. A WFD compliance assessment report should be prepared to assess the impacts and to make recommendations for mitigation or compensatory enhancements (where appropriate).

A WFD compliance assessment should be conducted in parallel to the production of the ESR to consider if the works are compliant with WFD objectives for the Thames RBMP. This assessment will help to ensure appropriate mitigation is included within the design.

The watercourses directly affected by potential morphological changes are both Main and non-Main Rivers and the lead local flood authority has a duty to ensure the works comply with the WFD. Further work will be required to ensure that the design adequately accounts for the requirements of the WFD.

Groundwater

Whilst there are no SPZs in the study area, all options being considered will cross areas defined as Secondary A Aquifer. Potential effects of the proposed scheme options may be associated with cuttings and retaining walls. In addition, construction will most likely require piling.

These works may affect the flow of groundwater in the secondary aquifer, indirectly affecting surface water features and abstractions which are dependent upon groundwater inputs. The works may introduce new pollutant pathways to the underlying aquifer. The inherent risks of contamination during construction presents a further risk to the underlying aquifer.

The inclusion of cuttings and earthworks in the proposed improvements presents a potential mechanism for impacts on groundwater level and quality. The nature of the aquifer, associated with historical and existing river channels means that any impacts on groundwater may affect surface water features. Consequently, groundwater is scoped in and will be subject to further investigation.

11.7 Potential Effects

Table 11-5 sets out a summary of the assessment results.

Table 11-5: Environmental Concerns for Each Option

Option	Environmental Concerns	Rank[62]
9	• 3 new watercourse crossings therefore potential direct water quality and morphological changes which may affect WFD status • Traverses flood risk zones both fluvial and surface water, so the increase in impermeable area due to widening works could increase surface water runoff and flood risk • Works adjacent to Boldermere WFD lake, potential impact on WFD lake status • Bisects Wisley Commons SSSI, a component asset of the Thames Basin Heaths SPA. With reference to Natural England's operations likely to damage the site, these include but not limited to drainage, modification of watercourses, the changing of water levels and tables and infilling of ditches, drains, ponds and pools • Potential effects to Secondary A bedrock aquifer and Principal and Secondary A superficial aquifers due to retaining wall works, piling, earthworks	1
14	• **3** new watercourse crossings • As per Option 9, plus the following environmental water concerns: ○ Includes works in close proximity to River Wey and River Mole and therefore potential impacts to WFD status ○ This option also includes widening on the M25, therefore the scale of works and potential impacts to the water environment have the potential to be larger	2
16	• **7** new watercourse crossings including a crossing on WFD watercourse Stratford Brook (GB106039017890) therefore potential direct water quality and morphological changes • As per Options 9 and 14, plus the following environmental water concerns: ○ Potential effects to Secondary A bedrock aquifer and Principal and Secondary A superficial aquifers has the potential to be larger than Options 9 and 14 due to works such as installation of gantries, and tunnelled structures, which are in addition to retaining walls, these could introduce a potential pollution pathway to groundwater ○ Option 16 also includes larger widening works on the M25 and therefore the scale of works and potential impacts to the water environment have the potential to be larger ○ The reconfiguration of junctions has the potential to effect spillage risk (both benefit or adverse	3

62 Key: 1 = Least environmental impact; 3 = most environmental impact

11.8 Limitations to Assessment

- Conservative estimates for importance of attributes have been assigned where there is potential for variation within the options *or* the importance is not yet definable due to lack of information.
- Data quality – desk study, using mainly web-based data has only been reported at this stage and therefore the level of detail for certain topics, such as abstractions and discharges is limited/unknown.
- Data quantity – as per quality, only open, freely licensed data has only been reported at this stage and therefore the amount of detail on certain topics is limited.
- No consultation with stakeholders has been undertaken to date.
- The assessment considers the most recent option alignment designs. Should any of the option alignments change, the water environment baseline conditions may be subject to change.
- All rivers/drains have been assigned an equal weighting in the assessment.
- The assessment is based on existing data sources and has not been verified through a site walkover survey.
- It is assumed that the provision of mitigation or compensation for any effects will be equally effective for each option. To date, no investigations have been made of potential opportunities to mitigate scheme effects which may only be associated with particular route alignments.
- The feasibility of adapting drainage infrastructure to derive benefits to the water environment has not been investigated.
- The vulnerability of the Secondary Aquifer is assumed to be consistent between the options.
- It is assumed that cumulative effects will be comparable for each route option.

11.9 Recommendations

One of the key recommendations for all water topics is a data request to the Environment Agency to refine the data collated at scoping stage. Table 11-6 sets out the recommendations for the next stage of the assessment.

Table 11-6: Recommendations

Water Topic	Recommandations
Surface water (including other Surface water features)	Source details of the proposed drainage strategy Source proposed traffic volume data Consider the implications of how the existing baseline may/may not as a consequence of climate change Review any contaminated land investigation which will refine the groundwater pathways and receptors
Groundwater	A data request to source details of the aquifer
WFD compliance assessment (surface and groundwater)	Site visits/surveys (ecological, geomorphological) to set the baseline and then the mitigation requirements would be proposed for the design Consultation with the Environment Agency to determine if a WFD compliance assessment is required and the scope of the assessment

Water Topic	Recommandations
	Geomorphology and WFD assessment criteria to be confirmed. It is anticipated this will be on professional judgement, experience and close communication with the Environment Agency and other relevant stakeholders during the EIA process
Abstractions and discharges	Further investigation in abstractions to ensure local abstraction is not affected
Flood risk	Consultation with the Lead Local Flood Authority and the Environment Agency in developing appropriate mitigation for surface water and groundwater management Liaison with the Environment Agency to obtain the available modelling Hydraulic modelling to assess the impact upon flood risk and to determine mitigation requirements Undertake an FRA with consideration of all sources of flood risk, including groundwater and climate change Reporting on the FRA, prepared in accordance with the guidance in DMRB HD45/09 (which complements NPPF)
Cumulative impact assessment (CIA)	In combination effects and cumulative impacts from other proposed schemes should be considered to ensure risks are captured and the aims of these disciplines and schemes are not undermined

All options could potentially, without appropriate mitigation, result in a deterioration of the water environment with potentially significant effects through construction and/or operation.

The very high importance of a range of receptors and potential impacts from cuttings and crossing watercourses and their floodplains will all need to be assessed in detail at the next stage. This assessment will need to be underpinned by both desk-based analysis and fieldwork as set out in the table above.

12 Geology and Soils

12.1 Introduction

This section presents a summary of the indicated ground conditions relevant to the three proposed scheme options for the upgrade of the M25/A3 interchange at Junction 10 (J10). It includes a high level preliminary geotechnical assessment, a review of historical land use and potential land contamination and outlines the preliminary geotechnical and geoenvironmental considerations/risks. Where applicable, relevant geological designated sites, active landfills/historical landfills and the quality of soils/agricultural land classification within and adjacent to the site have also been identified.

12.2 Assessment methodology

The assessment has been carried out in accordance with:

- the technical framework for structured decision-making about land contamination set out in Model Procedures for the Management of Land Contamination, Environment Agency Contaminated Land Report (CLR)11 (September 2004);
- guidance in DMRB Volume 11, Section 3, Part 11 - Geology and Soils (June 1993) in conjunction with supplementary guidance in IAN 125/15 – Environmental Assessment Update (Highways England, October 2015);
- guidance in DMRB Volume 4, Section 1, Part 2 – Managing Geotechnical Risk (HD 22/08) (August 2008); and
- the requirements and advice in IAN 161/15 – Smart Motorways (November 2015).

12.3 Study area

The assessment of geology and soils has been carried out over a study area that accounts for all three of the proposed J10 scheme options, encompassing:

- a 5.6km stretch of the A3 which runs in a north-east to south-west direction from A3 Ockham Park Junction, approximately 2.5km to the south-west of J10, to the crossing of Old Common Road under the A3, approximately 3km to the north-east of J10;
- a 2.7km stretch of the M25 which runs in a north-west to south-east direction from Buxton Wood footbridge approximately 1.3km to the north-west of J10, to Hatchford Park footbridge situated approximately 1.3km to the south-east of J10; and
- a 500m buffer zone from the proposed extent of earthworks and the existing M25 J10 layout.

Where the A3 and M25 meet at J10, they consequently split the site into four quadrants. For the purpose of facilitating this report, within Section 12 quadrants are referred to as the north, south, east and west quadrants. Any distances provided in Section 12 are reported from the closest point of the site boundary to the feature.

12.4 Baseline conditions

Sources of information

Baseline information was gathered from the readily available sources listed below. As such, it should be noted that this high level desk based assessment is indicative only at this stage and is pending the findings of a future geotechnical desk study and investigation:

- British Geological Survey (BGS) 'Geology of Britain Viewer', 1:50,000 (http://mapapps.bgs.ac.uk/geologyofbritain/home.html), accessed 12/07/2016
- British Geological Survey Lexicon (http://www.bgs.ac.uk/lexicon), accessed 12/07/2016
- British Geological Survey Borehole Scans (http://mapapps.bgs.ac.uk/boreholescans/boreholescans.html), accessed 12/07/2016
- British Geological Survey, England and Wales Sheet 285 Guildford Solid and Drift Geology, 1:50,000, BGS, 2001
- BGS Mining Access Portal: (http://mapapps2.bgs.ac.uk/mineplans/home.html) accessed 13/07/2016
- BGS Coal Authority interactive Map: (http://mapapps2.bgs.ac.uk/coalauthority/home.html), accessed 12/07/2016.
- Department for Food, Environment and Rural Affairs interactive 'MAGIC' map (http://magic.defra.gov.uk/, accessed 12/07/2016);
- Environment Agency What's In Your Backyard website (http://apps.environment-agency.gov.uk/wiyby/default.aspx, accessed 12/07/2016
- HE, n.d. *Highways England Agency Geotechnical Data Management System (HAGDMS) v5.6.0.* [Online] Available at: (http://www.hagdms.co.uk/), accessed 13/07/2016
- Natural England Designated Sites View website: (https://designatedsites.naturalengland.org.uk), accessed 13/07/2016
- Natural England Agricultural Land Classification Map of England and Wales: (http://publications.naturalengland.org.uk/publication/141047?category=5954148537204736), accessed 12/07/2016

An Envirocheck report was also purchased from Landmark Information Group on 12/07/2016 (held by Atkins and presented in Appendix I) and was utilised for this study. It should be noted that the data within the Envirocheck report is limited to the area around J10, and data for the furthermost north-eastern and south-western extents of the scheme will be purchased at a later date once the preferred option has been selected and the scheme extents finalised.

This preliminary high level desk study assessment excludes the following at this stage:

- a full review of historical borehole records;
- information from flood assessment data;
- a literature review of the local area;
- mining reports;

- Envirocheck data for the furthermost north-eastern and south-western extents of the scheme; and
- UXO reports.

Due to the high level nature of this desk study, encompassing all three options proposed at this stage, some of the information presented in the above sources may identify additional effects on the proposed scheme. It is therefore recommended that in accordance with HD 22/08, a full Preliminary Sources Study Report is carried out prior to preliminary design stage.

Current site setting

The study area comprises the M25 J10 roundabout, which acts as an interchange between the M25 and A3. The site encompasses a 2.7km stretch of the M25 orientated approximately north-west to south-east and a 5.6km stretch of the A3 which is orientated approximately south-west to north-east. As well as providing an interchange between the M25 and the A3, the roundabout also acts as a turn-around point for vehicles travelling northbound on the A3 that wish to access Old Lane, which is currently only accessible from the A3 via the southbound carriageway. The A245 passes over the A3 approximately 2km north of J10; the A245 links the towns of Cobham, which is situated approximately 3km north-east of J10 and Byfleet, which is situated approximately 3.5km to the north-west.

The majority of the surrounding area comprises woodland. The west quadrant of the site is largely occupied by Wisley Common, with some open space approximately located 600m to the west of J10 used as Birchmere Scout Camp. Land in the south quadrant of the site is occupied by Ockham Common (also named Sandpit Hill on historical maps), Chatley Heath and Hatchford Wood. Land in the north and east quadrants are dominated by woodland and fields, namely Buxton Wood, Clearmount, Red Hill, and Chatley Wood, however there is some development to the north-east of the aforementioned woodland.

A large residential area occupies land alongside the southbound carriageway of the A3, approximately located at National Grid Reference (NGR) 510268E, 160900N to the north-east of J10. Detached residential properties and farmhouses are located alongside Pointers Road, which runs parallel to and approximately 100m to the north of the M25 in the east quadrant of the site.

A small industrial estate is indicated at Bramley Hedge Farm approximately 600m to the north of J10.

Further isolated areas of commercial, recreational, agricultural and residential development include:

- the Royal Horticultural Societies Garden in the east quadrant of the site, approximately 1.7km to the south-west of J10;
- cottages at Elm Corner in the south quadrant of the site, approximately 1.4km to the south-west of J10;
- Park Barn Farm (also known as Pond Farm) and Hut Hill Cottage in the west quadrant of the site approximately 700m to the west and south-west of J10 respectively;
- an area in the north quadrant of the site approximately 1km to the north north-east of J10 bound by the northbound A3 carriageway, Byfleet Road and Redhill Road, where Feltonfleet School, Seven Hills Hotel, Silvermere Golf Club, Long Orchard Farm, Bramley Hedge Farm and detached residential properties are present;

- Hatchford Manor is located in the south quadrant of the site, approximately 1.4km to the south-east of J10;
- Foxwarren park is located in the north quadrant of the site, approximately 600m to the north of J10; and
- Painshill Park is a site of Roman buildings located in the east quadrant of the site adjacent to the River Mole approximately 900m to the north-east of J10; Painshill Park is accessed from the A245 and is situated adjacent to the southbound side of the A3 carriageway, between Cobham and the A3. Painshill Park comprises two historic buildings known as Charwell House and Gothic Tower;

There are environmentally important sites adjacent to J10. The MAGIC website indicates that large areas of the south and west quadrants of the site, as well woodland in the north quadrant of the site and parts of Red Hill in the east quadrant of the site are together designated as a Site of Special Scientific Interest (SSSI)[63] and a Local Nature Reserve (LNR)[64], collectively known as 'Ockham and Wisley Commons'. This area, excluding the woodland in the north quadrant of the site and Red Hill in the east quadrant of the site, is also designated as a Special Protection Area (SPA)[65]; known as Thames Basin Heath.

Roman buildings of historic interest are also located within close proximity to the north-east quadrant of J10.

Site history

The earliest available historical maps date from 1870 and latest available date from 1996. The historical development at the site is summarised in Table 12-1.

Table 12-1: Historical development of the site and surrounding area

Date	Summary of development at the site and surrounding area
1871	Two unnamed roads of similar alignment to the current day A3 and A245 are present; the generally north-south aligned road (assumed to be the current day A3) terminates approximately 2km north-east of the current J10 roundabout, at the generally east-west orientated unnamed road (assumed to be the current day A245, also known as Byfleet Road to the west and Portsmouth Road to the east of the intersection). Several roads and tracks lead off from the A3-aligned road, including roads at similar alignments to the current configuration of Pointers Road adjacent to the north of the current J10 roundabout, Old Lane approximately 600m to the south-west of the current J10 roundabout, Redhill Road approximately 550m to the north-east of the current J10 roundabout, and Seven Hills Road approximately 1.6km to the north-east of the current J10 roundabout. In general, land around the area of the current J10 roundabout is dominated by woodland and rough pasture. Large areas of woodland and heathland are mapped as Wisley Common, Ockham Common and Chatley Heath to the south-west, south and south-east of the current J10 roundabout respectively. Open fields are mapped beyond the heathland, woodland and rough pasture in all directions. A number of small tracks intersect the surrounding land. Small residential developments are mapped at Foxwarren (approximately 600m to the north of the current J10 roundabout), Elm Corner (approximately 1.4km to the south-west of the current J10 roundabout) and Street Cobham (approximately 2.3km to the north-east of the current J10 roundabout). Two gravel pits are located at Cockcrow Hill and Sandpit Hill in the south-western section of the current J10 roundabout; situated either side of the single lane unnamed A3-aligned road. Two

[63] Sites of Special Scientific Interest (SSSIs) are protected under the Wildlife and Countryside Act 1981 (as amended) and The Countryside and Rights of Way Act 2000.
[64] Local Nature Reserves (LNRs) are protected under the National Parks and Access to the Countryside Act 1949.
[65] Designated under Article 4.1 of EC Directive 79/409 on the Conservation of Wild Birds (the Birds Directive)

Date	Summary of development at the site and surrounding area
	sand pits are located within woodland 250m and 450m to the north-east of the current J10 roundabout. Pond Farm is located approximately 550m to the west of the current J10 roundabout, where a third sand pit is located. Four fish ponds are mapped within the site, including one at Pond Farm 500m to the west of the current J10 roundabout, one 200m to the east of the current J10 roundabout which appears to have been embanked on the eastern side, Manor Pond located approximately 2km to the north-west of the current J10 roundabout (although it is mapped as 'fish pond'), and Boulder Mere, which is situated approximately 700m to the south of the current J10 roundabout. 'Currie's Clump', which appears to be a site of archaeological interest, is present within woodland, approximately 450m to the south of the current J10 roundabout. A series of linear features, assumed to be tracks, appear to extend northwards from an assumed disused pit approximately 300m to the south of the current J10 roundabout.
1896	A gas works is mapped to the north-west of Street Cobham, approximately 2.3km to the north-east of the current J10 roundabout. The gravel pit at Sandpit Hill appears to have approximately tripled in size. The sand pit 250m to the north-east of the current J10 roundabout is now mapped as an 'old' sand pit. The sand pit at Pond Farm is no longer mapped. Further residential development has taken place at Street Cobham.
1914-1920	The roads at similar alignments to the current Old Lane and Pointers Road are identified as per their current names. The assumed tracks and disused pit 300m to the south of the current J10 roundabout are no longer mapped. The gravel pits at Cockcrow Hill and Sandpit Hill appear disused and trees are mapped within them. A sewage works is mapped adjacent to the gas works at Street Cobham. Residential development at Church Cobham has taken place adjacent to Cobham Street. Manor Pond is identified as per its current name. The Royal Horticultural Society (RHS) gardens are mapped approximately 1.6km to the south-west of the current J10 roundabout.
1936	Land immediately south of Foxwarren has been cleared of woodland and is mapped as 'Deer Park'. A number of ponds have been developed at Foxwarren. The gas works near Cobham Street is no longer mapped. The sandpit 450m to the north-east of the current J10 roundabout now appears disused and trees are mapped within it. Street Cobham and Church Cobham are now mapped as Cobham.
1961	The fish pond in the eastern section of the site is no longer mapped. Two tumuli are mapped approximately 150m and 350m to the south-west of the current J10 roundabout, however these are expected to have been long standing in the area.
1972-1973	The A3-aligned unnamed road is also mapped as Portsmouth Road. Car parks have been built either side of Portsmouth Road approximately 500m south of the current J10 roundabout. A small building has been constructed adjacent to 'Currie's Clump'. A significant number of roads and paths are mapped in surrounding woodland and heathland, particularly to the west and to the south of the current J10 roundabout. Some of these are shown to join Portsmouth Road. The previously unnamed road 550m to the north-east of the current J10 roundabout is now mapped as Redhill Road. The smaller tumulus mapped 350m to the south-west of the current J10 roundabout is mapped as a mound. Another slightly smaller mound is mapped approximately 350m to the north-west of the current J10 roundabout. These mounds are expected to have been long-standing in the area. A pond is shown within Chatley Wood, approximately 350m to the east of the current J10 roundabout. A number of new buildings have been constructed at Pond Farm. Highlands Farm occupies land approximately 600m north of the current J10 roundabout, where Brambley Hedge Farm is currently located.

Date	Summary of development at the site and surrounding area
1975-1977	The roads of similar alignments to Seven Hills Road and Byfleet Road are now identified as per their current names. Works appear to have been carried out to develop Portsmouth Road into a dual carriageway, including the development of earthworks. Two car parks are mapped adjacent to Old Lane approximately 600m to the south of the current J10 roundabout. Ockham Park Junction has been developed to its current configuration approximately 2.5km to the south-west of the current J10 roundabout. The area surrounding the site is generally mapped as woodland with less rough pasture than previously.
1989-1992	The M25 has been constructed. The A3-aligned portion of Portsmouth Road is mapped as the A3 and has been extended northwards beyond the current day A245 intersection; the extension, mapped as Esher Bypass, allows the A3 to bypass Cobham. Portsmouth Road is mapped as Portsmouth Road A245. The M25, A3 and A245 within the vicinity of the site are mapped as per their current configuration. A significant amount of earthworks have been carried out to accommodate the new road construction. Overbridges connecting various tracks, paths and roads within the surrounding woodland and heathland are mapped over the M25 and A3 approximately 1.2km to the west, 600m to the west, 400m to the south, 1.6km to the south-west, and 1.2km to the south-east of the current J10 roundabout. Several new roads and tracks are shown in the woodland and heathland surrounding the existing J10 roundabout. Some of the previously mapped roads/tracks have been realigned. A superstore is now mapped where the sewage works to the north-east of the current J10 roundabout was mapped.
1992	Bramble Hedge Farm Industrial Estate is located in the area once occupied by Highlands Farm, where a builder's yard is mapped.
1996	No significant changes.

Environmental datasheets, taken from the site specific Envirocheck report, identified the following features and land uses which historical maps did not reveal:

- a small business park, containing a number of commercial services is located alongside Redhill Road, approximately 60m to the west of the site. Commercial activities include garden machinery services, car body repairs, vehicle dealers, wood and furniture polishers, garage services, picture frame renovations, pest control services and stationery printers;
- an unused weir or sluice is located 250m to the east;
- historical landfill sites including: 'Land at Pond Farm' approximately 600m to the west of J10; 'Land at East of Buxton Wood' situated adjacent to the anticlockwise carriageway of the M25 at the north-western extent of the site; 'Chatley Farm' 130m to the north of the M25 anticlockwise carriageway at the south-eastern extent of the site; 'Old Rectory Farm' adjacent to the southbound A3 carriageway at the south-western extent of the site; and 'Cobham Bridge' adjacent to the northbound carriageway of the A3 at the north-eastern extent of the site; and
- potential infilling of other ponds / pits located circa. 277m east, 302m north-west, 335m north-east and 357m to the north-west.

Geology

Structural geology

The study area is situated approximately 8km south of the axis of north-east to south-west trending London Basin syncline.

No faults are shown near to the study area within the available resources.

Artificial deposits

Activities and land uses which potentially involve infilling of ground have been identified within the vicinity of the study area, including landfill sites and infilled ponds. Made Ground associated with the construction of the M25 and A3 carriageways and localised infrastructure, including construction of the roads, earthworks and structures is expected within the study area.

For the purposes of this report, artificial ground has been categorised as Landfill Material, associated with the identified landfill sites only, and Made Ground, associated with all other manmade infilling and backfilling activities.

Superficial deposits

Geological mapping suggests that no superficial deposits are expected over the majority of the site. Alluvium associated with the River Mole and another unnamed waterway is indicated to be present at the north-eastern and south-western extents of the site respectively. Lynch Hill Gravel Member (formerly known as Lynch Hill Gravel Formation) is indicated to be present locally across the site. Kempton Park Gravel Member (formerly known as the Kempton Park Gravel Formation) is indicated to be present at the north-western extent of the site. Taplow Gravel Member (formerly known as Taplow Gravel Formation) is indicated to be present at the north-eastern extent only. Boyn Hill Gravel Member is indicated to be present approximately 500m to the east of the north-eastern extent of the site.

Alluvium typically comprises soft, compressible sandy silty clay, with occasional sand, peat or organic rich layers. The Lynch Hill Gravel Member, Kempton Park Gravel Member and Taplow Gravel Member are members of the Maidenhead Formation, and typically comprise sand and gravel, with localised lenses of silt, clay and/or peat.

Bedrock geology

The underlying solid geology is anticipated to comprise Bagshot Formation of the Bracklesham Group. The Bagshot Formation is generally described as cross-bedded/ sometimes laminated, yellow or grey, fine to coarse grained sand with occasional clay and sparse glauconite and seams of gravel.

The London Clay Formation underlies the Bagshot Formation, and is generally described as a bioturbated or poorly laminated, fissured, blue-grey or grey-brown (when weathered) silty to very silty clay. The Claygate Member forms the uppermost beds of the London Clay Formation, and is generally of similar composition to the London Clay Formation although with a higher proportion of sand, typically formed as laminae. The BGS maps indicate that London Clay Formation forms the bedrock geology at the south-western extent of the site, and 600m to the south-east of the south-eastern site extent where Claygate Member is mapped. This suggests that the Bagshot Formation tapers towards the south and to the east, until it is no longer present in these areas.

Summary of anticipated geology

Table 12-2 summarises the anticipated ground conditions expected at the site.

Table 12-2: Summary of anticipated geology

Group	Formation	Thicknesses (m)	Top depth encountered in BGS boreholes (m bgl)	Location and description (BGS Lexicon)
Artificial deposits	Landfill Material	Unknown – not encountered BGS in boreholes.	Anticipated to be ground level – not encountered BGS in boreholes.	Materials deposited in various landfill sites identified within the study area. The exact composition remains unknown although where records are available, the landfills are recorded as comprising inert material. Likely materials include glass, concrete, bricks, tiles and stones.
	Made Ground	Unknown – not encountered BGS in boreholes.	Anticipated to be ground level – not encountered BGS in boreholes.	Highly variable materials associated with construction or infilling of ground. Made Ground is anticipated at embankments and slip roads associated with the M25 and A3 and possibly at infilled ponds indicated within the Envirocheck datasheets. Made Ground will likely comprise reworked Lynch Hill Gravel Member and Bagshot Formation.
Fluvial Deposits	Alluvium	3.5 – 5 at the north-eastern extent; 2.2 at the south-western extent (only encountered in TQ05NE25)	Ground level	Anticipated at the north-eastern and south-western extents of the site only. Normally soft to firm consolidated, compressible silty clay, but can contain layers of silt, sand, peat and basal gravel. A stronger, desiccated surface zone may be present.
Maidenhead Formation	Lynch Hill Gravel Member	3.5 (only encountered in TQ06SE167)	Ground level	Sand and gravel, locally with lenses of silt, clay and/or peat.
	Kempton Park Gravel Member	2.7 at the north-western extent; 1 – 3 at the south-western extent	Ground level	Anticipated at the western sections only. Sand and gravel, locally with lenses of silt, clay and/or peat.
	Taplow Gravel Member	1.4 - 6	Ground level	Anticipated at the eastern sections only. Sand and gravel, locally with lenses of silt, clay and/or peat.
Bracklesham Group	Bagshot Formation	Thinning towards the south and to the east; 7.5 - 24+	Ground level.	Expected to be absent locally at the south-western extent of the site. Generally pale yellow-brown to pale grey or white, locally orange or crimson, fine- to coarse-grained sand that is frequently micaceous and locally clayey, with sparse glauconite and sparse seams of gravel. Commonly cross-bedded but some are laminated. Thin beds and lenses of laminated pale grey to white sandy or silty clay or clay ('pipe-clay') occur sporadically, becoming thicker towards the top of the formation. A thick clay bed, the Swinley Clay Member, is included at the top. In places, there is a basal bed of gravelly coarse-grained sand.

Group	Formation	Thicknesses (m)	Top depth encountered in BGS boreholes (m bgl)	Location and description (BGS Lexicon)
Thames Group	London Clay Formation	17.5+ (maximum thickness observed in TQ05NE343, base unproven).	22 near to J10 (TQ05NE57); 24m at the western extent (TQ05NE343); 7.5m at the eastern extent (TQ05NE128); 6m at the southern extent (TQ05NE22); and not encountered in records at the northern extent (>7.6m in TQ16SW5)	Mainly comprises bioturbated or poorly laminated, blue-grey or grey-brown, slightly calcareous, silty to very silty clay, clayey silt and sometimes silt, with some layers of sandy clay. Commonly contains thin courses of carbonate concretions ('cementstone nodules') and disseminated pyrite. It also includes a few thin beds of shells and fine sand partings or pockets of sand, which commonly increase towards the base and towards the top of the formation. At the base, and at some other levels, thin beds of black rounded flint gravel occurs in places. Glauconite is present in some of the sands and in some clay beds, and white mica occurs at some levels.

Hydrogeology

Localised superficial deposits are anticipated at the site; the majority of the site directly overlies bedrock geology. The Lynch Hill Gravel Member and Alluvium are designated by the Environment Agency as Secondary A aquifers[66]. The Kempton Park Gravel Formation and Taplow Gravel Formation are designated by the Environment Agency as superficial Principal aquifers[67].

The Environment Agency has classified the Bagshot Formation (which underlies the majority of the site) as a bedrock Secondary A aquifer, with intermediate / high leaching potential. Most of the London Clay Formation is designated by the Environment Agency as unproductive strata, however the uppermost beds (Claygate Member) are designated as a Secondary A aquifer.

The Envirocheck report identifies that the Royal Horticultural Society (RHS) holds five groundwater abstraction licences within the vicinity of the site for spray irrigation, operating 300-400m to the north of the south-western extent of the site. A groundwater abstraction licence is also recorded in the Envirocheck report for a seed production company at Chilbrook Farm, 500m to the north-west of the south-eastern extent of the site.

There are no groundwater Source Protection Zones (SPZ) located within the study area. The site is not subject to tidal influence.

BGS borehole logs suggest that groundwater may be encountered in discrete granular layers of the Bagshot Formation at approximately between 1.5m and 5.0m below ground level. BGS records indicate that groundwater was encountered within the superficial deposits between 0.4 and 2.8m bgl at the north-western extent, 1.3 and

[66] *A Secondary A aquifer is defined as an aquifer with, 'permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers'.*

[67] *A Secondary (undifferentiated) aquifer is defined as an aquifer that 'has been assigned in cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type'.*

4.0m bgl at the north-eastern extent, and 0.4m to 1.0m bgl in the south-western extent of the site. Artesian groundwater conditions were observed in the south-eastern extent of the site on 30 January 1968 in TQ05NE25 and TQ05NE24, with ground water levels rising to up to 0.3m above ground level.

The site is located in a Surface Water Safeguard Zone.

Hydrology

Five ponds or lakes are located within the site vicinity as follows:

- adjacent to the A3 southbound carriageway in the south quadrant of the site approximately 800m to the south-west of J10 (Bolder Mere);
- adjacent to Pond Farm in the west quadrant of the site approximately 450m to the south-west of J10;
- in Chatley Wood in the east quadrant of the site approximately 350m to the east of J10;
- adjacent to Byfleet Road (A245) in the north quadrant of the site approximately 2km to the north-east of J10 (Manor Pond); and
- adjacent to Painshill Park in the east quadrant of the site approximately 1.2km to the north-east of J10 ('The Lake')

The River Mole meanders through farmland and Painshill Park in the east quadrant of the site, and crosses under the A3 at the north-eastern extent of the site where it flows in a northerly direction. The River Wey runs 150m to the west of the north-western site extent at its closest point to the site, and crosses the M25 approximately 1.8km to the west of J10. A number of drains and tertiary rivers are located within the vicinity of the site. The surface water features are discussed in greater detail within Section 11.

The Environment Agency website indicates that Flood Zones 2 and 3 are present within the site boundary; namely, at the south-western extent, where an unnamed water course or drainage feature crosses A3 at Ockham Park Junction, around the western extent, associated with the River Wey and associated with the River Mole in the eastern and northern sections of the site.

The Envirocheck report indicates the presence of seven surface water abstraction points located within the vicinity of the site. Five are licenced to the Royal Horticultural Society 350m to the north-western of the south-western extent of the site. Licences are also recorded for abstractions from the River Wey at Manor Farm 300m to the north of the M25 at the north-western extent of the site, and also from the River Mole at Painshill Park 350m to the south-east of the A3.

Mining activity and quarrying

The site is not located in an area affected by large scale mining or quarrying activities, based upon a review of the Coal Authority interactive map viewer and BGS non-coal mining plans. There are, however, a number of old sand and gravel pits located on and in close proximity to the site, where localised infilling of ground may have occurred.

In particular, attention should be drawn to Ockham Common Sand Pit (mapped as Sand Pit Hill throughout the historical maps) and Red Hill Sand Pit (mapped as 'Old Sand Pit' in the map dated 1897). These appear to have been historically situated at the location of the current A3 Junction 10 southbound on slip roundabout and 350m to the north-east of the current J10 roundabout respectively. They are both recorded within the Envirocheck report as BGS recorded mineral sites.

Geological SSSI

Whilst the majority of the site is located within the Ockham and Wisley Commons SSSI, this designation is as a result of the biodiversity that arises from the heathland present and not as a result of geological interest specifically. Further details of the SSSI designation can be found within Section 8.

There are no Regionally Important Geological Sites reported within 250m of the site on the MAGIC website.

In summary, no further consideration of special geological features is required for any of the proposed scheme options.

Quality of Soils / Agricultural Soils Classification

The land within the study area is classified as Non-Agricultural Land, which is predominantly in urban use or is other land not in agricultural use.

The site is partially located within a Nitrate Vulnerable Zone (eastern extent of the site).

Ground stability

The 1:50,000 scale ground stability maps provided within the Envirocheck report have been used to inform the potential for ground stability hazards at the site.

The potential for compressible ground as a stability hazard is shown as moderate where Alluvium is anticipated, and very low where Made Ground is anticipated.

The potential for running sand as a stability hazard is shown as low where Alluvium and Bagshot Formation are anticipated, and very low where Kempton Park Gravel Member and Lynch Hill Gravel Member are anticipated.

The potential for shrinking or swelling clay as a ground stability hazard is shown to be very low where Alluvium is anticipated, and low where London Clay Formation is anticipated at or near the bedrock surface.

The potential for collapsible ground as a stability hazard is shown as very low across the site.

The potential for landslides as a ground stability hazard is shown to be very low for the majority of the site. At the northern extent of the site, where the A3 crosses the river Mole, there is a low potential for landslides as a ground stability hazard.

Contaminated land

The Environment Agency website identifies the following historical landfill sites within the site, which are not registered as still active:

- Land at East of Buxton Wood is shown adjacent to the northern boundary of the far western extent of the site along the M25. This accepted inert wastes between 1981 and 1984;
- Land at Pond Farm is shown approximately 80m to the south of the western extent of the M25 section of the site. This accepted inert waste between 1981 and 1982;
- Chatley Farm is shown approximately 50m to the north-east of the eastern extent of the site (the M25). This site accepted inert waste between 1982 and 1993;

- Old Rectory Farm is shown adjacent to the southern extent of the A3 section of the site. Records for the types of waste and the dates of operation are unavailable; and
- Cobham Bridge is shown adjacent to the northern extent of the site. This accepted inert waste between 1986 and 1987.

Silvermere Pet Cemetery, Dunsborough Farm, Pointers Farm and Norwood Farm are also historical landfills recorded within the vicinity of the site, although beyond 500m from the currently proposed scheme options.

There is potential for Made Ground and any related contamination to be present, associated with the infilling of ponds, road construction (including embankments) and with the potential infilling of gravel and sand pits. Particular focus should be paid to the large sand pit located on the south-east quadrant of the existing junction. This pit was first detailed on maps from 1897 and appeared to have been not in use after 1919, at which time trees were growing from the centre of the pit. A gravel pit was also once present either side of the A3 on what is now occupied by the current location of the southern section of Junction

A number of potentially contaminative land uses have been operating within the immediate vicinity of the study area including those commercial services located within a small business park alongside Redhill Road approximately 80m to the west of the site (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 historical builder's yard located 30m to the west of the site (along Redhill Road) and an unused weir or sluice 250m to the east.

There are six recorded pollution incidents which have occurred within the vicinity of the site. Of these only one was deemed a significant incident by the Environment Agency. This occurred in 1997 in Painshill Park Lake which is connected to the River Mole. No details of this event are provided. The other five recorded pollution incidents which occurred within the vicinity of the site are considered to have been minor incidents affecting controlled waters from the release of sewage, oils and chemicals. These incidents occurred between 1994 and 1998 alongside the M25.

Existing earthwork condition

Earthworks are inspected and geotechnical observations are recorded in accordance with Highways England guidance in the DMRB Volume 4, Section 1, Part 3 – Maintenance of Highway Geotechnical Assets (HD 41/15). Observation classification is determined based on the feature and its location observed during walkover inspections.

A review of the Highways England Geotechnical Data Management System (HA GDMS) identified that all earthworks located adjacent to the A3 or M25 within the study site are classified as being in either 'A – As New', 'B – More than satisfactory' or 'C – Satisfactory' condition in accordance with Schedule 14 of the M25 Design, Build, Finance and Operate contract (Connect Plus Services, Geotechnical Asset Condition Methodology, June 2011).

The HA GDMS identifies six minor defects and fifteen at risk areas within the site. Of the fifteen at risk areas, nine of the records relate to the landfill sites previously mentioned. The unique references and a description of these geotechnical observations is summarised in Tabble 12-3, with the records relating to landfill sites omitted.

Table 12-3: Geotechnical observations within HA GDMS

Feature ID, as recorded on HA GDMS	Classification, in accordance with HD41/15	Description
3_A3_55384_540968	2 – At risk area	Undermined safety barrier foundations adjacent to bridge. Unknown embankment stability due to veg cover. Potential subsidence.
3_A3_55384_540969	2 – At risk area	Undermined safety barrier foundations adjacent to bridge. Unknown embankment stability due to veg cover.
3_A3_55386_495751	1D – Minor defect	Minor erosion w/ dislocated and blocked slope channel.
3_A3_55486_540913	2 – At risk area	Severe burrowing in mid to upper slope – rabbit warren or badger set, significant spoil, minor collapse
5_A3_14705_533343	1D – Minor defect	Slip at bottom of cutting. Obscured by veg.
5_A3_14753_543282	1D – Minor defect	Erosion 1.5m wide due to runoff from adjacent hillside.
5_M25_12962_536640	1D – Minor defect	Excavation at toe 0.3m high resulting in minor slip, due to installation of chamber.
5_M25_12962_536641	2 – At risk area	Unbackfilled excavation 0.5m height.
5_A3_14072_506047	1D – Minor defect	Slope slightly uneven and some burrows noted but no cracking.
5_A3_14660_421156	1D – Minor defect	Tension crack ~20cm wide.
5_M25_12989_536658	2 – At risk area	Tear in geogrid due to signpost construction.
5_M25_12989_536656	2 – At risk area	Defective geogrid (torn).

12.5 Regulatory / Policy Framework

This assessment has been prepared in line with the National Planning Policy Framework 2012 which states that the site should be suitable for its new use. The suitable for use designation takes account of ground conditions and land instability, including issues arising from natural hazards or former activities, and pollution arising from former land uses.

This section highlights the regulations and policy directly concerning geology and soils for the M25 J10 proposed options. The applicable regulations, policy and guidance documents are outlined below:

- Mines and Quarries Act 1954;
- Control of Pollution Act 1974;
- Wildlife and Countryside Act 1981 (amended 1985) (for Geological SSSIs);
- Environmental Protection Act 1990 (c. 43), as amended by the Environment Act 1995;
- Town and Country Planning Act 1990;
- Anti-Pollution Works Regulations 1999;
- Pollution Prevention and Control Act 1999;
- Water Framework Directive 2000 (2000/60/EC);
- Contaminated Land (England) Regulations 2000;
- Control of Pollution (Oil Storage) (England) Regulations 2001;
- Control of Substances Hazardous to Health (COSHH) Regulations 2002;

- Water Resources Act 2003;
- Mole Valley Local Plan (Mole Valley District Council, 2000;
- The Dangerous Substances Directive (78/44/EEC) (replaced by the CLP Regulation, 2008);
- Safeguarding our Soils – A Strategy for England 2009;
- Waste Management Regulations 2011;
- National Planning Policy Framework 2012;
- National Networks National Policy Statement 2014;
- DMRB Volume 11, Section 3, Part 11 (as amended), 1993;
- Interim Advice Note 125/15 (2015);
- DMRB Volume 4, Section 1, Part 2 (HD 22/08) (2008);
- DMRB Volume 4, Section 1, Part 3 (HD 41/15) (2015);
- MCHW Volume 1, Series 600 (2016);
- MCHW Volume 2, Series 600 (2016);
- MCHW Volume 1, Series 1600 (1998);
- MCHW Volume 2, Series 1600 (1998);
- MCHW Volume 1, Series 1700 (2014);
- MCHW Volume 2, Series 1700 (2014);
- Interim Advice Note 124/11 (2011);
- Interim Advice Note 161/15 (2015);
- Eurocode 0: Basis of Structural Design; and
- Eurocode 7: Geotechnical Design.

Good practice guidance is also provided by the Environment Agency and Defra in Contaminated Land Report (CLR) 11 – Model Procedures for the Management of Land Contamination. CLR11 provides a technical framework for the application of a risk management process for dealing with land affected by contamination. The assessment framework and guidance given within these documents have been considered in this assessment.

12.6 Preliminary Engineering Assessment

This section includes an assessment of the anticipated ground conditions associated with each of the currently proposed options. Consideration has also been given to the differing engineering requirements of each option.

A geological map overlaid with the route options is provided as Figure 12.1.

Options 9, 14 and 16 – Widening of A3

Unless otherwise stated, solid geology at the location of all three options is anticipated to comprise Bagshot Formation over London Clay Formation. Superficial deposits are indicated to be absent for the majority of the works. Localised deposits of Made Ground, associated with the construction of the M25 and A3 and other infilling activities is expected.

In order to accommodate widening of the A3, the following has been proposed:

- chainage (Ch) 400 to 1400: construction of new road to accommodate realignment of Mill Lane and Wisley Lane. Ground conditions are anticipated to comprise superficial deposits of Alluvium and Kempton Park Gravel Member over solid geology of London Clay Formation from Ch 400 to 600, beyond which Bagshot Formation is anticipated with no superficial deposits;
- Ch 450 to 5950: redevelopment of existing earthworks to accommodate carriageway and slip road widening for additional lane construction and merge and diverge realignment. Differing ground conditions include:
    - bedrock geology of London Clay Formation may be encountered from Ch 450 to 600, beyond which Bagshot Formation is anticipated;
    - superficial deposits Kempton Park Gravel Member may be encountered from Ch 450 to 600;
    - superficial deposits of Lynch Hill Gravel Member may be encountered from Ch 3900 to 4200 and Ch 4900 to 5250;
    - superficial deposits of Alluvium may be encountered from Ch 5450 to 5700;
    - superficial deposits of Taplow Gravel Member may be encountered from Ch 5600 to 6000;
    - Landfill Material associated with Old Rectory Farm landfill may be encountered from Ch 450 to 600; and
    - Landfill Material associated with Cobham Bridge landfill may be encountered from Ch 5600 to 5700;
- construction of two single span gantries(Ch 1200 and 1800) and three super span gantries (Ch 2400, 3850 and 4350);
- Ch 1350: replacement of Wisley Lane footbridge;
- Ch 1400: diversion of access to Elm Lane to Old Lane;
- Ch 3750 to 4100: realignment of Red Hill Road from;
- Ch 3200 to 4550: construction of a new local access road running parallel and to the south-east of the A3 to divert local access; and
- Ch 4800 to 5300: widening of the A245 from its junction with Seven Hill Road and the A3.

Option 9 – J10 Reconfiguration

Ground conditions are anticipated to comprise solid geology of Bagshot Formation over London Clay Formation for the majority of the Option 9 J10 reconfiguration. No superficial deposits are recorded on the BGS maps. Made Ground associated with construction of the existing M25 and A3 is anticipated.

In order to accommodate reconfiguration of J10, the following has been proposed:

- construction of a new bridge over the existing J10 roundabout; and
- development of new earthworks (cuttings and embankments) to accommodate construction of a new road linking the proposed new bridge, the A3 off slips and the M25 on slips.

