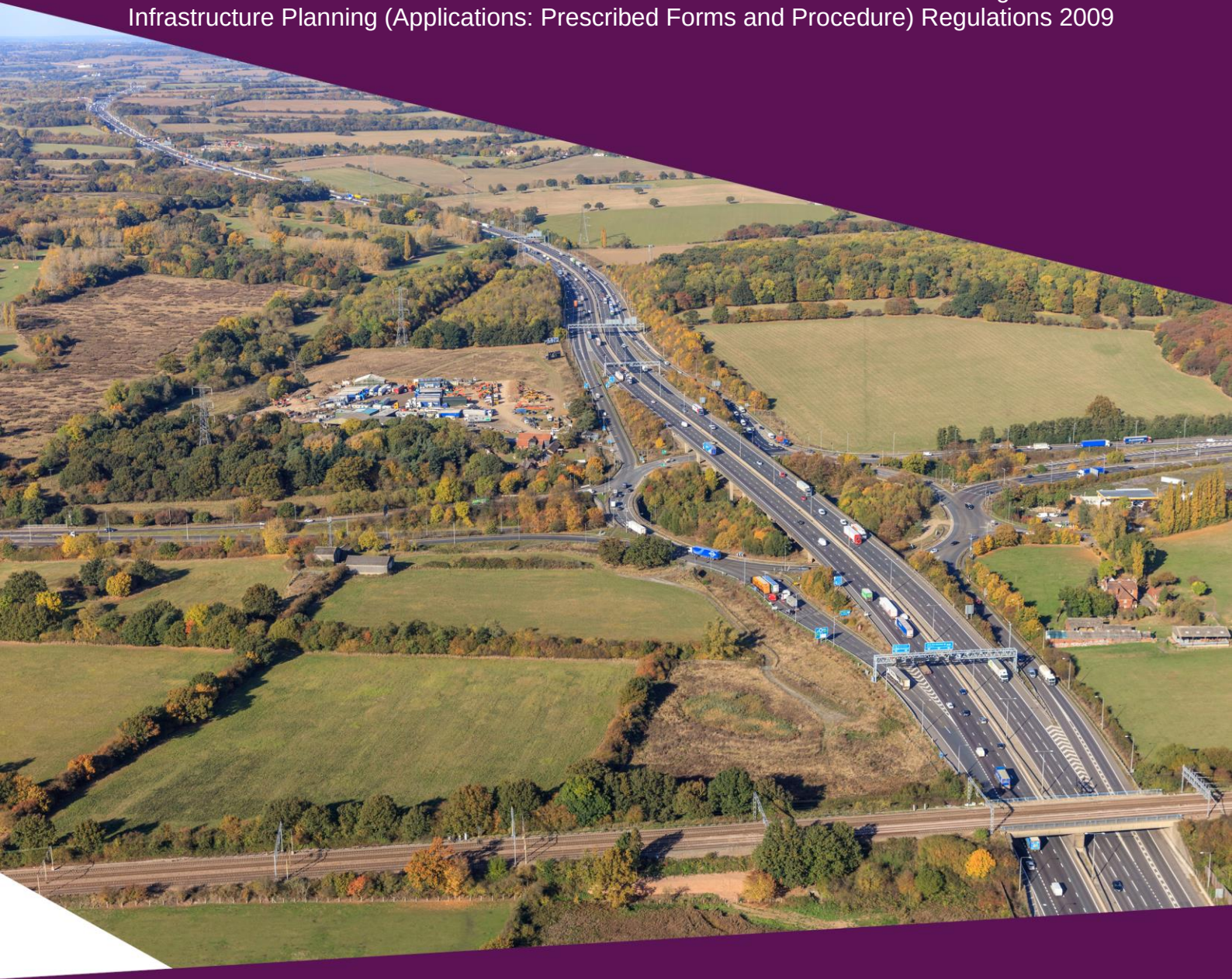
M25 junction 28 improvement scheme
TR010029
6.3 Environmental Statement
Appendix 4.1: DMRB sensitivity test