Option 14 – J10 Reconfiguration

Ground conditions are anticipated to comprise solid geology of Bagshot Formation over London Clay Formation for the majority of the Option 14 J10 reconfiguration. Superficial deposits of Kempton Park Gravel Member are anticipated at the western

extent, where existing earthworks will be redeveloped to accommodate carriageway widening for construction of a new slip road. Made Ground associated with construction of the existing M25 and A3 is anticipated.

In order to accommodate reconfiguration of J10, the following has been proposed:

- construction of two new bridges over the existing M25;
- reduction of hardened verges within the existing J10 A3 underbridge to accommodate carriageway widening; and
- development and redevelopment of new and existing earthworks to accommodate construction of a new elongated roundabout and slip roads.

Option 16 – J10 Reconfiguration

Ground conditions are anticipated to comprise solid geology of Bagshot Formation over London Clay Formation for the majority of the Option 14 J10 reconfiguration. Superficial deposits of Kempton Park Gravel Member are anticipated at the western extent of the site, where redevelopment of existing earthworks to accommodate carriageway widening for construction of a new slip road is anticipated. Landfill material associated with Land at East of Buxton Wood Landfill may be encountered, where cutting is proposed to accommodate widening of the M25 anticlockwise carriageway. Made Ground associated with construction of the existing M25 and A3 is anticipated.

In order to accommodate reconfiguration of J10, the following has been proposed:

- construction of four new bridges over the existing M25 and proposed new roads;
- construction of two new tunnels under the A3;
- development of new earthworks and retaining walls to accommodate new road construction for slip roads connecting the M25 and A3;
- redevelopment of existing earthworks to accommodate road widening for new slip road construction;
- replacement or reconstruction of Cockcrow Footbridge and Clearmount Footbridge;
- decommissioning of the existing J10 roundabout; and
- diversion of access to Old Lane via Ockham Lane and Ockham Road North.

12.7 Design Mitigation and Enhancement Measures

The proposed scheme options will be designed to ensure that construction works will not pose a risk to human health or the environment.

A more detailed assessment of the indicated geology and ground conditions local to the preferred option should be carried out prior to detailed design stage once the locations of proposed structures have been confirmed.

Potential risks have been identified as part of this high level data review and there is potential for the creation of contaminant pathways between sources and the identified receptors with any of the proposed options.

Appropriate mitigation measures will be identified as part of the assessment once the chosen development option has been finalised. Mitigation and enhancement measures are likely to include:

- production of a Preliminary Sources Study Report in accordance with HD 22/08 to review existing data (geological, hydrological, hydrogeological, geotechnical, past and current land use and the potential for contaminated land), to provide recommendations for further investigation and to confirm the findings of this initial high level study. Existing contamination and geotechnical information will be reviewed, including BGS boreholes, BGS mapping and historical ground investigation reports relating to the construction of the M25;
- production of a detailed preliminary risk assessment to understand risk to groundwater, surface water and the nearby environmentally sensitive sites from proposed works;
- a walkover/inspection of the chosen option site to clarify the baseline condition of earthworks and highlight any earthworks that require remediation to facilitate build of the scheme;
- an intrusive ground investigation, including the collection and laboratory analysis of soil samples and subsequent monitoring/sampling/laboratory analysis of groundwater, vapour and ground gas, to:
    - target areas of instability/bridge design/junction reconfiguration;
    - confirm the geological succession and provide an assessment of ground conditions;
    - identify the extent of the suspected buried hollow;
    - provide an assessment of the groundwater and gas regime at the site;
    - determine the presence and nature of any sub-surface obstructions;
    - determine the level of contamination at the site;
    - classify waste for disposal off site;
    - identify geotechnical and geo-environmental risk;
    - provide geotechnical parameters for design (including pavement, bridge and earthwork design);
    - identify materials for re-use in construction; and
    - identify import materials for use in earthwork construction.
- production of a risk assessment to better determine areas of contaminated ground / groundwater and any necessary mitigation and/or design measures once ground investigation data has been obtained and analysed;
- classification of waste to inform reuse or disposal of material. This will be undertaken in accordance with current UK and European legislation regarding management of wastes. The potential effects will be reduced by adoption of mitigation measures including the development of an MMP and a SWMP;
- geotechnical interpretation of ground investigation data, to include the production of a ground model for the site, the provision of geotechnical characteristic parameters and identification of geotechnical risk;
- design of geotechnical engineering features to ensure that contamination migration pathways are not created;
- production of a piling risk assessment to determine risk of introducing contamination pathways;
- on site geotechnical monitoring to analyse stability and settlement during construction; and

- geotechnical supervision during construction to ensure the suitability of materials and construction technique.

Geotechnical reporting and the management of geotechnical risk shall be in accordance with the Design Manual for Roads and Bridges (HD22/08).

Environmental interpretation, reporting and risk assessment will be undertaken in accordance with CLR11 and will include the development of a Conceptual Site Model (CSM) and, subject to the findings of the risk assessment, provide recommendations for further assessment and/or remediation where necessary.

In subsequent stages, sufficient assessment will be undertaken to further refine the choice of route option, identifying significant impacts on geology and soils and, where appropriate, any contaminated land issues. The study will confirm baseline information, report consultations with relevant statutory bodies and report the findings of site investigations. Any significant effects on geological sites will be recorded along with possible methods of treating contaminated land where present.

Good site practices should also be adhered to during construction. Measures are likely to include (but are not be limited to):

- management of potential risks to ground investigation/construction workers through health and safety legislation, such as the Control of Substances Hazardous to Health (COSHH) Regulations. COSHH requires the employer to carry out an assessment of the risks associated with exposure to hazardous substances and then to prevent and if this is not reasonably practicable, to adequately control such exposures;
- working methods during construction to ensure that surface water cannot run from the works and any stockpiles into adjacent surface watercourses;
- implementation of appropriate dust control measures;
- storage of fuel away from surface watercourses in accordance with Environment Agency Pollution Prevention Guidance (PPG) notes PPG2 and PPG6; and
- development of a methodology to address what remedial actions will be undertaken and how such actions will be validated and recorded if unsuspected contamination is encountered during the works;

The measures listed above are a small selection of those adopted as standard on all development sites. Further details will be provided in a site specific CEMP.

Assuming appropriate mitigation measures are implemented during the design and construction stages of the project, it is considered that there should be no significant adverse effects to the identified receptors caused by the implementation of the proposed options. On this basis, it is considered that the overall impact would likely to be neutral.

12.8 Potential effects

Published geological data and available environmental datasheets, as taken from the site specific Envirocheck report, have been used to produce the high level preliminary geotechnical risk register presented as Table 12-4. Potential hazards associated with the geology and soils within the study area have been identified and plausible mitigation strategies have been outlined. This is for indicative purposes only; further site-specific investigations should be carried out to gain a better understanding of the risks present for each option and to aid detailed design of mitigation measures. An

initial assessment of the risk presented by each identified hazard is presented for each of the proposed scheme options.

Summary of high level risk identification

Where ground conditions associated with an identified hazard are not anticipated at this stage, the risk associated with that hazard is considered Low (L). Where the ground conditions associated with an identified hazard are present, but it is considered that the hazard will have minimal impact on the project, the risk is considered Moderate (M). Where anticipated ground conditions are such that an identified hazard may have a significant impact on the project, the risk is considered High (H). Risk level is presented in Table 12-4 prior to the introduction of mitigation measures; potential mitigation options have also been included in Table 12-4 to assist in the identification of potential furute works and optioneering process.

From a review of the historical maps and other publically available sources of information, several potential sources of contamination have been identified within or in proximity to the site. These include historical landfills, potential infilling of sand and gravel pits, deposits of Made Ground (and any related contamination) and road construction (including embankments). There have also been number of pollution incidents which have affected controlled waters within the vicinity of the site from varying sources.

Potential human receptors include local residents (along Pointers Road, the residential area aligning the A3 on the northern section of the site and other isolated properties present throughout the vicinity identified within section 12.4: baseline conditions; contaminated land.), workers at nearby commercial premises (along Redhill Road) and site workers.

Potential controlled water receptors comprise:

- groundwater, which include the underlying superficial Secondary A aquifer present in the northern portion of the site, the superficial Principle Aquifer to the west and southwest of the site and bedrock Secondary A Aquifer beneath the whole extent of the proposed works; and
- surface water, which include the River Mole and its associated drains/ponds situated to the north and east of the site and Bolder Mere located south of the site.

It should also be noted that other environmentally sensitive receptors are located within wither the scheme boundary or 500m of the site. These include Thames Basin Heath SPA, Oakham Common and Wisley Common SSSI, Ockham and Wisley LNR, Ancient Woodland and Roman buildings.

Potential sources of contamination and receptors associated with the scheme options are shown on Figure 12.2

Subject to the findings of a ground investigation and based on the identified potential sources and human receptors, plausible exposure pathways for the identified human receptors may include but are not limited to:

- inhalation, ingestion and dermal contact with contaminants in soil and soil-derived dust/fibres;
- inhalation, ingestion and dermal contact with contaminants within perched water and shallow groundwater;

- migration and accumulation of ground gases followed by inhalation or ignition causing asphyxiation and/or explosion; and
- inhalation of vapours.

Again, subject to the findings of a ground investigation, potential pathways to the identified controlled waters receptors and sensitive environmental receptors may include but are not limited to:

- surface water run-off;
- leaching/migration of contaminants in soils to underlying groundwater;
- lateral migration of contamination in groundwater;
- lateral migration of contamination in groundwater to surface waters;
- migration of contamination in drainage ditches to controlled surface waters; and
- chemical attack on historic features (Roman and listed buildings).

Table 12-4: High level risk register

Hazard	Description	Mitigation	Problematic materials or conditions	Risk rating in			
				A3 Widening All Options	J10 realignment Option 9	J10 realignment Option 14	J10 realignment Option 16
Unexpected ground conditions	Ground conditions encountered are different to those anticipated, leading to time and cost implications during the ground investigation and construction phases.	Carry out a PSSR and Annex A to determine the likely ground conditions, and perform a site specific ground investigation to assess the ground conditions, including an assessment of contamination and groundwater.	Generic risk	H	H	H	H
Buried & overhead services	Buried services associated with the road and other nearby infrastructure are likely abundant throughout the study area. Overhead services are likely present which may interfere with construction or drilling equipment.	Contractor to ensure they are satisfied that all present services have been located prior to intrusive works. Service surveys may be required, and some services may need to be diverted.	Generic risk	H	H	H	H
High groundwater table, perched and water ingress.	High groundwater levels or groundwater within more permeable layers above the groundwater table may present a geotechnical risk or cause complications during the construction and ground investigation phases.	Groundwater levels should be monitored during the ground investigation phase, accounting for seasonal variation.	Generic risk	M	M	M	M
Variable ground conditions	Inconsistency in material properties may occur due to variable materials and/or weathering profiles. This can lead to complications during the ground investigation phase, and when considering geotechnical parameters during the detailed design phase.	A detailed desk study should be carried out prior to any intrusive ground investigation. Contractors Method Statement should identify ways to deal with variable ground that may be encountered.	Generic risk	H	H	H	H
Clay shrink-swell	Clay minerals are susceptible to shrinkage and swelling as the weather and groundwater conditions change. This can cause differential settlement, and thus structural damage, to overlying structures.	Consideration should be given to the foundations during detailed design stage. Foundations must be designed deep enough so that clay shrink / swell has minimal impact on the structure.	Bedrock Geology (Claygate Member; London Clay Formation)	M	L	L	L
Soft, compressible and/or low strength ground	Soft, compressible and/or low strength ground may cause excessive settlement or bearing capacity failure to any structures founded onto or above the associated materials.	Consideration should be given to the suitability of foundations during design stage. Piled foundations or replacement of the bearing strata with a stronger or less compressible material (such as compacted granular fill) may be required, depending on loading conditions.	Landfill Material;	M	L	L	M
			Made Ground	H	H	H	H
			Superficial Deposits (Alluvium)	M	L	L	L
Ground conditions aggressive towards concrete	Presence of sulphate and/or sulphide bearing materials within the ground may induce sulphate attack on buried concrete structures, causing major deterioration to the strength of the concrete.	Chemical testing should be carried out on soil and groundwater samples during the Ground Investigation phase to determine the aggressiveness of the ground towards concrete. Any buried concrete structures should be designed in accordance with the Building Research Establishment Special Digest 1 during detailed design stage.	Landfill Material	M	L	L	M
			Made Ground	H	H	H	H
			Superficial Deposits (Alluvium)	M	L	L	L
			Bedrock Geology (London Clay Formation)	M	L	L	L

Hazard	Description	Mitigation	Problematic materials or conditions	Risk rating in			
				A3 Widening All Options	J10 realignment Option 9	J10 realignment Option 14	J10 realignment Option 16
Hard layers encountered during drilling / excavation	Hard layers, such as boulders, ferruginous concretions and septarian nodules, may cause delays or damage to drilling equipment during the construction and ground investigation phases, potentially resulting in programme delays and/or cost implications.	A detailed desk study should be carried out prior to any intrusive ground investigation. Contractors Method Statement should identify ways to deal with hard layers that may be encountered.	Bedrock Geology (London Clay Formation)	M	M	M	M
Weathered bedrock	The surface of the bedrock will likely have an irregular weathering profile, differing geotechnical properties compared to the underlying unweathered material. The weathered surface material will likely be weaker, and fissures may be more abundant causing uncharacteristic behaviour and altering the groundwater regime.	A detailed ground investigation should be carried out to determine the weathering profile of the bedrock geology, and determine the difference in characteristics between the weathered and unweathered bedrock.	Bedrock geology (Bagshot Formation; London Clay Formation)	H	H	H	H
Existing earthwork defects (unidentified or developing)	Defects to the existing earthworks are areas of weakness, and may present a risk of landslip during ground investigation and construction. Whilst some defects have already been identified, there may be existing defects beyond those identified	Continued inspections of nearby earthworks to be undertaken, and identified defects near to the proposed works to be repaired. Remediation of significant defects may be required.	Work on or near existing cuttings and embankments.	H	H	H	H
Destabilisation of excavation side walls or existing slopes	Loading or regrading of existing slopes may cause them to become unstable, or large, unsupported excavation walls could collapse.	Consideration should be given to any work carried out on or near to the crest of a slope, and to any regraded slopes during the detailed design phase.	Superficial Deposits	M	M	M	M
			Work on or near existing cuttings and embankments	H	H	H	H
Encountering contaminated materials and creating source-receptor pathways	Historical infilling and landfill wastes may not have been capped and confined within an impermeable membrane.	Physical and/or chemical hazard to human receptors: Appropriate PPE to be worn on site. Removal and correct disposal of such wastes.	Landfill Material, Made Ground or infilled pits	H	M	H	H
		Release of contaminants into groundwater or surface water sources from surcharge: Minimising impact of construction work which could lead to the release of contaminants into the environment.		H	M	H	H
	Organic and inorganic contaminant residue may have laterally migrated within Made Ground and superficial deposits or within groundwater (if present) freely beneath the site and may have accumulated.	Physical and/or chemical hazard to human receptors: Appropriate PPE to be worn on site. Removal and correct disposal of such wastes.	Unknown, possible residue contamination from pollution incidents' and historical and current land uses including commercial and light industrial processes namely alongside Redhill Road.	H	L	M	M
		Release of contaminants into groundwater or surface water sources from surcharge: Minimising impact of construction work which could lead to the release of contaminants into the environment.		H	L	M	M
Cutting and earthwork activities impacting groundwater and environmentally sensitive areas	Cutting and earthworks activities impacting groundwater and may mobilise contaminants within Made Ground or identified landfill areas (Historical Landfill, infilled ponds, infilled sand or gravel pits). These contaminants may have the potential to migrate to surface water bodies in the area.	Completion of risk assessment to quantify the risk to the surface water environment from construction. Minimise earthworks which impact groundwater and environmentally sensitive areas.		H	M	H	H

Hazard	Description	Mitigation	Problematic materials or conditions	Risk rating in			
				A3 Widening All Options	J10 realignment Option 9	J10 realignment Option 14	J10 realignment Option 16
Piling activities creating preferential pathway facilitating the moment of contamination.	Piling has the potential to affect the flow of groundwater and create preferential pathways for the migration of contaminants. There is potential for piling to facilitate the migration of contaminants into the bedrock Secondary A Aquifer beneath the site and the superficial Principal Aquifer located to the west of the junction.	Release of contaminants into groundwater or surface water sources from surcharge: Minimising impact of construction work which could lead to the release of contaminants into the environment.		H	H	H	H

Key

- High risk
- Moderate risk
- Low risk

12.9 Limitations to assessment

The current assessment has been based on the collation and evaluation of readily available documentation provided by the Environment Agency, BGS, Envirocheck report (Appendix I) and other data sources made available to Atkins, as detailed in section 12.4: baseline conditions; sources of information. Some of the opinions may be based on unconfirmed data or information from third parties which cannot be fully verified and, as such, no responsibility can be taken for its accuracy. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. The accuracy of maps cannot be guaranteed and it should be recognised that different conditions within the area may have existed between and subsequent to the various map surveys.

Atkins has not undertaken direct consultation with relevant regulatory bodies in association with this work as consultation is not considered to be appropriate at this stage. It is anticipated that consultation shall commence as part of Stage 3 works, to assist in the procurement and execution of intrusive investigations/surveys.

Any borehole data from British Geological Survey (BGS) sources are included on the basis that: 'The British Geological Survey accept no responsibility for omissions or misinterpretation of the data from their Data Bank as this may be old or obtained from non-BGS sources and may not represent current interpretation'.

This report should be read in light of the legislation, statutory requirements and/or industry good practice applicable at the time of the works being undertaken. Any subsequent changes in this legislation, guidance or design may necessitate the findings to be reassessed in the light of these circumstances.

13 Materials and Waste

13.1 Introduction

This chapter assesses, at a high level, the potential impacts of materials and waste arisings from the proposed M25 J10 scheme options. Proposed mitigation and enhancement measures are detailed towards the end of the chapter.

The chapter is broadly based on the guidance and methodologies outlined in the DMRB Volume 11, Section 1, 2, 3 and 11 and the Department for Transport's Interim Advice Note 153 / 11 titled 'Guidance on the Environmental Assessment of Material Resources'.

13.2 Assessment Methodology

Interim Advice Note 153 / 11 is intended for the "identification of impacts associated with materials resource use waste arisings" for construction, improvement and maintenance projects and as such is applicable to the M25 J10 proposed options.

The Interim Advice Note 153 / 11 states that a 'Simple Assessment' should be undertaken before detailed design. The simple assessment collates information and data that is readily available to address the potential effects during the options identification stage (PCF1). This level of assessment would usually be undertaken at the DMRB Scoping Stage, however as the options being assessed within this ESR are preliminary, the assessment undertaken below broadly follows this approach, and is limited in scope due to the lack of relevant information at this options identification stage.

No specific significance criteria is defined in the DMRB for materials and waste. Therefore, the assessment follows will be based on the recptor sensitivities subsequently described. . The sensitivity of the receptor is dependent on the capacity of the local environment to provide materials and to dispose / treat of waste arisings (i.e. the capacity of available waste management infrastructure in county of Surrey). Once a preferred option has been selected, construction, demolition, and excavation waste arisings estimates will be produced and used to identify the magnitude for change. The magnitude of change will only be assessed for waste arisings as no baseline is available for material use and this is generally not reported for such schemes.

Sensitivity

The sensitivity of the materials cannot be determined as some impacts may occur offsite, or possibly outside of the UK. This includes the depletion of non-renewable resources, the extraction of minerals or during the manufacturing process and transport. This level of information is unlikely to be available until the contractor(s) have been appointed and a detailed Bill of Quantities (BoQ) is available.

With regards to waste, the sensitivity will be dependent upon on the baseline waste arisings and the treatment / disposal capacity, which will be qualitatively assessed during the options selection stage. Both the quantities of waste generated and the composition of the waste will vary with the M25 J10 scheme options.

13.3 Study Area

M25 J10 lies to the south west of the M25 London Orbital motorway within the county of Surrey. The study area therefore includes the waste disposal and treatment networks within Surrey.

13.4 Baseline Conditions

Materials used and wastes generated have the potential to generate environmental impacts through:

- Use of large quantities of materials (e.g. from non-renewable resources);
- Generation of large quantities of waste; and
- Generation of hazardous waste.

As defined in the Interim Advice Note 153 / 11 surplus materials and waste are likely to arise from two sources:

- 'Existing site materials'; and
- 'Materials brought onto site but not used for the original purpose'.

It should be noted that materials generated from the works will also include excavation materials as a principle source.

Baseline information was gathered from the sources listed below. It should be noted that the desk based assessment is indicative only and is limited in scope due to the lack of relevant information at the options identification stage.

- Environment Agency 'What's In Your Backyard?' website (available at: http://apps.environment-agency.gov.uk/wiyby/default.aspx);
- Multi-Agency Geographic Information for the Countryside ('MAGIC') website (available at: http://magic.defra.gov.uk/);
- Surrey Waste Plan (2008, as amended in 2009)68;
- Surrey Strategic Partnership Plan 2010 – 2020 (2010)69;
- Envirocheck Reports purchased from the Landmark Information Group on the 12/07/16 and the 21/07/16, see Appendix I (Order Numbers: 90741937_1_1 (12/07/16) and 91390642_1_1 (21/07/16)).

Baseline information on the ground conditions relevant to the proposed scheme options is provided in the 'Geology and Soils' chapter in Section 12.

With regards to materials, no baseline is available for material use and this is generally not reported for such schemes.

With regards to operational waste, it is anticipated that the waste arisings associated with the M25 J10 at present consists only of litter and ad hoc maintenance waste. Within the surrounding area the waste arisings are likely to be minimal, and will primarily consist of:

- Landscaping waste from the surrounding areas of common land, including, Ockham Common and Wisley Common; and

[68] *The Surry Waste Plan is currently under review. The revised Plan will cover the period 2018 – 2033.*
[69] *The Surrey Waste Plan (2008) supports the Surrey Strategic Partnership Plan 2010 – 2020.*

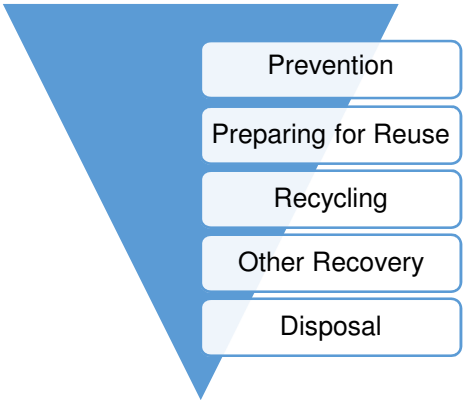
- Municipal and commercial waste from Chatley Farm, Elm Corner, Ockham Bites, Park Barn Farm, Birchmere Scout Campsite, Manor House, Foxwarren Park and the three commercial establishments on Redhill Road.

As aforementioned, the baseline for waste arisings has been extended to include the waste management networks within the county of Surrey as waste is regularly treated / disposed of within these areas.

13.5 Regulatory / Policy Framework

This section highlights the regulations and policy which will directly affect materials and waste management for the M25 J10 proposed options. The regulations and policy documents primarily emphasise the waste hierarchy to ensure that waste is managed within the priority order, as shown in Figure 13-1.

Figure 13-1: Waste Hierarchy



The regulations and policy documents are outlined below:

- EU Waste Framework Directive (2006/12/EC);
- EU Landfill Directive (1993/31/EC), as amended by the EU Directive (2003/33/EC);
- Waste (England and Wales) Regulations 2011 (SI 2011/988), as amended in 2012 (SI 2012/1889) and in 2014 (SI 2014/656);
- The Hazardous Waste (England and Wales) Regulations 2005 (SI 2005/894), as amended in 2009 (SI 2009/507), 2015 (SI 2015/1360) and 2016 (SI 2016/336);
- Waste Electrical and Electronic Equipment (WEEE) Regulations 2006 (SI 2006/3289), as amended in 2007 (SI 2007/3454), 2009 (SI 2009/2957), 2010 (SI 2010/1155) and 2013 (SI 2013/3113);
- Environmental Protection (Disposal of Polychlorinated Biphenyls and other Dangerous Substances) (England and Wales) Regulations 2000 (SI 2000/1043), as amended in 2000 (SI 2000/3359);
- The Environmental Permitting (England and Wales) Regulations 2010 (SI 2010/675), as amended in 2011 (SI 2011/2043), 2012 (SI 2012/630) and 2014 (2014/255);
- European Waste Catalogue (2000/532/EC);
- Environmental Damage (Prevention and Remediation) Regulations 2009 (SI 2009/153), as amended in 2010 (SI 2010/587) and 2015 (SI 2015/810);

- The Control of Asbestos Regulations 2012 (SI 2012/632);
- Environmental Protection Act 1990 (c. 43), as amended in 1996;
- Clean Neighbourhoods and Environment Act 2005 (c. 16);
- Environmental Protection (Duty of Care) Regulations 1991 (SI 1991/2839), as amended in 2003 (SI 2003/63);
- Waste Management Plan for England 2013;
- National Planning Policy for Waste 2014;
- National Networks National Policy Statement 2014;
- DMRB Volume 11, Section 1, 2, 3 and 11 (as amended);
- Interim Advice Note 153 / 11 (2011);
- Surrey Waste Plan (2008, as amended in 2009)[70];
- Surrey Strategic Partnership Plan 2010 – 2020 (2010)[71];

It should be noted that the European Commission (EC) will soon be revising a number of directives to ensure they align with the Circular Economy Package, which aims to be "closing the loop of product lifecycles through greater recycling and re-use, and bring benefits for both the environment and the economy". The directives which will be revised, which may have measures for consideration in this the M25 J10 scheme, include the EU Waste Framework Directive (2008/98/EC), the EU Landfill Directive (1993/31/EC) (as amended), and the Waste Electrical and Electronic Equipment (WEEE) Directive (2012/19/EU) (as amended).

13.6 Design Mitigation and Enhancement Measures

With regards to the type, quantity, and source of materials to be used and the type, quantity and composition of waste that will be generated, there are a number of different environmental mitigation and enhancement measures to be considered. These measures can be utilised during construction, demolition, and excavation as outlined (at a high level) in Figure 13-2 and detailed below. These options should be implemented to mitigate the potential for significant environmental impact of the materials and waste associated with the proposed M25 J10 scheme, whilst ensuring legal compliance and meeting all applicable targets.

[70] *The Surry Waste Plan is currently under review. The revised Plan will cover the period 2018 – 2033.*
[71] *The Surrey Waste Plan (2008) supports the Surrey Strategic Partnership Plan 2010 – 2020.*

Figure 13-2: Material and Waste Mitigation and Enhancement Measures

Designing out Waste

Ideally waste will be designed out throughout all design stages, to ensure materials are either reused (potentially from excavation) or recovered (potentially from demolition). Further to this, Designing out Waste (DoW) will ensure locally sourced, recycled and / or recovered materials are used where practicable.

The UK's Waste Resources Action Programme (WRAP) has produced guidelines for design teams under the following headings:

- Re-use and recovery;
- Offsite construction;
- Materials optimisation;
- Waste efficient procurement; and
- Deconstruction and flexibility.

All of these factors should be considered and implemented in the design of the development to improve the sustainability of the project including minimising waste to landfill. It should be noted that the reuse of excavated materials (associated with earthworks) for the M25 J10 scheme will be dependent upon the design of the preferred scheme option and further investigations of the potential for contaminated land in the surrounding area. Such investigations are detailed in the 'Geology and Soils' chapter in Section 11.

A 'Lite' Site Waste Management Plan (SWMP) should be prepared in order to estimate the waste arisings, the waste composition and the potential for re-use and recovery. Once the design process progresses further, a full SWMP should be prepared based on the detailed design drawings and the latest available BoQ. The full SWMP will set out the further detail related to waste arisings, procedures, and responsibilities for the management of waste. If applicable, the potential for reuse of the excavated materials should be detailed in a Materials Management Plan (MMP) which should follow the guidance and framework set out in the 'CL:AIRE Definition of Waste: Development Industry Code of Practice' (DoW CoP).

On Site Management

The contractor on site should work to maximise reuse and recycling, and minimise waste to landfill. The full SWMP should continually be updated and managed, by the contractor, to facilitate such measures. The full SWMP will provide an auditable trail of the actual reuse / recycling figures and document the final destination of waste materials during construction, demolition and excavation.

In addition, the M25 J10 scheme should be managed so as to avoid unnecessary waste such as excess material brought to site. Best practice waste management on such schemes is inclusive of but not limited to:

- Designing out waste at the initial stage of the project through utilising standardised sizes and materials where possible and engaging with the design team on the importance of this;
- Having a clear understanding of the nature of the excavated material;
- Undertaking robust sampling and characterisation of waste;
- Setting targets for waste recovery and recycling to enable those working on the scheme to have a clear understanding of what is expected;
- Including a full SWMP so that waste generation and management can be logged and audited;
- Using precast concrete and other materials that can be prepared off site to minimise waste generation on site;
- Avoiding ordering excess materials and using materials brought to site as efficiently as possible;
- Organising deliveries so materials arrive on site as they are needed to reduce the possibility of damage and wastage occurring;
- Having clearly defined and separated skips on site as well as a clearly marked waste area;
- Having a good understanding of the waste market (e.g. waste segregation and sale prices);
- Utilisation, where practicable, of on or off site treatment to re-introduce waste in to the market as a resource; and
- Training staff to understand how they should sort any waste and having regular reminders and updates.

In addition to the reduction of environmental impacts, best practice measures for waste management also contribute to financial benefits for the M25 J10 scheme, through the avoidance of costs associated with landfilling.

Treatment and Disposal

In order to reduce the environmental impacts of the M25 J10 scheme, commitments to achieve a high recycling and recovery rate for all waste generated should be made. This can be achieved through source segregation of recyclable materials and the provision of appropriate recycling facilities. Achieving a high recycling rate will minimise the environmental burden (such as pollution and energy impacts) associated with the production of products from virgin material.

Across Surrey, there are number of contractors, waste collection and waste disposal companies. Highways England should select a waste contractor who is local (where available) and is registered with the Environment Agency as a licensed waste carrier

for all the waste classifications to be transported (to be determined during the next design stage). The contractor should be able to undertake daily collections which will be required during peak construction, demolition and excavation activities. The contractor, on behalf of Highways England, should always ensure to complete Waste Transfer Notes or Hazardous Waste Consignments Notes. These should be kept for a minimum of 2 and 3 years respectively.

13.7 Potential Effects

At this stage of the design process no information on the use of materials or generation of waste associated with the proposed options is currently available. However, it is assumed that proposed options which cover the greatest area (physical extent) will require the greatest amount of demolition works, have the greatest volume of earthworks (excavation works), and will require the greatest volume of construction materials, thus have the potential to produce more waste. For Junction 10 option 16 covers the greatest physical area. The options assessed include option 9, 14 and 16.

A summary of the potential effects on each of the proposed options is provided in Table 13-1 below.

Table 13-1: Materials and Waste Potential Effects

Potential Effect	Option 9	Option 14	Option 16
Potential excess material use / waste generation if wastes are not reused / recycled where practicable.	x	x	x
Potential for the disposal of large quantities of excavated materials, if the materials are found to be hazardous and thus not suitable for reuse (for further details see the 'Geology and Soils' chapter in Section 11	x	x	x
Increased waste arisings associated with the modification / realignments of existing carriageways, slip roads and the roundabout.	x	x	x
Increased waste arisings associated with the construction of a new two lane roundabout and additional slip roads.			x
Potential for enhanced quantities of demolition waste airings associated with the demolition of the existing roundabout and slip roads.			x
Increased waste arisings works associated with bridge (under and over) construction (i.e. piling).	x	x	x

13.8 Limitations to Assessment

No detailed information regarding material types or potential waste generation is available at this stage of design (PCF1). This assessment should be updated once more information is available on these topics and assessed for the preferred option only, as aforementioned in the 'Assessment Methodology' section. Once further information is available, the magnitude of change will only be assessed for waste arisings as no baseline is available for material use, and this is not typically reported for such schemes. It is anticipated that waste arisings, once the scheme is operational, will be negligible as it these will continue to arise from litter and ad hoc maintenance, and as such will not be assessed.

Additionally, as outlined above, some impacts of materials and waste may occur offsite or potentially outside the UK, including the depletion of non-renewable resources, the

production of waste at the point of extraction, and transportation of this materials or waste. These stages of the process are likely to have had their own environmental assessments and, as such, will not be included in the scope of this assessment.

14 People and Communities

14.1 Introduction

The assessment will consider the impacts of the proposed scheme options on People and Communities. This will include impacts on Motorised Travellers (MT: drivers and passengers of both public and private vehicles), Non-Motorised Users (NMU: pedestrians, cyclists and equestrians), Community Severance, Land Use, and Community Effects. This assessment follows the updated DMRB interim guidance contained within IAN 125/15, combining published guidance in DMRB Volume 11, Section 3, Parts 6 (Land Use), 8 (Pedestrians, Cyclists, Equestrians and Community Effects) and 9 (Vehicle Travellers) into one assessment of People and Communities.

The assessment considers any impacts that the proposed options may have on:

- Effects on All Travellers: Motorised Travellers (MT) (drivers and passengers of both public and private vehicles) and Non- Motorised Users (NMU) (pedestrians, cyclists and equestrians), including amenity and journey length
- Effects on Communities, including development land, agricultural land, private and community land, community severance.

The ESR provides a high level assessment of the potential for the proposed options to effect existing travel patterns, journey lengths and community effects within the study area. Road safety has also been considered, together with effects on severance at the local level.

14.2 Assessment Methodology

Motorised Travellers: Views from the road

Using the category description in the DMRB views from the road will be assessed according to travellers' ability to see the surrounding landscape on a four point scale: no view, restricted view, intermittent view, open view as described in Table 14.1.

Table 14-1: DMRB Criteria for Views from the Road

View Categories	Description
No view	Road is in a deep 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 but with shallow cuttings or barriers at intervals
Open view	View extending over many miles, or only restricted by exiting landscape features

There are no specific assessment 'significance criteria' or 'magnitude of impact' assessment frameworks associated with 'view from the road' set out in DMRB therefore a qualitative assessment using professional judgment and based on the above criteria, is considered appropriate. The assessment will take into account findings from the landscape and visual impact assessment, including the landscape character, quality of the view experience and route type.

Motorised Travellers: Driver Stress

Driver Stress is defined in DMRB as the adverse mental and psychological effects experienced by a driver traversing a road network. Stress can induce in drivers' feelings of discomfort, annoyance, frustration, or fear culminating in physical or emotional tension that detracts from the value and safety of the journey. DMRB

indicates that with increased driver stress, a drop in driving standards occurs, which may be expressed as an increase in aggression towards other road users, or a diminished response to visual and other stimuli.

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. 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, steeping 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.

The measurable aspect of Driver Stress is associated with frustration due to delays. However, no detailed modelling of the performance of the M25 J10 has been undertaken at PCF Stage 1 assessment. As a consequence 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.

Non-Motorised Users and Community Severance

The assessment for NMU will be undertaken in accordance with the guidance for a Simple Assessment in the Pedestrians, Cyclists and Equestrians component of DMRB 11.3.8. It will focus on changes in journey lengths and times, the effect on the amenity value of journeys and changes in community severance band will consider:

- The impact of the scheme on the journeys that pedestrians, cyclists and equestrians make in its locality;
- The impact on existing usage of the community facilities and routes by pedestrians and others;
- Changes in safety and amenity value of routes which may be affected by the proposed options; and
- The effects of the proposed options on community severance.

The assessment will involve a desk study to identify likely Non-Motorised Users (NMU) activity, as well as how local community facilities are likely to be impacted by the construction and operation of the junction proposed options in both adverse and beneficial senses. No surveys or consultation have been undertaken for the PCF Stage 1 assessment.

The level of new severance will be taken into account using criteria set out by DMRB Volume 11, Section 3, Part 8 which categorises the level of severance as Slight, Moderate or Severe.

Table 14.2 sets out how the magnitude of impact is assessed for impacts on NMU using a three point scale. The magnitude can be both positive (beneficial) or negative (adverse) and also takes into account the permanence and reversibility of the impact. Professional judgement will be used to assign the correct level of impact.

Table 14-2: Magnitude of Impact – Non motorised travellers

Magnitude of Impact	Criteria
Low	In general the current journey pattern is likely to be maintained, but there will probably be some hindrance to movement for limited amount of time. • Pedestrian at-grade crossing of a new road carrying below 8,000 vehicles per day (AADT); or • A new bridge will need to be climbed or subway traversed; or • Journeys will be increased by up to 250m
Medium	Some people, are likely to be dissuaded from making trips. Other trips will be made longer or less attractive. • Two or more of the hindrances set out under 'Low' are applied to single trips; or • Pedestrian at-grade crossing of a new road carrying between 8,000 – 16,000 vehicles per day (AADT); or • Journeys will be increased by 250m – 500m.
High	People are likely to be deterred from making trips to an extent sufficient to induce reorganisation of their habits. Considerable hindrance will be caused to people trying to make their existing journeys for a prolonged period of time. • Pedestrian at-grade crossing of a new road carrying over 16,000 vehicles per day (AADT); or • Journeys will be increased by more than 500m; or • Three or more of the hindrances set out under 'Low' or two or more hindrances set out under 'Medium'

The sensitivity of the NMU and PRoW will be determined by usage as identified in Table 14.3 below.

Table 14-3: Sensitivity value of NMU users

Sensitive Value	Criteria
High	Frequent or continuous use of a resource, no suitable equivalent alternative resources used by the receptor are reasonably available
Medium	Moderate or occasional use of a resource, limited equivalent alternative resources used by the receptor are reasonably available.
Low	Low or infrequent use of a resource, suitable alternative are readily available.
Negligible	Very infrequent use of resource, multiple equivalent or better alternatives are freely and easily available.

The relationship between the sensitivity of the receptor and the magnitude of impact from the proposed Scheme is considered to determine the significance of the effect as described in Section 5 and repeated in Table 14.4. Moderate and major effects are considered significant and minor and negligible effects are not considered significant. Effects can be either adverse or beneficial.

Table 14-4: Significance of Impact Magnitude of Receptors

Significance		Impact Magnitude			
		High Impact	Medium Impact	Low Impact	Negligible Impact
Sensitivity of receptor	High	**Major**	**Major**	**Moderate**	Minor
	Medium	**Major**	**Moderate**	Minor	Minor
	Low	**Moderate**	Minor	Negligible	Negligible

Private Property, Community Land, Agricultural Land & Development Land

The assessment for loss of these land uses and receptors will be undertaken in accordance with the guidance for “Land Use” DMRB Volume 11.3.6. The magnitude of impact is assessed as the amount of land to be taken, using a three point scale of high medium or low. It also takes in account if there is other land in the vicinity that could be used for exchanged land. Professional judgement will be used to assign the correct level of impact. The methodology for assessing NMU and PRoW will be used for assessment of effected land.

Private property consists of the property required to accommodate the proposed options. Private Property is land outside the existing highways boundary that does not accommodate public open space or any other community facility or asset. It can be residential or commercial/ industrial property.

Community land is any area of public open space and other facilities such as schools, hospitals, libraries and recreation facilities relied upon for community health and well-being.

Agricultural land is land devoted the rearing of livestock and production of crops to produce food and products.

Development land is land designated within the development plan for particular development purposes, or for which planning permission has been granted or is pending. The study area for 'development land' consists of the land parcels required to accommodate the proposed options.

14.3 Study Area

The study area for road users MT and NMU comprises the roads, connecting roads, Public Rights of Way (PRoW) and footpaths located within 1km of the proposed scheme options.

The study area for ‘community severance’ will be extended to include communities that may potentially be directly affected by the proposed scheme options, for example, through the severance. These would include communities directly connected by the NMU and MT routes.

The study area for ‘private assets’ (including Private Assets, Agricultural Land and Community Assets) will consist of the land parcels required to accommodate the Proposed Schemes Options.

14.4 Baseline Conditions

Motorised Travellers: View from the Road

The existing views from M25 J10 / A3 Wisley Interchange are described below:

- The view from the A3 is screened by vegetation whilst travelling north and south bound. The M25 is visible when passing over the overbridge.
- The views from the M25 are also screened with vegetation alongside. At J10 from the M25 there are clear views of the overbridge of the A3.

In general, the views from the road for MT on the surrounding road network are restricted by adjacent existing mature vegetation.

Motorised Travellers: Driver Stress

The M25 provides a continuous orbital route around Greater London but carries high volumes of traffic which cause disruption and delays to the surrounding road network

particularly when emergency closures and lane closures are imposed. The south west quadrant of the M25 is one of the busiest sections of the motorway network and regularly experiences severe congestion. The probability of experiencing congestion in the peak period is more than 80% in the south west quadrant of the M25. Average speed at peak times on the M25 is as low as 31-40 mph west of Junction 10 and 41-50 mph to the east. The south west quadrant is in the top 10 percent nationally in terms of vehicle hour delay.

Although it is not possible to assess route uncertainty, it is thought due to the level of fear and frustration experienced by MTs as a result of features described previously, the level of Driver Stress experienced is 'High'.

Non-Motorised Users and Community Severance

There are several Public Rights of Way (PRoW) and footpaths and of local importance within a 1km radius of M25 J10 / A3 Wisley Interchange, some of which cross or interact with the proposed scheme options. Figure 14.1 shows the NMU infrastructure network in the wider M25 J10 / A3 interchange area[72].

The PRoW considered within the assessment have been identified from the Surrey County Council online mapping as follows (in order east to west):

- Footpath FP58 is a 50m section of footpath which meets Leigh Hill Road and is situated within the residential area to the North East of the A245/A3 junction.
- Footpath FP67a and b meets the FP66 and FP66a at either end, before terminating at A245 High Street.
- Footpath FP66 is a 1.2km footpath connecting the A245 Portsmouth Road to Church Street.
- Footpath FP65 comprises of two sections- one is 120m and the other 150m long. The sections of footpath run through the residential area to the North East of the A245/A3 junction.
- Bridleway BW69 passes Hatchford Wood before crossing the M25 at Hatchford Park footbridge, totalling a distance of 700m.
- Footpath FP17 traverses Ockham Common for approximately 900m to the Cockrow Footbridge, which it crosses and terminates just south of the public car park on Wisley Common. This adjoins FP10 at Hut Cottage and forms part of the London Country Way long distance footpath.
- Bridleway BW16 meets restricted byway BY525 southeast of Bolder Mere.
- Bridleway BW12 crosses the A3 at the M25 Junction 10/A3 Wisley Interchange. It links Wisley Common to Redhill Bottom and Chatley Wood.
- FP12 is formed of a 350m footpath which splits from FP11 and crosses Wisley common to the A3, where it adjoins bridleway BW12. It is located within the North West quadrant of the M25 J10 / A3 Wisley Interchange.
- A section of FP11 is approximately 950m in length in the North West quadrant of the Wisley Interchange. It travels from the M25 boundary to the east to the A3 boundary in the west across Wisley Common meeting BW8 and FP10 at Clearmount footbridge.

[72] *Source: M25 J10 / A3 Wisley Interchange NMU Context Report Highways England April 2016*

- The end of FP14 abuts the proposed highway works at Bolder Mere to the south of the A3.
- Footpath FP10 starts at Clearmount footbridge, where it meets FP11 and BW8. It then traverses the eastern section of Wisley Common (South West quadrant of Wisley Interchange) for approximately 1 km, passing Pond Farm and Woolgers Wood to the west. It terminates at the boundary of the proposed highway works at Hut Hill and then continues to adjoin
- Bridleway BW544 starts at Elm Lane before crossing the former Wisley Airfield. It joins with FP13 and FP13a.
- Footpaths FP13 and FP13a connect at the eastern side of Ockham junction at Ockham Lane. They then split, following parallel paths eastwards along the Former Wisley Airfield until they rejoin at Bridge End Farm.
- Bridleway BW8 crosses the M25 at Clearmount footbridge. Southwards it crosses Wisley common to the west of Woolger's wood finishing close to Battleston Hill. Northwards it abuts the northern boundary f Buxton Wood, carrying on northwards until it ends at Bluegates Hole. It has a total distance of 3.3 km.
- Footpath FP9 traverses Wisley Common for approximately 1km and terminates at the boundary of the common and A3. It intersects bridleway BW8.
- Footpath FP7 runs approximately 1.4km along the eastern edge of Wisley Common north towards Buxton Wood Footbridge which crosses the M25 then follows the western boundary of Buxton Wood until it adjoins and terminates at Byway BW25.
- A 1.2km stretch of path, footpath FP6, travels eastwards from Mill Lane and along the northern boundary of Wisley Gardens, where it terminates at eastern edge of Wisley Gardens.
- Footpath FP69 links Hill Lane, south of Hungry Hill to Ripley Bypass, south of Ockham Park.
- BW33 is a 900m bridleway links Ockham Mill Farm to the B2215, transecting Dunsborough park.

There are also several footpaths and cycleways within close proximity to the proposed scheme options.

The footpaths, cycleways and PRoW considered in this assessment serve as both recreational routes and for travelling between the surrounding local area. NMU users within the surrounding areas may be affected by traffic noise and the visual intrusion of the road network within the wider environment.

There are routes which are considered in this assessment to be suitable for use by cyclists. A shared footpath cycle route runs along the A3 Portsmouth Road following the southbound carriageway between Painshill Interchange and Ockham Junction in Elmbridge and Guildford boroughs. The shared cycle route continues across the J10 roundabout at grade with pelican crossings. There is also a short shared cycle route which follows the northbound carriageway of the A3 starting at the entrance for the slip for J10 continuing over the roundabout at grade, providing a link to southbound shared footpath cycle route, ending at Redhill Road. The proposed scheme options have the potential to temporarily or permanently affect the users of the existing M25 J10 shared pedestrian footpath and cycleway.

Based on the land use in the local area (Wisley and Ockham Commons) as well as existing trip generators (Wisley RHS Gardens), it can be assumed that the NMU

infrastructure mainly accommodates leisure movements. NMU Surveys[73] carried out show generally low usage flows of NMU across the study area. High flows are only identified at FP7 where the footbridge connects Wisley Lane and Elm Lane, providing a crossing point across the A3.

Agricultural Land

The areas affected by the proposed scheme options are classified as 'other land primarily in non-agricultural use', in accordance with Defra's Agricultural Land Classification[74]. As such, no agricultural land is required as part of any options and therefore no effects predicted.

Residential Properties and Private Land

There are several residential and non-residential properties which are located within close proximity to the study area however at this stage none appear to be required within the land parcels required to accommodate the Proposed Scheme Options.

- Hut Hill Cottage, in vicinity of Wisley Common, south west of J10.
- Park Barn Farm, in vicinity of Wisley Common, south west of J10.
- Chatley Park, Pointers Road, north east of J10.
- Foxwarren Park, to the north west of J10.
- Redhill Road residential, and which includes a neighbouring n equestrian school, personal training studio and car repairs amongst other light industrial uses, to the north west of J10.
- To the west of the A3 and west of the Painshill Interchange there is Feltonfleet School which fields abut the road A3 and A245.
- To the west of the A3 and west of the Ockham Junction there is the Royal Horticultural Society Wisley Gardens.

Community Land

There are also several community land and facilities which are located within close proximity to the study area. The proposed options will require land take from the commons identified and listed below. However, at this stage the other identified community land don't appear to be required within the land parcels required to accommodate the Proposed Scheme Options.

- Wisley Common, to the west of the A3.
- Ockham Common including Chatley Heath, to the east of the A3.
- Redhill Road includes an equestrian school, personal training studio and car repairs amongst other light industrial uses, to the north west of J10.
- To the west of the A3 and west of the Painshill Interchange there is Feltonfleet School which fields abut the road A3 and A245.
- To the north west of J10 is Painshill Park.

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[73] *Source: M25 J10 / A3 Wisley Interchange NMU Context Report Highways England April 2016*

74 Natural England. 2010. Agricultural Land Classification map London and the South East (ALC007). [ONLINE] Available at: http://publications.naturalengland.org.uk/publication/141047?category=5954148537204736. [Accessed 27th January 2016].

- To the west of the A3 and west of the Ockham Junction there is the Royal Horticultural Society Wisley Gardens.

Development Land

To the north of J10 within Elmbridge there are potential mixed use development sites between the A3 and A245 within 300m of the Painshill interchange at Cobham. These sites have not been formally adopted within a site allocation document. The land south of J10 within the borough of Guilford to the south east of the Ockham junction contains a proposed strategic site allocation as part of the boroughs Proposed Submission Local Plan: strategy and sites (2016) policy site A35 Land at former Wisley Airfield Ockham. The 92.8ha new settlement site will contain, 2000 homes as part of a mixed use development, a request for an EIA scoping opinion at the former Wisley Airfield (14/S/00001) was received in 2014. These potential development sites are close to the study area however, at this stage none appear to be required within the land parcels required to accommodate the Proposed Scheme Options.

The key receptors identified in the baseline study are shown on Figure 14.1 in Appendix K.

14.5 Regulatory/Policy Framework

National Policy

The National Planning Policy Framework (NPPF) sets out the Government's planning policies and how these are expected to be applied. NPPF identifies a set of 12 core land-use planning principles that it is stated should underpin both plan-making and decision-taking. It states that planning should proactively drive and support sustainable economic development to deliver, amongst other things, infrastructure that the country needs.

A relevant principle in the NPPF to this chapter, 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. The policy encourages solutions that seek to reduce congestion, greenhouse gas emissions and serve to facilitate the use of sustainable transport. Furthermore, local planning authorities (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.

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. Paragraph 75 states policies should protect and enhance public rights of way (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.

Countryside and Rights of Way Act 2008

The Countryside and Rights of Way Act 2008 (CRoW) regulates all Public Rights of Way (PRoW) and ensures access to them. It requires local highway authorities to publish a Rights of Way Improvement Plan (RoWIP), which should be reviewed every 10 years. The Act also obliges the highway authority to recognise the needs of the mobility impaired when undertaking improvements.

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.

The document also identifies built development is 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 public rights of way to improve connectivity.

Local Policy

Local policy which has indirect relevance for people, community use and enjoyment are set within both authorities Elmbridge and Guilford adopted local planning policy.

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. Policy CS16 'Social and Community Infrastructure' resists the loss of existing social and community facilities or sites. 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. 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.

In the Borough of Guildford 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. 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. Policy CF2 'Loss of Community Facilities' resists the loss of community buildings. A new Local Plan for Guildford has currently been consulted on and is anticipated for adoption in winter 2017.

14.6 Design Mitigation and Enhancement Measures

There are opportunities to introduce mitigation and enhancement measures into the scheme design, and the management of the scheme. The preferred design option should be designed with future development and housing requirements in mind. Highways England have access to funds for improving provision for non-motorised users through the Environment Designated Fund (Walking and Cycling) and it is possible that this could be used to enhance facilities at J10. The use of best practice construction methods will reduce disruption to users of residential and community receptors within the vicinity of the proposed highways scheme.

The assessment deals with potential outline scheme options without associated environmental design measures. Therefore generic design or mitigation measures that have the potential to be incorporated within the Scheme have been identified. The assessment takes into consideration the potential for reduction of adverse effects through the introduction of environmental design or mitigation measures.

Potential mitigation measures that could be applied to the considered schemes are below:

- The preferred option should where possible either retain or improve the existing access arrangements. Existing footpaths and PRoWs should be retained and where crossed by the route, provided with proper means of access to prevent severance;
- Clear signage should be positioned to show temporary diversion routes for the effected Motorised Travelers, PRoWs, footpaths & cycleways;
- Users of the effected PRoWs, footpaths & cycleways which are to be affected would be notified of planned diversion with signs along the sections to be closed during construction at least one month prior to the works;
- Construction works will need to be programmed so that affected PRoW, footpaths or cycleways remain open for part or duration of the construction works, and also that other routes can act as a diversion route for those effected;
- The View from the Road for Motorised Travelers where possible should not be further obstructed, and open views of the surrounding countryside should be retained;
- Where possible landscaping that can provide screening and reduce noise levels of the chosen option, and which will also improve amenity for users for non-motorised, residential and community receptors;
- It may be necessary for key stakeholders, including local walking, riding and cycling groups, to be consulted on the effect of the route options on existing NMU routes;
- Take on board the environmental design mitigation from the other topics, notably Landscapes, Air Quality and Noise and Vibration which are linked it this topic;
- Consultation with the public and stakeholders to discuss the proposals and proposed mitigation;
- Consultation with the local authorities to agree diversion routes and the proposed mitigation;
- Appropriate local media campaign to notify people of the works and update them on construction. This could result in a reduction in Driver Stress associated with delays during construction for Motorised Travellers; and
- Discussions with Surrey County Council and Elmbridge and Guildford Borough Councils should take place to find a suitable exchange of land for the potential parts of Wisley and Ockham Commons which will be lost.

14.7 Potential Effects

Effects on All Travellers – driver stress, views from the road, NMUs

Effects on NMUs

For all Options, during construction phase there is expected to be a change in amenity for NMU users at footpaths, particularly those located close to the construction works. Although a decrease in amenity is possible, given the temporary nature of the construction works and transient nature of these public rights of way these are not considered significant.

No significant effects have been identified for any of the PRoWs during construction or operational phase for any of the three options. It is assumed the construction of the chosen option will have an adverse effect on the shared cycleway and footpath along the A3 however, it is assumed there will be a slight beneficial effect to this NMU route

on operation. It is proposed Subways and bridges will be provided for NMUs where required through the junction areas. This assessment is based on current assumptions primarily that no footpaths will be closed permanently and any temporary closure during construction phase would provide a temporary crossing adjacent to the current location.

The full assessment can be found in Appendix K.

The low NMU survey counts give the majority of routes low sensitivity, and it is assumed at this stage that no closures are required for PRoW or footpaths at this stage, it is also assumed that during the time of reconstruction of footbridges that the footpaths will be maintained for this entire period, either through prior construction of footbridge or providing a temporary crossing. The most sensitive PRoW, given the higher NMU surveys is at FP7 which has high flows of NMU crossing the A3 on footbridge, particular care should be given to maintaining this footpath.

Driver Stress

In terms of Driver Stress, the scheme objectives seek to address capacity issues by reducing the average delay (time lost per vehicle per mile) on the mainline A3 and smooth the floor of traffic and improve journey time reliability on the mainline A3. The scheme also seeks to reduce annual collision frequency. Existing levels of driver stress on the road within the study area are all high, due to the peak hourly traffic lows which can increase journey times. Driver stress is expected to be temporarily adversely impacted by the construction works, however is expected to reduce during operation through increased traffic flows and a more efficient road network reducing driver frustration for all options.

Views from the road

Views from the road, it is expected that in operation the effects will vary in the extent depending on option selected as listed below. The setting that is provided by adjacent woodland areas will continue to restrict the visibility of the proposed scheme options as well as number of potential receptors that could potentially view them. The proposed A3 dual 4 all purpose (D4AP) widening upgrade option, could see further loss of screening including trees and vegetation across Options 9, 14 and 16 with views having the potential to provide further restricted views north of J10 while south of J10 these views are still likely to be restricted due to the dense woodland cover. It is expected that environmental design and mitigation measures will help to accommodate the new elements into the surrounding landscape and operational effects are likely to have less impact on visual receptors in the longer term when any proposed planting matures.

Option 9: Restricted View

Views from the Proposed Scheme Option 9 would be restricted by a combination of landform with a dense woodland. Whilst occasional views into the adjacent landscape are likely to be available, these would be glimpsed, transient and predominantly short distance through the gaps in vegetation or available from more elevated sections of the road, but centred mainly on the road corridors.

Option 14: No View

Views from the Proposed Scheme Option 14 into the adjacent landscape would be blocked by adjacent landform and dense woodland cover.

Option 16: Intermittent View

The Proposed Scheme Option 16 contains a number of elevated features including slip roads that would require considerable earthworks to accommodate them within existing landscape but also bridges that would be elevated considerably in comparison

to the baseline alignment of the junction. Therefore some glimpsed, filtered views may be available over the adjacent landform and woodland.

Effects on Communities - community land, agricultural land, development land

During both construction and operational phase of all the proposed options land will be required from Wisley and Ockham Commons. Dependent on the option approximately 7.6ha (Option 9), 2.3 ha (Option 14) or 20ha (Option 16) of common land is expected to be required, this represents approximately 2% (Option 9), 0.7% (Option 14) or 6% (Option 16) of the overall land area of the commons. It is possible further land will be required during construction phase but at this stage in the design process it is not able to be identified.

The common land which is required differs for each option, either, from the north eastern and south western quadrant of the M25/ A3 roundabout (Option 9), land is taken from a narrow stretch of land from the north and south of the M25, west of the existing roundabout at Wisley Common (Option 14) or the maximum option where land is required from the north eastern, north western and south western quadrants of the M25/ A3 roundabout (Option 16).

The land take is greatest for Options 16 is greatest in terms of land requirements however all options is assessed to have major adverse and therefore a significant effect on community land due to the loss of land from Wisley and Ockham Commons. It is proposed replacement common land would have to be delivered as part of the chosen option to replace the common land lost, ideally this replacement common land should be provided on or as close to the land lost but might be located offsite after discussions with the local authorities involved, Surrey County Council and the Boroughs of Elmbridge and Guildford.

The options are likely to have an adverse effect during construction and operation on residential receptors identified in proximity to J10 which are currently screened by existing woodland from the M25, A3 and J10. It is expected that environmental design and mitigation measures will decrease the effect of the options during operation of the identified residential receptors. The three options will effect different residential receptors, and it is assumed this will effect Chatley Park, Park Barn Farm and Hut Hill Cottage for Option 9. Option 14 is likely to have the least significant effect on the residential receptors while Option 16 will affect all the residential receptors identified. No impact is expected to any of the development land identified earlier in this chapter as it is located outside the development boundary of proposals for all options.

Summary

In summary, the differences between Option 9, 14 and 16 mean that in terms of people and community's assessment there are no major differences and at this stage are all assessed as having no significant impacts except for loss of community land. Driver stress is expected to be temporarily impacted by construction works, however is expected to reduce during operation from existing stress levels. Views from the road are blocked by adjacent landform and dense woodland cover, it is expected that environmental design and mitigation measures will accommodate the options into the surrounding landscape and operational effects are likely to have less impact on visual receptors. The options are likely to have an adverse effect during construction and operation on residential receptors identified in proximity to J10 which are currently screened by existing woodland from the M25, A3 and J10, with Option 16 having the biggest impact. The most significant major adverse effect of the proposed options will be the significant loss of Common Land, it is unknown at present if this can be replaced on site. Option 16 does require the greatest land take from the commons and therefore at this stage, and with assumptions above, has the greatest impact on

People and Communities. The full assessment tables can be found in Appendix K of this report.

14.8 Limitations to assessment

The assessment is based on professional judgement and takes into account both the adverse and beneficial contribution that proposed development can have upon the existing and surrounding receptors. The report provides broad, high level indication of effects, reporting on the potential effects to people and community based on simple assessment. No site visit has been undertaken and the findings are based upon a desk based study of the area using professional judgement and consultant's knowledge based on previous similar schemes and assessments. Information were relevant has been used from other specialist topic inputs in helping asses the magnitude of the proposed scheme on receptors. At this stage, where options are explored there is no detailed information available on the construction duration, public right of way closures and potential construction compounds, therefore the assessment is based on assumptions and previous experience.

15 Cumulative Effects

15.1 Introduction

In accordance with legislation the DMRB Volume 11, Section 2 Part 5: Assessment and Management of Environmental Effects (HA205/08) requires that Cumulative Effects are assessed as part of the assessment process.

Cumulative effects “result from multiple actions on receptors and resources and over time and are generally additive or interactive (synergistic) in nature. Cumulative impacts can also be considered as impacts resulting from incremental changes caused by other past, present or reasonably foreseeable actions together with the project” (Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interaction, European Commission, May 1999) . Cumulative effects are broadly effects that result from the accumulation of a number of individual effects that may also have synergistic aspects.

15.2 Baseline

In order to carry out the assessment it is necessary to define the location and timing of nearby potential developments. In effect, the ‘study area’ will encompass all schemes which are ‘committed’ including (but not necessarily limited to):

- Trunk Road projects which have been confirmed (i.e. gone through the statutory processes) in proximity to the M25 J28 Improvements.
- Development projects with valid planning permissions as granted by the Local Planning Authority, and for which statutory EIA is a requirement or a non-statutory EIA has been undertaken.

Although the assessment will primarily include developments that are likely to occur and have some form of planning/land use approval, speculative developments will also be mentioned, specifically when their approval is fairly certain and if they are likely to have significant impacts.

15.3 Potential Significant Effects and Mitigation

The DMRB identifies two types of cumulative impact in environmental assessment:

- Cumulative effects from a single scheme (acknowledging the outcomes of each of the environmental topics assessed for the M25 J28 Improvements) or intra-project effects.
- Cumulative effects from different schemes (assessed in combination with the scheme in question) or inter-project effects.

The main source of data for the cumulative effects assessment will be the outcomes and information obtained from the individual environmental topic assessments. The assessment of cumulative effects arising from the proposed scheme options in combination with other schemes will primarily constitute a desk-top study of planning documents broadly covering the location of schemes (if any are identified) considered relevant to the assessment.

15.4 Potential Effects

The DMRB identifies two types of cumulative impact in environmental assessment:

- Cumulative effects from a single scheme (acknowledging the outcomes of each of the environmental topics assessed for the M25 J10 Improvements) or intra-project effects.
- Cumulative effects from different schemes (assessed in combination with the scheme in question) or inter-project effects.

The main source of data for the cumulative effects assessment will be the outcomes and information obtained from the individual environmental topic assessments. The assessment of cumulative effects arising from the proposed scheme options in combination with other schemes will primarily constitute a desk-top study of planning documents broadly covering the location of schemes (if any are identified) considered relevant to the assessment.

The planned infrastructure schemes which are considered to have the potential for cumulative effects together with this scheme are outlined in Table 15.1 and are taken from the emerging Guildford Local Plan and the draft Elmbridge options consultation: Settlement Investment and Development Plans.

Elmbridge will plan for approximately 3,375 net additional dwellings within the Borough between 2011 and 2026 as part of the adopted Core Strategy (2013). The proposed draft Guildford Local Plan will make provision for 13,860 new homes during the plan period (2013-33).

The development sites identified in table below 15-1 below comprise a mix of committed sites due to be granted planning permission and proposed site allocations which have not been formally adopted by the relevant LPA.

Table 15-1: Planned Infrastructure Schemes for Consideration of Cumulative Effects

Scheme	Local Authority	Description
Land along A3 adjacent to Sainsbury's Car Park, Cobham	Elmbridge	Proposed Site allocation as part of a new Elmbridge Settlement Investment and Development Plans. 1.32ha site with the ability to deliver up to 70 dwellings.
Vermont Exchange, Portsmouth Road, Cobham	Elmbridge	Proposed Site allocation as part of a new Elmbridge Settlement Investment and Development Plans. 0.69ha site with the ability to deliver up to 60 dwellings. A Full application was submitted incorporating 44 retirements flats and 6 dwellings (2015/0997) and was granted permission September 2015.
1-7 Holly Parade & 22A / 22B High Street, Cobham	Elmbridge	Proposed Site allocation as part of a new Elmbridge Settlement Investment and Development Plans. 0.2ha site with the ability to deliver up to 15 dwellings as part of a mixed use site. A Full application was submitted for 1-7 Holly Parade incorporating mixed use and 24 dwellings (2016/2185) and is awaiting a decision.
A35 Land at former Wisley Airfield Ockham	Guildford	Proposed Site allocation as part of the new Guildford Local Plan. 92.8ha new settlement site will contain, 2000 homes as part of a mixed use development, a request for an EIA scoping opinion at the former Wisley Airfield (14/S/00001) was received in 2014. An Outline application was submitted (15/P/000012) which was refused in April 2016.

Cumulative effects associated with noise, air quality and traffic are likely to increase due to the Borough of Elmbridge and the Borough of Guildford planned housing schemes. The growing district's housing requirements are likely to result in more cars using the local transport network and increased pressure on the local transport infrastructure.

15.5 Indication of any difficulties encountered

This assessment does not feature a full assessment of the cumulative impacts from different projects together with the scheme being assessed, as described in DMRB 11.2.5 (HD 205/08) and Part 6 (HD 48/08). However, the main expected cumulative impacts from different projects with the M25 Junction 10 improvements are considered likely to be from changes to the flows of traffic, and the associated environmental impacts on noise and air quality. The traffic modelling which would enable such an assessment is not available at this stage, and therefore the assessment of these effects will be undertaken at a later stage and will be supported by the Transport Assessment.

16 Outline Environmental Management Plan

16.1 Introduction

The use of Environmental Management Plans (EMPs) to manage the environmental effects of development is widely considered as best practice for major infrastructure projects by statutory, non-statutory and major companies alike. Use of EMPs conform to best practice guidance from BS EN ISO 14001 (BSI, 1996, as amended) and is guided for Highways England schemes by the Interim Advice Note (IAN) 'Environmental Management Plans' (183/14).

Preparation and implementation of EMPs permits the demonstration of compliance with environmental legislation. They also provide a mechanism by which designers can integrate best practice and sustainability elements into scheme concept and design, whilst contractors can show effective management of good working practices.

The need for environmental management planning extends throughout the whole project cycle, commencing at the early design stage. Obviously there needs to be a certain degree of information available before main design decisions can be made. This restriction is recognised in IAN 183/14, which indicates that initially, during PCF Stages 0-2, there is only need for high level consideration of Client Scheme Requirements, as the level of detail available is insufficient for effective EMP development.

An Outline EMP is required for PCF Stages 3 and 4, leading on to a Construction Environment Management Plan (CEMP) for PCF Stage 5, ultimately evolving into a Handover EMP (HEMP which is the main mechanism for passing essential environmental information to the client and, crucially, to the body responsible for the future maintenance and operation of the asset.

16.2 Client Scheme Requirements (Environment)

For the purpose of the Scheme, the primary Client Scheme Requirement for environmental issues is 'minimise the detrimental environmental effects of the scheme and offset with mitigation measures where technically feasible and economic to do so, taking into account of costs, availability of funding and statutory obligations'.

With this requirement in mind, measure have already been considered to mitigate and minimise the potential environmental implications of both the Online and Offline options. This includes minimisation of land and property take, integration of Offline embankment design to address noise and landscaping mitigation measures and use of possible drainage management to facilitate biodiversity mitigation.

As the Scheme is still in the stage of option identification, it is too early to provide anything more than these preliminary references to environmental management measures. Nevertheless, all environmental factors are being fully evaluated during this assessment and as such, an outline is provided of the way in which it is envisaged that the environmental management plan should be developed for the Scheme.

16.3 Outline of EMP Requirements

One of the prime purposes of an EMP is to help identify potential environmental risks and to provide a mechanism for recording such possibilities and identifying ways in which to manage, control and/or obviate those risks. The EMP must then provide the framework to demonstrate delivery of the environmental responsibilities for implementing the management of potential adverse effects. Typically a listing of

environmental aspects and impact is used to note potential impacts, feeding into the main EMP structure. This is identified in IAN 183/14 as a Register of Environmental Actions and Commitments (REAC), which is critical to the success of the EMP and subsequently, the environmental performance of the project.

The EMP must also demonstrate compliance with relevant environmental legislation, government objectives and scheme specific environmental objectives. It is also important that all relevant consents from regulatory authorities such as Sefton Council, Natural England and the Environment Agency are implemented, managed and updated, where necessary.

In order to demonstrate that all such measures are being taken and followed, the EMP needs to provide a mechanism for monitoring, reviewing, updating and auditing environmental performance and compliance.

The IAN (183/14) acknowledges that it would be too onerous to prepare the EMP at this early stage of option identification, as there are still several options under consideration and insufficient information to be able to develop a clear, robust listing of scheme specific issues to be considered. Therefore a detailed outline of the structure of the EMP will be required at PCF Stage 3, during the preparation of the preferred option.

The indicative elements of the outline EMP are given below:

- Introduction and background: giving a brief summary of the project, any relevant strategy or programme context and the purpose of the EMP;
- Environmental risk assessments: detailing the environmental risks associated with all activities on the project, the mitigation measures to remove or reduce the risks and assigned responsibilities for the risks;
- Description of proposed design and proposed management of that design identifying individuals responsible;
- Environmental Actions and Commitments Register (REAC): to provide a record of the project specific environmental actions and commitment to be implemented and managed thorough all stages of the project.

The Highways England IAN 183/14 provides more detail of the indicative contents of the Construction Environmental Management Plan, which is not required until PCF Stage 5, but which should be borne in mind during the preparation of the Outline EMP at PCF Stages 3 and 4.

Table 16.1 provides a summary of the environmental mitigation and management measures that will be required, based on the current level of understanding of the impacts of the overall scheme. At this stage generic measures are provided that are likely to be required for all of the design options currently being proposed. The specific detail of mitigation required will need to be revisited once an option has been selected and the impacts can be better understood.

Table 16-1: Outline Environmental Management Plan

TOPIC	SENSITIVE RECEPTORS	POTENTIAL IMPACT	MANAGEMENT MEASURES	TIME FRAME
Air Quality	Sensitive receptors such as residential properties, schools, nurseries, hospitals located within 200 m of the scheme or any road affected by a change in traffic. Ecological receptors within ancient woodland such as the Thames Basin Heaths Special Protection Area (SPA) and Ockham and Wisley Commons Site of Special Scientific Interest (SSSI).	Annoyance caused by dust deposition during construction. Adverse effect on human health and ecological receptors from additional traffic emissions during construction.	Best Practice Measures in a CEMP Traffic Management Plan	Prior to Construction
Cultural Heritage	Unknown buried remains	Physical disturbance caused during the excavation of new roads, service trenches, topsoil stripping, landscaping features and drainage ponds	Archaeological Investigations where necessary to establish nature, extent and survival of any previously unrecorded buried archaeological remains If necessary, to be agreed with relevant local authority planning archaeologist.	Consultation as part of update to the ESR Prior to or alongside construction of the scheme
	Heritage Assets including Scheduled Monuments, Listed Buildings, Registered Park and Garden, and non-designated historic buildings	Impact on historic setting Direct impact on Registered Parks and Gardens due to land take	High quality design Undertake Setting Assessment including Historical Landscape Assessment Any further measures resulting from consultation with statutory bodies	As an update to ESR Prior to submission for approval
Landscape	Sensitive landscape receptors include: existing mature trees, belts of trees and hedgerows. Sensitive views from following visual receptors at: Painshill Park Grade I Registered Park and Garden, Wisley and Chatley Heath Common, PRoW's	Landscape: potential loss of vegetation, and transformation of landscape pattern and land use; Deterioration of visual amenity due to alteration of the view both through introduction new	At design stage a tree survey should be carried out to inform arboriculture constraints accompanied by tree constraints plans. As design is more defied an Arboriculture Method Statement accompanied by tree retention plans	Design stage

Topic	Sensitive Receptors	Potential Impact	Management Measures	Time Frame
	within the study area, Chatley Farm and from the RHS Wisley Grade II* Registered Park and Garden.	elements of the scheme and loss of existing landscape elements in the view.	should be produced to inform tree protection measures. During construction all existing tree, scrub, shrub and hedgerow planting within the highway estate would be retained wherever possible and protected in accordance with BS5837:2012. Loss of tree, scrub and shrub cover should be substituted elsewhere within the highway boundary in the vicinity of the scheme. Construction working methods around tree roots should take account of arboricultural advice for the protection of all retained trees.	Construction stage
Ecology and Nature Conservation	Designated Sites (SPA, SAC, SSSI, LNR, SNCI)	Habitat loss, fragmentation, degradation or disturbance	Assessment of Impacts on European Sites. Undertake species and habitat surveys including breeding birds and bats. Option selection, design of structures and layouts to minimise impacts. Identification of appropriate mitigation or compensation measures, a management plan and aftercare plan.	As part of an update to the ESR and an Appropriate Assessment
	Valued habitats including ancient woodland	Temporary degradation or disturbance or permanent loss of these habitats	Option selection, design of structures, layouts, management plan and aftercare plan	As part of an update to the ESR
	Protected and notable species	Loss of habitat, disturbance and direct harm	Undertake Phase II species surveys e.g. bats, breeding birds, dormouse, otter, water vole, badger and invertebrates, to determine exact management measures required. Following surveys identify appropriate mitigation and/or compensation measures.	As part of an update to the ESR at later stage in design process to reduce likelihood of surveys going out-of-date
Geology and Soils	Geology and soils, construction workers and water resources	Contamination, accidental spillage, unforeseen ground conditions and groundwater regime; redesign, programme and cost implications	Best Practice measures in acoordance with CEMP, Eurocode, HD22/08 and HD41/15, to include desk study, ground investigation and geotechnical reporting	Prior to Construction

Topic	Sensitive Receptors	Potential Impact	Management Measures	Time Frame
	Buildings (buried concrete structures)	Damage to the structure due to chemical attack and degradation; redesign, programme and cost implications	Best Practice measures in accordance with, Eurocode, BRE Special Digest 1 HD22/08 and HD41/15, to include desk study, ground investigation and geotechnical reporting	Prior to Construction
Materials and Waste	Material resources.	Use of finite resources.	Designing out Waste (DoW) to ensure locally sourced, recycled and / or recovered materials are used where practicable.	During the development of the design
	Waste treatment and disposal infrastructure.	Increased pressures placed on regional waste treatment and disposal infrastructure.	Implementation of best practice waste management measures e.g. development of an SWMP ('lite' and detailed) and if applicable an MMP, designing out waste, setting recovery and reuse targets, promoting offsite construction, materials optimisation, waste efficient procurement, having clearly defined onsite segregation facilities and disposal plans.	Prior to and during construction
Noise and Vibration	Residential receptors (including NIAs) recreational users of footpaths and outdoor space, sensitive habitat and species.	Disturbance from construction phase or due to bringing road traffic noise closer to receptor	BPM to minimise construction noise If required noise mitigation for the operation phase could include low noise surfacing, noise barriers or secondary glazing	Prior to submitting for approval
People and Communities	Motorised users of the road NMU of road and off-road routes	Change in levels of driver stress during construction Reduction in NMU amenity and journey length	Consideration of landscape screening of the road wherever possible Use of Best Practice construction methods to reduce disruption to users of facilities within vicinity Deregistration of Common Land if required Replacement Common Land to be provided and agreed with authorities	As part of an update to the ESR in PCF 2 Prior to submitting for approval
	Users of community facilities Registered Common Land (Wisley and Ockham Commons) Owners and users of private property including residential dwellings	Community severance Loss of Registered Common Land (Wisley and Ocham Commons) Impact on amentiy of residential dwellings		
Road Drainage and the Water Environment	Floodplain	Increased flood risk	Prepare a FRAonce option is decided upon Best Practice Measures in a CEMP	As part of an update to the ESR Prior to Construction
	Surface and Groundwater Quality (including River Arun)	Deterioration in quality and quantity		

17 Summary of effects

17.1 Introduction

As this is only the option identification PCF Stage1 of the project process, there is no attempt to make any form of comparative assessment of the options. Therefore, in this conclusion section, we present the initial findings of the optioneering process for each of the disciplines. Dependent upon the nature of the assessment undertaken, i.e. Simple or Detailed, not all the options within the overall schemes have been assessed individually.

17.2 Option 9

Air quality

Adverse air quality impacts on designated ecological sites will be unavoidable. The free flow links may offset adverse effects due to instances of reduced distance between the emissions source and sensitive receptors by improving vehicle flow resulting in a reduction in emissions.

There is expected to be an increase in AADT and likely negative effects on nearby receptors with the proposed scheme on the majority of links included in the ARN including:

- the three arms of Junction 10 to the northeast, northwest and and south west;
- the A245 running through Cobham;
- Ripley to Pyford Village

There is expected to be a decrease in AADT and likely positive effects on nearby receptors with the proposed scheme on the following roads:

- The western arm of the Painshill Interhcange;
- Wisley Lane off the A3; and
- The M25 southbound from J10.

Cultural heritage

Option 9 has the potential to result in significant adverse effects on five assets, including temporary and permanent large adverse effects on a Scheduled Monument due to the construction of road infrastructure immediately adjacent to it. All the significant effects relate to impacts on the settings of designated assets. Additionally, a number of non-designated archaeological assets may be removed or truncated by construction of the scheme, as may previously undiscovered archaeological remains in areas of previously undisturbed land take. The A3 D4AP upgrade has the potential to introduce significant adverse effects on a further six assets, in conjunction with this Option.

Landscape

Significant landscape effects are expected during construction stage and operational stage due to a major alteration to the local landscape character as large scale construction operations would be required. New features introduced by the Proposed Scheme would substantially alter landscape character also in the operational stage as the proposed planting would not fully integrate it into the existing local landscape character. Majority of the identified visual receptors will be significantly affected both in the construction stage due to a large scale of construction activities. During operational

stage potential environmental design measures would help to integrate the Proposed Scheme into the existing landscape, however some elements of the Proposed Scheme would remain prominent resulting in a noticeable deterioration to the existing views for some receptors.

Nature conservation

This scheme will involve approximate land take of 17 ha, of which:

- 10.98ha is designated as Thames Basin Heaths SPA
- 16.02 ha is designated as Ockham and Wisley Commons SSSI

Land take would be focussed in the south west and north east quadrants. Woodland and regenerating heathland habitat would be lost. The south east quadrant, which supports the established heathland habitat, where all qualifying SPA species were recorded, would be almost completely avoided (only very localised road realignment at the junction).

Geology and soils

The anticipated geology and soils present over the majority of the proposed route of Option 9 comprise Made Ground and solid geology of the Bagshot Formation. Superficial deposits of Alluvium, Lynch Hill Gravel Member, Kempton Park Gravel Member and Taplow Gravel Member are anticipated locally within the option extents. Solid geology of London Clay Formation is anticipated to be encountered at the south-western extent of the site. Construction associated with widening of the A3 is proposed on or adjacent to historical landfill sites. There is potential for impacts to: the scheme associated with ground conditions that may be encountered; and human and/or controlled waters receptors associated with potential sources of contamination within or in proximity to the proposed route, such as localised deposits of Made Ground, historical landfill sites and other contaminative land uses.

Materials and Waste

At this stage of the design process no information on the use of materials or generation of waste associated with the proposed options is currently available. However, it is assumed that proposed options which cover the greatest area (physical extent) will require the greatest amount of demolition works, have the greatest volume of earthworks (excavation works), and will require the greatest volume of construction materials, thus have the potential to produce more waste. A summary of the key effects associated with Option 9 are summarised below:

- Potential excess material use / waste generation if wastes are not reused / recycled where practicable.
- Potential for the disposal of large quantities of excavated materials, if the materials are found to be hazardous and thus not suitable for reuse.
- Increased waste arisings associated with the modification / realignments of existing carriageways, slip roads and the roundabout.
- Increased waste arisings works associated with bridge (under and over) construction (i.e. piling).

Noise and vibration

All construction activities have the potential to cause some disturbance at nearby noise and/or vibration sensitive receptors, with demolition works and piling works (for new viaducts and retaining walls) giving rise to some of the highest noise levels dependent on the methods chosen. Major increases in the Opening and Design years are predicted on the new links from the A3 to M25, and the M25 eastbound off slip road.

The New links will bring the carriageway closer to receptors at Pond Farm, Chatley Farm, Court Close Farm, Foxwarren Park and Silvermere Equestrian Centre

People and Communities

Construction phase there is expected to be a change in amenity for NMU users at footpaths, particularly those located close to construction works. No significant effects have been identified for any of the PRoWs during construction or operational phase, except for the shared cycleway and footpath along the A3. PRoW FP7 has been identified as the most sensitive, given the higher NMU surveys, particular care should be given to maintaining this footpath. Views from Option 9 would be restricted by a combination of landform with a dense woodland therefore, this setting will continue to restrict the visibility of Option 9 including from potential receptors. Option will have impact on the identified residential receptors during construction and operation. Both construction and operational phase land will be required and loss from Wisley and Ockham Commons, and is assessed to have major adverse effect on community land.

Road drainage and the water environment

Of the three options considered in this assessment, Option 9 is the least environmentally damaging for the water environment. Although this option proposes three new crossings, the proposed works for Option 9 are smaller in scale than the other options.

17.3 Option 14

Air quality

The widening of the junction would reduce the distance between the road and sensitive receptors. The sources of vehicle emissions would be brought within the boundaries of designated ecological sites, with the potential to adversely impact on vegetation and also reduce the distance between the road and isolated residential properties, although they will remain at a distance of over 200 metres from the emissions source. The adverse impacts from moving the emission source closer to sensitive receptors may be offset by improving vehicle flow resulting in a reduction in emissions. The majority of roads within the ARN are expected to experience an increase in AADT with the scheme. The extent of the affected links are similar to that for Option 9 however all arms of Junction 10 are expected to experience an increase of AADT with this option variant.

Cultural heritage

Option 14 has the potential to result in significant adverse effects on three assets, including a temporary large adverse effect on a Scheduled Monument. All the significant effects relate to impacts on the settings of designated assets. Additionally, a number of non-designated archaeological assets may be removed or truncated by construction of the scheme, as may previously undiscovered archaeological remains in areas of previously undisturbed land take. The A3 D4AP upgrade has the potential to introduce significant adverse effects on a further eight assets, in conjunction with this Option.

Landscape

No significant landscape effects were identified during operational and construction stage for the Option 14. A minor loss and alteration to the local landscape character is expected as a result of construction activities as these would be located close to the perimeter of the existing road corridors. It is expected that in the operational stage there is a good potential to accommodate these options into the existing landscape. Some closely located receptors, within Painshill Park, adjacent Common's and ProW's

will be significantly affected during construction stage as views would be dominated by construction activities. In the operational stage the Proposed Scheme would be better integrated into the existing landscape through the incorporation of the environmental design measures and would be seen as slight extension to the existing road corridors.

Nature conservation

This scheme will involve approximate land take of 8 ha, of which:

- 3.84 ha is designated as Thames Basin Heaths SPA
- 6.74 ha is designated as Ockham and Wisley Commons SSSI

An elongated roundabout would result in loss of small areas of woodland habitat from all four quadrants. Option 14 may have the lowest negative impact due to the smallest land take and loss of the least amount of buffering habitat between the roads and mature and regenerating heathland habitat.

Geology and soils

The anticipated geology and soils present over the majority of the proposed route of Option 14 comprise Made Ground and solid geology of the Bagshot Formation. Superficial deposits of Alluvium, Lynch Hill Gravel Member, Kempton Park Gravel Member and Taplow Gravel Member are anticipated locally within the option extents. Solid geology of London Clay Formation is anticipated to be encountered at the south-western extent of the site. Construction associated with the widening of the A3 is proposed on or adjacent to historical landfill sites. There is potential for impacts to: the scheme associated with ground conditions that may be encountered; and human and/or controlled waters receptors associated with potential sources of contamination within or in proximity to the proposed route, such as localised deposits of Made Ground, historical landfill sites and other contaminative land uses.

Materials and Waste

At this stage of the design process no information on the use of materials or generation of waste associated with the proposed options is currently available. However, it is assumed that proposed options which cover the greatest area (physical extent) will require the greatest amount of demolition works, have the greatest volume of earthworks (excavation works), and will require the greatest volume of construction materials, thus have the potential to produce more waste. A summary of the key effects associated with Option 14 are summarised below:

- Potential excess material use / waste generation if wastes are not reused / recycled where practicable.
- Potential for the disposal of large quantities of excavated materials, if the materials are found to be hazardous and thus not suitable for reuse.
- Increased waste arisings associated with the modification / realignments of existing carriageways, slip roads and the roundabout.
- Increased waste arisings works associated with bridge (under and over) construction (i.e. piling).

Noise and vibration

All construction activities have the potential to cause some disturbance at nearby noise and/or vibration sensitive receptors, with demolition works and piling works (for new viaducts and retaining walls) giving rise to some of the highest noise levels dependent on the methods chosen. Major increases in noise are predicted on new links from M25 eastbound to A3 northbound, A3 northbound and westbound M25, and a new section of the M25 eastbound on slip road.

People and Communities

Construction phase there is expected to be a change in amenity for NMU users at footpaths, particularly those located close to construction works. No significant effects have been identified for any of the PRoWs during construction or operational phase, except for the shared cycleway and footpath along the A3. PRoW FP7 has been identified as the most sensitive, given the higher NMU surveys, particular care should be given to maintaining this footpath. Views from Option 14 would be restricted by a combination of landform with a dense woodland therefore, this setting will continue to restrict the visibility of Option 14 including from potential receptors. Option will have the least impact on the residential receptors identified during construction and operation. Both construction and operational phase land will be required and loss from Wisley and Ockham Commons, and is assessed to have major adverse effect on community land.

Road drainage and the water environment

Option 14 is the 'middle ground' option between Option 9 and Option 16. It crosses the same number of watercourses as Option 9, however works are on a larger scale. Based on the number of new watercourse crossings, Option 14 is less environmentally damaging than Option 16.

17.4 Option 16

Air quality

Although Option 16 introduces new road links in closer proximity to nearby residential receptors (Redhill Road), they have the potential to positively affect local air quality conditions through reduced congestion and removal of idling vehicles in the area. Air quality effects on designated ecological sites will be unavoidable as new emissions sources are introduced within designated site boundaries. The majority of roads within the ARN are expected to experience an increase in AADT with the scheme. The extent of the affected links are similar to that for the other two options and as with Option 9, three arms of J10 are expected to experience an increase of AADT with the scheme.

Cultural heritage

Option 16 has the potential to result in significant adverse effects on ten assets, including temporary or permanent large adverse effects on two Scheduled Monuments, one Grade I and one Grade II* Registered Park and Garden, and a Grade II listed building. These significant effects relate to impacts on the settings of designated assets, and the removal of small sections of the Registered Parks and Gardens. Additionally, a number of non-designated archaeological assets may be removed or truncated by construction of the scheme, as may previously undiscovered archaeological remains in areas of previously undisturbed land take. The A3 D4AP upgrade has the potential to introduce significant adverse effects on a further six assets, in conjunction with this Option.

Landscape

Significant landscape effects are expected during construction stage and operational stage due to a major alteration to the local landscape character as large scale construction operations would be required and new features introduced by the Proposed Scheme would substantially alter landscape character also in the operational stage as the proposed planting would not fully integrate it into the existing local landscape character. Majority of the identified visual receptors will be significantly affected both in the construction stage due to a large scale of construction activities. During operational stage potential environmental design measures would help to integrate the Proposed Scheme into the existing landscape, however some elements

of the Proposed Scheme would remain prominent resulting in a noticeable deterioration to the existing views for some receptors.

Nature conservation

This scheme will involve approximate land take of 48 ha, of which:

- 22.98 ha is designated as Thames Basin Heaths SPA
- 41.69 ha is designated as Ockham and Wisley Commons SSSI

This option will involve the loss of a significant amount of habitat within all four quadrants. Large areas of woodland habitat would be lost or isolated within the junction and there would be loss of a heathland glade in the northwest quadrant and a part of the regenerating heathland in the southwest quadrant. Option 14 may have the greatest negative impact due to the largest land take, loss of small areas of heathland habitat and the greatest amount of buffering habitat between the roads and heathland habitat, supporting SPA qualifying bird species.