APFP Regulation 5(2)(a)
Planning Act 2008
Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009



Volume 6
May 2020

Infrastructure Planning

Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

M25 junction 28 scheme
Development Consent Order 202[x]

6.3 ENVIRONMENTAL STATEMENT
APPENDIX 4.1: DMRB SENSITIVTY TEST

Regulation Number:	Regulation 5(2)(a)
Planning Inspectorate Scheme Reference:	TR010029
Application Document Reference:	TR010029/APP/6.3
Author:	M25 junction 28 improvement scheme project team, Highways England

Version	Date	Status of Version
1	May 2020	Application issue

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Appendix 4.1 DMRB sensitivity test

1. Introduction

1.1 Overview

1.1.1 The Design Manual for Roads and Bridges[1] (DMRB) is a suite of documents which contains requirements and advice relating to works on motorway and all-purpose trunk roads through design, construction and operational stages of the highways assets.

1.1.2 The DMRB embodies the collective experience of the highway authority, their agents and designers. It provides requirements and advice resulting from research, practical experience of constructing and operating motorway and all-purpose trunk roads, and from delivering compliance to legislative requirements.

1.1.3 The DMRB has recently been updated, with the DMRB updates having been rolled out between Q2 of 2019 and Q1 of 2020.

1.1.4 The updates to the DMRB guidance are intended to:

- Bring the specifications up to date.
- Make it less ambiguous, more concise and easier to use.
- Enable a digital framework for standards content that will support innovation in digital design, construction and operation of highways infrastructure.

1.2 Requirement for this appendix

1.2.1 The ES and HRA reports outline the environmental impacts of the Scheme using the DMRB guidance available at the time of undertaking the preliminary design, which includes the preliminary environmental design mitigation work. The majority of the EIA (not including the materials and waste assessment) and HRA was undertaken before the issue of the updated DMRB guidance. Checks have now been undertaken to consider the potential for any changes to the environmental effects concluded in the ES and HRA reports and whether there would be any new effects to be taken into consideration through the life cycle of the Scheme.

1.2.2 This appendix outlines the key parts of the DMRB guidance used in the EIA and HRA referred to throughout the Environmental Statement (ES) (application document TR010029/APP/6.1) and HRA report (application document TR010029/APP/6.9) and considers whether the DMRB updates would change the outcome of the EIA for the Scheme.

1.2.3 This appendix also considers the updated DMRB guidance relating to the Outline Construction Environmental Management Plan (application document TR010029/APP/7.2).

1.2.4 A summary of the key changes to DMRB assessment and methodology guidance for each environmental discipline considered as part of the EIA and HRA for the Scheme is provided in Table 1.1.

[1] https://standardsforhighways.co.uk/dmrb/

Table 1.1: Updates to DMRB documents relevant to the EIA for the Scheme

Superseded DMRB reference	Updated DMRB reference	Document title	Issue date
HA 200/08, HA 201/08, IAN 125/15, IAN 126/15, IAN 133/10	LA 101	Introduction to environmental assessment	July 2019
HD 47/08, IAN 126/15, IAN 133/10	LA 102	Screening projects for Environmental Impact Assessment	July 2019
HA 204/08, IAN 125/15, IAN 133/10	LA 103	Scoping projects for environmental assessment	January 2020[2]
HA 205/08, HD 48/08, IAN 125/15, IAN 133/10	LA 104	Environmental assessment and monitoring	July 2019
HA 207/07, IAN 170/12, IAN 174/13, IAN 175/13, parts of IAN 185/15	LA 105	Air quality	November 2019
HA 208/07, HA 60/92, HA 75/01	LA 106	Cultural heritage assessment	January 2020[3]
Landscape Effects 11.3.5 and IAN 135/10	LA 107	Landscape and visual effects	February 2020[4]
Volume 11, Section 3, Part 4, IAN 130/10	LA 108	Biodiversity	March 2020[5]
Volume 11, section 3, parts 6 and 11	LA 109	Geology and soils	October 2019
IAN 153/11	LA 110	Material assets and waste	August 2019
HD 213/11, parts of IAN 185/15	LA 111	Noise and vibration	February 2020[6]
Volume 11, section 3, parts 6, 8 and 9	LA 112	Population and human health	October 2019
HD 45/09	LA 113	Road drainage and the water environment	March 2020[7]
-	LA 114	Climate	October 2019