Geology and soils

The anticipated geology and soils present for the majority of the proposed route of Option 16 comprise Made Ground and solid geology of the Bagshot Formation. Superficial deposits of Alluvium, Lynch Hill Gravel Member, Kempton Park Gravel Member and Taplow Gravel Member are anticipated locally within the option extent. Solid geology of London Clay Formation is anticipated to be encountered at the south-western extent of the site. Construction associated with the widening of the A3 and reconfiguration of J10 is proposed on or adjacent to historical landfill sites. There is potential for impacts to: the scheme associated with ground conditions that may be encountered; and human and/or controlled waters receptors associated with potential sources of contamination within or in proximity to the proposed route, such as localised deposits of Made Ground, historical landfill sites and other contaminative land uses.

Materials and Waste

At this stage of the design process no information on the use of materials or generation of waste associated with the proposed options is currently available. However, it is assumed that proposed options which cover the greatest area (physical extent) will require the greatest amount of demolition works, have the greatest volume of earthworks (excavation works), and will require the greatest volume of construction materials, thus have the potential to produce more waste. A summary of the key effects associated with Option 16 are summarised below:

- Potential excess material use / waste generation if wastes are not reused / recycled where practicable.
- Potential for the disposal of large quantities of excavated materials, if the materials are found to be hazardous and thus not suitable for reuse.
- Increased waste arisings associated with the modification / realignments of existing carriageways, slip roads and the roundabout.
- Increased waste arisings associated with the construction of a new two lane roundabout and additional slip roads.
- Potential for enhanced quantities of demolition waste airings associated with the demolition of the existing roundabout and slip roads.
- Increased waste arisings works associated with bridge (under and over) construction (i.e. piling).

Noise and vibration

All construction activities have the potential to cause some disturbance at nearby noise and/or vibration sensitive receptors, with demolition works and piling works (for new viaducts and retaining walls) giving rise to some of the highest noise levels dependent on the methods chosen. In both the Opening and Design years, most of the newly constructed links, and the carriageways travelling away from J10 are predicted to have major increases in traffic noise. This is likely due to traffic not having to slow down at junctions and therefore increase the average speed.

People and Communities

Construction phase there is expected to be a change in amenity for NMU users at footpaths, particularly those located close to construction works. No significant effects have been identified for any of the PRoWs during construction or operational phase, except for the shared cycleway and footpath along the A3. PRoW FP7 has been identified as the most sensitive, given the higher NMU surveys, particular care should be given to maintaining this footpath. Option 16 contains elevated features that would require considerable earthworks to accommodate them within existing landscape but also bridges that would be elevated considerably in comparison to the baseline alignment of the junction. Therefore some glimpsed, filtered views may be available over the adjacent landform and woodland. This option will have the most impact on the residential receptors identified during construction and operation. Both construction and operational phase land will be required and loss from Wisley and Ockham Commons, and is assessed to have major adverse effect on community land. Option 16 requires the greatest land take from the commons and therefore has the greatest impact on People and Communities out of all the options.

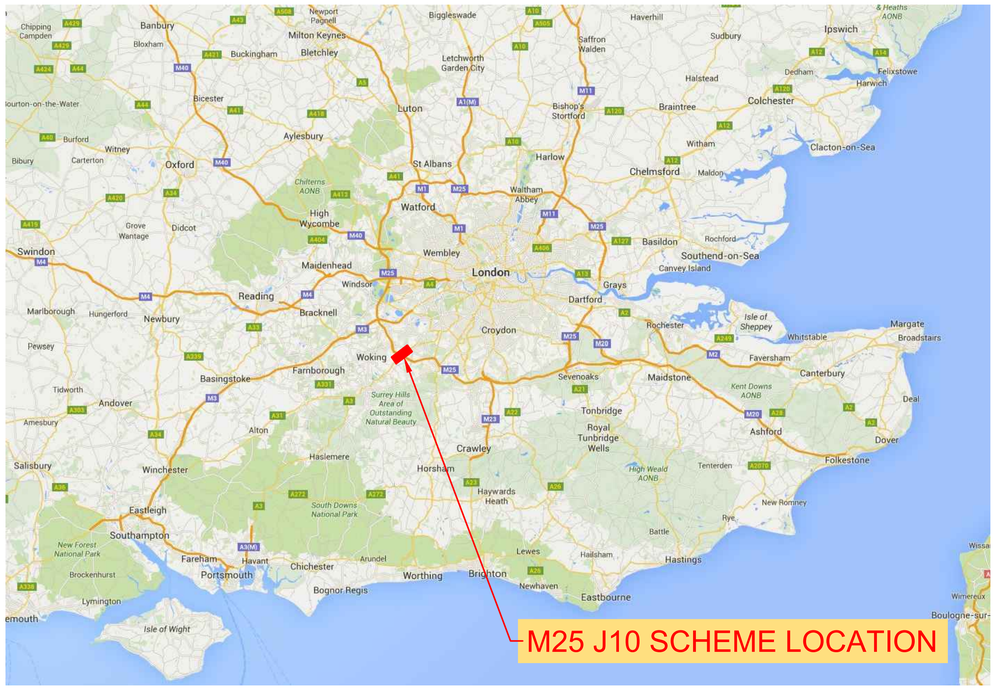
Road drainage and the water environment

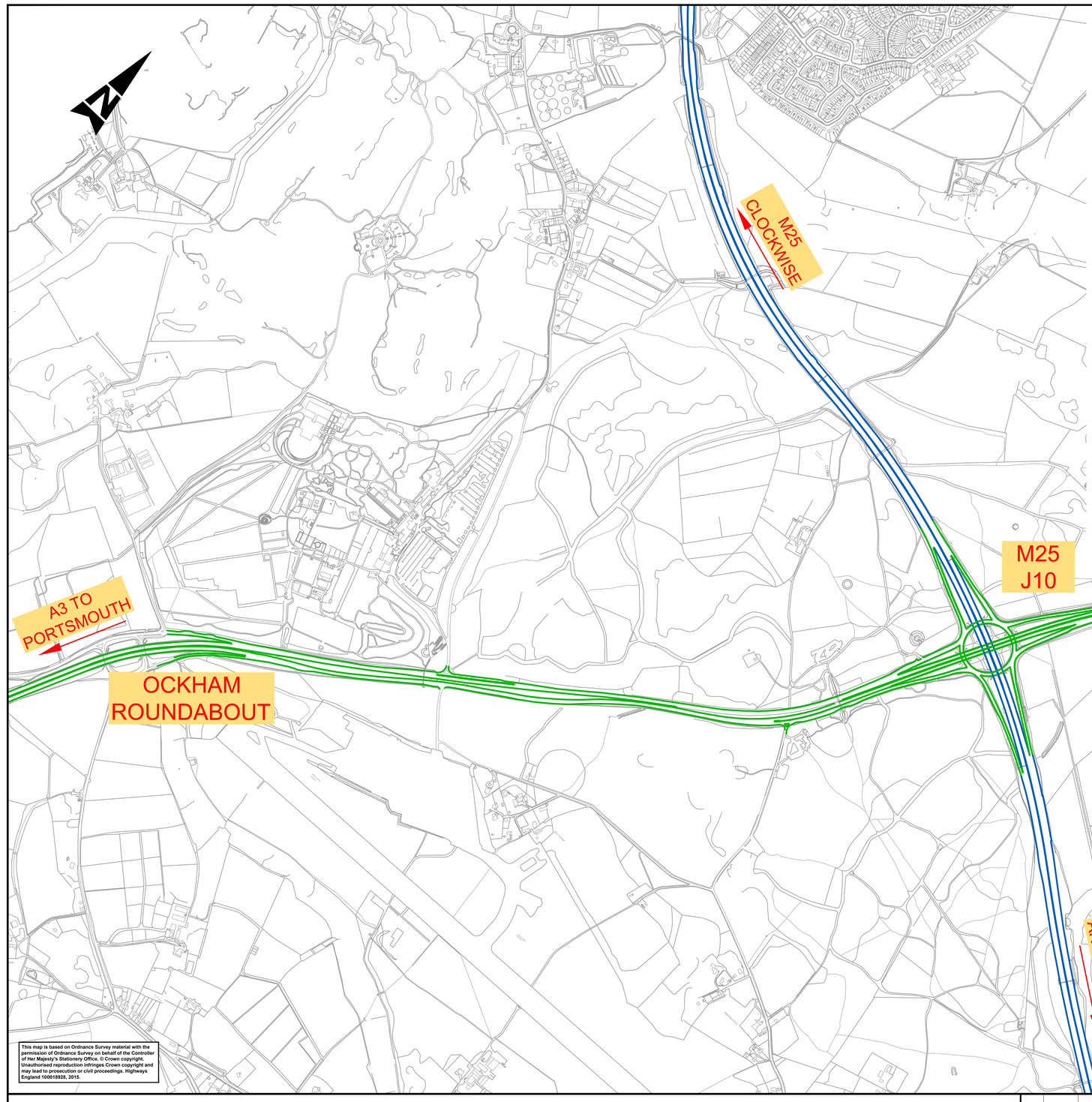
Option 16 is the most environmentally damaging for the water environment as this crosses more watercourse, and proposed works are on a larger scale than those associated with the other options.

Appendix A: Location Plan

DO NOT SCALE

Millimetres 0 10 100





DRAFT : FOR INFORMATION ONLY

Rev.	Date	Description	By	Chk'd	App'd
P01.1	---	First Issue	---	---	---

Drawing Status: Work in Progress
Suitability: S0

ATKINS
Epsom Gateway
Ashley Avenue
Epsom
Surrey
KT18 5AL
Tel: +44 (0)1372 726140
Fax: +44 (0)1372 740055
www.atkinsglobal.com

Client: Working on behalf of highways england

Project Title: REGIONAL INVESTMENT PROGRAMME
M25 J10 IMPROVEMENT

Drawing Title: SCHEME LOCATION

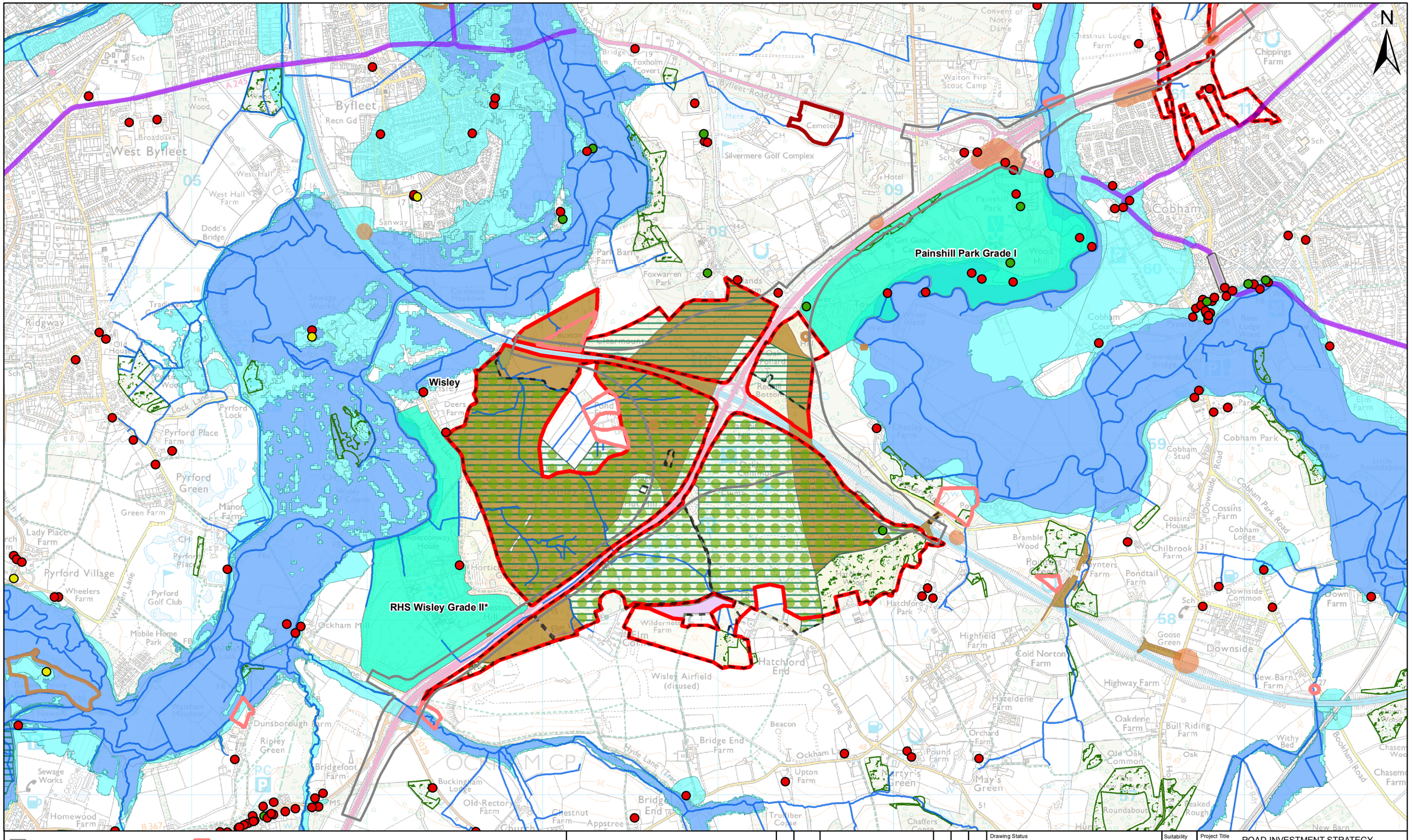
Scale	Drawn	Checked	Approved	Authorised
NTS	---	---	---	---
Original Size: A1	Date: ---	Date: ---	Date: ---	Date: ---

Drawing Number: HE551522 - ATK - GEN - M25J10 - SK - Z - 0001
(Project | Originator | Volume | Location | Type | Role | Number)

Project Ref. No.: 5145620
Revision: P01.1

Plotted by: arro9099 Date: Jan 28, 2016 - 1:56pm

Appendix B: Environmental Constraints



- Scheme Area Boundary
- Grade I listed building
- Grade II listed building
- Grade II* listed building
- PCM Links
- Detailed River Network (DRN)
- Land Fill Site (Authorised)
- Land Fill Site (Historic)
- Scheduled Monument
- Important Areas for Noise
- Local Nature Reserve (LNR)
- Site of Special Scientific Interest (SSSI)
- Common Land
- Cobham Air Quality Management Area
- Special Protection Area (SPA)
- Ancient Woodland
- Parks & Gardens
- Flood Zone 3
- Flood Zone 2
- Access Land
- Land with Apparent Public Access

CLIENT NAME: Highways England

LICENCE NUMBER: 100018928

Metres

0 125 250 500 750 1,000

Rev.	Date	Description	By	Chk'd	App'd
P04	11.10.16	ADDITION OF SCHEME BOUNDARY	JVR	SW	NW
P03	08.07.16	AMMENDMENTS AS OF 30.06.16	JVR	AS	NW
P02	15.01.16	COMMON LAND DATA ADDED	JVR	HM	NW
P01	24.09.15	ISSUED FOR INFORMATION	AT	HM	NW

Drawing Status: REVIEW AND COMMENT

Suitability: S3

ATKINS
Elizabeth House
28 Baddow Road
Chelmsford
Essex
CM2 0DG
Tel: +44 (0) 1245 245245
Fax: +44 (0) 1245 345010
www.atkinsglobal.com

Client

Project Title: ROAD INVESTMENT STRATEGY M25 J10

Drawing Title: ENVIRONMENT CONSTRAINTS MAP Page 1 of 1

Scale	Designed	Drawn	Checked	Authorised
1:20000	AT	AT	HM	NW
Original Size	Date	Date	Date	Date
A3	20/10/16	20/10/16	20/10/16	20/10/16

Drawing Number: Project HE551522 - Originator ATK - Volume EGN - Location M25J10 - Type DR - Role EN - Number 0001

Project Ref. No.: 5145620

Revision: P04

Appendix C: Scheme Options

DO NOT SCALE

Millimetres 0 10 100

M25 JUNCTION 10 / A3 WISLEY INTERCHANGE

HEATHROW

M25

FOR CONTINUATION REFER TO SHEET 2 - VIEW A

POSSIBLE NEW CULVERT REQUIRED.
LENGTH 115m
ASSUME 900mm Dia.

IL2A

TYPE E DIVERGE
(NOT YET MODELLED)

TUMULUS: ANCIENT MONUMENT

3533 WISLEY INTERCHANGE
WEST UNDERBRIDGE
(LEVEL 2)

6100 WISLEY INTERCHANGE
NORTH UNDERBRIDGE
(LEVEL 2)

BRIDGE STRUCTURE
LENGTH 310m
MAX SPAN 65m
WIDTH 20m

15186 REDHILL
RETAINING WALL

A3

BOLDER MERE

FOR A3 WIDENING SEE Drg. No.
HE551522-ATK-HGN-M25J10-SK-D-0162
NOTE: TIE-IN LOCATION VARIES WITH DIFFERING A3 WIDENING OPTIONS

EXISTING FOOTBRIDGE

OLD LANE

BRIDGE STRUCTURE
LENGTH 310m
MAX SPAN 65m
WIDTH 20m

6152 WISLEY INTERCHANGE
SOUTH UNDERBRIDGE
(LEVEL 2)

3514 WISLEY INTERCHANGE
A3 UNDERBRIDGE
(LEVEL 3)

3512 WISLEY INTERCHANGE
EAST UNDERBRIDGE
(LEVEL 2)

IL1A

TYPE E DIVERGE

FOR A3 WIDENING SEE Drg. No.
HE551522-ATK-HGN-M25J10-SK-D-0164
NOTE: TIE-IN LOCATION VARIES WITH DIFFERING A3 WIDENING OPTIONS

POSSIBLE NEW CULVERT REQUIRED.
LENGTH 75m
ASSUME 900mm Dia.

FOR CONTINUATION REFER TO SHEET 2 - VIEW B

M25

GATWICK

APPROXIMATE QUANTITIES OPTION 9

EARTHWORKS CUT VOLUME	8,300m³
EARTHWORKS FILL VOLUME	593,325m³
PAVEMENT AREA (EXCLUDING STRUCTURES)	35,600m²

Scale 1:2500
50m 0m 50m 100m 150m

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
(Enter "None" if applicable)

Maintenance / Cleaning
(Enter "None" if applicable)

Use
(Enter "None" if applicable)

Decommissioning / Demolition
(Enter "None" if applicable)

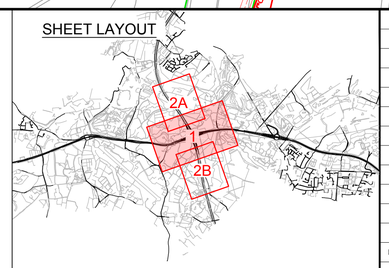
NOTES

1. LINK ROADS SHOWN AS IL1A ARE DETERMINED FROM TD 22/08. IT WOULD BE PROPOSED TO PROVIDE ALL LINK ROADS WITH AN IL2A CROSS SECTION IN ORDER TO FUTURE PROOF AND MAXIMISE FLEXIBILITY.
2. FOR CROSS SECTIONS IL1A & IL2A REFER TO TD 27/05, FIGURE 4-16.
3. UNLESS SPECIFIED OTHERWISE, MERGE AND DIVERGE TYPES ARE AS PER TD 22/06.
4. UNLESS SPECIFIED OTHERWISE, EARTHWORKS SLOPES TO BE 1:4

KEY

- EXISTING OVERBRIDGE STRUCTURES
- EXISTING UNDERBRIDGE STRUCTURES
- EXISTING RETAINING WALLS
- HIGHWAY BOUNDARY (INDICATIVE ONLY)
- EXISTING WATERWAYS
- EXISTING BUILDINGS
- PROPOSED HIGHWAY WORKS

SHEET LAYOUT



Rev.	Date	Description	By	Chk'd	App'd
P01	01/04/16	TO BENCHMARK FOR COST ESTIMATE	SA	RM	PJ

Drawing Status: FOR COSTING
Suitability: D1

ATKINS
Epsom Gateway
Ashley Avenue
Epsom
Surrey
KT18 5AL
Tel: +44 (0)1372 726140
Fax: +44 (0)1372 740055
www.atkinsglobal.com

Client: Working on behalf of highways england

Project Title: REGIONAL INVESTMENT PROGRAMME M25 J10 IMPROVEMENT

Drawing Title: GENERAL ARRANGEMENT OPTION 9 4 LEVEL, FREEFLOW IN 2 DIRECTIONS SHEET 1 OF 2

Scale	Drawn	Checked	Approved	Authorised
1:2500	SA	RM	PJ	KB
Original Size	**Date**	**Date**	**Date**	**Date**
A1	01/04/16	01/04/16	01/04/16	01/04/16

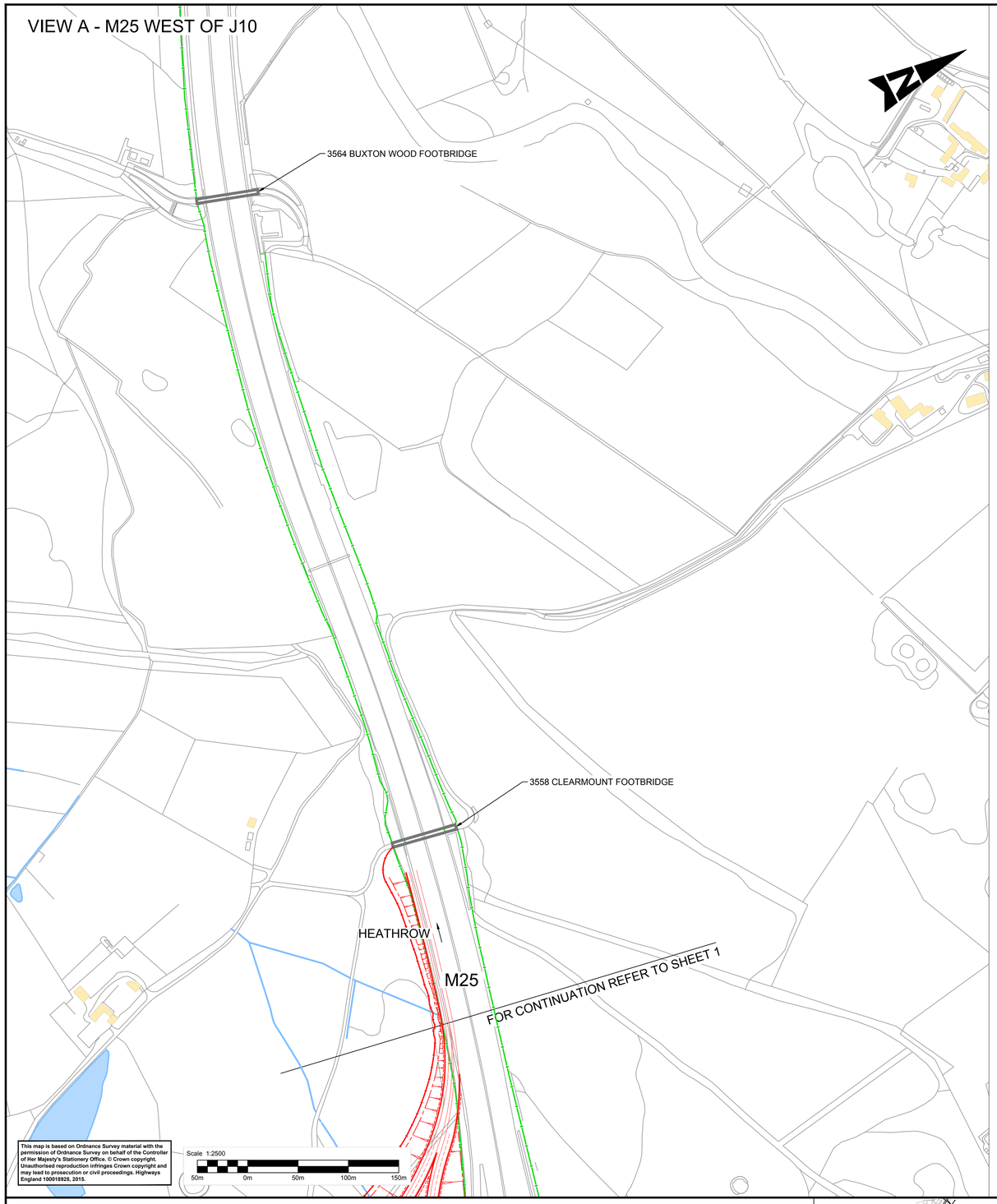
Drawing Number: Project | Originator | Volume
HE551522 - ATK - HGN - M25J10 - SK - D - 0091
Location | Type | Role | Number

Project Ref. No.: 5145620
Revision: P01

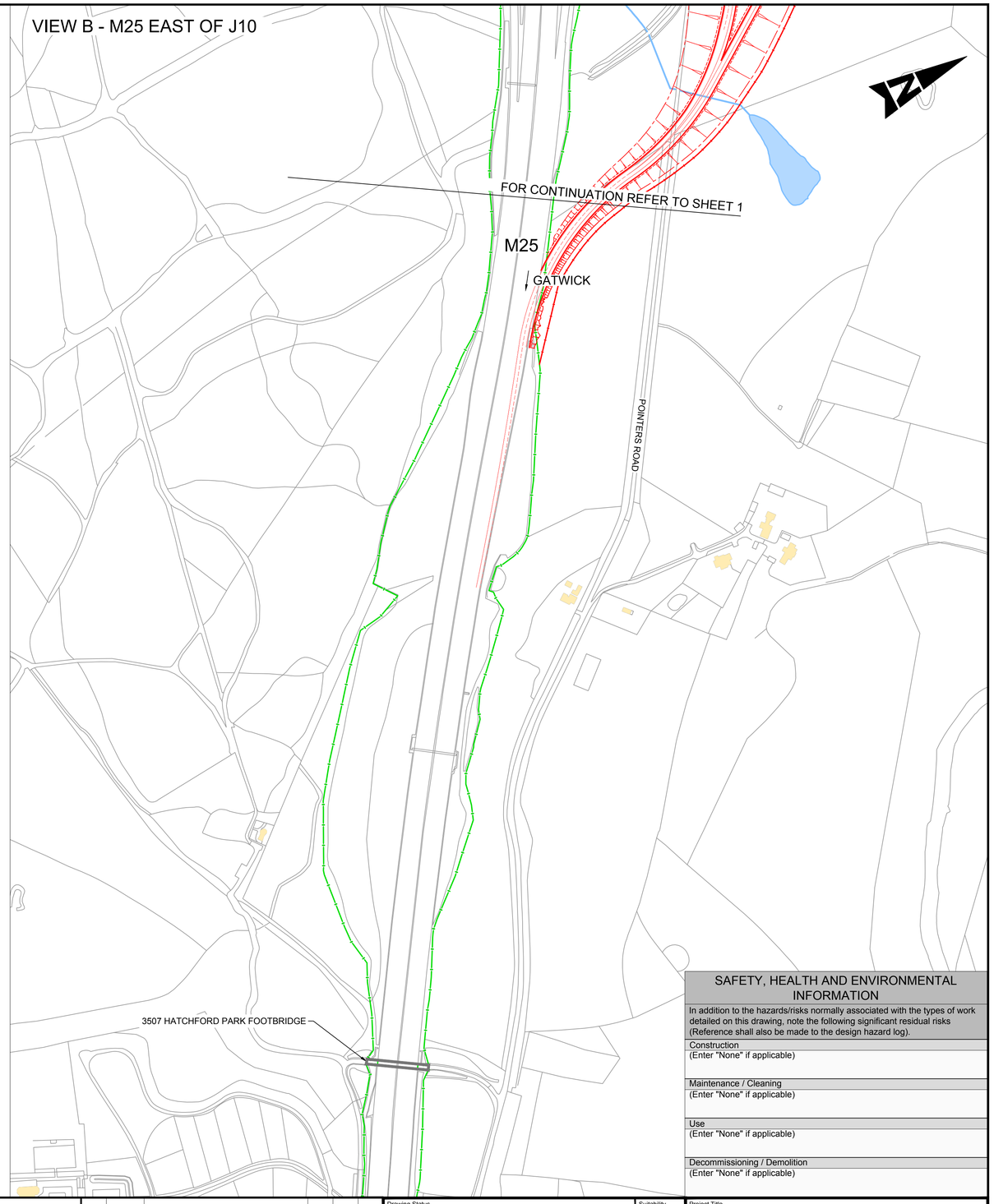
DO NOT SCALE

Millimetres 100 0 10

VIEW A - M25 WEST OF J10



VIEW B - M25 EAST OF J10



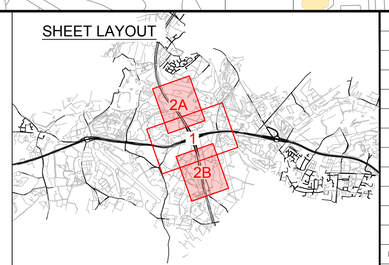
NOTES

1. LINK ROADS SHOWN AS IL1A ARE DETERMINED FROM TD 22/08. IT WOULD BE PROPOSED TO PROVIDE ALL LINK ROADS WITH AN IL2A CROSS SECTION IN ORDER TO FUTURE PROOF AND MAXIMISE FLEXIBILITY.
2. FOR CROSS SECTIONS IL1A & IL2A REFER TO TD 27/05, FIGURE 4-16.
3. UNLESS SPECIFIED OTHERWISE, MERGE AND DIVERGE TYPES ARE AS PER TD 22/06.
4. UNLESS SPECIFIED OTHERWISE, EARTHWORKS SLOPES TO BE 1:4

KEY

- EXISTING OVERBRIDGE STRUCTURES
- EXISTING UNDERBRIDGE STRUCTURES
- EXISTING RETAINING WALLS
- HIGHWAY BOUNDARY (INDICATIVE ONLY)
- EXISTING WATERWAYS
- EXISTING BUILDINGS
- PROPOSED HIGHWAY WORKS

SHEET LAYOUT



Rev.	Date	Description	By	Chk'd	App'd
P01	01/04/16	TO BENCHMARK FOR COST ESTIMATE	SA	RM	PJ

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
(Enter "None" if applicable)

Maintenance / Cleaning
(Enter "None" if applicable)

Use
(Enter "None" if applicable)

Decommissioning / Demolition
(Enter "None" if applicable)

Drawing Status: FOR COSTING
Suitability: D1

ATKINS
Epsom Gateway
Ashley Avenue
Epsom
Surrey
KT18 5AL
Tel: +44 (0)1372 726140
Fax: +44 (0)1372 740055
www.atkinsglobal.com

Client: Working on behalf of highways england

Project Title: REGIONAL INVESTMENT PROGRAMME
M25 J10 IMPROVEMENT

Drawing Title: GENERAL ARRANGEMENT
OPTION 9
4 LEVEL, FREEFLOW IN 2 DIRECTIONS
SHEET 2 OF 2

Scale	Drawn	Checked	Approved	Authorised
1:2500	SA	RM	PJ	KB
Original Size: A1	Date: 01/04/16	Date: 01/04/16	Date: 01/04/16	Date: 01/04/16

Drawing Number: Project | Originator | Volume
HE551522 - ATK - HGN -
M25J10 - SK - D - 0092
Location | Type | Role | Number

Project Ref. No.: 5145620
Revision: P01

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DO NOT SCALE

Millimetres 100 0 10

HEATHROW

M25

FOR CONTINUATION REFER TO SHEET 2 - VIEW A

M25 JUNCTION 10 / A3 WISLEY INTERCHANGE

BRIDGE STRUCTURE
LENGTH 45m
WIDTH 25m

3533 WISLEY INTERCHANGE WEST UNDERBRIDGE (LEVEL 2)

REDUCTION OF HARDENED VERGES TO ENABLE 1 LANE CARRIAGEWAY WIDENING THROUGH EXISTING STRUCTURE

TUMULUS: ANCIENT MONUMENT

FOR A3 WIDENING SEE Drg. No. HE551522-ATK-HGN-M25J10-SK-D-0162
NOTE: TIE-IN LOCATION VARIES WITH DIFFERING A3 WIDENING OPTIONS

15186 REDHILL RETAINING WALL

A3

BOLDER MERE

REDUCTION OF HARDENED VERGES TO ENABLE 1 LANE CARRIAGEWAY WIDENING THROUGH EXISTING STRUCTURE

EXISTING FOOTBRIDGE

6152 WISLEY INTERCHANGE SOUTH UNDERBRIDGE (LEVEL 2)

6100 WISLEY INTERCHANGE NORTH UNDERBRIDGE (LEVEL 2)

3514 WISLEY INTERCHANGE A3 UNDERBRIDGE (LEVEL 3)

FOR A3 WIDENING SEE Drg. No. HE551522-ATK-HGN-M25J10-SK-D-0164
NOTE: TIE-IN LOCATION VARIES WITH DIFFERING A3 WIDENING OPTIONS

3512 WISLEY INTERCHANGE EAST UNDERBRIDGE (LEVEL 2)

BRIDGE STRUCTURE
LENGTH 45m
WIDTH 25m

OLD LANE

EXTENT OF SCHEME

FOR CONTINUATION REFER TO SHEET 2 - VIEW B

M25

GATWICK

APPROXIMATE QUANTITIES OPTION 14

EARTHWORKS CUT VOLUME	45,110m³
EARTHWORKS FILL VOLUME	67,150m³
PAVEMENT AREA (EXCLUDING STRUCTURES)	61,500m²

Scale 1:2500
50m 0m 50m 100m 150m

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
(Enter "None" if applicable)

Maintenance / Cleaning
(Enter "None" if applicable)

Use
(Enter "None" if applicable)

Decommissioning / Demolition
(Enter "None" if applicable)

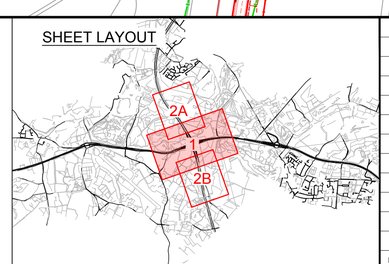
NOTES

1. LINK ROADS SHOWN AS IL1A ARE DETERMINED FROM TD 22/08. IT WOULD BE PROPOSED TO PROVIDE ALL LINK ROADS WITH AN IL2A CROSS SECTION IN ORDER TO FUTURE PROOF AND MAXIMISE FLEXIBILITY.
2. FOR CROSS SECTIONS IL1A & IL2A REFER TO TD 27/05, FIGURE 4-16.
3. UNLESS SPECIFIED OTHERWISE, MERGE AND DIVERGE TYPES ARE AS PER TD 22/06.
4. UNLESS SPECIFIED OTHERWISE, EARTHWORKS SLOPES TO BE 1:4

KEY

- EXISTING OVERBRIDGE STRUCTURES
- EXISTING UNDERBRIDGE STRUCTURES
- EXISTING RETAINING WALLS
- HIGHWAY BOUNDARY (INDICATIVE ONLY)
- EXISTING WATERWAYS
- EXISTING BUILDINGS
- PROPOSED HIGHWAY WORKS

SHEET LAYOUT



Rev.	Date	Description	By	Chk'd	App'd
P01	01/04/16	TO BENCHMARK FOR COST ESTIMATE	SA	RM	PJ

Drawing Status: FOR COSTING
Suitability: D1

ATKINS
Epsom Gateway
Ashley Avenue
Epsom
Surrey
KT18 5AL
Tel: +44 (0)1372 726140
Fax: +44 (0)1372 740055
www.atkinsglobal.com

Client: Working on behalf of highways england

Project Title: REGIONAL INVESTMENT PROGRAMME M25 J10 IMPROVEMENT

Drawing Title: GENERAL ARRANGEMENT OPTION 14 - ELONGATED ROUNDABOUT WITH REALIGNED M25 SLIPS SHEET 1 OF 2

Scale	Drawn	Checked	Approved	Authorised
1:2500	SA	RM	PJ	KB
Original Size	**Date**	**Date**	**Date**	**Date**
A1	01/04/16	01/04/16	01/04/16	01/04/16

Drawing Number: Project | Originator | Volume | Location | Type | Role | Number
HE551522 - ATK - HGN - M25J10 - SK - D - 0141

Project Ref. No.: 5145620
Revision: P01

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DO NOT SCALE

Millimetres 0 10 100

VIEW A - M25 WEST OF J10

HEATHROW

3564 BUXTON WOOD FOOTBRIDGE

EXTENT OF SCHEME

MAJOR/MINOR MERGE - LANE GAIN AT GHOST ISLAND AS PER TD 39/94

EXTENT OF SCHEME

3558 CLEARMOUNT FOOTBRIDGE.
EXISTING FOOTBRIDGE TO BE REPLACED.
LENGTH 70m
MAX SPAN 35m

TYPE D DIVERGE

FOR CONTINUATION REFER TO SHEET 1

M25

Scale 1:2500
50m 0m 50m 100m 150m

VIEW B - M25 EAST OF J10

EXTENT OF SCHEME

M25

FOR CONTINUATION REFER TO SHEET 1

POINTERS ROAD

MAJOR/MINOR MERGE - LANE GAIN AT GHOST ISLAND AS PER TD 39/94

EXTENT OF SCHEME

3507 HATCHFORD PARK FOOTBRIDGE

GATWICK

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
(Enter "None" if applicable)

Maintenance / Cleaning
(Enter "None" if applicable)

Use
(Enter "None" if applicable)

Decommissioning / Demolition
(Enter "None" if applicable)

NOTES

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KEY

- EXISTING OVERBRIDGE STRUCTURES
- EXISTING UNDERBRIDGE STRUCTURES
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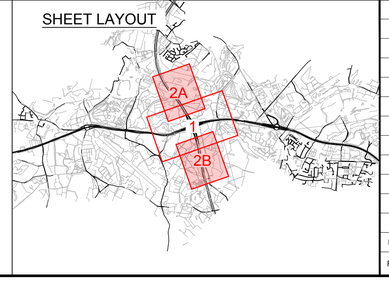
- HIGHWAY BOUNDARY (INDICATIVE ONLY)
- EXISTING WATERWAYS
- EXISTING BUILDINGS
- PROPOSED HIGHWAY WORKS

SHEET LAYOUT



Rev.	Date	Description	By	Chk'd	App'd
P01	01/04/16	TO BENCHMARK FOR COST ESTIMATE	SA	RM	PJ

Drawing Status: FOR COSTING
Suitability: D1

ATKINS
Epsom Gateway
Ashley Avenue
Epsom
Surrey
KT18 5AL
Tel: +44 (0)1372 726140
Fax: +44 (0)1372 740055
www.atkinsglobal.com

Client: Working on behalf of highways england

Project Title: REGIONAL INVESTMENT PROGRAMME
M25 J10 IMPROVEMENT

Drawing Title: GENERAL ARRANGEMENT
OPTION 14 - ELONGATED ROUNDABOUT
WITH REALIGNED M25 SLIPS
SHEET 2 OF 2

Scale	Drawn	Checked	Approved	Authorised
1:2500	SA	RM	PJ	KB
Original Size	Date	Date	Date	Date
A1	01/04/16	01/04/16	01/04/16	01/04/16

Drawing Number: Project | Originator | Volume
HE551522 - ATK - HGN - M25J10 - SK - D - 0142
Location | Type | Role | Number

Project Ref. No.: 5145620
Revision: P01

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DO NOT SCALE

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
(Enter "None" if applicable)

Maintenance / Cleaning
(Enter "None" if applicable)

Use
(Enter "None" if applicable)

Decommissioning / Demolition
(Enter "None" if applicable)

NOTES

1. LINK ROADS SHOWN AS IL1A ARE DETERMINED FROM TD 22/08. IT WOULD BE PROPOSED TO PROVIDE ALL LINK ROADS WITH AN IL2A CROSS SECTION IN ORDER TO FUTURE PROOF AND MAXIMISE FLEXIBILITY.
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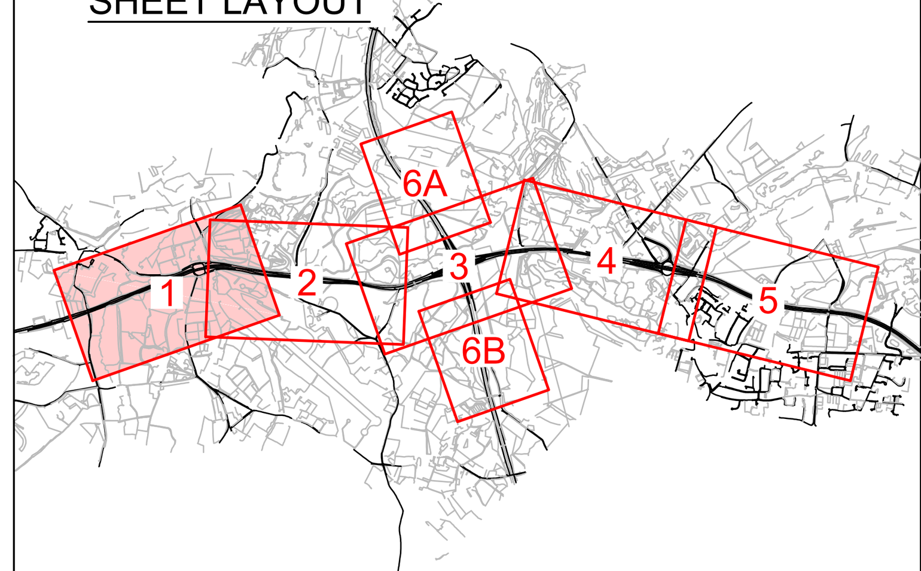
KEY

- EXISTING OVERBRIDGE STRUCTURES
- EXISTING UNDERBRIDGE STRUCTURES
- EXISTING RETAINING WALLS
- HIGHWAY BOUNDARY (INDICATIVE ONLY)
- EXISTING WATERWAYS
- EXISTING BUILDINGS
- PROPOSED HIGHWAY WORKS

SHEET LAYOUT



Rev.	Date	Description	By	Chk'd	App'd
P01	01/04/16	TO BENCHMARK FOR COST ESTIMATE	SA	RM	PJ

Drawing Status: FOR COSTING | Suitability: D1

ATKINS
Epsom Gateway
Ashley Avenue
Epsom
Surrey
KT18 5AL
Tel: +44 (0)1372 726140
Fax: +44 (0)1372 740055
www.atkinsglobal.com

Client: Working on behalf of highways england

Project Title: REGIONAL INVESTMENT PROGRAMME
M25 J10 IMPROVEMENT

Drawing Title: GENERAL ARRANGEMENT
OPTION 16
CYCLIC FREEFLOW
SHEET 1 OF 6

Scale	Drawn	Checked	Approved	Authorised
1:2500	SA	RM	PJ	KB
Original Size: A1	Date: 01/04/16	Date: 01/04/16	Date: 01/04/16	Date: 01/04/16

Drawing Number (Project | Originator | Volume | Location | Type | Role | Number): HE551522 - ATK - HGN - M25J10 - SK - D - 0161

Project Ref. No.: 5145620

Revision: P01

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DO NOT SCALE

Millimetres 0 10 100

WISLEY RHS GARDENS

FOR CONTINUATION REFER TO SHEET 1

FOR CONTINUATION REFER TO SHEET 3

A3 CARRIAGEWAY UPGRADED TO D4AP. FOR CROSS SECTION SEE IAN 149 TABLE 4-1. PRIORITY 9 WITH 0.7m HARDSTRIP.

MERGE UPGRADED TO TD 27 TYPE F MERGE

PROPOSED SINGLE SPAN GANTRY SPAN 25m

WISLEY LANE

LOCAL ACCESS:
- 4.1m SINGLE CARRIAGEWAY
- PASSING BAYS APPROX. 200m APART
- 2.5m VERGES
- TO BE PROVIDED ADJACENT TO CARRIAGEWAY WITH VISUAL SCREEN/ENVIRONMENTAL BARRIER

DIRECT ACCESS TO WISLEY LANE AND LAYBY REMOVED

PROPOSED SINGLE SPAN GANTRY SPAN 25m

PROPOSED RETAINING WALL LENGTH 180m

PROPOSED SUPER SPAN GANTRY SPAN 50m

A3

DIVERGE UPGRADED TO TD 27 TYPE D DIVERGE

6050 WISLEY FOOTBRIDGE. EXISTING FOOTBRIDGE TO BE REPLACED. NEW SPAN 55m

ELM LANE

ACCESS TO ELM LANE TO BE REMOVED AND DIVERTED TO OLD LANE

MERGE UPGRADED TO TD 27 TYPE F MERGE

MAINLINE UPGRADED TO D4AP. FOR CROSS SECTION SEE IAN 149 TABLE 4-1. PRIORITY 9 WITH 0.7m HARDSTRIP.

MAINLINE AS EXISTING TWO LANE LAYOUT THROUGH JUNCTION

BOLDER MERE

OLD LANE

FORMER WISLEY AIRFIELD
(SUBJECT TO DEVELOPMENT)

ELM LANE

Scale 1:2500
50m 0m 50m 100m 150m

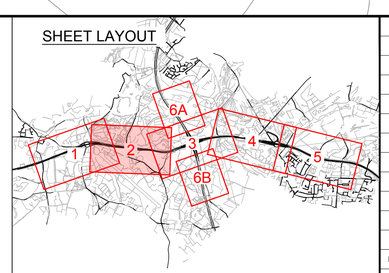
NOTES

1. LINK ROADS SHOWN AS IL1A ARE DETERMINED FROM TD 22/08. IT WOULD BE PROPOSED TO PROVIDE ALL LINK ROADS WITH AN IL2A CROSS SECTION IN ORDER TO FUTURE PROOF AND MAXIMISE FLEXIBILITY.
2. FOR CROSS SECTIONS IL1A & IL2A REFER TO TD 27/05, FIGURE 4-16.
3. UNLESS SPECIFIED OTHERWISE, MERGE AND DIVERGE TYPES ARE AS PER TD 22/06.
4. UNLESS SPECIFIED OTHERWISE, EARTHWORKS SLOPES TO BE 1:4

KEY

- EXISTING OVERBRIDGE STRUCTURES
- EXISTING UNDERBRIDGE STRUCTURES
- EXISTING RETAINING WALLS
- HIGHWAY BOUNDARY (INDICATIVE ONLY)
- EXISTING WATERWAYS
- EXISTING BUILDINGS
- PROPOSED HIGHWAY WORKS

SHEET LAYOUT



Rev.	Date	Description	By	Chk'd	App'd
P01	01/04/16	TO BENCHMARK FOR COST ESTIMATE	SA	RM	PJ

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
(Enter "None" if applicable)

Maintenance / Cleaning
(Enter "None" if applicable)

Use
(Enter "None" if applicable)

Decommissioning / Demolition
(Enter "None" if applicable)

Drawing Status: FOR COSTING
Suitability: D1

ATKINS
Epsom Gateway
Ashley Avenue
Epsom
Surrey
KT18 5AL
Tel: +44 (0)1372 726140
Fax: +44 (0)1372 740055
www.atkinsglobal.com

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M25 J10 IMPROVEMENT

Drawing Title: GENERAL ARRANGEMENT
OPTION 16
CYCLIC FREEFLOW
SHEET 2 OF 6

Scale	Drawn	Checked	Approved	Authorised
1:2500	SA	RM	PJ	KB
Original Size	**Date**	**Date**	**Date**	**Date**
A1	01/04/16	01/04/16	01/04/16	01/04/16

Drawing Number: Project | Originator | Volume
HE551522 - ATK - HGN -
M25J10 - SK - D - 0162
Location | Type | Role | Number

Project Ref. No.: 5145620

Revision: P01

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DO NOT SCALE

Millimetres 0 10 100

M25 JUNCTION 10 / A3 WISLEY INTERCHANGE

HEATHROW

M25

FOR CONTINUATION REFER TO SHEET 6 - VIEW A

FOR CONTINUATION REFER TO SHEET 2

FOR CONTINUATION REFER TO SHEET 4

FOR CONTINUATION REFER TO SHEET 6 - VIEW B

GATWICK

A3

BOLDER MERE

OLD LANE

TYPE E DIVERGE

TUMULUS: ANCIENT MONUMENT

NEW CULVERT REQUIRED.
LENGTH 130m
ASSUME 900mm Dia.

BRIDGE STRUCTURE
LENGTH 170m
MAX SPAN 80m

IL2A

ALL SLIP ROADS:
PAVEMENT TO BE REMOVED, OR PUNCTURED AT 1m SPACINGS WITH 0.5m HOLES AND PLANTED.
ROUNDABOUT PAVEMENT AND BRIDGE STRUCTURES TO REMAIN IN-SITU

TUNNELLED STRUCTURE (HEADING & BENCH OR BOX JACKED) APPROX LENGTH 65m

6152 WISLEY INTERCHANGE
SOUTH UNDERBRIDGE
(LEVEL 2)

3533 WISLEY INTERCHANGE
WEST UNDERBRIDGE
(LEVEL 2)

BRIDGE STRUCTURE
LENGTH 100m
MAX SPAN 20m

15186 REDHILL
RETAINING WALL

ACCESS TO OLD LANE TO BE REMOVED AND DIVERTED VIA OCKHAM LANE AND OCKHAM ROAD NORTH TO OCKHAM PARK JUNCTION

PROPOSED FOOTBRIDGE MAX SPAN 20m

6156 COCKROW FOOTBRIDGE
EXISTING FOOTBRIDGE TO BE RECONSTRUCTED MAX SPAN 20m
TOTAL SPAN 70m

BRIDGE STRUCTURE
LENGTH 100m
MAX SPAN 20m

EARTHWORKS MAX HEIGHT 2m
0-10m RETAINING WALL AT TOE-LENGTH 80m

NEW CULVERT REQUIRED.
LENGTH 235m
ASSUME 900mm Dia.

6100 WISLEY INTERCHANGE
NORTH UNDERBRIDGE
(LEVEL 2)

3514 WISLEY INTERCHANGE
A3 UNDERBRIDGE
(LEVEL 3)

3512 WISLEY INTERCHANGE
EAST UNDERBRIDGE
(LEVEL 2)

TUNNELLED STRUCTURE (HEADING & BENCH OR BOX JACKED) APPROX LENGTH 45m

PROPOSED SUPER SPAN GANTRY
SPAN 35m

TYPE E DIVERGE

ALL SLIP ROADS:
PAVEMENT TO BE REMOVED, OR PUNCTURED AT 1m SPACINGS WITH 0.5m HOLES AND PLANTED.
ROUNDABOUT PAVEMENT AND BRIDGE STRUCTURES TO REMAIN IN-SITU

NEW CULVERT REQUIRED.
LENGTH 150m
ASSUME 900mm Dia.

BRIDGE STRUCTURE
LENGTH 175m
MAX SPAN 80m

APPROXIMATE QUANTITIES OPTION 16

EARTHWORKS CUT VOLUME	532,000m³
EARTHWORKS FILL VOLUME	590,000m³
NEW PAVEMENT AREA (EXCLUDING STRUCTURES)	133,000m²
A3 RESURFACING/WIDENING PAVEMENT AREA	143,000m²

Scale 1:2500
50m 0m 50m 100m 150m

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
(Enter "None" if applicable)

Maintenance / Cleaning
(Enter "None" if applicable)

Use
(Enter "None" if applicable)

Decommissioning / Demolition
(Enter "None" if applicable)

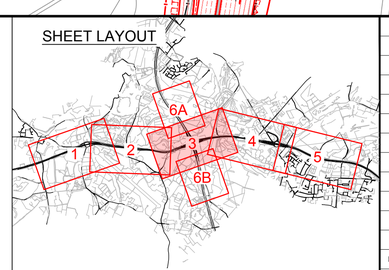
NOTES

1. LINK ROADS SHOWN AS IL1A ARE DETERMINED FROM TD 22/08. IT WOULD BE PROPOSED TO PROVIDE ALL LINK ROADS WITH AN IL2A CROSS SECTION IN ORDER TO FUTURE PROOF AND MAXIMISE FLEXIBILITY.
2. FOR CROSS SECTIONS IL1A & IL2A REFER TO TD 27/05, FIGURE 4-16.
3. UNLESS SPECIFIED OTHERWISE, MERGE AND DIVERGE TYPES ARE AS PER TD 22/06.
4. UNLESS SPECIFIED OTHERWISE, EARTHWORKS SLOPES TO BE 1:4

KEY

- EXISTING OVERBRIDGE STRUCTURES
- EXISTING UNDERBRIDGE STRUCTURES
- EXISTING RETAINING WALLS
- HIGHWAY BOUNDARY (INDICATIVE ONLY)
- EXISTING WATERWAYS
- EXISTING BUILDINGS
- PROPOSED HIGHWAY WORKS

SHEET LAYOUT



Rev.	Date	Description	By	Chk'd	App'd
P01	01/04/16	TO BENCHMARK FOR COST ESTIMATE	SA	RM	PJ

Drawing Status: FOR COSTING
Suitability: D1

ATKINS
Epsom Gateway
Ashley Avenue
Epsom
Surrey
KT18 5AL
Tel: +44 (0)1372 726140
Fax: +44 (0)1372 740055
www.atkinsglobal.com

Client: Working on behalf of highways england

Project Title: REGIONAL INVESTMENT PROGRAMME
M25 J10 IMPROVEMENT

Drawing Title: GENERAL ARRANGEMENT
OPTION 16
CYCLIC FREEFLOW
SHEET 3 OF 6

Scale	Drawn	Checked	Approved	Authorised
1:2500	SA	RM	PJ	KB
Original Size A1	Date 01/04/16	Date 01/04/16	Date 01/04/16	Date 01/04/16

Drawing Number
Project | Originator | Volume
HE551522 - ATK - HGN -
M25J10 - SK - D - 0163
Location | Type | Role | Number

Project Ref. No. 5145620
Revision P01

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DO NOT SCALE

Millimetres 0 10 100

A3/A245 PAINSHILL JUNCTION

A245 BYTLEET ROAD

SEVEN HILLS ROAD

A245 UPGRADED WITH 3 LANES IN EACH DIRECTION

MAINLINE AS EXISTING THREE LANE LAYOUT THROUGH JUNCTION

NEW TRAFFIC SIGNALS AND ASSOCIATED EQUIPMENT TO ALLOW FOR ADDITIONAL LANE FROM SEVEN HILLS JUNCTION TO THE ROUNDABOUT

NEW TRAFFIC SIGNALS AND ASSOCIATED EQUIPMENT TO ENABLE DEDICATED LEFT TURN LANE

NEW TRAFFIC SIGNALS AND ASSOCIATED EQUIPMENT TO ENABLE POTENTIAL DEDICATED LEFT TURN LANE

FOR CONTINUATION REFER TO SHEET 5

FOR CONTINUATION REFER TO SHEET 3

MERGE UPGRADED TO TD 27 TYPE G TWO LANE GAIN

MAINLINE AS EXISTING TWO LANE LAYOUT THROUGH JUNCTION

MAINLINE UPGRADED TO D4AP FOR CROSS SECTION SEE IAN 149 TABLE 4-1 PRIORITY 9 WITH 0.7m HARDSTRIP

DIVERGE UPGRADED TO TD 27 TYPE D

FELTON FLEET SCHOOL

6073 PAINSHILL INTERCHANGE WEST OVERBRIDGE

6075 PAINSHILL NORTH-WEST RETAINING WALL

6070 CONVENT LANE UNDERBRIDGE

6072 PAINSHILL INTERCHANGE EAST OVERBRIDGE

4.1m LOCAL ACCESS TO BE PROVIDED ADJACENT TO CARRIAGEWAY WITH VISUAL SCREEN/ENVIRONMENTAL BARRIER

A3

3600 3800 4000 4100 4200 4300 4400 4500 4600 4700 4800 4900 5000 5100 5200 5300 5400 5500 5600

EXTENT OF SCHEME

RIVER MOLE

6074 PAINSHILL SOUTH-WEST RETAINING WALL

PROPOSED SUPER SPAN GANTRY SPAN 45m

4.1m LOCAL ACCESS TO BE PROVIDED ADJACENT TO CARRIAGEWAY WITH VISUAL SCREEN/ENVIRONMENTAL BARRIER

10m OF EXISTING RETAINING WALL TO BE RENEWED

OFFSIDE SLIP ROAD WIDENING, EARTHWORKS TO BE MODIFIED

A245 PORTSMOUTH ROAD

MAINLINE UPGRADED TO D4AP FOR CROSS SECTION SEE IAN 149 TABLE 4-1 PRIORITY 9 WITH 0.7m HARDSTRIP

AS EXISTING THREE LANE LAYOUT THROUGH JUNCTION

MERGE UPGRADED TO TYPE F

PAINSHILL PARK

Scale 1:2500

50m 0m 50m 100m 150m

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
(Enter "None" if applicable)

Maintenance / Cleaning
(Enter "None" if applicable)

Use
(Enter "None" if applicable)

Decommissioning / Demolition
(Enter "None" if applicable)

NOTES

1. LINK ROADS SHOWN AS IL1A ARE DETERMINED FROM TD 22/08. IT WOULD BE PROPOSED TO PROVIDE ALL LINK ROADS WITH AN IL2A CROSS SECTION IN ORDER TO FUTURE PROOF AND MAXIMISE FLEXIBILITY.
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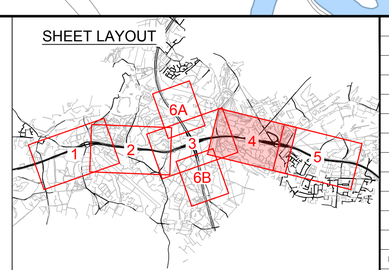
KEY

- EXISTING OVERBRIDGE STRUCTURES
- EXISTING UNDERBRIDGE STRUCTURES
- EXISTING RETAINING WALLS
- HIGHWAY BOUNDARY (INDICATIVE ONLY)
- EXISTING WATERWAYS
- EXISTING BUILDINGS
- PROPOSED HIGHWAY WORKS

SHEET LAYOUT



Rev.	Date	Description	By	Chk'd	App'd
P01	01/04/16	TO BENCHMARK FOR COST ESTIMATE	SA	RM	PJ

Drawing Status: FOR COSTING

Suitability: D1

ATKINS
Epsom Gateway
Ashley Avenue
Epsom
Surrey
KT18 5AL
Tel: +44 (0)1372 726140
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www.atkinsglobal.com

Client: Working on behalf of highways england

Project Title: REGIONAL INVESTMENT PROGRAMME
M25 J10 IMPROVEMENT

Drawing Title: GENERAL ARRANGEMENT
OPTION 16
CYCLIC FREEFLOW
SHEET 4 OF 6

Scale	Drawn	Checked	Approved	Authorised
1:2500	SA	RM	PJ	KB
Original Size: A1	Date 01/04/16	Date 01/04/16	Date 01/04/16	Date 01/04/16

Drawing Number: Project | Originator | Volume | Location | Type | Role | Number
HE551522 - ATK - HGN - M25J10 - SK - D - 0164

Project Ref. No.: 5145620

Revision: P01

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DO NOT SCALE

Millimetres 0 10 100

MAINLINE AS EXISTING THREE LANE LAYOUT THROUGH JUNCTION

MERGE UPGRADEED TO TD27 TYPE B

FOR CONTINUATION REFER TO SHEET 4

6069 RIVER MOLE UNDERBRIDGE

EXTENT OF SCHEME

A3

5400 5500 5600 5700 5800 5900 6000 6100 6220 6300 6400 6500 6600

LONDON

GUILDFORD & PORTSMOUTH A3

RIVER MOLE

6068 OLD COMMON ROAD SUBWAY

A245 PORTSMOUTH ROAD

Scale 1:2500

50m 0m 50m 100m 150m

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

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Construction
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Maintenance / Cleaning
(Enter "None" if applicable)

Use
(Enter "None" if applicable)

Decommissioning / Demolition
(Enter "None" if applicable)

NOTES

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KEY

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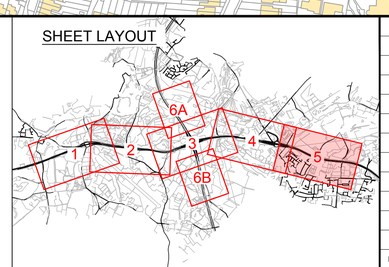
- EXISTING BUILDINGS
- PROPOSED HIGHWAY WORKS

SHEET LAYOUT



Rev.	Date	Description	By	Chk'd	App'd
P01	01/04/16	TO BENCHMARK FOR COST ESTIMATE	SA	RM	PJ

Drawing Status: FOR COSTING

Suitability: D1

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Epsom Gateway
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KT18 5AL
Tel: +44 (0)1372 726140
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Client: Working on behalf of highways england

Project Title: REGIONAL INVESTMENT PROGRAMME M25 J10 IMPROVEMENT

Drawing Title: GENERAL ARRANGEMENT OPTION 16 CYCLIC FREEFLOW SHEET 5 OF 6

Scale	Drawn	Checked	Approved	Authorised
1:2500	SA	RM	PJ	KB
Original Size	**Date**	**Date**	**Date**	**Date**
A1	01/04/16	01/04/16	01/04/16	01/04/16

Drawing Number: Project | Originator | Volume | Location | Type | Role | Number
HE551522 - ATK - HGN - M25J10 - SK - D - 0165

Project Ref. No. 5145620

Revision P01

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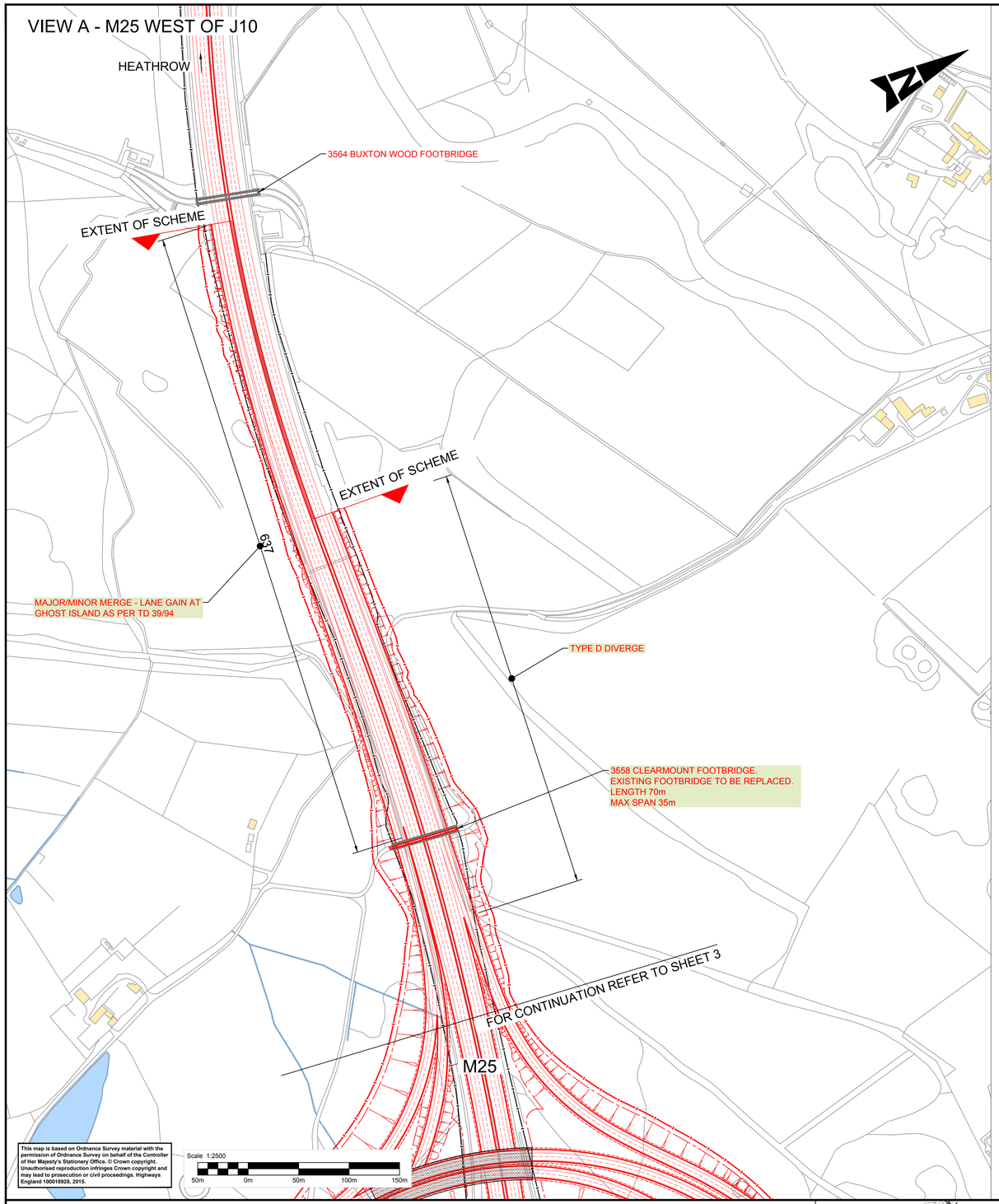
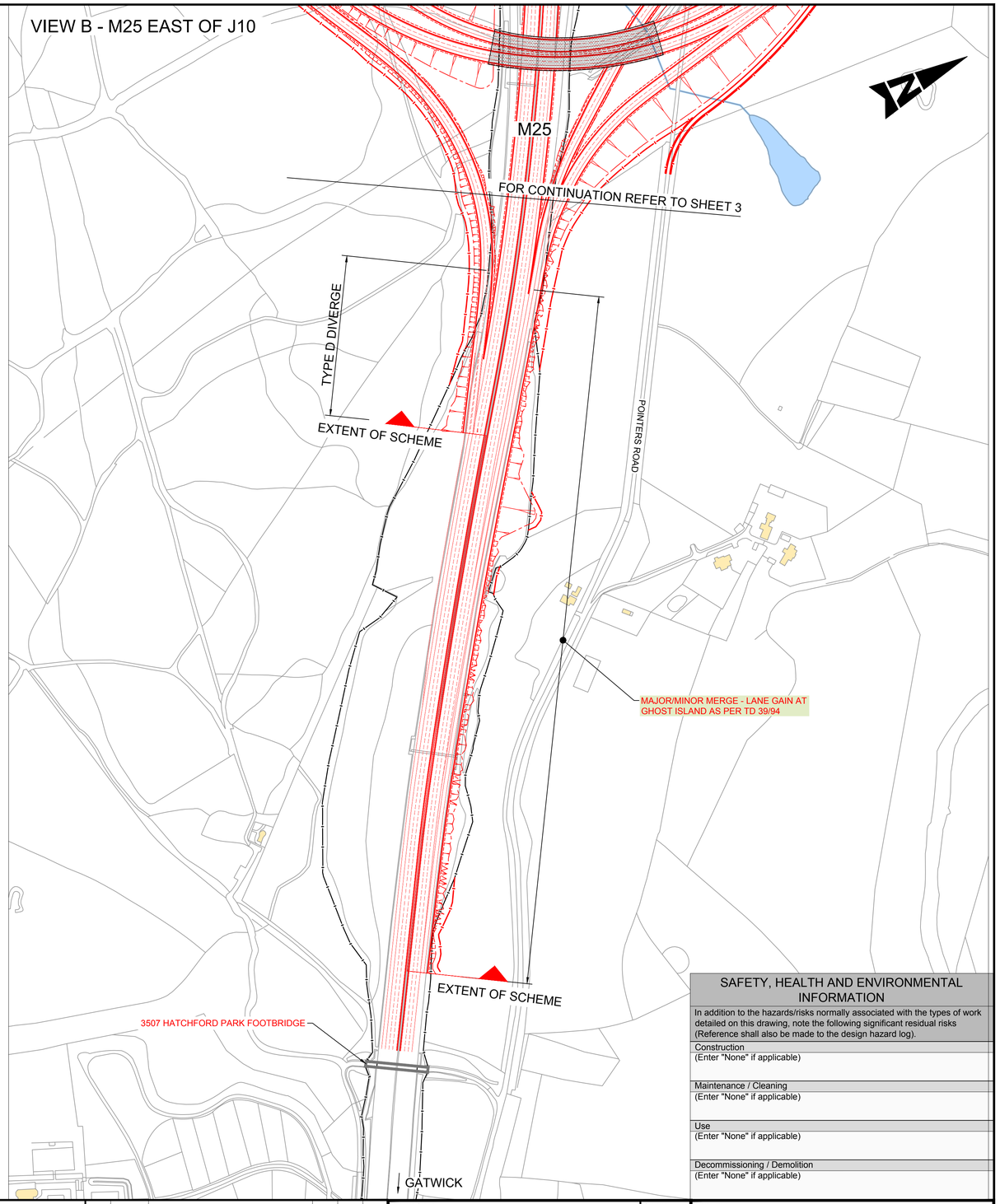
DO NOT SCALE

Millimetres 0 10 100

VIEW A - M25 WEST OF J10



VIEW B - M25 EAST OF J10



NOTES

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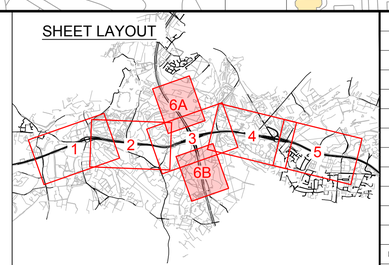
SHEET LAYOUT



Rev.	Date	Description	By	Chk'd	App'd
P01	01/04/16	TO BENCHMARK FOR COST ESTIMATE	SA	RM	PJ

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction	(Enter "None" if applicable)
Maintenance / Cleaning	(Enter "None" if applicable)
Use	(Enter "None" if applicable)
Decommissioning / Demolition	(Enter "None" if applicable)

Drawing Status: FOR COSTING

Suitability: D1

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Epsom Gateway
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Client: Working on behalf of highways england

Project Title: REGIONAL INVESTMENT PROGRAMME M25 J10 IMPROVEMENT

Drawing Title: GENERAL ARRANGEMENT OPTION 16 CYCLIC FREEFLOW SHEET 6 OF 6

Scale	Drawn	Checked	Approved	Authorised
1:2500	SA	RM	PJ	KB
Original Size	**Date**	**Date**	**Date**	**Date**
A1	01/04/16	01/04/16	01/04/16	01/04/16

Drawing Number: Project | Originator | Volume | Location | Type | Role | Number
HE551522 - ATK - HGN - M25J10 - SK - D - 0166

Project Ref. No.: 5145620

Revision: P01

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Appendix D: Landscape

Appendix D

Landscape Assessment Methodology

Landscape Sensitivity

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 GLVIA3). Table 1 explains sensitivity rating in relation to assessed landscape resource:

Table 1: Landscape sensitivity criteria

Landscape sensitivity	Typical Description for Landscape Sensitivity
High	Landscapes which by nature of their character would be unlikely to be able to accommodate change of the type proposed without undue consequences. 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, and; • Likely to contain features and elements that are rare and could not be replaced.
Moderate	Landscapes which by nature of their character would likely be able to accommodate change of the type proposed, albeit with some consequences. 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, and; • 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 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; • Not designated; • Containing few, if any, features of value through use, perception or historic and cultural associations, and; • Likely to contain few, if any, features and elements that could not be replaced.

Visual Sensitivity

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 GLVIA3). Table 2 explains visual sensitivity rating criteria:

Table 2: Visual sensitivity criteria

Landscape sensitivity	Typical Description for Visual Sensitivity
High	Receptors where the value of the view is high and the change experienced to the view is considerable given the nature of the activity and the likely expectation of the viewer. Typically these would be: • Residential properties; • Users of Public Rights of Way or other recreational trails (e.g. National Trails, footpaths, bridleways), and; • Users of recreational facilities where the purpose of that recreation is enjoyment of the countryside (e.g. Country Parks, National Trust or other access land etc.).
Moderate	Receptors where there is value attached to the view and there is a change experienced to the view, but this change is not likely to be critical to the experience of the receptor. Typically these would be: • Users of scenic roads or waterways or users of designated tourist routes; • Outdoor workers, and; • Schools and other institutional buildings, and their outdoor areas.
Low	Receptors where there is value attached to the view and there is a change experienced to the view, but this change is not likely to be critical to the experience of the receptor. Typically these would be: • Users of main roads (e.g. trunk roads) or passengers in public transport on main arterial routes; • Indoor workers, and; • Users of recreational facilities where the purpose of that recreation is not related to the view (e.g. sports facilities).

Magnitude of impact

The magnitude of landscape impact is determined by taking into consideration size, scale, geographical extent, duration and reversibility of the improvement's works on the landscape resource. Table 3 below describes the criteria for determination of magnitude level.

Table 3: Criteria for magnitude of landscape impact

Magnitude of landscape impact	Typical Description for Magnitude of Landscape Impact
Major adverse	Total loss or large scale damage to existing landscape character or distinctive features and elements; and/or The addition of new but uncharacteristic conspicuous features and elements (intensive change to a limited area of the landscape). Likely to be a long term change.

Moderate adverse	Partial loss or noticeable damage to existing landscape character or distinctive features and elements; and/or The addition of new but uncharacteristic noticeable features and elements to a limited area of the landscape. Likely to be a medium term change.
Minor adverse	Slight loss or damage to existing landscape character or features and elements; and/or The addition of new but uncharacteristic features and elements to a limited area of the landscape. Likely to be a short term change.
Negligible adverse	Barely noticeable loss or damage to existing landscape character or features and elements; and/or The addition of new but uncharacteristic features and elements to a limited area of the landscape.
No change	No noticeable loss, damage or alteration to landscape character or features or elements.
Negligible beneficial	Barely noticeable improvement of landscape 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 landscape 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	Slight improvement of landscape 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.
Major beneficial	Large scale improvement of landscape character by the restoration of distinctive features and elements, and/or The removal of uncharacteristic and conspicuous features and elements, or by the addition of new distinctive features.

Magnitude of visual impact

The magnitude of visual impact is determined by taking into considerations a degree of change in the composition of the view in comparison to the baseline of the view. In determining the magnitude of visual impact, the following has been considered; scale of change, nature of change, duration of change, distance, screening, direction of the view, removal of vegetation, whether the receptor is static or moving, and the numbers and type of receptor. The magnitude of visual impact is assessed by taking into consideration the potential for introduction of environmental design measures or mitigation measures. These factors help inform the magnitude of the visual impact as shown in Table 4, which can be adverse or beneficial.

Table 4: Criteria for magnitude of Visual Impact

Magnitude of visual impact	Typical Description for magnitude of Visual Impact
Major	The route option, or a part of it, would become the dominant feature or focal point of the view.
Moderate	The route option, or a part of it, would form a noticeable feature or element of the view which is readily apparent to the receptor.
Minor	The route option, 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 route option 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 route option, or work or activity associated with it, is discernible.

Significance of effects

The significance of landscape or visual effects has been determined by taking into consideration both the magnitude and sensitivity of landscape resource or visual receptors. The effects can be both adverse, neutral and beneficial. The assessment is determined using professional judgement, which relies on a consistent reasoning based on the current guidance including IAN 135/10 and GLVIA3.

Landscape or visual effect are generally considered as significant when moderate of higher level of adverse effects has been identified. Table 5 shows how combined magnitude and sensitivity influences a level of significance. Table 6 provides description of various landscape significance levels of effects whilst the Table 7 provides description of various levels of significance for visual effects.

Table 5: Arriving at the Significance of Effects

		MAGNITUDE OF IMPACT (DEGREE OF CHANGE)				
		No change	**Negligible**	**Minor**	**Moderate**	**Major**
ENVIRONMENTAL VALUE (SENSITIVITY)	**Very High**	Neutral	Slight	Moderate or Large	Large or Very Large	Very Large
	High	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or Very Large
	Medium	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
	Low	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate
	Negligible	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight

Table 6: Description of significance for landscape effects

Significance of landscape effects	Typical Description of Significance of landscape effects
Very large beneficial	The route option would: • Greatly enhance the character (including quality and value) of the Landscape; • Create an iconic high quality feature and/or series of elements, and; • Enable a sense of place to be created or greatly enhanced.
Large beneficial	The route option 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, and; • Enable a sense of place to be enhanced.
Moderate beneficial	The route option 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, and; • Enable a sense of place to be restored.
Slight beneficial	The route option would: • Complement the character (including quality and value) of the landscape; • Maintain or enhance characteristic features and elements, and; • Enable some sense of place to be restored.
Neutral	The route option would: • Maintain the character (including quality and value) of the landscape; • Blend in with characteristic features and elements, and; • Enable a sense of place to be retained.
Slight adverse	The route option would: • Not quite fit the character (including quality and value) of the landscape; • Be at variance with characteristic features and elements, and; • Detract from a sense of place.
Moderate adverse	The route option would: • Conflict with the character (including quality and value) of the landscape; • Have an adverse impact on characteristic features or elements, and; • Diminish a sense of place.
Large adverse	The route option 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, and; • Damage a sense of place;

Very Large adverse	The route option would: • Be at complete variance with the character (including quality and value) of the landscape, and; • Cause the integrity of characteristic features and elements to be lost. • Cause a sense of place to be lost.

Table 7: Description of significance for visual effects

Significance of visual effects	**Typical Description of Significance of landscape effects**
Very Large beneficial	The route option would create an iconic new feature that would greatly enhance the view.
Large beneficial	The route option would lead to a major improvement in a view from a highly sensitive receptor.
Moderate beneficial	The route option 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 route option 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	No perceptible change in the view.
Slight adverse	The route option 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 route option 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 route option 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 route option 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

Below a detailed assessment of landscape effects has been presented in the Table 8 during construction stage and Table 9 during operational stage.

Table 8: Effects on potential landscape receptors (Construction)

Potential landscape effects	Option 9	Option 9 with A3 widening	Option 14	Option 14 with A3 widening	Option 16	Option 16 with A3 widening
Effects on landscape character include: -introduction of compounds, parking and welfare facilities; - loss of vegetation; - alteration to landform; (introduction of earthworks); -requirement for temporary construction land; and - temporary presence of material set down areas and stock piles.	**Sensitivity**: The sensitivity of landscape character is considered at **medium** level. The landscape around the junction comprises predominantly large scale coniferous woodland areas with occasional patches of open land consisting of grassland, scrub or heathland with recreational paths. Much of this area is included within a Registered Common i.e. Wisley Commons and Chatley Heath. There landscape around the junction is sparsely populated including few farmsteads and cottages in the vicinity of the junction. The existing M25 crosses the area of Commons bringing noise and views of moving traffic. Existing woodland areas and undulating landform combines to heavily reduce visibility across the local landscape character, however there are some views available through the woodland along tracks and clearings. The Royal Horticultural Society (RHS) gardens at Wisley (approximately 1.6km to the south west) are considered as a visitor attraction at the national scale. The Wisley gardens are also designated as a Grade II* Registered Park and Garden. The Painshill Park (located 0.65km) is a Grade I Registered Park and Garden. Although there are no landscape designations within the study area the woodland areas around the junctions and Commons are considered of high value for the local residents. The RHS Wisley and Painshill Park are considered as important features as a popular destination through its cultural and historical associations. The RHS Wisley is considered as a visitor attraction of national importance. Some lost elements of the existing landscape like land use, pattern and existing woodlands would be difficult to replace. As a result the sensitivity of local landscape has been assessed at medium level.					
	Magnitude					
	Moderate	Major	Minor	Major	Major	Major
	Partial loss to the existing woodland areas, and landscape pattern is expected during construction stage. New and temporary landscape pattern will be introduced	A large scale alteration to the landscape character is expected through construction activities associated with this option as large scale compound areas would be required,	A slight alteration to the local landscape character is expected during construction stage of this option. The construction activities would take place at the area that is relatively	A total loss to the qualities of local landscape character is expected in construction stage as the ground works progress and new elements of the scheme will be	A large scale loss to the existing landscape character is expected during construction stage of this option. A large scale loss of woodland and alteration to the	A large scale loss to the existing landscape character is expected during construction stage of this option. Large areas of woodland would be cleared to accommodate the

	including cranes, earthworks formation, and construction of underbridge and on and off slip roads. Large scale construction operations are likely to require large compound areas including site office, welfare facilities, parking areas, and material set down areas. A large scale earthworks formation would be required as the landform around the junction undulates. It is expected that area currently used for recreational purposes within Commons would be reduced significantly during construction stage. The construction activities will be temporary but of considerable scale within the local landscape character.	alongside temporary access tracks, materials stockpiles, site office with associated parking. These elements of construction site would be set amongst moving construction traffic and tall machinery that would temporarily cause a large scale damage to the local landscape resulting primarily as a result of the loss of vegetation, alteration to the landform and change to the landscape pattern.	small and associated with the immediate peripheries of the existing M25J10. A slight reduction of woodland area would be expected in this option, but there is a good potential for introduction of new planting that could compensate partially for the loss of vegetation. A pattern of construction activities will be centred on the existing junction, however widening of the existing approaches to the junction will also be required. It is expected that the integrity and overall purpose of adjacent Common's and woodland areas would not be compromised in the construction stage.	introduced. Tranquility will be altered through increased noise and movement of vehicles alongside presence of construction dust. Large construction areas would introduce a pattern of construction activities that would change the local landscape pattern and alter the landform through introduction of new and uncharacteristic elements of the landscape.	existing landform would be expected during construction stage of this option. It is expected that the integrity, fabric and function of woodland areas and adjacent Commons Wood be compromised through the loss of vegetation, change of land use and loss of the connectivity. The pattern of construction activities would dominate as new uncharacteristic features and construction operations would be introduced, transforming the local landscape.	proposed alignment of the junction. Additionally large scale clearing of vegetation would take place along the A3 with scrub and some trees being removed. Accommodation of the proposed roundabout, on and off slip roads as well as the A3 widening would also require alteration of landform and introduction of earthworks. Generally construction activities would be of large scale and would dominate the local landscape for the duration of the construction activities. It is expected that the integrity, fabric and function of woodland areas and adjacent Commons would be affected during construction activities. The alteration of landscape character, loss of recreational purpose, reduction in tranquillity, connectivity and all aspects of landscape enjoyment close to the junction are expected during construction stage.

	Potential effects					
	This option would conflict with the local landscape character around the junction during construction stage, as characteristic elements of the existing landscape like existing woodland and landform would be lost and new uncharacteristic construction elements would be introduced.	This Option would be at considerable variance, temporarily during construction stage with the local landscape character as its qualities and value will be diminished throughout the construction stage. The integrity of the landscape character would be temporarily degraded as manmade operations of earthworks formation and introduction of scheme features will be dominant throughout the construction stage resulting in loss of the existing landscape elements.	This option would not quite fit with the local landscape character during construction stage as new temporary pattern of construction activities would be introduced around the perimeter of the junction detracting locally from a sense of place.	A sense of place would be lost as this option will be introduced. Large scale construction operations would alter the current balance of features within the local landscape with man-made operations dominating natural landscape elements around the junction. The loss of vegetation, alteration to the landform and expansion of the infrastructure pattern would temporarily compromise the integrity of the local landscape character around the junction. The presence of material stock piles and movement of construction machinery alongside presence of the site office would cover large areas, transforming the perception of local landscape.	This option would be at considerable variance with the local landscape character as large scale alterations will take place resulting in large scale loss of woodland and landscape pattern. The integrity of existing landscape elements as well as their function would be compromised during construction stage.	This option would be at considerable variance with the local landscape character as large scale alterations will take place resulting in loss of woodland and landscape pattern. The landform and land use will be altered considerably. The tranquillity will be further reduced and this would be perceptible to residents and PRoW users much further away from the junction. The integrity of existing landscape elements as well as their function would be compromised during construction stage
	Moderate adverse (significant adverse)	Large adverse (significant adverse)	Slight adverse (not significant)	Large adverse (significant adverse)	Large adverse (significant adverse)	Large adverse (significant adverse)

Table 9: Effects on potential landscape receptors (Operation)

Potential landscape effects	Option 9	Option 9 with A3 widening	Option 14	Option 14 with A3 widening	Option 16	Option 16 with A3 widening
Effects on landscape character including: -Introduction pf permanent viaducts, overbridges and underbridges, on and off slip roads and earthworks; -Introduction of gantries and other smaller elements of highway infrastructure eg. signage; retaining structures and others. -Introduction of new footways and footbridges; -Realignment of kerb lines and -Introduction of new planting and other mitigation measures.	**Sensitivity**: The sensitivity of landscape character is considered at **medium** level. The landscape around the junction comprises predominantly large scale coniferous woodland areas with occasional patches of open land consisting of grassland, scrub or heathland with recreational paths. Much of this area is included within a Registered Common i.e. Wisley Commons and Chatley Heath. There landscape around the junction is sparsely populated including few farmsteads and cottages in the vicinity of the junction. The existing M25 crosses the area of Commons bringing noise and views of moving traffic. Existing woodland areas and undulating landform combines to heavily reduce visibility across the local landscape character, however there are some views available through the woodland along tracks and clearings. The Royal Horticultural Society (RHS) gardens at Wisley (approximately 1.6km to the south west) are considered as a visitor attraction at the national scale. The Wisley gardens are also designated as a Grade II* Registered Park and Garden. The Painshill Park (located 0.65km) is a Grade I Registered Park and Garden. Although there are no landscape designations within the study area the woodland areas around the junctions and Commons are considered of high value for the local residents. The RHS Wisley and Painshill Park are considered as important features as a popular destination through its cultural and historical associations. The RHS Wisley is considered as a visitor attraction of national importance. Some lost elements of the existing landscape like land use, pattern and existing woodlands would be difficult to replace. As a result the sensitivity of local landscape has been assessed at medium level.					
	Magnitude					
	Moderate	Moderate	Negligible	Moderate	Moderate	Moderate
	Introduced environmental measures will help to integrate partially the Proposed Scheme in the operational stage. However alteration to landscape pattern, landform and introduction	A large scale loss of vegetation is expected through the introduction of this Option resulting in considerable alteration to the local landscape character. Whilst maturing vegetation will help to	In operational stage it is expected that this option would cause barely noticeable loss or damage to the existing landscape character as the loss of woodland would be gradually replaced through	A noticeable damage to the existing local landscape character is expected through the introduction of this option. The loss of vegetation and local alteration to the landform will be partially mitigated	A noticeable damage to the existing local landscape character is expected through the introduction of this option. A large scale loss of woodland, alteration to the existing landscape	A noticeable damage to the existing local landscape character is expected through the introduction of this option. Alteration to the existing landscape pattern and land use would only be partially compensated

Potential landscape effects	Option 9	Option 9 with A3 widening	Option 14	Option 14 with A3 widening	Option 16	Option 16 with A3 widening
	of new elements of the scheme including on and off slip roads, underbridge would permanently transform the local landscape. New features associated with the road infrastructure would be permanently introduced.	integrate the Proposed Scheme Option into the existing landscape, the introduced scheme elements would expand the existing pattern of road infrastructure into adjacent areas, which would create a long term change in the local landscape.	new planting and alteration to the landform along perimeter of the junction would become less perceptible.	through the introduction of environmental design measures. However the alteration to the local landscape character would result in addition of new features associated with improved junction that would be create a prominent change into the existing landscape pattern even after establishment of mitigation planting.	pattern and land use would only be partially compensated through the implementation of environmental design measures.	through the implementation of environmental design measures. Lost landscape elements during construction stage would be replaced with permanent man-made features of road infrastructure with implemented environmental design measures that would partially accommodate the proposed scheme.
	Potential effects					
	This option would conflict with the local landscape character as new elements of the scheme would conflict with the key attributes of local landscape including landform and presence of woodland areas. Whilst some characteristics of the scheme would be integrated into landscape through environmental design measures, the pattern of road infrastructure would be considerably extended,	Introduction of this option would have adverse effect on local landscape features directly affected by the introduction of the road improvements. Whilst some of the adverse effects like loss of vegetation would be largely compensated through mitigation planting, the introduced elements of the scheme would conflict with the local landscape character, diminishing a local sense of place. Local landscape pattern and land	A slight alteration to the local landscape character is expected through the introduction of this option. Whilst some deterioration to the existing landscape features around the junction would take place, the changes would be of small scale. The implemented environmental design measures would integrate the scheme into the existing landscape and over a time the alteration to the landscape would be barely perceptible.	The introduction of this Option would permanently reinforce the A3 corridor through its widening and provision of links with the local road network. Whilst the loss of vegetation would be largely compensated through introduction of mitigation planting the alteration of landscape pattern, introduction of embankments and link roads with the A3 and M25, bridge and underbridges would result in permanent introduction of	This option would conflict with local landscape character as important qualities of the local landscape like woodland areas, landscape pattern and landform would be permanently transformed at a relatively large area around the junction. The proposed changes would remain perceptible and significant within the local landscape character.	This option would conflict with local landscape character as important qualities of the local landscape like woodland areas, landscape pattern and landform would be permanently transformed across large area around the junction and along the A3. The proposed changes would remain perceptible and significant within the local landscape character as the adverse effects would be only partially compensated through the

Potential landscape effects	Option 9	Option 9 with A3 widening	Option 14	Option 14 with A3 widening	Option 16	Option 16 with A3 widening
	which would diminish the sense of place and would compromise partially functionality and qualities of adjacent woodland and Commons.	use would remain adversely affected.		uncharacteristic features within the local landscape character.		implemented environmental design measures.
	Moderate adverse (significant adverse)	Moderate adverse (significant adverse)	Slight adverse (not significant)	Moderate adverse (significant adverse)	Moderate adverse (significant adverse)	Moderate adverse (significant adverse)

Below a detailed assessment of visual effects has been presented in the Table 10 during construction stage and Table 11 during operational stage.

Table 10: Effects on potential visual receptors (Construction)

Visual Receptors	Option 9	Option 9 with A3 widening	Option 14	Option 14 with A3 widening	Option 16	Option 16 with A3 widening
Magnitude of change	Major	Major	Minor	Major	Major	Major
Receptor 1 Views from Painshill Park Grade I Registered Park and Garden. **Sensitivity: High**	The construction activities would become a dominant feature in the view.	The construction activities would become a dominant feature in the view.	The construction operations along section of the scheme will cause a minor alteration to one or more characteristics of the view.	The construction activities would become a dominant feature in the view.	The construction activities would become a dominant feature in the view.	The construction activities would become a dominant feature in the view.
Potential effects	The construction activities would cause a major	The construction activities would cause a major alteration	The construction operations would result in partial	The construction activities would become a dominant feature in the view.	The route option would cause the loss of views from a highly sensitive	The route option would cause the loss of views from a highly sensitive receptor, and would

Visual Receptors	Option 9	Option 9 with A3 widening	Option 14	Option 14 with A3 widening	Option 16	Option 16 with A3 widening
	alteration to key characteristic of the view.	to key characteristic of the view.	alteration to key characteristics of the view.		receptor, and would constitute a dominant discordant feature in the view.	constitute a dominant discordant feature in the view.
	Large adverse (significant)	Large adverse (significant)	Moderate adverse (significant)	Large adverse (significant)	Very large adverse (significant)	Very large adverse
Magnitude of change	Major	Major	Minor	Major	Major	Major
Receptor 2 Views from Wisley and Chatley Heath Common. **Sensitivity: High**	The construction activities would become a dominant feature in the view.	The construction activities would become a dominant feature in the view.	The construction operations along section of the scheme will cause a minor alteration to one or more characteristics of the view.	The construction activities would become a dominant feature in the view.	The construction activities would become a dominant feature in the view.	The construction activities would become a dominant feature in the view.
Potential effects	The construction activities would cause a major alteration to key characteristic of the view.	The construction activities would cause a major alteration to key characteristic of the view.	The construction operations would result in partial alteration to key characteristics of the view.	The construction activities would cause a major alteration to key characteristic of the view.	The route option would cause the loss of views from a highly sensitive receptor, and would constitute a dominant discordant feature in the view.	The route option would cause the loss of views from a highly sensitive receptor, and would constitute a dominant discordant feature in the view.
	Large adverse (significant)	Large adverse (significant)	Moderate adverse (significant)	Large adverse (significant)	Very large adverse (significant)	Very large adverse (significant)
Magnitude of change	Major	Major	Minor	Major	Major	Major

Visual Receptors	Option 9	Option 9 with A3 widening	Option 14	Option 14 with A3 widening	Option 16	Option 16 with A3 widening
Receptor 3 Views from the network of PRoW's within the study area. **Sensitivity: High**	The construction activities would become a dominant feature in the view.	The construction activities would become a dominant feature in the view.	The construction operations along section of the scheme will cause a minor alteration to one or more characteristics of the view.	The construction activities would become a dominant feature in the view.	The construction activities would become a dominant feature in the view.	The construction activities would become a dominant feature in the view.
	The construction activities would cause a major alteration to key characteristic of the view.	The construction activities would cause a major alteration to key characteristic of the view.	The construction operations would result in partial alteration to key characteristics of the view.	The construction activities would cause a major alteration to key characteristic of the view.	The route option would cause the loss of views from a highly sensitive receptor, and would constitute a dominant discordant feature in the view.	The route option would cause the loss of views from a highly sensitive receptor, and would constitute a dominant discordant feature in the view.
Potential effects	Large adverse (significant)	Large adverse (significant)	Moderate adverse (significant)	Large adverse (significant)	Very large adverse (significant)	Very large adverse (significant)
Magnitude of change	Moderate	Moderate	No change	No change	Major	Major
Receptor 4 Views from Chatley Farm. **Sensitivity: High**	The construction activities would be noticeable feature in the view.	The construction activities would be noticeable feature in the view.	The construction activities would become a dominant feature in the view.	The construction activities would become a dominant feature in the view.	The construction activities would become a dominant feature in the view.	The construction activities would become a dominant feature in the view.
Potential effects	The construction operations would result in partial alteration to key characteristics of the view.	The construction operations would result in partial alteration to key characteristics of the view.	There would be no perceptible change in the view.	There would be no perceptible change in the view.	The route option would cause the loss of views from a highly sensitive receptor, and would constitute a dominant	The route option would cause the loss of views from a highly sensitive receptor, and would constitute a dominant discordant feature in the view.

Visual Receptors	Option 9	Option 9 with A3 widening	Option 14	Option 14 with A3 widening	Option 16	Option 16 with A3 widening
					discordant feature in the view.	
	Moderate adverse (significant)	Moderate adverse (significant)	Neutral	Neutral	Very large adverse (significant)	Very large adverse (significant)
Magnitude of change	No change	Minor	No change	Minor	Minor	Minor
Receptor 7 Views from RHS Wisley Grade II* Registered Park and Garden. **Sensitivity: Very high**	The construction activities would become a dominant feature in the view.	A partial loss or alteration to the view is expected in operational stage.	The construction activities would become a dominant feature in the view.	A partial loss or alteration to the view is expected in operational stage.	The construction operations along section of the scheme will cause a minor alteration to one or more characteristics of the view.	The construction operations along section of the scheme will cause a minor alteration to one or more characteristics of the view.
	There would be no perceptible change in the view.	A limited deterioration to the view is expected through addition of new features, which are largely characteristic of the existing view from the receptor.	There would be no perceptible change in the view.	A limited deterioration to the view is expected through addition of new features, which are largely characteristic of the existing view from the receptor.	The construction operations would result in partial alteration to key characteristics of the view.	The construction operations would result in partial alteration to key characteristics of the view.
Potential effects	Neutral	Moderate adverse (significant)	Neutral	Moderate adverse (significant)	Moderate adverse (significant)	Moderate adverse (significant)

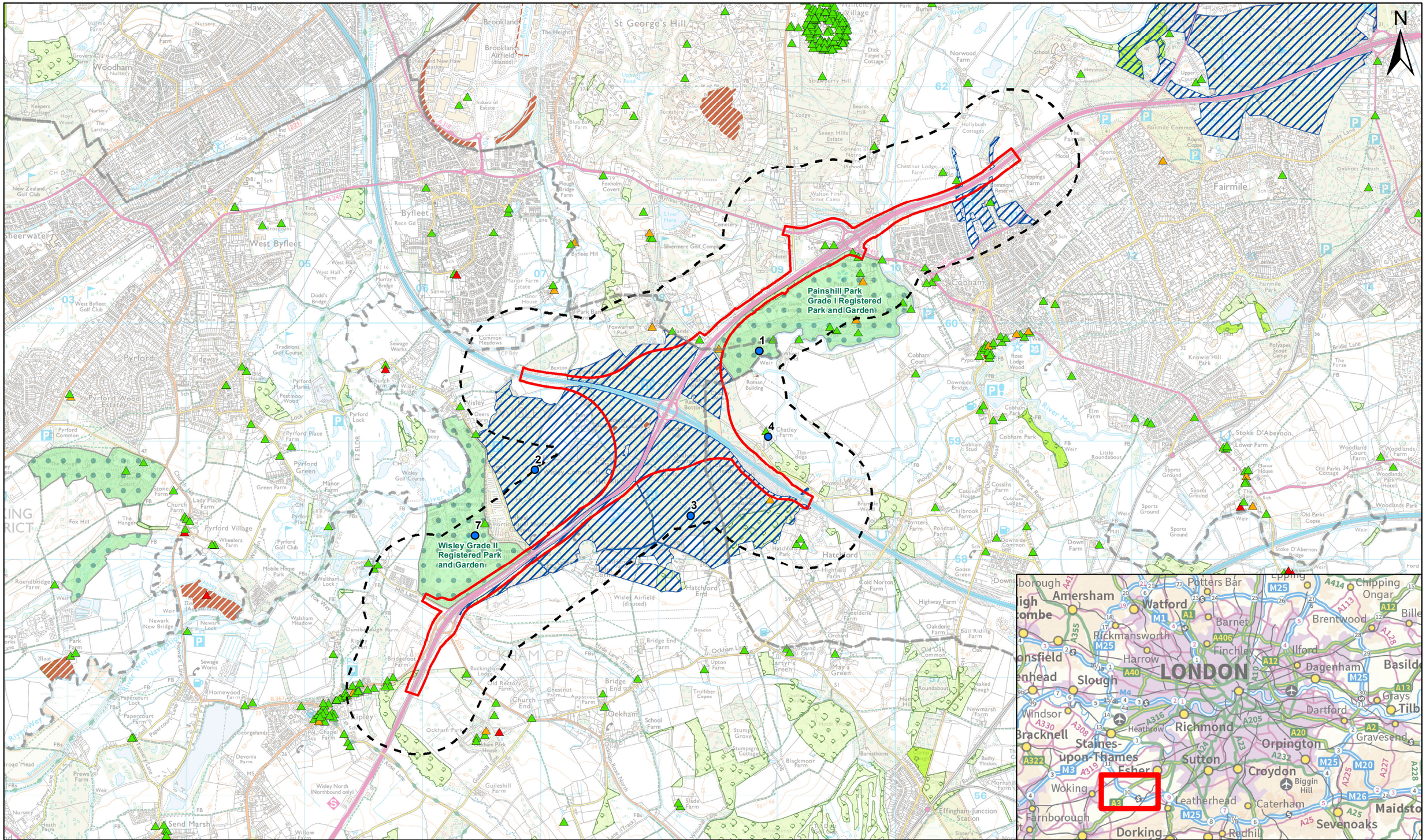
Table 11: Effects on potential visual receptors (Operation)

Receptors	Option 9	Option 9 with A3 widening	Option 14	Option 14 with A3 widening	Option 16	Option 16 with A3 widening
Magnitude of change	Major	Major	Minor	Major	Major	Major
Receptor 1 Views from Painshill Park Grade I Registered Park and Garden. **Sensitivity: High**	It is expected that introduced option would form a noticeable element of the view.	It is expected that introduced option would form a noticeable element of the view.	A partial loss or alteration to the view is expected in operational stage.	It is expected that introduced option would form a noticeable element of the view.	Introduced scheme would become dominant feature or focal point of the view.	Introduced scheme would become dominant feature or focal point of the view.
Potential effects	Introduction of this option would result in major alteration to the view from the receptor.	Introduction of this option would result in major alteration to the view from the receptor.	A limited deterioration to the view is expected through addition of new features, which are largely characteristic of the existing view from the receptor.	Introduction of this option would result in major alteration to the view from the receptor.	Introduction of this option would result in major alteration to the view from the receptor.	Introduction of this option would result in major alteration to the view from the receptor.
	Large adverse (significant)	Large adverse (significant)	Slight adverse (not significant)	Large adverse (significant)	Large adverse (significant)	Large adverse (significant)
Magnitude of change	Major	Major	Minor	Major	Major	Major
Receptor 2 Views from Wisley and Chatley Heath Common. **Sensitivity: High**	Introduced scheme would become dominant feature or focal point of the view.	Introduced scheme would become dominant feature or focal point of the view.	A partial loss or alteration to the view is expected in operational stage.	Introduced scheme would become dominant feature or focal point of the view.	Introduced scheme would become dominant feature or focal point of the view.	Introduced scheme would become dominant feature or focal point of the view.

Receptors	Option 9	Option 9 with A3 widening	Option 14	Option 14 with A3 widening	Option 16	Option 16 with A3 widening
Potential effects	Introduction of this option would result in major alteration to the view from the receptor.	Introduction of this option would result in major alteration to the view from the receptor.	A limited deterioration to the view is expected through addition of new features, which are largely characteristic of the existing view from the receptor.	Introduction of this option would result in major alteration to the view from the receptor.	Introduction of this option would result in major alteration to the view from the receptor.	Introduction of this option would result in major alteration to the view from the receptor.
	Large adverse (significant)	Large adverse (significant)	Slight adverse (not significant)	Large adverse (significant)	Large adverse (significant)	Large adverse (significant)
Magnitude of change	Major	Major	Minor	Major	Major	Major
Receptor 3 Views from the network of PRoW's within the study area. **Sensitivity: High**	Introduced scheme would become dominant feature or focal point of the view.	Introduced scheme would become dominant feature or focal point of the view.	A partial loss or alteration to the view is expected in operational stage.	Introduced scheme would become dominant feature or focal point of the view.	Introduced scheme would become dominant feature or focal point of the view.	Introduced scheme would become dominant feature or focal point of the view.
Potential effects	Introduction of this option would result in major alteration to the view from the receptor.	Introduction of this option would result in major alteration to the view from the receptor.	A limited deterioration to the view is expected through addition of new features, which are largely characteristic of the existing view from the receptor.	Introduction of this option would result in major alteration to the view from the receptor.	Introduction of this option would result in major alteration to the view from the receptor.	Introduction of this option would result in major alteration to the view from the receptor.
	Large adverse	Large adverse	Slight adverse	Large adverse	Large adverse	Large adverse

Receptors	Option 9	Option 9 with A3 widening	Option 14	Option 14 with A3 widening	Option 16	Option 16 with A3 widening
	(significant)	(significant)	(not significant)	(significant)	(significant)	(significant)
Magnitude of change	Minor	Minor	No change	No change	Moderate	Moderate
Receptor 4 Views from Chatley Farm. **Sensitivity: High**	A partial loss or alteration to the view is expected in operational stage.	A partial loss or alteration to the view is expected in operational stage.	There would be no change to the view as the views are blocked completely.	There would be no change to the view as the views are blocked completely.	It is expected that introduced option would form a noticeable element of the view.	It is expected that introduced option would form a noticeable element of the view.
Potential effects	A noticeable deterioration to the view is expected through introduction of this option.	A limited deterioration to the view is expected through addition of new features, which are largely characteristic of the existing view from the receptor.	There would be no perceptible change in the view.	There would be no perceptible change in the view.	The route option would cause the loss of views from a highly sensitive receptor, and would constitute a dominant discordant feature in the view.	The route option would cause the loss of views from a highly sensitive receptor, and would constitute a dominant discordant feature in the view.
	Moderate adverse (significant)	Moderate adverse (significant)	Neutral	Neutral	Large adverse (significant)	Large adverse (significant)
Magnitude of change	No change	Minor	No change	Minor	Minor	Minor
Receptor 7 Views from RHS Wisley Grade II* Registered Park and Garden.	There would be no change to the view as the views are blocked completely.	A partial loss or alteration to the views is expected in operational stage.	There would be no change to the view as the views are blocked completely.	A partial loss or alteration to the view is expected in operational stage.	A partial loss or alteration to the view is expected in operational stage.	A partial loss or alteration to the view is expected in operational stage.

Receptors	Option 9	Option 9 with A3 widening	Option 14	Option 14 with A3 widening	Option 16	Option 16 with A3 widening
Sensitivity: Very high						
Potential effects	There would be no perceptible change in the view.	A limited deterioration to the view is expected through addition of new features, which are largely characteristic of the existing view from the receptor.	There would be no perceptible change in the view.	A limited deterioration to the view is expected through addition of new features, which are largely characteristic of the existing view from the receptor.	A noticeable deterioration to the view is expected through introduction of this option.	A noticeable deterioration to the view is expected through introduction of this option.
	Neutral	Moderate adverse (significant)	Neutral	Moderate adverse (significant)	Moderate adverse (significant)	Moderate adverse (significant)



- Scheme Area Boundary
- Study Area
- Borough Boundary
- Visual Receptors
- Listed Building Grade I
- Listed Building Grade II*
- Listed Building Grade II
- Scheduled Monuments
- Local Nature Reserves
- Ancient & Semi-Natural Woodland
- Ancient Replanted Woodland
- Registered Parks and Gardens

Metres

0 150 300 600 900 1,200 1,500

Rev.	Date	Description	By	Chk'd	App'd
P01	03/08/16	ISSUED FOR REVIEW AND COMMENT	ZK	SW	NW

Drawing Status: REVIEW AND COMMENT

Suitability: S3

ATKINS
Epsom Gateway
Ashley Avenue
Epsom
Surrey
KT18 5AL
Tel: +44 (0) 1372 726140
Fax: +44 (0) 1372 740055
www.atkinsglobal.com

Client: highways england

Project Title: ROAD INVESTMENT STRATEGY
M25 Junction 10

Drawing Title: FIGURE 6.1
LANDSCAPE AND
VISUAL CONTEXT

Scale	Designed	Drawn	Checked	Authorised
1:25 000	ZK	ZK	SW	NW
Original Size: A3	Date: 03/08/16	Date: 03/08/16	Date: 03/08/16	Date: 03/08/16

Drawing Number
Project | Originator | Volume | Location | Type | Role | Number

Project Ref. No.: 5145620

Revision: P01

N

WOKING BOROUGH COUNCIL

ELMBRIDGE BOROUGH COUNCIL

GUILDFORD BOROUGH COUNCIL

- Scheme Area Boundary
- Study Area
- Borough Boundary

Landscape Character Area

Elmbridge Borough Council

- RF10 Lower Mole River Floodplain
- SS9 Weybridge South Settled and Wooded Sandy Farmland
- SW5 Wisley Sandy Woodland
- LR2 Ockham and Clandon Wooded Rolling Claylands
- SW6 Fairmile to Esher Sandy Woodland
- Urban

Guildford Borough

- G2 Wisley Wooded and Settled Heath
- H1 Sand Gravel Terrace
- E2 Ockham and Claydon Wooded Rolling Claylands

Metres

0 150 300 600 900 1,200 1,500

Rev.	Date	Description	By	Chk'd	App'd
P01	03/08/16	ISSUED FOR REVIEW AND COMMENT	ZK	SW	NW

Drawing Status: REVIEW AND COMMENT

Suitability: S3

ATKINS
Epsom Gateway
Ashley Avenue
Epsom
Surrey
KT18 5AL
Tel: +44 (0) 1372 726140
Fax: +44 (0) 1372 740055
www.atkinsglobal.com

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Project Title: ROAD INVESTMENT STRATEGY
M25 Junction 10

Drawing Title: FIGURE 6.2
LANDSCAPE CHARACTER

Scale	Designed	Drawn	Checked	Authorised
1:30 000	ZK	ZK	SW	NW
Original Size	**Date**	**Date**	**Date**	**Date**
A3	03/08/16	03/08/16	03/08/16	03/08/16

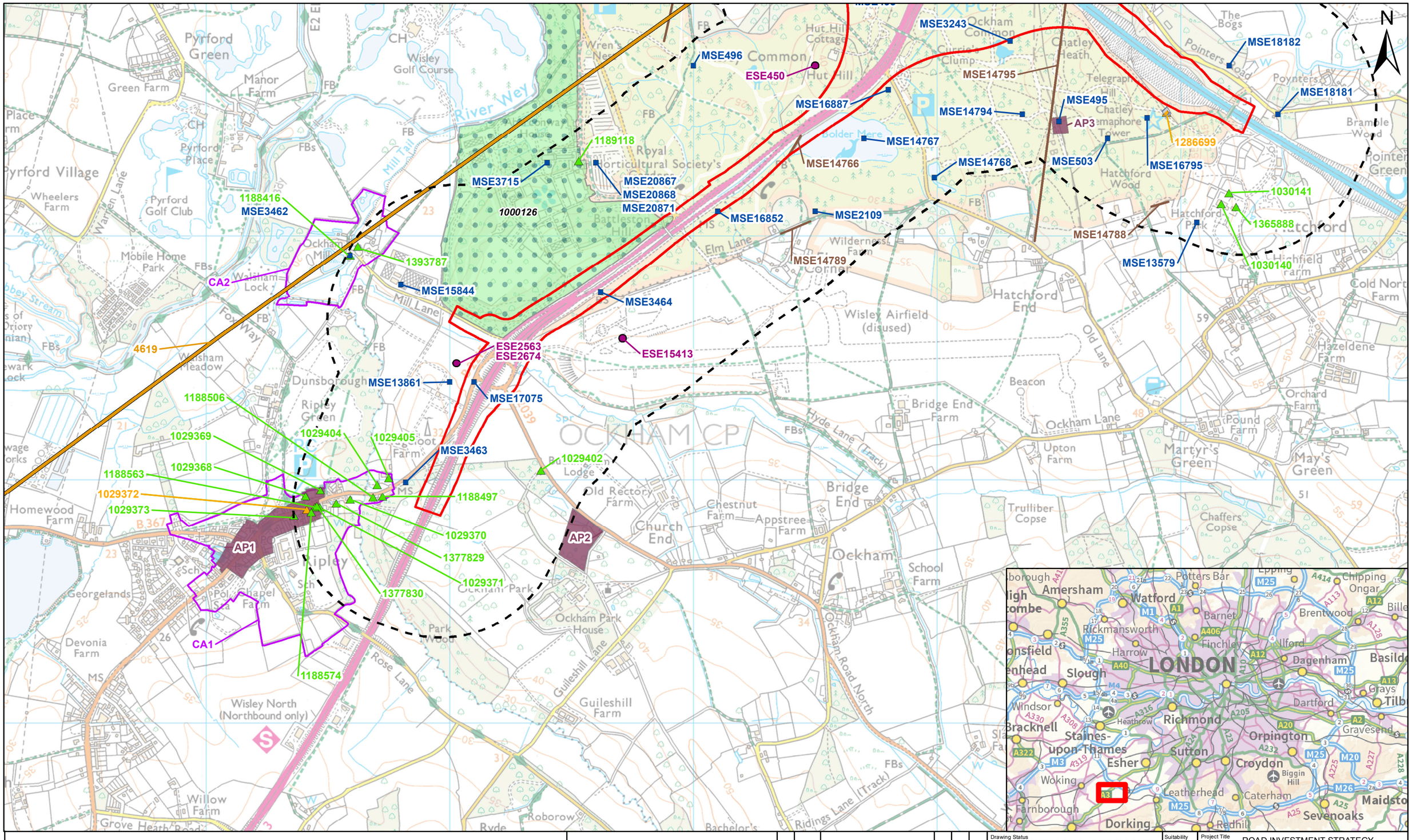
Drawing Number: Project | Originator | Volume | Location | Type | Role | Number

Project Ref. No.: 5146620

Revision: P01

Appendix E: Cultural Heritage

Working on behalf of highways england



- Scheme Area Boundary
- 500m Study Area Boundary
- Listed Building Grade II*
- Listed Building Grade II
- HER Monuments
- HER Events Points
- HER Monuments Line
- Roman Roads
- HER Areas of High Archaeological Potential
- Conservation Areas
- HER County Sites of Archaeological Importance
- Scheduled Monuments
- Registered Parks and Gardens

CLIENT NAME: Highways England

LICENCE NUMBER: 100018928

Metres
0 50 100 200 300 400 500

Rev.	Date	Description	By	Chk'd	App'd
P01	05/08/16	ISSUED FOR REVIEW AND COMMENT	PO	SW	NW

Drawing Status: REVIEW AND COMMENT
Suitability: S3

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Epsom Gateway
Ashley Avenue
Epsom
Surrey
KT18 5AL
Tel: +44 (0) 1372 726140
Fax: +44 (0) 1372 740055
www.atkinsglobal.com

Client: highways england

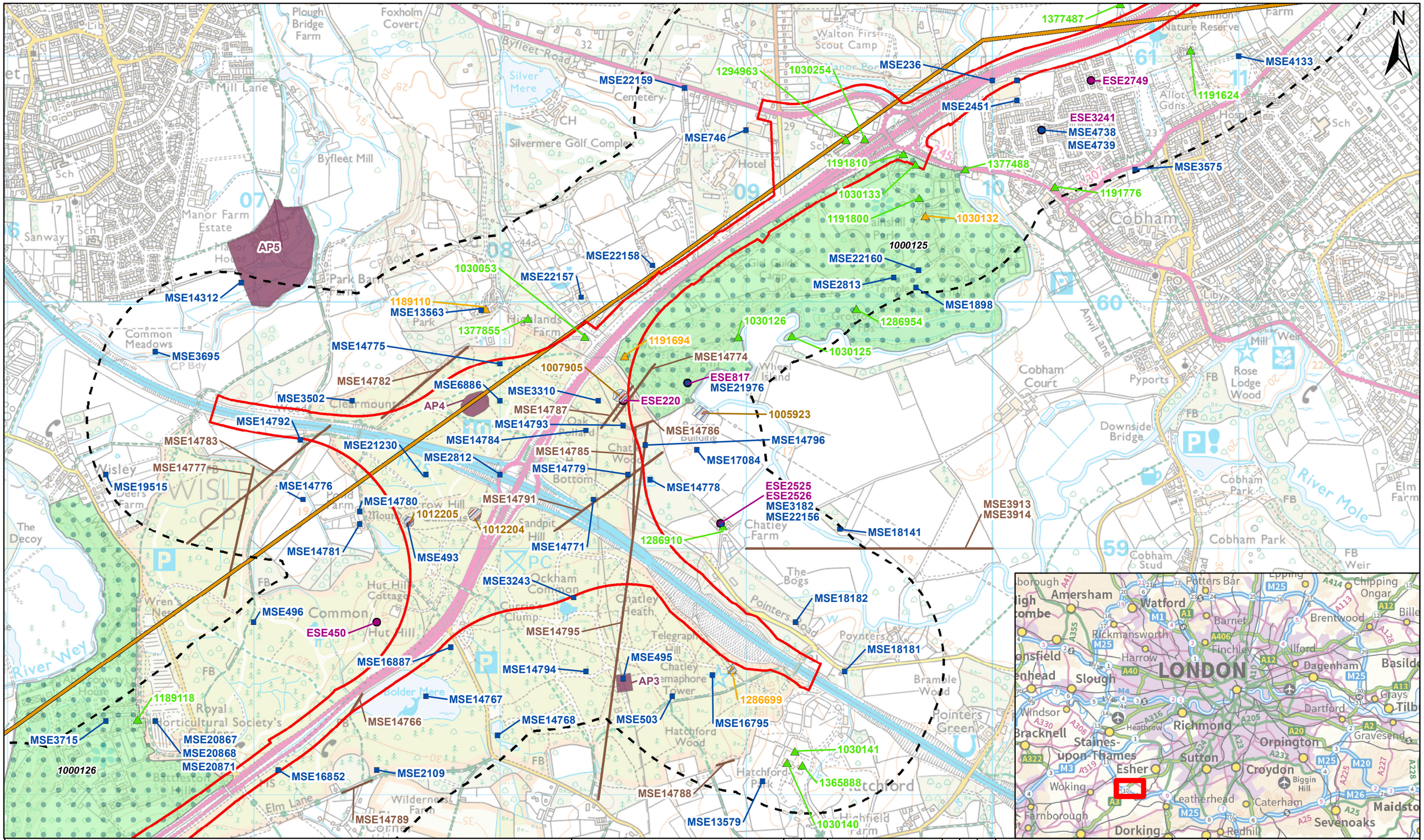
Project Title: ROAD INVESTMENT STRATEGY
M25 Junction 10

Drawing Title: FIGURE 7.1
CULTURAL HERITAGE
CONSTRAINTS MAP
SHEET 1 of 3

Scale	Designed	Drawn	Checked	Authorised
1:15 000	PO	PO	SW	NW
Original Size: A3	Date: 05/08/16	Date: 05/08/16	Date: 05/08/16	Date: 05/08/16

Drawing Number
Project | Originator | Volume | Location | Type | Role | Number

Project Ref. No.: 5146520
Revision: P01



- Scheme Area Boundary
- 500m Study Area Boundary
- Listed Building Grade II*
- Listed Building Grade II
- HER Monuments
- HER Events Points
- HER Monuments Line
- Roman Roads
- HER Areas of High Archaeological Potential
- Conservation Areas
- HER County Sites of Archaeological Importance
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- Registered Parks and Gardens

CLIENT NAME: Highways England

LICENCE NUMBER: 100018928

Metres
0 50 100 200 300 400 500

Rev.	Date	Description	By	Chk'd	App'd
P01	05/08/16	ISSUED FOR REVIEW AND COMMENT	PO	SW	NW

Drawing Status: REVIEW AND COMMENT
Suitability: S3

ATKINS
Epsom Gateway
Ashley Avenue
Epsom
Surrey
KT18 5AL
Tel: +44 (0) 1372 726140
Fax: +44 (0) 1372 740055
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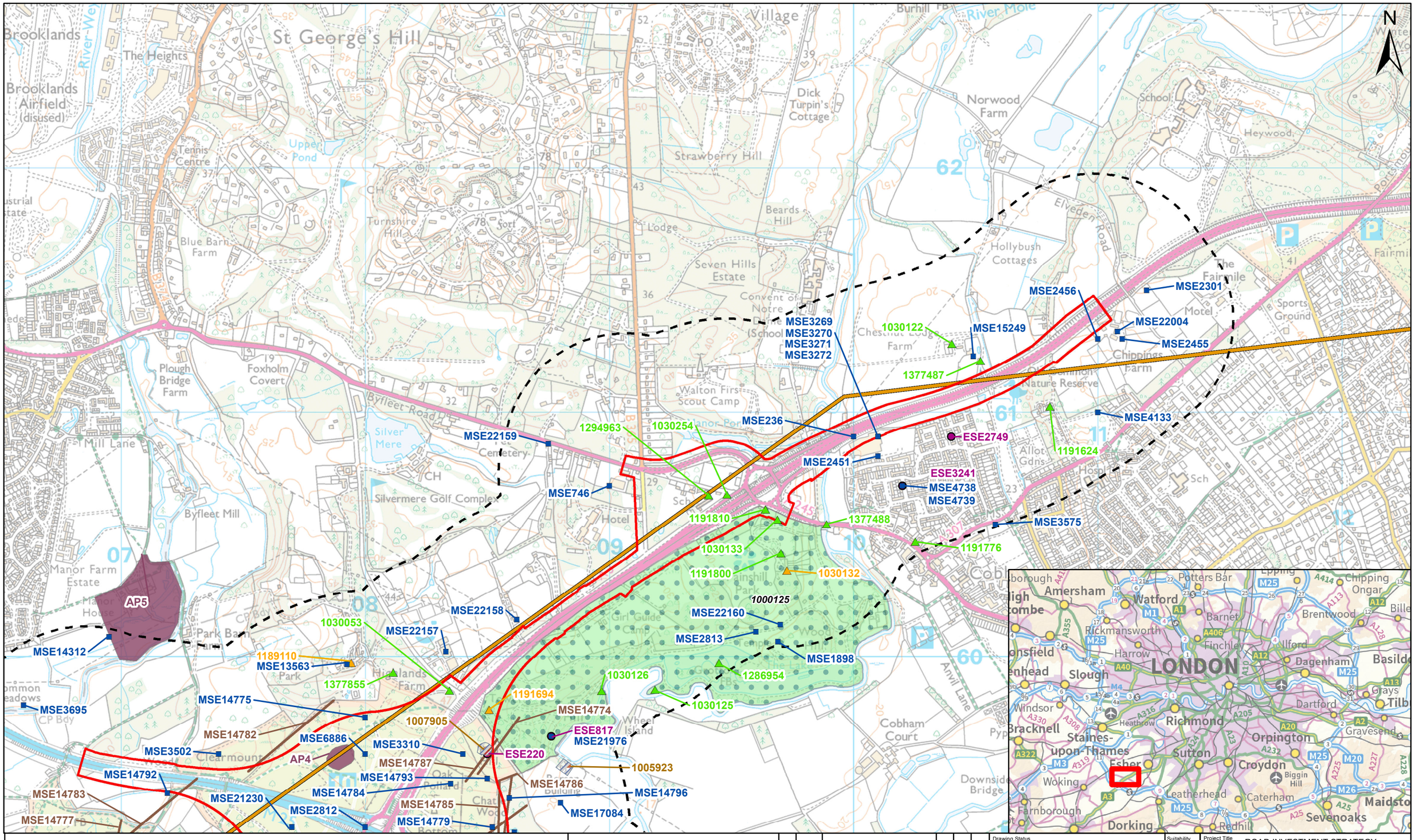
Client: highways england

Project Title: ROAD INVESTMENT STRATEGY
M25 Junction 10

Drawing Title: FIGURE 7.1
CULTURAL HERITAGE CONSTRAINTS MAP
SHEET 2 of 3

Scale	Designed	Drawn	Checked	Authorised
1:15 000	PO	PO	SW	NW
Original Size: A3	Date: 05/08/16	Date: 05/08/16	Date: 05/08/16	Date: 05/08/16

Drawing Number: Project | Originator | Volume | Location | Type | Role | Number
Project Ref. No.: 5145620
Revision: P01



Metres
0 50 100 200 300 400 500

Rev.	Date	Description	By	Chk'd	App'd
P01	05/08/16	ISSUED FOR REVIEW AND COMMENT	PO	SW	NW

Drawing Status: REVIEW AND COMMENT
Suitability: S3

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Epsom Gateway
Ashley Avenue
Epsom
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Client: highways england

Project Title: ROAD INVESTMENT STRATEGY
M25 Junction 10

Drawing Title: FIGURE 7.1
CULTURAL HERITAGE
CONSTRAINTS MAP
SHEET 3 of 3

Scale	Designed	Drawn	Checked	Authorised
1:15 000	PO	PO	SW	NW
Original Size	**Date**	**Date**	**Date**	**Date**
A3	05/08/16	05/08/16	05/08/16	05/08/16

Drawing Number: Project | Originator | Volume | Location | Type | Role | Number
Project Ref. No.: 5146620
Revision: P01

Appendix E: Gazetteer of Non-Designated Cultural Heritage Assets

Reference (ref from Surrey HER)	**Name**	**Description** (from Surrey HER)	**Value (refer to Section 7.4)**
HER Areas of High Archaeological Potential			
AP1	Ripley village	The centre of the historic village of Ripley. Contains a number of designated buildings, with early post-medieval origins. Potential for buried archaeology relating to the development of the village.	Low
AP2	Ockham Park	A small nucleated settlement is shown on Roque map of 1768. Potential for buried archaeology relating to this removed settlement.	Low
AP3	Earthworks, including possible bowl barrow	Possible bowl barrow amongst earthworks. May be of more modern origin, following post-designation assessment.	Low
AP4	Possible bowl barrow	Possible barrow, since excavated and thought now to be a natural modern feature.	Negligible
AP5	Byfleet Manor	Site of Byfleet Manor, south of the village of Byfleet. Potential for buried archaeology associated with manor site.	Low
HER Monuments (including Roman roads)			
MSE236	Romano-British pottery	Fragments of Romano-British pottery vessels (50-100 AD), part of a spout of a mortarium and pieces of wattle and daub found during sewage works construction in 1932, close to the River Mole.	Low
MSE495	Probable tree planting earth bank, Ockham Common	Circular earthwork ring, probably tree-planting clump, with outer ditch cut by later parish boundary ditch.	Low
MSE496	Mesolithic or Neolithic Quartzite Mace	Quartzite hammer or mace with hour glass perforation, found on Wisley Common.	Low
MSE503	Mesolithic Site, Ockham Common and Chatley Heath	Mesolithic flint scatter astride a sandy path. Only two feet square, but with a scattering of other flints, including scrapers, in the general area. The flints are recorded as being from a primitive flint industry employing local gravels found on site.	Low
MSE746	Two Palaeolithic handaxes	Two Palaeolithic Acheulian hand axes recorded as found in gravel at house at the corner of the Severn Hills and Cobham - Byfleet Roads	Low
MSE1898	Icehouse at Painshill Park	Icehouse which served Painshill Park	Low
MSE2109	Early Bronze Age Flanged Axe	Early Bronze Age flanged axe (1600-1400 BC) found 1978 with a metal detector to the south of Bolder Mere.	Low
MSE2301	Undated Flint Flakes	Flint flakes and chips, found 1969, on the surface of plough soil on the north-east side of a field.	Low
MSE2451	Possible Late Bronze Age Pot	A small cup or crucible, apparently Late Bronze Age, found at the sewage works in April 1963.	Low
MSE2455	Flint Scraper	Flint scraper found on farmland in 1971.	Low
MSE2456	Undated Flint Flakes	Flint flakes found in 1971.	Low
MSE2812	Possible medieval boundary bank, Wisley/Ockham parish boundary	Boundary bank partly destroyed by the construction of the M25 motorway.	Low
MSE2813	Painshill Park	Landscaped parkland of Painshill Park	Low
MSE3182	Neolithic flint scraper	A Neolithic flint scraper found at Chatley Farm	Low
MSE3243	Possible field system or mineral extraction site of unknown date	Extensive system of large earth ridges or banks, often parallel to one another and often of exceptional size. The ridges appear to lead into a large sub-circular quarry hollow, with the edges seeming to radiate out from this quarry, often following well-defined alignments, but sometimes	Low

Reference (ref from Surrey HER)	**Name**	**Description** (from Surrey HER)	**Value (refer to Section 7.4)**
		forming different alignments. Some possible trackways leading into and out of the quarry.	
MSE3269	Prehistoric Pottery Sherds	Prehistoric pottery sherds from Cobham Sewage works	Low
MSE3270	Mesolithic Flints	Mesolithic flints from Cobham Sewage works	Low
MSE3271	Roman Pottery Sherds	Roman pottery sherds from Cobham Sewage works	Low
MSE3272	Medieval Pottery Sherds	Medieval pottery sherds from Cobham Sewage works	Low
MSE3310	Possible Roman quarrying site	There is damage to the north-east side of the Red Hill Hengi-form monument by quarrying, probably for ironstone. It has been suggested that this might be of Roman date on account of the nearby possible villa site about 350m to the east.	Low
MSE3462	Ockham Mill	Former mill, 19th century, now a residential property	Low
MSE3463	Milestone	Milestone, marked Portsmouth 48, Hyde Park Corner 21, Cobham 4 and Guildford 6 miles.	Low
MSE3464	Parish boundary stone	Much-weathered boundary stone between Ockham and Wisley	Low
MSE3502	Mesolithic Flint Cores	Five Mesolithic flint cores were found at Clearmont, Wisley Common	Low
MSE3575	Milestone	Milestone on the south side of the old A3. The front marked Hyde Park Corner 17 and the sides Esher 3 and Ripley 4.	Low
MSE3695	Worked flints	Worked flints found in all fields bordering the River Wey, during fieldwalking along the route of the M25.	Low
MSE3715	Wisley Gardens	Royal Horticultural Society's Gardens at Wisley	Low
MSE3913	Roman copper alloy brooch	Roman copper alloy brooch of Colchester `B' type, dating to AD. 50-70. Roman pottery and a tile were also discovered in this area.	Low
MSE3914	Roman Mule Or Asses Head	A copper/iron Roman mule or asses head found in an area of Cobham court, with a metal detector.	Low
MSE4133	Two Palaeolithic hand-axes	Two Palaeolithic hand-axes found in gravel pits on side of Old Portsmouth Road.	Low
MSE4619	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.	Medium
MSE4738	Medieval pottery	Four pottery sherds were recovered from evaluation of site, probably of medieval date; the fifth is likely to be prehistoric, perhaps dating to the Bronze Age.	Low
MSE4739	Bronze Age pottery	Pottery sherd recovered from evaluation of site, likely to be prehistoric, perhaps dating to the Bronze Age.	Low
MSE6886	Anti Aircraft Gun Emplacement	WWII anti-aircraft gun emplacement	Low
MSE13563	Foxwarren Park	Mid-19th century gardens, contemporary with house of 1855-60.	Low
MSE13579	Hatchford Park	Elements of 19th century gardens of different periods remained up to the recent conversion of the house. Includes sunken rose garden, a Japanese water garden, follies, statutes and a bandstand. Significant restoration of garden features is important part of 21st century complex.	Low
MSE13861	Bronze Age pottery and flintwork	A single linear feature containing Bronze Age pottery and flintwork at Nutberry Farm.	Low

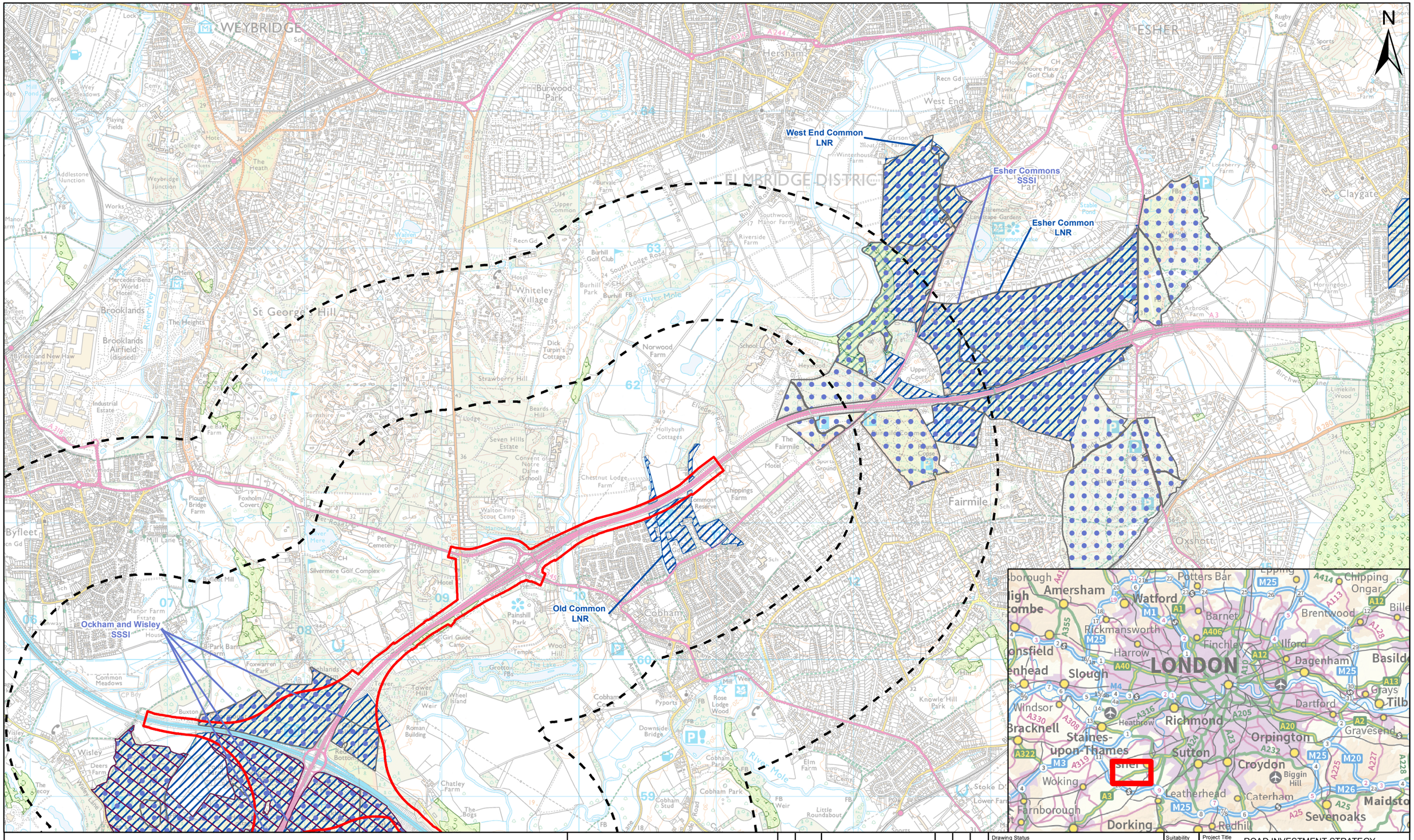
Reference (ref from Surrey HER)	**Name**	**Description** (from Surrey HER)	**Value (refer to Section 7.4)**
MSE14312	Cropmark	An aerial photograph shows a small cluster of linear features south-west of Byfleet Manor House. Two are linear and parallel with a ditch further east and could be drains.	Low
MSE14766	Dam, Bolder Mere	Dam, with bank and ditch, heavily disturbed by drainage channels from A3. Possibly 16th century.	Low
MSE14767	Pond, Bolder Mere	Large pond of about 6 hectares on Ockham Common, 16th century, possibly earlier.	Low
MSE14768	Remnant of Purple Pond	A marshy pool, heavily overgrown, and much silted up. 17th or 18th century.	Low
MSE14771	Pond site	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 on the east and north sides, now partly buried under the M25.	Low
MSE14774	Red Hill Road Holloway or ditch feature	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. Probably medieval	Low
MSE14775	Linear earthworks, Foxwarren Park	Linear earthworks running approximately north-south across Wisley Common to boundary of Foxwarren Park, some now reused as garden features.	Low
MSE14777	Bank and ditch feature	Bank with ditch on east side. Possibly 20th century.	Low
MSE14778	Pond site	Pond, early 20th century but possibly reusing earlier pond. The pond is presently dry, and appears to have been for the last two or three years.	Low
MSE14779	Quarry, Chatley Wood	Quarry hollow, on the west side of an enclosure bank thought to have been put up following the 1793 enclosure.	Low
MSE14780	Farmhouse, Pond Farm	Brick farmhouse. Built as a 'cottage' by Lord King between circa 1800-1804. Later 19th and 20th century alterations and additions.	Low
MSE14781	Barn, Pond Farm	Barn with lean-to on north side.	Low
MSE14782	Boundary bank	Bank with slight ditch. Oak trees of some antiquity on one side. 18th century, possibly earlier.	Low
MSE14783	Lord King's ditch, Pond Farm	Deep ditch, with signs of regularly recutting. Local tradition ascribes it as the ditch cut to drain Wisley Pond circa 1800.	Low
MSE14784	Ockham sand pit	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.	Low
MSE14785	Enclosure bank, Chatley Wood	Bank forming boundary between surviving portion of Chatley Heath and private enclosure created by Thomas Page in 1793. Traces of ditch on common (west) side.	Low
MSE14786	Enclosure bank, Red Hill	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.	Low
MSE14787	Enclosure bank, Red Hill	Bank running alongside of hill. Some old trees on the bank, and traces of a ditch on the south-west side. Formerly an enclosure bank between a piece of private woodland and an enclosed part of Wisley Heath.	Low
MSE14788	Holloway, Hatchford Wood	Traces of holloway between Mausoleum and Elm Cottage along southern edge of Hatchford Wood.	Low
MSE14789	Enclosure bank, Ockham Village Green	Semi-circular bank and ditch surrounding "Ockham Village Green", late 19th century.	Low
MSE14791	Pointers Road	This road is now a tarmacked road that terminates near the A3/M25 interchange. It once extended west of this point. There are no obviously	Negligible

Reference (ref from Surrey HER)	**Name**	**Description** (from Surrey HER)	**Value (refer to Section 7.4)**
		historic features to this road now that it has been modernised, but it follows an earlier alignment.	
MSE14792	Site of Oldpond House	Site of house, now overgrown by nettles and scrub. The house is shown on map of 1768. On tithe map a cottage, orchard and garden. 1870 map refers shows a house and a large outbuilding. They had both gone before the M25 was built.	Low
MSE14793	Linear earthworks, Red Hill	A series of linear earthworks crossing the various parish boundaries, and surrounding conventional quarries in the area, similar to earthworks identified on Ockham Common and south of Foxwarren Park. Unknown date, though Iron Age postulated.	Low
MSE14794	Mound and linear earthworks, possible barrow, Ockham Heath	Large sub-circular mound, with similarities to other barrows in the area, though more likely to be a mound associated with nearby quarrying. Associated linear earthworks.	Low
MSE14795	Parish boundary bank, Ockham Heath	Old parish boundary between Ockham and Cobham, possibly related to an early Saxon boundary. Its survival is intermittent particularly in the north where its line is much disturbed by quarry workings and other earthworks. Along the southern part of the boundary the bank is relatively easy to follow, with traces of a ditch on one side. Unfortunately this section has recently been seriously damaged.	Low
MSE14796	Quarry pit, Chatley Wood Quarry	Small quarry pit, set in woodland between Wisley/Cobham Boundary and Chatley Wood Pond.	Low
MSE15844	Ring ditch cropmark	An irregular ring ditch with short lengths of linear ditches.	Low
MSE16795	Chatley Heath Semaphore Tower	An acre of land was often allocated to these towers. Frequently the land surrounding semaphore towers was used for kitchen gardens to supply the families of the Superintendent. Chatley Heath was said to have many fruit trees, several shrubs, with a summerhouse, woodhouse, henhouse and pigsty.	Low
MSE16852	Milestone	Claygate to Guildford Milestone near RHS Gardens, north-east of footbridge	Low
MSE16887	Milestone	Claygate to Guildford Milestone south of junction with M25 on slip road (old lane)	Low
MSE17075	Cropmarks	A number of small circular and sub-circular cropmarks. Observed on 1971 and 1947-9 surveys.	Low
MSE17084	Cropmarks	Square dark cropmark. There are possibly others in this field.	Low
MSE18141	Earthwork bank	Earthwork bank of unknown date, at the edge of a copse with slight ditch and adjacent pathway.	Low
MSE18181	The Lodge and Lodge Wood	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. Woodland to the east appears to be secondary. The Lodge is probably 19th century.	Low
MSE18182	The Bogs: semi-ornamental woodland	This is a substantial area of semi-ornamental woodland, first labelled as such in 1876. The Bogs appears to have been cultivated land in 1768 and 1793 and was perhaps developed as woodland as part of landscaping in the early 19th century.	Low
MSE19515	Saucer Brooch	Copper-alloy saucer brooch dated from AD c.475-c.600. A circular copper-alloy brooch, with a central circular hole within a central circular flat-topped boss.	Low
MSE20867	War memorial, RHS Headquarters	WWI war memorial. Bronze panel surrounded by a frame of Hoptonwood stone.	Low
MSE20868	War memorial, RHS Headquarters	WWII war memorial. Bronze panel surrounded by a frame of Hoptonwood stone.	Low

Reference (ref from Surrey HER)	**Name**	**Description** (from Surrey HER)	**Value (refer to Section 7.4)**
MSE20871	War memorial, RHS Headquarters	WWI and WWII war memorial in the form of a clock with gilded numerals and red hands above the entrance, and a rectangular plaque inside the main laboratory building.	Low
MSE21230	Anti Aircraft Site, Wisley Common	An unarmed Anti Aircraft Site at Wisley Common	Low
MSE21976	The Hermitage at Painshill Park	Site of an 18th century hermitage created as part of the pleasure grounds at Painshill Park. Reconstructed in 2004 as part of the wider Painshill Park restoration project.	Low
MSE22004	Chippings Farm	Site of an historic farmstead.	Low
MSE22156	Chatley Farm	Farmstead of Chatley Farm	Low
MSE22157	Highlands Farm	Farmstead of Highlands Farm	Low
MSE22158	Long Orchard Farm	Farmstead of Long Orchard Farm	Low
MSE22159	Silvermore Farm Estate	Farmstead of Silvermore Farm Estate	Low
MSE22160	Pains Hill House Farm	Farmstead of Pains Hill House Farm	Low
HER Events			
ESE220	Geophysical survey at Red Hill	Geophysical survey carried out by English Heritage Ancient Monuments Lab at Red Hill, Wisley	n/a
ESE450	Ockham and Wisley Commons Historic landscape survey	Historic landscape survey by C Currie, for SCC's Planning Dept, as part of the process for considering designation as an Area of Historic Landscape Value. The most frequent earthwork features on the commons are the large number of substantial parallel ridges, some up to 3m high and extending for over 100m. Most of the identified groupings surround former quarries, lending support to the theory that these features are related to mineral extraction. The remains of conventional quarrying are also highly visible, both as quarry pits and spoil mounds. In fact, the survey suggests that the Red Hill hengi-form monument may be formed from fairly recent quarry upcast. The adjacent quarry, which has formerly been suggested to be Roman in date, appears to respect the Cobham/Wisley parish boundary, suggesting it post-dates that boundary.	n/a
ESE817	An archaeological report on The Hermitage, Painshill Park	An archaeological evaluation of the site of the Hermitage in 1986 recorded little that could be related to a building. The trenches excavated at that time concentrated to the south-west of the mound on which research indicated that the Hermitage was built. A shallow spread of rubble was recorded but little else of substance. In 2004 the Hermitage building was reconstructed. The design and position of the building based on an eighteenth century engraving that had come to light after completion of the 1986 excavations. During the reconstruction works, which concentrated on the south-eastern side of the mound, brick foundations were exposed and recorded.	n/a
ESE2525	Historic Building Recording at Chatley Farm House	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	n/a
ESE2526	An Archaeological Watching Brief at Chatley Farm Estate	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	n/a
ESE2563	An Archaeological Evaluation at Nutberry Farm	Evaluation by SLR Archaeology prior to the construction of a composting facility. A single linear feature containing Bronze Age pottery and flintwork was revealed.	n/a

Reference (ref from Surrey HER)	**Name**	**Description** (from Surrey HER)	**Value (refer to Section 7.4)**
ESE2674	A Cultural Heritage Assessment of Nutberry Farm	SLR Consulting Ltd was commissioned to prepare a report to provide an evaluation of the base line land quality at the site, for submission with an Environmental Impact Assessment, alongside desk based research to study the site's current and historical land use.	n/a
ESE2749	An Archaeological Geophysical Survey at London Irish Rugby Club	Evaluation by ASE undertaken following geophysical survey by Stratascan. The geophysics revealed that the majority of the site appears to be dominated by anomalies likely to be related to its current use as rugby pitches, but it also revealed responses that may relate to archaeological deposits. The evaluation involved the excavation of trenches around the rugby pitches and revealed a boundary ditch of probable post-medieval date, a shallow gully and evidence of plough scarring. Where the geophysics and evaluation overlapped, the geophysics detected the gully revealed by the geophysics, but not the large boundary feature.	n/a
ESE3241	Land adjacent to Sainsbury's store, Cobham, Surrey. An archaeological desktop study.	An archaeological desktop study by Thames Valley Archaeological Services for Alfred McAlpine Southern Home Limited, as part of proposals to develop for housing the parcel of land formally occupied by Cobham sewage treatment works and adjacent to the Sainsbury's store on Portsmouth road.	n/a
ESE15413	Heritage desk-based assessment: Wisley Airfield	A desk-based assessment was carried out by Cotswold Archaeology in order to assess the archaeological potential of land at Wisley Airfield, Woking, Surrey. The site was determined to be of low archaeological potential due to disturbance through the construction of the airfield however limited potential for use of the site from the medieval onwards was identified in undisturbed areas.	n/a

Appendix F: Ecology



- Scheme Area Boundary
- 1km Study Area Boundary
- 2km Study Area Boundary
- Special Areas of Conservation
- Special Protected Areas
- Site of Special Scientific Interest (SSSI)
- Local Nature Reserves
- Ancient Woodland

NOTE:

Please note this map does not include non-statutory Sites of Nature Conservation Importance' or Conservation Verges.

CLIENT NAME: Highways England

LICENCE NUMBER: 100018928

Metres

0 130 260 520 780 1,040 1,300

Rev.	Date	Description	By	Chk'd	App'd
P01	02/08/16	ISSUED FOR REVIEW AND COMMENT	PO	SW	NW

Drawing Status: REVIEW AND COMMENT

Suitability: S3

ATKINS
Epsom Gateway,
Ashley Avenue,
Epsom,
Surrey
KT18 5AL

Tel: +44 (0) 1372 726140
Fax: +44 (0) 1372 740055

www.atkinsglobal.com

Client: highways england

Project Title: ROAD INVESTMENT STRATEGY
M25 Junction 10

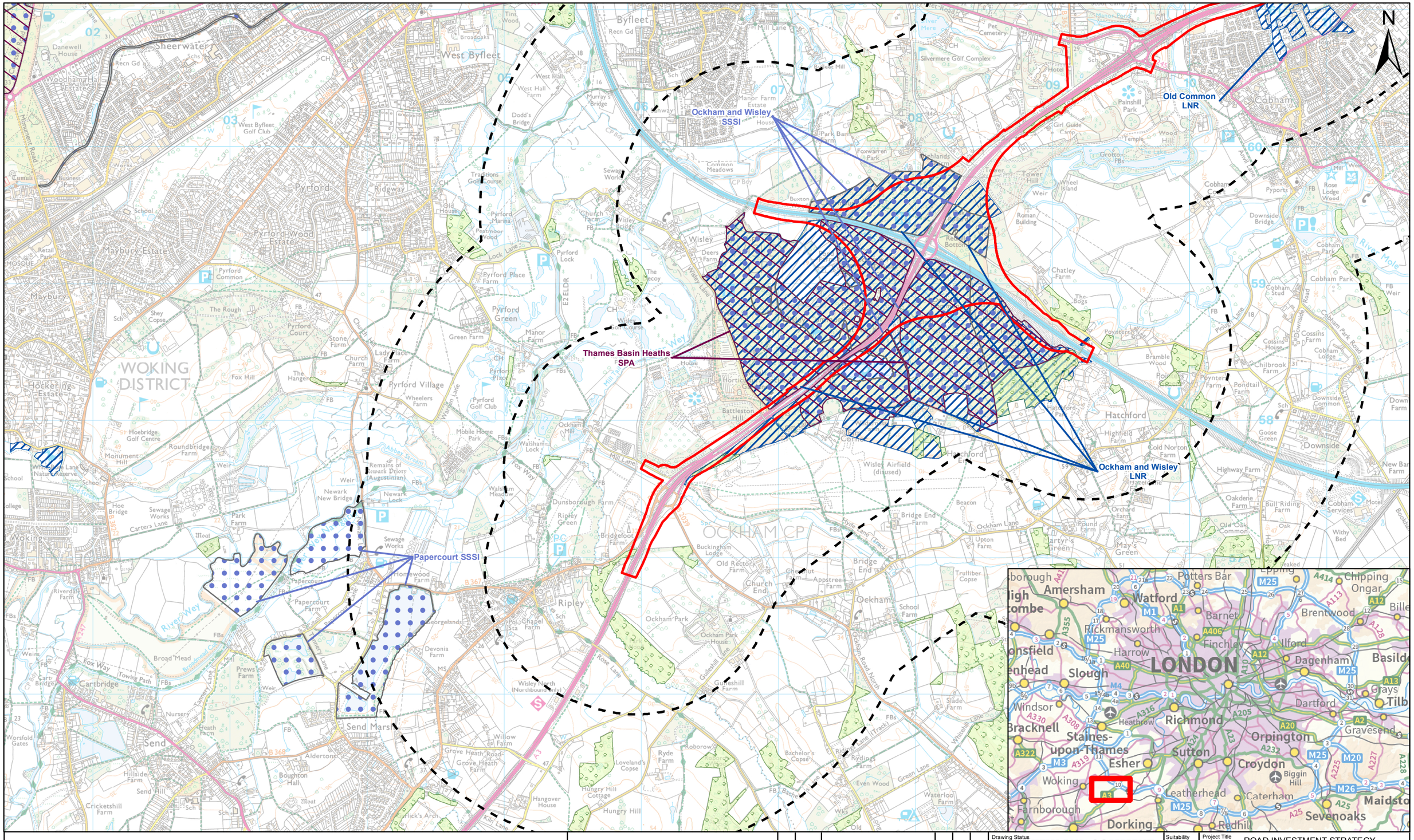
Drawing Title: NATURE CONSERVATION DESIGNATED SITES SHEET 1 of 2

Scale	Designed	Drawn	Checked	Authorised
1:20 000	PO	PO	SW	NW
Original Size	Date	Date	Date	Date
A3	02/08/16	02/08/16	02/08/16	02/08/16

Drawing Number
Project | Originator | Volume | Location | Type | Role | Number

Project Ref. No.: 5145620

Revision: P01



- Scheme Area Boundary
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CLIENT NAME: Highways England

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Rev.	Date	Description	By	Chk'd	App'd
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Epsom Gateway,
Ashley Avenue,
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KT18 5AL
Tel: +44 (0) 1372 726140
Fax: +44 (0) 1372 740055
www.atkinsglobal.com

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Project Title: ROAD INVESTMENT STRATEGY
M25 Junction 10

Drawing Title: NATURE CONSERVATION DESIGNATED SITES SHEET 2 of 2

Scale	Designed	Drawn	Checked	Authorised
1:20 000	PO	PO	SW	NW
Original Size A3	Date 02/08/16	Date 02/08/16	Date 02/08/16	Date 02/08/16

Drawing Number
Project | Originator | Volume | Location | Type | Role | Number

Project Ref. No. 5145620

Revision P01

Appendix D. Summary of Relevant Legislation in England

Species	Legislation	Offences	Licensing procedures and guidance
Bats *European protected species*	Conservation of Habitats and Species Regulations 2010 (as amended) Reg 41	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 Regulations 2010 (as amended) Reg 41	Deliberately[1] capture, injure or kill an otter; deliberate disturbance[2] of otters; or damage or destroy a breeding site or resting place used by an otter.	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)
	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.

Species	Legislation	Offences	Licensing procedures and guidance
Hazel dormouse *European protected species*	Conservation of Habitats and Species Regulations 2010 (as amended) Reg 41	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.	No licence is required for survey in England, unless you are likely to commit an action that is otherwise illegal. There are currently no licensing purposes that explicitly cover development activities or activities associated with the improvement or maintenance of waterways. However when a proposed lawful activity has no opportunity to retain water voles within a development site and their translocation would result in a conservation benefit then a licence from Natural England may be obtained. Guidance documents: *NE Standing Advice for protected species 2013* *The Water Vole Conservation Handbook* (R. Strachan & T. Moorhouse, Wildlife Conservation Research Unit, 2nd Edition 2006) *Water voles and development licensing policy* - NE Technical Information Note TIN042 2008

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 2010 (as amended) Reg 41	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.

Species	Legislation	Offences	Licensing procedures and guidance
Natterjack toad **Sand lizard** **Smooth snake** *European protected species*	Conservation of Habitats and Species Regulations 2010 (as amended) Reg 41	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)
	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 2010 (as amended); Reg.45	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 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,	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)

Species	Legislation	Offences	Licensing procedures and guidance
hybrid knotweed, giant knotweed, giant hogweed, rhododendron, Himalayan balsam			*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 2010 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.

Site Designation	Legislation	Protection	Guidance
Special Area of Conservation (SAC) **Special Protection Area (SPA)** **Wetland of International Importance (Ramsar site)**	Conservation of Habitats and Species Regulations 2010 (as amended) EC Directive on the conservation of natural 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).	Assessment of the implications of plans and projects is effected through Part 6 of the Conservation of Habitats and Species Regulations 2010 (in particular Regs 59 – 67). 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.	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. 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 Designation	Legislation	Protection	Guidance
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.
Local Sites (eg County Wildlife Sites, Sites of Nature Conservation Importance)	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.

Habitats & 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	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.

	principal importance as described above.	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).
Hedgerows	The Hedgerows Regulations 1997	Under the regulations, it is against the law to remove or destroy certain hedgerows without permission from the local planning authority in Wales. In general, permission will be required before removing hedges that are at least 20 metres in length, over 30 years old and contain certain species of plant. The local planning authority will assess the importance of the hedgerow using criteria set out in the regulations.

Breeding Bird Survey and Results

Methodology

The survey area included the four quadrants (as divided by the M25 and A3 roads) of land surrounding Junction 10 of the M25 (see Figure 8.1 for the survey area). Within each quadrant a survey transect was walked, followed existing footpaths, that allowed detailed coverage of the habitats within the survey area, passing within approximately 50m of any point. The two southernmost quadrants contain heathland and are part of the Thames Basin Heaths Special Protection Area. In addition, Bolder Mere Lake was included in the survey.

The survey methodology was based on an adaptation of the Common Bird Census methodology[1], combined with species-specific survey methods for the Thames Basin Heaths Special Protection Area qualifying bird species (nightjar, Dartford warbler, woodlark) as described in Gilbert *et al*. (1998)[2].

A total of five survey visits were carried out in 2016; in late April, mid-May, late May, mid-June and late June. Survey started at sunrise, in accordance with the Common Bird Census methodology. This is a reduction in survey effort from the original Common Bird Census methodology, which recommends 8-10 survey visits. Due to this site being surveyed during reasonable weather conditions and taking into account the openness of the survey area, five breeding bird survey visits, using the CBC mapping technique were considered appropriate to meet the purpose of the surveys. See limitations section below for further information.

From late May onwards the survey area was split into two sections, and each survey included a 1.5 hour pre-dawn and/or a post-dusk survey of one of the two heathland areas.

The survey methodology for woodlark recommends three morning survey visits: Visit 1 between 15th February and 21st March, Visit 2 between 22nd March and 25th April and Visit 3 between 26th April and 1st June. Due to the breeding bird surveys being commissioned and starting at the end of April, the full recommended survey season for woodlark was not covered. Woodlark-specific surveys will be carried out in 2017.

This survey effort was considered sufficient to record the suite of breeding birds within the survey area, and identify the approximate breeding density of species notable for their protected or conservation concern status. In addition, it met the full species-specific survey requirements for two of the Thames Basin Heaths Special Protection Area qualifying species: Dartford warbler (three visits: one from the beginning of April to mid-May, one between mid- and late May and one in June) and nightjar (at least two visits between June and mid-July, either at dusk, or about an hour before dawn).

All birds seen or heard were recorded on a map using British Trust for Ornithology two-letter codes, and symbols to record any breeding behaviours being displayed, such as singing, nest building, carrying food.

Survey maps were combined to produce a map showing the distribution of breeding territories for notable bird species (Schedule 1, BoCC or UK BAP) present within or in habitats adjacent

[1] *A survey method developed by the British Trust for Ornithology in order to allow the mapping of breeding bird territories*
[2] *Gilbert, G, Gibbons, D.W. and Evans, J. (1998) Bird Monitoring Methods. Sandy: RSPB.*

to the scheme (Figure 8.1). Registrations[3] of birds were judged to be 'breeding', 'probable breeding', 'possible breeding' or 'non-breeding' according to the following criteria:

Breeding

- Adults observed at nest; or
- Nest with eggs; or
- Unfledged young; or
- Carrying nest material, food or faecal sac; or
- Present in one location (within normal territory range) on at least two occasions and displaying behaviour indicative of breeding (such as singing) on at least one occasion.

Probable Breeding

- Present in suitable habitat in the same location (within normal territory range) on two or more occasions; or
- Displaying breeding behaviour on one occasion only.

Possible breeding

- Present in suitable habitat on one occasion only.

Non-breeding

- Present in non-suitable habitat for breeding; or
- Immature birds.

Limitations

Ecological surveys are limited by a variety of factors which affect the presence of flora and fauna such as season, climate, migration patterns and species behaviour. Even though evidence of protected species is not discovered during the survey, this does not mean that such a species is not present, or that it will not be present in the future.

The CBC, which began in 1962 and was designed as a long-term population monitoring scheme, allows the recording of bird territories through conspicuous singing and displaying during the breeding season. The CBC adopted ten survey visits as the standard approach, although to detect the presence of any one species all ten visits were rarely needed. The BTO have since recognised weaknesses of the CBC as a long-term population monitoring scheme largely due to the time-consuming nature of the fieldwork dictated by the ten survey visits and it has now been superseded by the Breeding Bird Survey (BBS). The BBS is a simpler survey method, involving two survey visits along a pre-determined transect[4]. However, the CBC mapping methodology remains the most accurate and practical way to determine the numbers and local distribution of breeding birds within a particular survey area.

Habitats within the areas being surveyed allowed a thorough coverage. This level of survey effort was considered suitable to generate enough encounters with birds to determine the approximate abundance of breeding bird species on site, and to minimise the risk of overlooking scarce and/or species of conservation concern.

There are factors such as weather, behaviour of certain species and density of habitat that could cause certain birds to be missed when conducting CBC surveys. However, due to this site being surveyed during reasonable weather conditions and taking into account the

[3] *The term refers to the recording of a sighting on a map (it is registered) and over successive visits to the site multiple registrations of the same species in the same general area (a cluster of registrations) is likely to indicate a territory.*

[4] *The BBS method allows population trends to be established from annually repeated surveys of transects. This method covers a transect route and does not provide a detailed plan of all species within a specific area.*

openness of the survey area, five breeding bird survey visits, using the CBC mapping technique were considered appropriate to meet the purpose of the surveys. It is considered unlikely that any breeding territories within the survey area have been missed. Therefore it is assumed that all breeding birds within the survey area have been recorded.

The surveys started on the 28th of April 2016, three days after the recommended survey window for the second (of three) woodlark species-specific survey visits. Although the surveys started part way through the woodlark breeding season, it is considered likely that any woodlarks within the survey area would have been recorded over the five visits. However, it is recommended that woodlark-specific surveys of the heathland habitat are carried out in 2017 in order to ensure that this species is surveyed for correctly.

Results

A total of 45 bird species were recorded within the survey area, of which 36 were thought to have bred within the survey area, based on breeding behaviour observed and/or habitats present.

Of the 45 species recorded, 12 are notable for their Schedule 1[5], Annex 1[6] and/or their Red or Amber List Bird of Conservation Concern (BoCC)[7] status. Breeding was confirmed for seven notable species (common tern, Dartford warbler, dunnock, mute swan, nightjar, song thrush and spotted flycatcher). In addition, mistle thrush and stock dove were thought to probably breed within the survey area. Refer to Table 1 for a list of notable species and their breeding status, and refer to Figure 8.1 for a map of confirmed and probable breeding territories of notable species.

Table 1 List of Notable Species

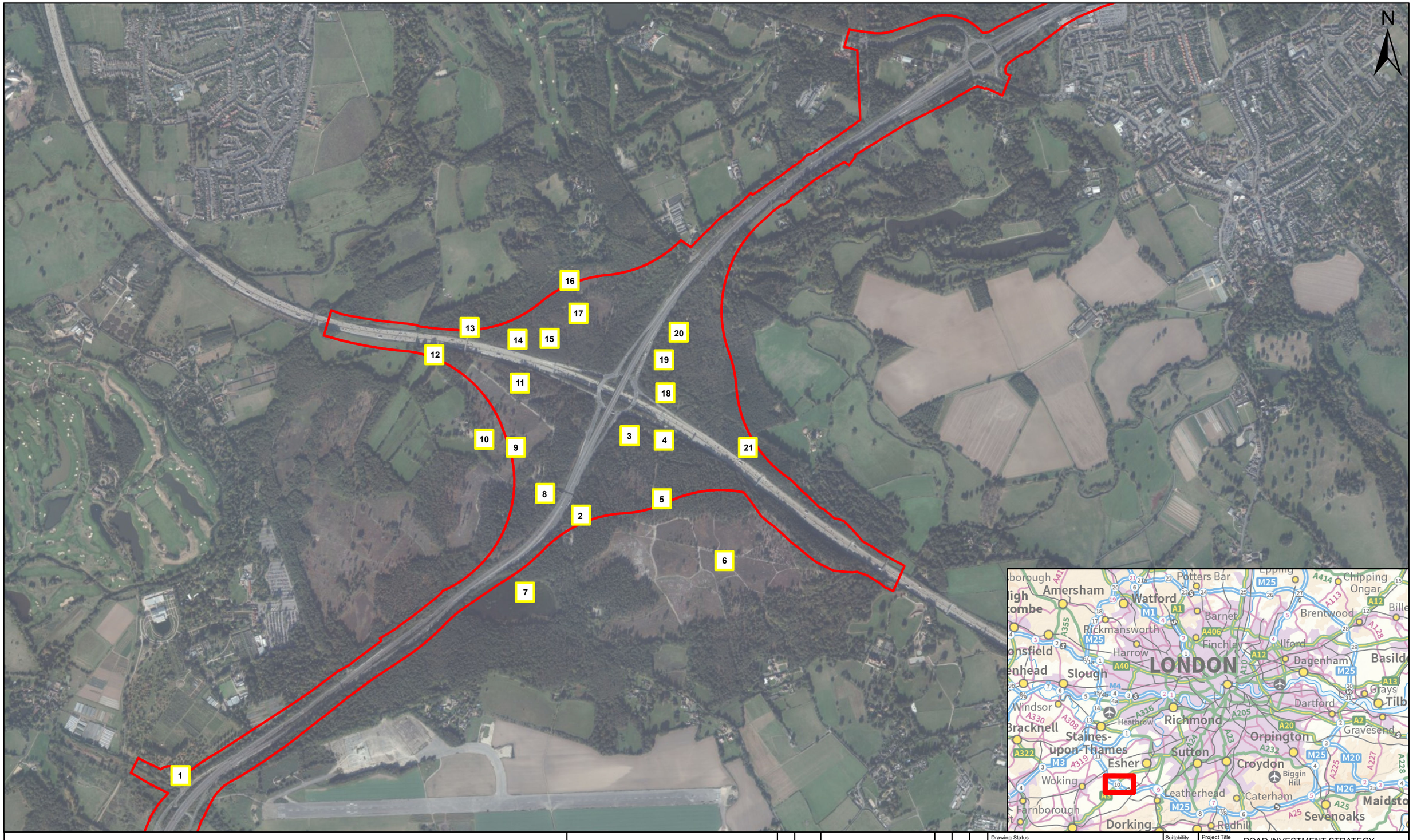
Species	Notable status	Breeding status within survey area
Dartford warbler	Schedule 1, Annex 1, Amber List BoCC	Two confirmed territories and three probable/possible territories
Hobby	Schedule 1	Recorded on one occasion. No evidence of breeding within the survey area, but may breed nearby
Nightjar	Annex 1, Amber List BoCC	Four confirmed territories and one probable/possible territory
Common tern	Annex 1, Amber List BoCC	One confirmed territory on Bolder Mere
Lesser redpoll	Red List BoCC	Recorded on one occasion. No evidence of breeding within the survey area
Song thrush	Red List BoCC	Four confirmed territories and four probable/possible territories
Spotted flycatcher	Red List BoCC	One confirmed territory and one probable territory
Mistle thrush	Red List BoCC	Two probable/possible territories
Dunnock	Amber List BoCC	One confirmed territory and one probable territory
Mallard	Amber List BoCC	No evidence of breeding, but may breed on Bolder Mere

[5]All wild birds are protected under the Wildlife and Countryside Act (WCA) 1981 (as amended), making it illegal to kill, injure or take any wild bird or take, damage or destroy a nest (whilst being built or in use) or their eggs. Birds listed on Schedule 1 of the Act have special protection against disturbing these birds at their nests, or their dependent young

[6]Birds species listed under Annex 1 of the Birds Directive 79/409/EEC are considered endangered or important migratory species in Europe. These species have been protected by the establishment of a coherent network of Special Protection Areas (SPAs), forming an integral part of the NATURA 2000 ecological network, and comprising all the most suitable habitats to ensure the survival and reproduction of these species in their area of distribution.

[7] The UK's leading bird conservation organisations have worked together on the latest review of the status of the birds that occur regularly in the UK. Bird species have been assessed against a set of objective criteria to place each on one of three lists – green, amber and red – indicating an increasing level of conservation concern.

Species	Notable status	Breeding status within survey area
Mute swan	Amber List BoCC	One confirmed territory on Bolder Mere
Stock dove	Amber List BoCC	Two probable/possible territories



Scheme Area Boundary

Ecology Target Note

Note: The aerial imagery used in this figure contains data from the following Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

CLIENT NAME: Highways England

LICENCE NUMBER: 100018928

Metres

0 50 100 200 300 400 500

Rev.	Date	Description	By	Chk'd	App'd
P01	05/08/16	ISSUED FOR REVIEW AND COMMENT	PO	SW	NW

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ATKINS
Epsom Gateway
Ashley Avenue
Epsom
Surrey
KT18 5AL

Tel: +44 (0) 1372 726140
Fax: +44 (0) 1372 740055

www.atkinsglobal.com

Client: highways england

Project Title: ROAD INVESTMENT STRATEGY
M25 Junction 10

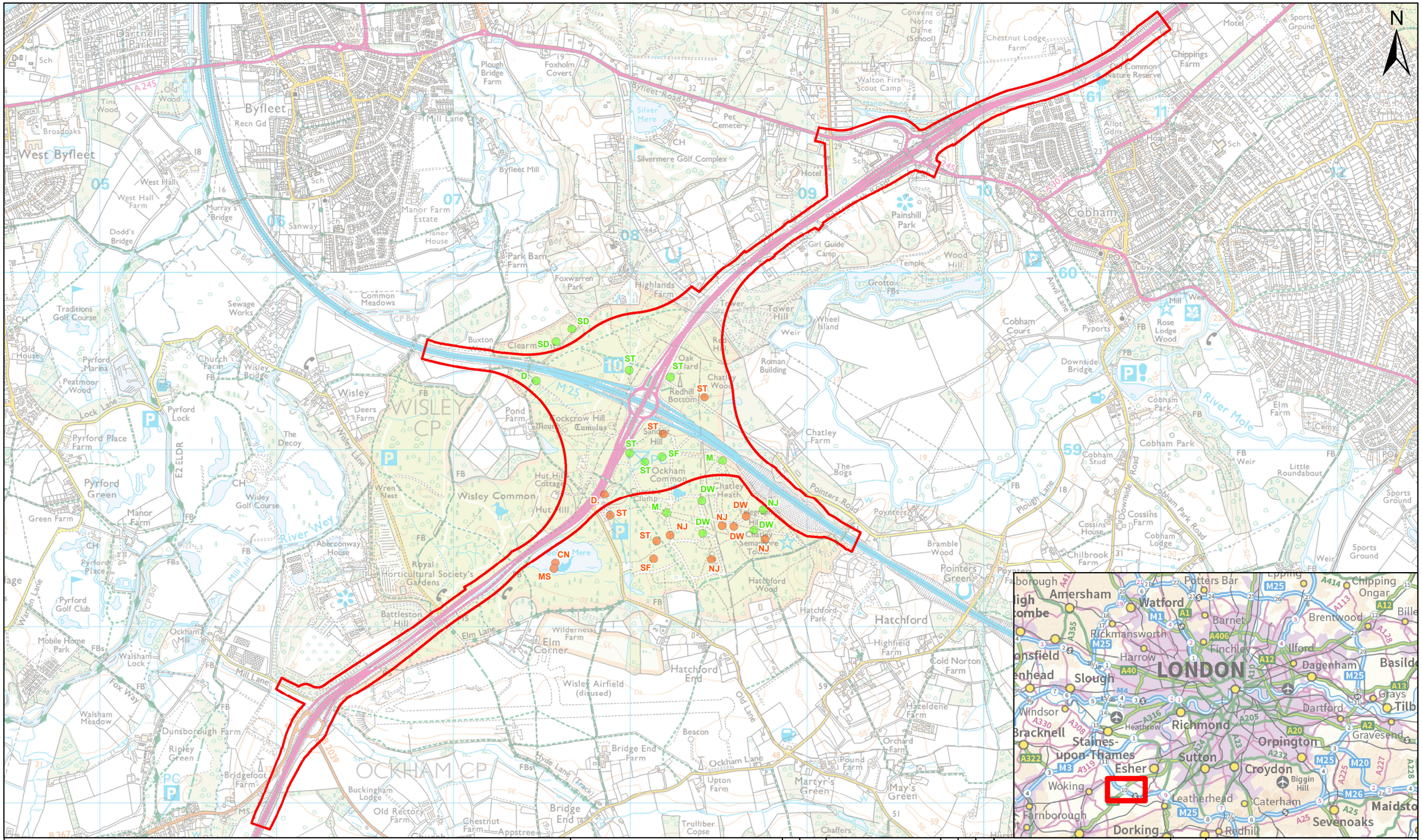
Drawing Title: FIGURE NO 8.1
ECOLOGICAL TARGET NOTES

Scale	Designed	Drawn	Checked	Authorised
1:15 000	PO	PO	SW	NW
Original Size	**Date**	**Date**	**Date**	**Date**
A3	05/08/16	05/08/16	05/08/16	05/08/16

Drawing Number
Project | Originator | Volume | Location | Type | Role | Number

Project Ref. No.: 5145620

Revision: P01



🟥 Scheme Area Boundary
🟢 Probable Breeding Territory
🟠 Confirmed Breeding Territory

SPECIES CODE:
CN - Common Tern
D. - Dunnock
DW - Dartford Warbler
M. - Mistle Thrush
MS - Mute Swan
NJ - Nightjar
SD - Stock Dove
SF - Spotted Flycatcher
ST - Song Thrush

CLIENT NAME: Highways England

LICENCE NUMBER: 100018928

Metres
0 100 200 400 600 800 1,000

Rev.	Date	Description	By	Chk'd	App'd
P01	03/08/16	ISSUED FOR REVIEW AND COMMENT	PO	SW	NW

Drawing Status: REVIEW AND COMMENT
Suitability: S3

Project Title: ROAD INVESTMENT STRATEGY
M25 Junction 10

ATKINS

Epsom Gateway,
Ashley Avenue,
Epsom,
Surrey
KT18 5AL

Tel: +44 (0) 1372 726140
Fax: +44 (0) 1372 740055
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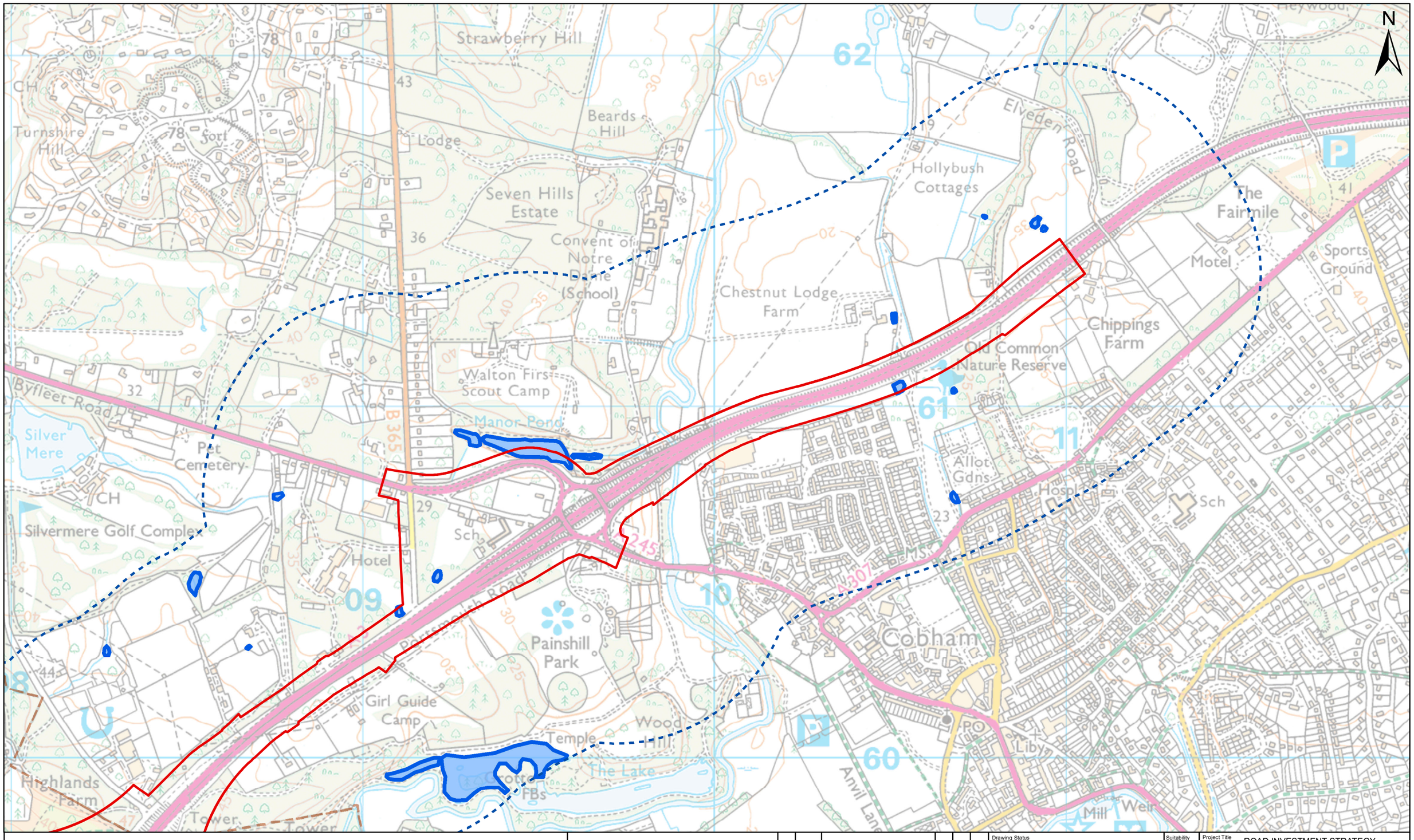
Drawing Title: FIGURE 8.1
NOTABLE BREEDING
BIRD TERRITORY MAP

Scale	Designed	Drawn	Checked	Authorised
1:20 000	PO	PO	SW	NW

Original Size	Date	Date	Date	Date
A3	03/08/16	03/08/16	03/08/16	03/08/16

Drawing Number: Project | Originator | Volume | Location | Type | Role | Number
Project Ref. No.: 5145620
Revision: P01



- Waterbodies
- 2016 eDNA Survey
- Scheme Area Boundary
- 500m Buffer
- Local Authority Boundary

Metres

0 50 100 200 300 400 500

Rev.	Date	Description	By	Chk'd	App'd
P01	20/10/16	ISSUED FOR REVIEW AND COMMENT	HC	JVR	SG

Drawing Status: REVIEW AND COMMENT

Suitability: S3

ATKINS
Elizabeth House
28 Baddow Road
Chelmsford
Essex
CM2 0DG

Tel: +44 (0) 1245 245245
Fax: +44 (0) 1245 345010

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Project Title: ROAD INVESTMENT STRATEGY
M25 Junction 10

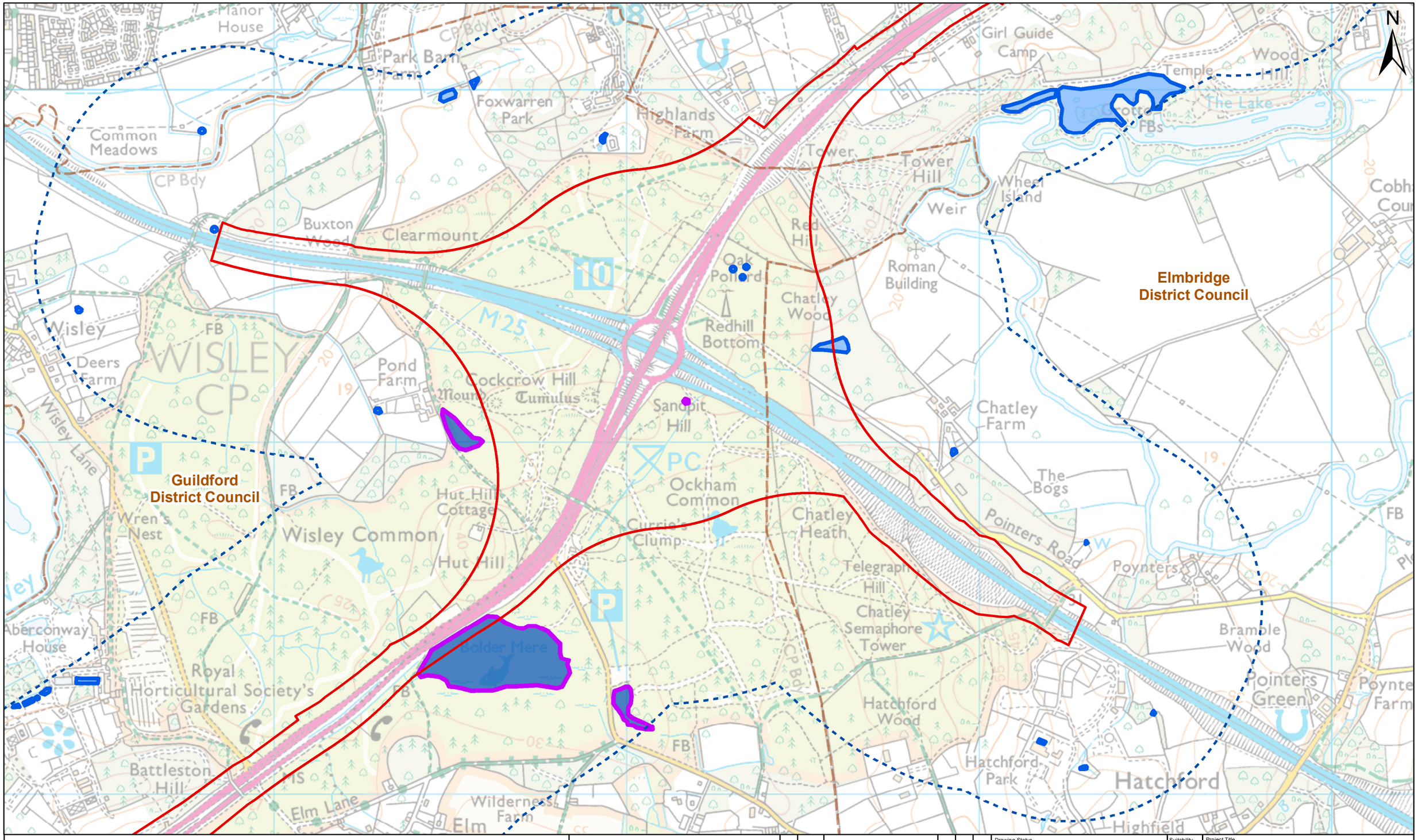
Drawing Title: WATERBODIES
Page 1 of 3

Scale	Designed	Drawn	Checked	Authorised
1:25 000	HC	HC	JVR	SG
Original Size	**Date**	**Date**	**Date**	**Date**
A3	20/10/16	20/10/16	20/10/16	20/10/16

Drawing Number: Project | Originator | Volume | Location | Type | Role | Number

Project Ref. No.: 5145620

Revision: P01



- Waterbodies
- 2016 eDNA Survey
- Scheme Area Boundary
- 500m Buffer
- Local Authority Boundary

Metres

0 50 100 200 300 400 500

Rev.	Date	Description	By	Chk'd	App'd
P01	20/10/16	ISSUED FOR REVIEW AND COMMENT	HC	JVR	SG

Drawing Status: REVIEW AND COMMENT

Suitability: S3

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Elizabeth House
28 Baddow Road
Chelmsford
Essex
CM2 0DG
Tel: +44 (0) 1245 245245
Fax: +44 (0) 1245 345010
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Project Title: ROAD INVESTMENT STRATEGY
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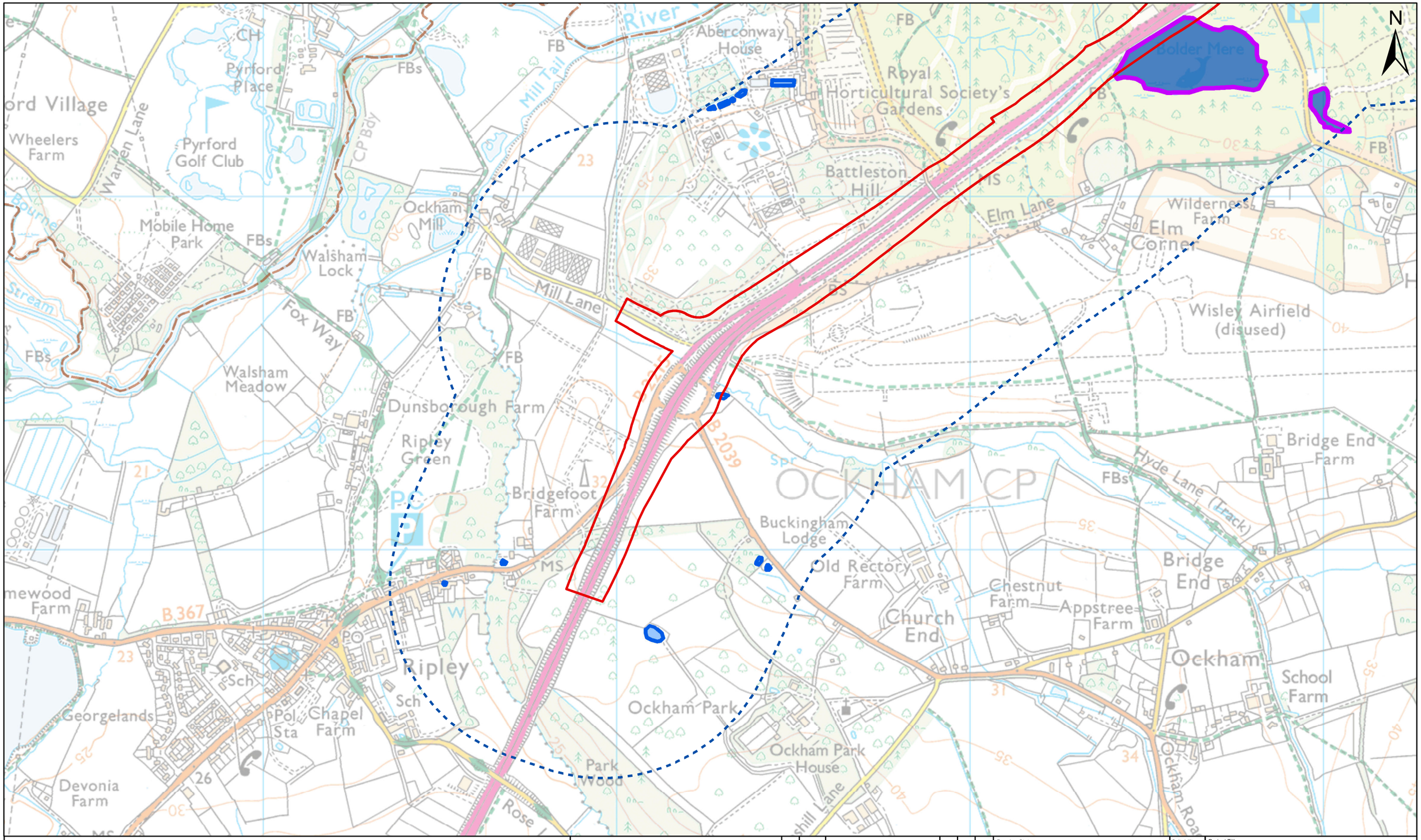
Drawing Title: WATERBODIES
Page 2 of 3

Scale	Designed	Drawn	Checked	Authorised
1:25 000	HC	HC	JVR	SG
Original Size: A3	Date: 20/10/16	Date: 20/10/16	Date: 20/10/16	Date: 20/10/16

Drawing Number: Project | Originator | Volume | Location | Type | Role | Number

Project Ref. No.: 5145620

Revision: P01



- Waterbodies
- 2016 eDNA Survey
- Scheme Area Boundary
- 500m Buffer
- Local Authority Boundary

CLIENT NAME: Highways England

LICENCE NUMBER: 100018928

Metres

0 50 100 200 300 400 500

Rev.	Date	Description	By	Chk'd	App'd
P01	20/10/16	ISSUED FOR REVIEW AND COMMENT	HC	JVR	SG

Drawing Status: REVIEW AND COMMENT

Suitability: S3

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Elizabeth House
28 Baddow Road
Chelmsford
Essex
CM2 0DG
Tel: +44 (0) 1245 245245
Fax: +44 (0) 1245 345010
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Project Title: ROAD INVESTMENT STRATEGY
M25 Junction 10

Drawing Title: WATERBODIES
Page 3 of 3

Scale	Designed	Drawn	Checked	Authorised
1:25 000	HC	HC	JVR	SG

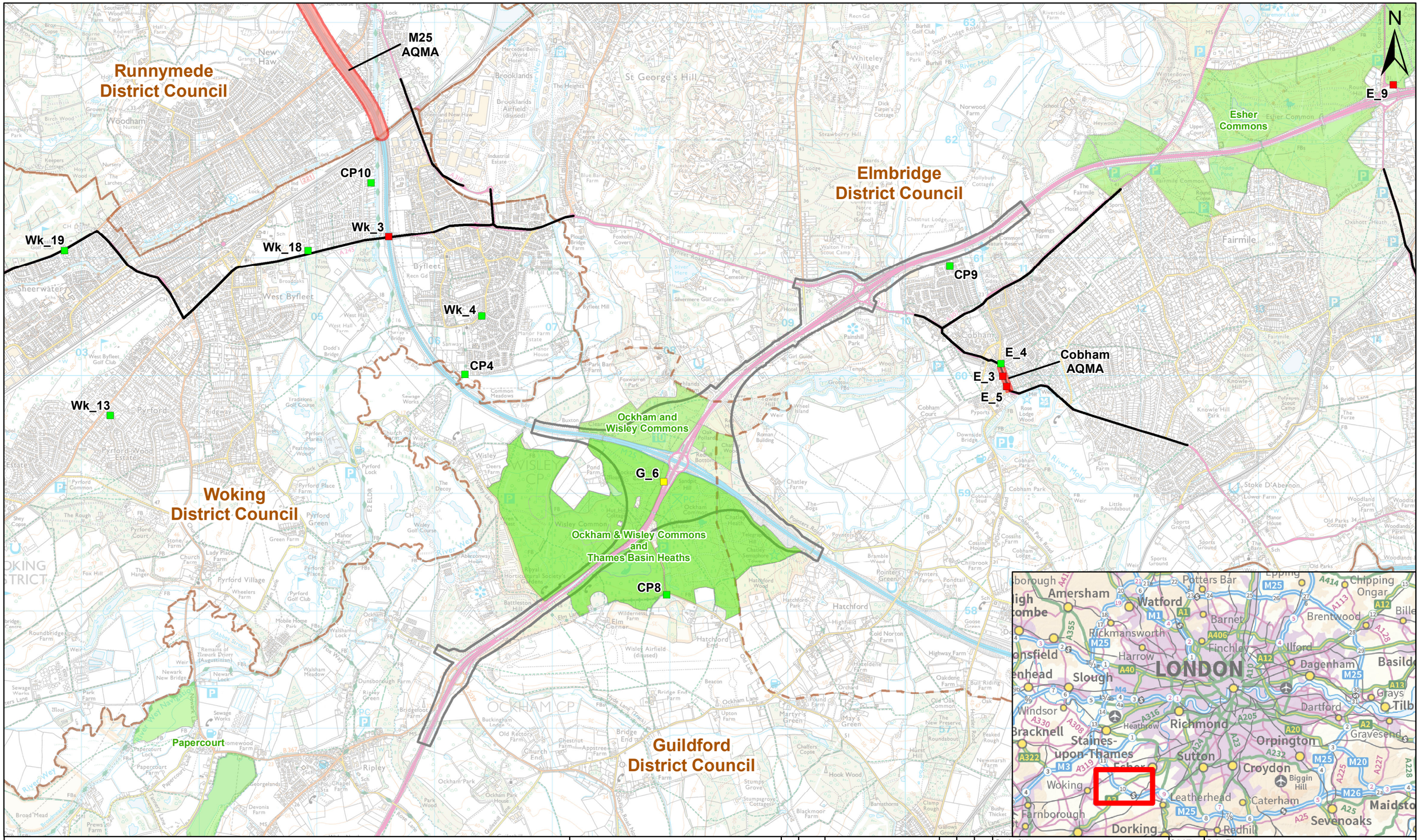
Original Size	Date	Date	Date	Date
A3	20/10/16	20/10/16	20/10/16	20/10/16

Drawing Number: Project | Originator | Volume | Location | Type | Role | Number

Project Ref. No.: 5145620

Revision: P01

Appendix G: Air Quality



Scheme Area Boundary
Local Authority Boundary
Ecological Designated Sites
AQMA

DEFRA PCM Roadside NO_2 Concentrations (2014)
- < 40 µg/m^3

Diffusion Tube Monitoring Sites
Annual Mean NO_2 Concentration (2014)
- No data
- < 36 µg/ m^3
- 36 to 40 µg/ m^3
- > 40 µg/ m^3

CLIENT NAME: Highways England

LICENCE NUMBER: 100018928

Metres
0 150 300 600 900 1,200 1,500

Rev.	Date	Description	By	Chk'd	App'd
P01	30/08/16	ISSUED FOR REVIEW AND COMMENT	JVR	SW	NW

Drawing Status: REVIEW AND COMMENT
Suitability: S3

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Elizabeth House
28 Baddow Road
Chelmsford
Essex
CM2 0DG
Tel: +44 (0) 1245 245245
Fax: +44 (0) 1245 345010
www.atkinsglobal.com

Client: highways england

Project Title: ROAD INVESTMENT STRATEGY
M25 Junction 10

Drawing Title:
FIGURE 9.1
AIR QUALITY CONSTRAINTS

Scale	Designed	Drawn	Checked	Authorised
1:25 000	JVR	JVR	SW	NW
Original Size	Date	Date	Date	Date
A3	30/08/16	30/08/16	30/08/16	30/08/16

Drawing Number: Project | Originator | Volume | Location | Type | Role | Number
Project Ref. No.: 5145620
Revision: P01

Appendix H: Water Environment

Redhill Bottom

The River Mole - Horley to Hersham (WFD ID GB106039017621)

Esher Commons SSSI

Ockham and Wisley Commons SSSI and Thames Basin Heath SPA

River Wey - Shalford to River Thames confluence at Weybridge (WFD ID GB106039017630)

The Wey Navigation - Pyrford reach (WFD ID GB106039017910)

Sandpit Hill

Boldermere Lake (WFD ID GB30643218)

Guileshill Brook (WFD ID GB106039017880)

East Clandon Stream (WFD ID GB106039017860)

Stratford Brook (WFD ID GB106039017890)

- Scheme Area Boundary
- 1km Study Area Boundary
- WFD River Waterbodies Cycle 2
- Flood Zone 2
- Flood Zone 3

CLIENT NAME: Highways England

LICENCE NUMBER: 100018928

Metres

0 100 200 400 600 800 1,000

Rev.	Date	Description	By	Chk'd	App'd
P01	03/08/16	ISSUED FOR INFORMATION	KB	SW	NW

Drawing Status: REVIEW AND COMMENT

Suitability: S3

Project Title: ROAD INVESTMENT STRATEGY M25 Junction 10

Drawing Title: FIGURE 11.2 WATER ENVIRONMENT

ATKINS
Epsom Gateway
Ashley Avenue
Epsom
Surrey
KT18 5AL
Tel: +44 (0) 1372 726140
Fax: +44 (0) 1372 740055
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1:25 000	JVR	KB	SW	NW
Original Size	Date	Date	Date	Date
A3	03/08/16	03/08/16	03/08/16	03/08/16

Drawing Number: Project | Originator | Volume | Location | Type | Role | Number

Project Ref. No.: 5145620

Revision: P01

Appendix I: Envirocheck Report

Appendix J: Geology and Soils

KEY

- J10 Improvement - Option 14 (See Note 3)
- J10 Improvement - Option 16 (See Note 3)
- J10 Improvement - Option 9 (See Note 3)
- A3 widening - All options (See Note 3)
- Historic landfill site (See Note 5)

Artificial geology (See Note 4)

- Landscaped Ground
- Made Ground
- Worked Ground
- Infilled Ground

Superficial geology (See Note 4)

- Alluvium (ALV)
- Head (HEAD)
- River Terrace Deposits (Undifferentiated) (RTDU)
- Kempton Park Gravel Member (KPGR)
- Boyn Hill Gravel Member (BHT)
- Taplow Gravel Member (TPGR)
- Lynch Hill Gravel Member (LHGR)

Bedrock geology (See Note 4)

- Bagshot Formation (BGS)
- Claygate Member (CLGB)
- London Clay Formation (LC)

Norwood Farm
Cobham Bridge
Silvermere Pet Cemetery
Land at East of Buxton Wood
Land at Pond Farm
Chatley Farm
Pointers Farm
Old Rectory Farm
Dunsborough Farm

NOTES

1. Coordinates in Ordnance Survey Great Britain 1936 (OSGB36) (Ordnance Survey National Grid / British National Grid).
2. OS VectorMap District (Raster) and OS Miniscale R18 data at scale 1:25,000. OS DATA under the PMSA (Public Sector Mapping Agreement) © Crown copyright and database right 2016 Ordnance Survey 100018595.
3. Option extents based on CAD drawings provided by Atkins Geospatial Team on 07 July 2016. Option extents are subject to change for indicative purposes only. A3 widening is currently proposed for all options, although the exact layout of A3 widening has not yet been finalised for Option 9 and Option 14. The A3 widening depicted here is as is currently proposed for Option 16.
4. BGS geology data presented as a buffer of the proposed scheme extent from Envirocheck® Report, purchased from Landmark on 21 July 2016 © Landmark Information Group 2016. Some of the superficial geology data has been edited by Atkins to reflect the information presented on the BGS maps, as referenced in the Environmental Studies Report (See Note 6)
5. Historic landfill sites digisted from Environment Agency's 'What's In Your Backyard' website accessed on 29 July 2016.
6. This drawing is to be read in conjunction with section 12 of the Environmental Studies Report, reference HE551522-ATK-EGN-1-RP-EN-001.

CLIENT NAME: Highways England

LICENCE NUMBER: 100018928

Metres
0 100 200 400 600 800 1,000

Rev.	Date	Description	By	Chk'd	App'd
P01	05/08/16	ISSUED FOR REVIEW AND COMMENT	KB	JG	XX

Drawing Status: REVIEW AND COMMENT
Suitability: S3

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Epsom Gateway
Ashley Avenue
Epsom
Surrey
KT18 5AL
Tel: +44 (0) 1372 726140
Fax: +44 (0) 1372 740055
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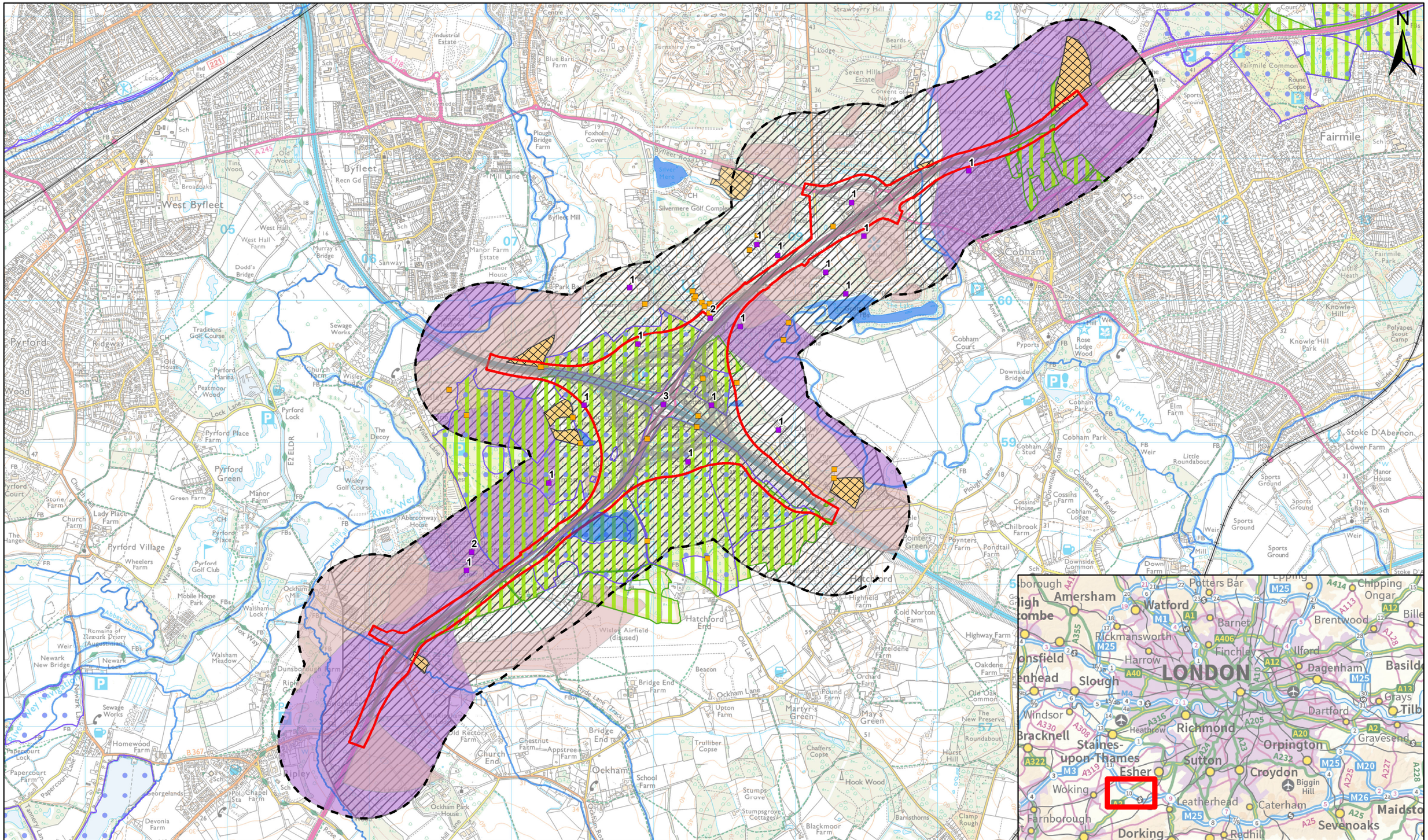
Project Title: ROAD INVESTMENT STRATEGY
M25 Junction 10

Drawing Title: FIGURE 12.1
GEOLOGICAL MAP
AND SCEME OPTIONS

Scale	Designed	Drawn	Checked	Authorised
1:15 000	KB	KB	JG	XX
Original Size	Date	Date	Date	Date
A3	05/08/16	05/08/16	05/08/16	XX

Drawing Number: HE551522-ATK-EGN-1-RP-EN-001
Project | Originator | Volume | Location | Type | Role | Number
Project Ref. No.: 5145622
Revision: P01



General

- Scheme Area Boundary
- 500m Study Area Boundary
- Alignment Options
- Sites of Special Scientific Interest (SSSI)
- Local Nature Reserve (LNR)

Sources

- Other Potentially Contaminative Activities and Incidents
- Landfill
- Railway

Receptors

- 1 Human health: Residents/Scout and Guide Campsite Users/Common Users etc
- 2 Human health: Nearby workers
- 3 Future Site Workers
- Secondary 'A' Aquifer (Superficial)
- Principal Aquifer (Superficial)
- Secondary 'A' Aquifer (Bedrock)
- Surface Water Courses
- Surface Water Bodies

Note:
Superficial Aquifer extent (Secondary 'A') is applied within the 500m area boundary only and is supplied by Envirocheck and based on British Geological Society 1:625,000 geological map and is indicative only.
Superficial Principal Aquifer and Bedrock Secondary 'A' Aquifer is applied within the 500m area boundary only based on British Geological Society 1:625,000 geological maps and is indicative only.

CLIENT NAME: Highways England

LICENCE NUMBER: 100018928

Metres
0 100 200 400 600 800 1,000

Rev.	Date	Description	By	Chk'd	App'd
P01	12/08/16	ISSUED FOR REVIEW AND COMMENT	JVR	SW	NW

Drawing Status: REVIEW AND COMMENT
Suitability: S3

Project Title: ROAD INVESTMENT STRATEGY
M25 Junction 10

Drawing Title: FIGURE 12.2
GEOLOGY AND SOILS, SOURCES AND RECEPTORS OF POTENTIAL LAND CONTAMINATION

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Epsom Gateway
Ashley Avenue
Epsom
Surrey
KT18 5AL
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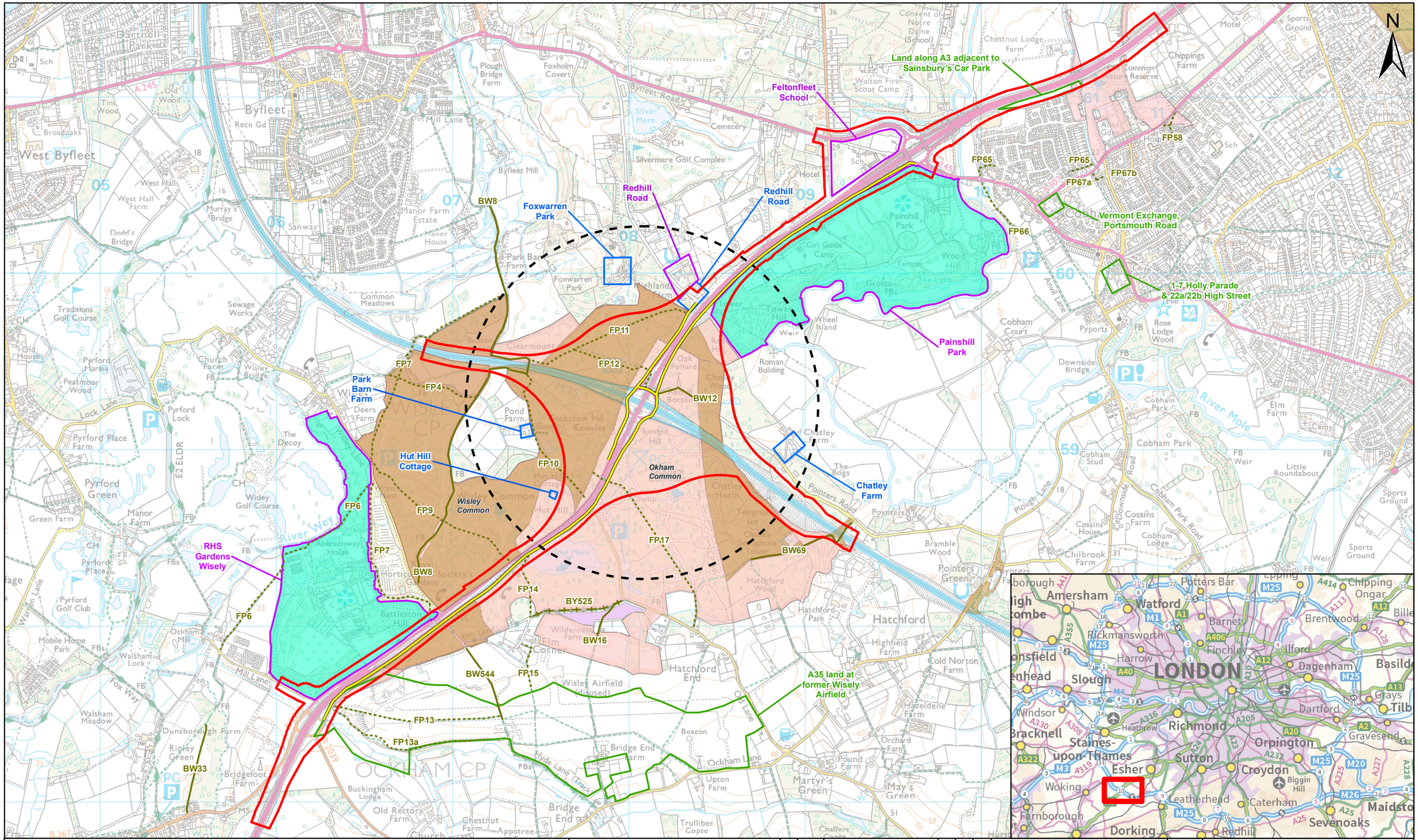
1:25 000	JVR	FM	SW	NW
Original Size A3	Date 12/08/16	Date 12/08/16	Date 12/08/16	Date 12/08/16

Drawing Number
Project | Originator | Volume | Location | Type | Role | Number
Project Ref. No. 5145620
Revision P01

Appendix K: People and Communities



- Scheme Area Boundary
- 1km Search Radius

Receptors

- Residential
- Community
- Development Land
- Access Land
- Common Land

- Land with Apparent Public Access
- Parks & Gardens
- A3 Portsmouth Road Cycleways + Footpath

Pathways

- Bridleway (BW)
- Byway (BY)
- Footpath (FP)

CLIENT NAME: Highways England

LICENCE NUMBER: 100018928

Metres

0 100 200 400 600 800 1,000

Rev.	Date	Description	By	Chk'd	App'd
P01	17/08/16	ISSUED FOR REVIEW AND COMMENT	FM	SW	NW

Drawing Status: REVIEW AND COMMENT

Suitability: S3

Project Title: ROAD INVESTMENT STRATEGY
M25 Junction 10

Drawing Title: FIGURE 14.1
PEOPLE AND COMMUNITIES

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Epsom Gateway,
Ashley Avenue,
Epsom,
Surrey
KT18 5AL
Tel: +44 (0) 1372 726140
Fax: +44 (0) 1372 740055
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Client: highways england

Scale	Designed	Drawn	Checked	Authorised
1:20 000	FM	FM	SW	NW
Original Size	Date	Date	Date	Date
A3	17/08/16	17/08/16	17/08/16	17/08/16

Drawing Number: Project | Originator | Volume | Location | Type | Role | Number

Project Ref. No.: 5145620

Revision: P01

Appendix K: People and Communities Construction Phase Assessment Table

Potential Effect	Option 9	Option 14	Option 16
Non-Motorised Users: PRoW Footpaths	**Users of shared A3 Portsmouth Road cycleway & footpath Moderate Adverse – significant**	**Users of shared A3 Portsmouth Road cycleway & footpath Moderate Adverse – significant**	**Users of shared A3 Portsmouth Road cycleway & footpath Moderate Adverse – significant**
	Users of FP58 No impact	**Users of FP58 No impact**	**Users of FP58 No impact**
	Users of FP67a No impact	**Users of FP67a No impact**	**Users of FP67a No impact**
	Users of FP66 No impact	**Users of FP66 No impact**	**Users of FP66 No impact**
	Users of FP65 No impact	**Users of FP65 No impact**	**Users of FP65 No impact**
	Users of BW69 No impact	**Users of BW69 No impact**	**Users of BW69 No impact**
	Users of FP17 Negligible – not significant	**Users of FP17 Negligible – not significant**	**Users of FP17 Negligible – not significant**
	Users of BW16 No impact	**Users of BW16 No impact**	**Users of BW16 No impact**
	Users of BW12 No impact	**Users of BW12 No impact**	**Users of BW12 No impact**
	Users of FP12 No impact	**Users of FP12 No impact**	**Users of FP12 No impact**
	Users of FP11 No impact	**Users of FP11 No impact**	**Users of FP11 No impact**
	Users of FP14 No impact	**Users of FP14 No impact**	**Users of FP14 No impact**
	Users of FP10 Negligible – not significant	**Users of FP10 Negligible – not significant**	**Users of FP10 Negligible – not significant**
	Users of BW544 None	**Users of BW544 None**	**Users of BW544 None**
	Users of FP13/13a None	**Users of FP13/13a None**	**Users of FP13/13a None**
	Users of BW8 None	**Users of BW8 None**	**Users of BW8 None**
	Users of FP9 None	**Users of FP9 None**	**Users of FP9 None**
	Users of FP7 Minor Adverse – not significant	**Users of FP7 Minor Adverse – not significant**	**Users of FP7 Minor Adverse – not significant**
Community Land	**Wisley and Ockham Common Land**	**Wisley and Ockham Common Land**	**Wisley and Ockham Common Land**

	Major Adverse – significant	**Major Adverse – significant**	**Major Adverse – significant**
Residential Properties	**Chatley Park, Park Barn Farm and Hut Hill Cottage** **Moderate Adverse - significant**	**Residential properties** **Minor Adverse – not significant**	**Residential properties** **Moderate Adverse – significant**
Private Land Required for Land Take	N/A	N/A	N/A

Appendix K: People and Communities Operational Phase Assessment

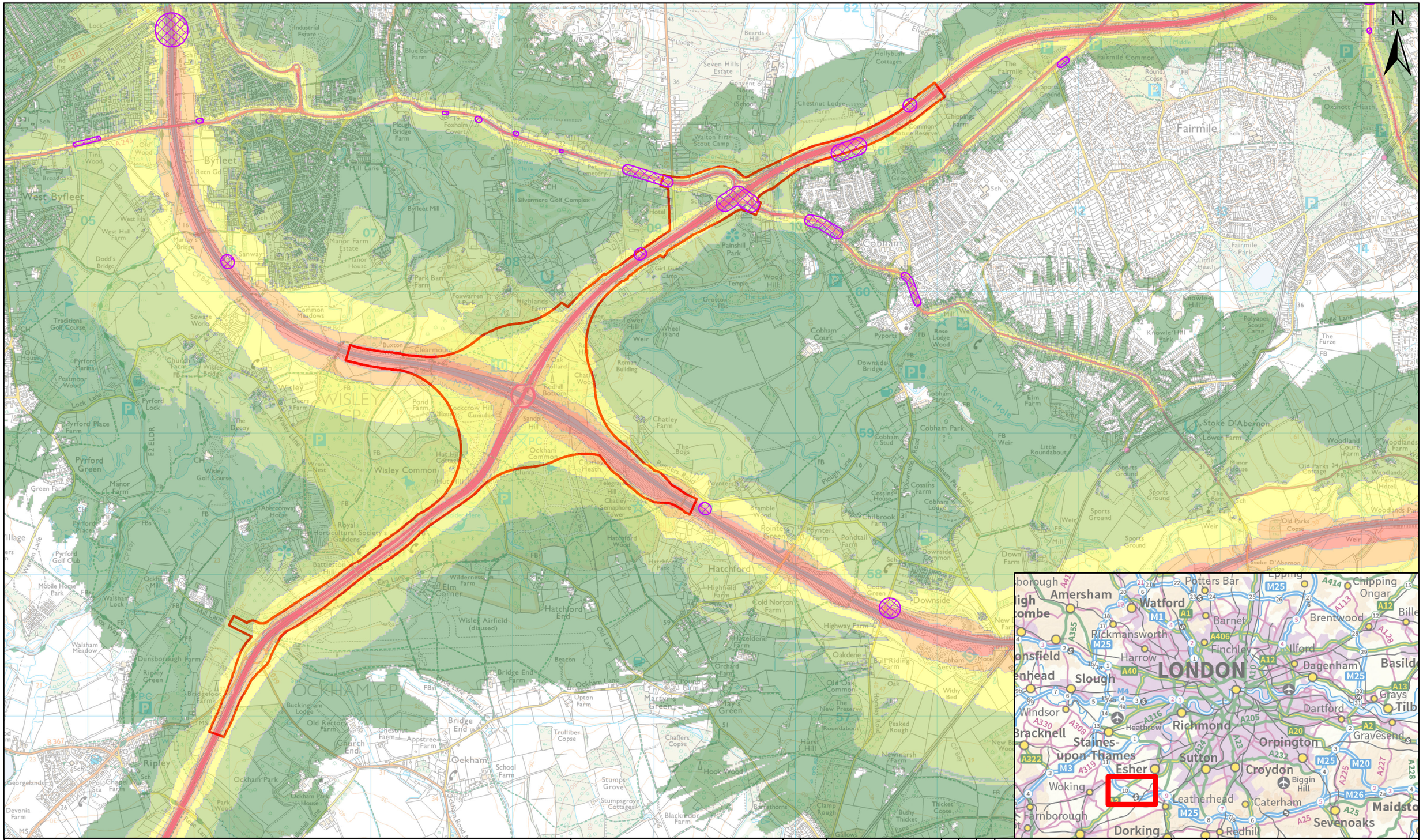
Potential Effect	**Option 9**	**Option 14**	**Option 16**
Non-Motorised Users: PRoW Footpaths	**Users of shared A3 Portsmouth Road cycleway & footpath** **Minor Beneficial – not significant**	**Users of shared A3 Portsmouth Road cycleway & footpath** **Minor Beneficial – not significant**	**Users of shared A3 Portsmouth Road cycleway & footpath** **Minor Beneficial – not significant**
	Users of FP58 **No impact**	**Users of FP58** **No impact**	**Users of FP58** **No impact**
	Users of FP67a **No impact**	**Users of FP67a** **No impact**	**Users of FP67a** **No impact**
	Users of FP66 **No impact**	**Users of FP66** **No impact**	**Users of FP66** **No impact**
	Users of FP65 **No impact**	**Users of FP65** **No impact**	**Users of FP65** **No impact**
	Users of BW69 **No impact**	**Users of BW69** **No impact**	**Users of BW69** **No impact**
	Users of FP17 **Negligible – not significant**	**Users of FP17** **Negligible – not significant**	**Users of FP17** **Minor Beneficial – not significant**
	Users of BW16 **No impact**	**Users of BW16** **No impact**	**Users of BW16** **No impact**
	Users of BW12 **No impact**	**Users of BW12** **Minor Beneficial - not significant**	**Users of BW12** **Minor Beneficial - not significant**
	Users of FP12 **No impact**	**Users of FP12** **Minor Beneficial - not significant**	**Users of FP12** **Minor Beneficial - not significant**
	Users of FP11 **No impact**	**Users of FP11** **No impact**	**Users of FP11** **No impact**
	Users of FP14 **No impact**	**Users of FP14** **No impact**	**Users of FP14** **No impact**
	Users of FP10 **Negligible – not significant**	**Users of FP10** **Negligible – not significant**	**Users of FP10** **Negligible – not significant**
	Users of BW544 **None**	**Users of BW544** **None**	**Users of BW544** **None**

	Users of FP13/13a **None**	**Users of FP13/13a** **None**	**Users of FP13/13a** **None**
	Users of BW8 **None**	**Users of BW8** **None**	**Users of BW8** **None**
	Users of FP9 **None**	**Users of FP9** **None**	**Users of FP9** **None**
	Users of FP7 **Minor Beneficial - Not significant**	**Users of FP7** **Minor Beneficial - not significant**	**Users of FP7** **Minor Beneficial - not significant**
Community Land	**Wisley and Ockham Common Land** **Major Adverse – significant**	**Wisley and Ockham Common Land** **Major Adverse – significant**	**Wisley and Ockham Common Land** **Major Adverse – significant**
Residential Properties	**Chatley Park, Park Barn Farm and Hut Hill Cottage** **Minor Adverse - Not significant**	**Residential properties** **Negligible – not significant**	**Residential properties** **Moderate Adverse – significant**
Private Land Required for Land Take	N/A	N/A	N/A

Significance of Impact Magnitude of Receptors

Significance		Impact Magnitude			
		High Impact	Medium Impact	Low Impact	Negligible Impact
Sensitivity of receptor	High	**Major**	**Major**	**Moderate**	Minor
	Medium	**Major**	**Moderate**	Minor	Minor
	Low	**Moderate**	Minor	Negligible	Negligible

Appendix L: Noise



Scheme Area Boundary

Noise Important Areas

Daytime Noise Bands, LAeq,16h dB

- 55.0-59.9
- 60.0-64.9
- 65.0-69.9
- 70.0-74.9
- >=75.0

Metres

0 100 200 400 600 800 1,000

Rev.	Date	Description	By	Chk'd	App'd
P01	03/08/16	ISSUED FOR REVIEW AND COMMENT	FM	SW	NW

Drawing Status: REVIEW AND COMMENT

Suitability: S3

Project Title: ROAD INVESTMENT STRATEGY
M25 Junction 10

Drawing Title: FIGURE 10.1
NOISE IMPORTANT AREAS

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Epsom Gateway
Ashley Avenue
Epsom
Surrey
KT18 5AL
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Fax: +44 (0) 1372 740055
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Client: highways england

Scale	Designed	Drawn	Checked	Authorised
1:25 000	JVR	FM	SW	NW
Original Size	Date	Date	Date	Date
A3	03/08/16	03/08/16	03/08/16	03/08/16

Drawing Number: Project | Originator | Volume | Location | Type | Role | Number

Project Ref. No.: 5145620

Revision: P01

Scheme Area Boundary

Noise Important Areas

Night Noise Bands, Lnight, dB

- 55.0-59.9
- 60.0-64.9
- 65.0-69.9
- 70.0-74.9
- >=75.0

Meters

0 100 200 400 600 800 1,000

Rev.	Date	Description	By	Chk'd	App'd
P02	20/10/16	ISSUED FOR REVIEW AND COMMENT	JVR	SW	NW
P01	03/8/16	ISSUED FOR REVIEW AND COMMENT	FM	SW	NW

Drawing Status: REVIEW AND COMMENT

Suitability: S3

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Epsom Gateway
Ashley Avenue
Epsom
Surrey
KT18 5AL

Tel: +44 (0) 1372 726140
Fax: +44 (0) 1372 740055

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Client: highways england

Project Title: ROAD INVESTMENT STRATEGY
M25 Junction 10

Drawing Title:

FIGURE 10.2
NOISE IMPORTANT AREAS

Scale	Designed	Drawn	Checked	Authorised
1:25 000	JVR	FM	SW	NW
Original Size	**Date**	**Date**	**Date**	**Date**
A3	20/10/16	20/10/16	20/10/16	20/10/16

Drawing Number: Project | Originator | Volume | Location | Type | Role | Number

Project Ref. No.: 5145620

Revision: P02

highways england
driving forward

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