[2] Revision 1 (January 2020) Revision to update references only. Revision 0 (July 2019) LA 103 replaces HA 204/08, IAN 125/15 and IAN 133/10. The full document has been re-written to make it compliant with the new Highways England drafting rules.
[3] Revision 1 (January 2020) Revision to update references only. Revision 0 (September 2019) LA 106 replaces HA 208/07, HA 60/92 and HA 75/01. The full document has been re-written to make it compliant with the new Highways England drafting rules.
[4] Revision 2 (February 2020) Additional update to informative references. Ref 4.I replaces previous Ref 1.I and 5.I. Revision 1 (January 2020) Revision to update references only. Revision 0 (September 2019) LA 107 replaces DMRB Volume 11 Section 3 Part 5 and IAN 135/10. This full document has been re-written to make it compliant with the new Highways England drafting rules.
[5] Revision 1 (March 2020) Update to references only. Revision 0 (November 2019) LA 108 replaces DMRB Volume 11, Section 3, Part 4 Ecology and Nature Conservation and IAN 130/10. This full document has been re-written to make it compliant with the new Highways England drafting rules.
[6] Revision 1 (February 2020) Update to Wales National Application Annex. Revision 0 (November 2019) LA 111 replaces HD 213/11 and IAN 185/15. This full document has been re-written to make it compliant with the new Highways England drafting rules.
[7] Revision 1 (March 2020) Revision to update references only. Revision 0 (August 2019) LA 113 replaces HD 45/09. The full document has been re-written to make it compliant with the new Highways England drafting rules.

Superseded DMRB reference	Updated DMRB reference	Document title	Issue date
HD 44/09	LA 115	Habitats Regulations Assessment	January 2020[8]
HA 117/08	LA 116	Cultural heritage asset management plans	September 2019
IAN 183/14, IAN 183/16 (W)	LA 120	Environmental management plans	November 2019
HA 13/81 HA 55/92 HA 56/92 HA 57/92 HA 58/92 HA 60/92 HA 63/92 HA 85/01 HA 87/01 HA 88/01 HA 89/01 HA 92/01 HA 108/04 HA 115/05 Volume 11, section 3 part 5	LD 117	Landscape design	March 2020[9]
HA 59/92, HA 67/93, HA 80/99 HA 81/99, HA 84/01, HA 97/01, HA 98/01, HA 116/05, IAN 116/08, IAN 116/08 (W)	LD 118	Biodiversity design	March 2020[10]
HA 65/94 HA 66/95	LD 119	Roadside environmental mitigation and enhancement	March 2020[11]
TA 68/96, TA 90/05, TA 91/05, TD 36/93	CD 143	Designing for walking, cycling and horse-riding	March 2020[12]
IAN 195/16	CD 195	Designing for cycle traffic	March 2020[13]
HA 219/09	CD 523	Determination of pipe roughness and assessment of sediment deposition to aid pipeline design	March 2020[14]

[8] Revision 1 (January 2020) Revision to update references only. Revision 0 (October 2019) LA 115 replaces HD 44/09. The full document has been re-written to make it compliant with the new Highways England drafting rules.
[9] LD 117 replaces LA 117 revision 1 which superseded HA 13/81, HA 55/92, HA 56/92, HA 57/92, HA 58/92, HA 60/92, HA 63/92, HA 85/01, HA 87/01, HA 88/01, HA 89/01, HA 92/01, HA 108/04 and HA 115/05. This full document has been re-written to make it compliant with the new Highways England drafting rules. LD 117 was first published as LA 117 in October 2019 and re-published as revision 1 in February 2020 to update clause 2.7 to include the text 'in accordance with Appendix A or Appendix B'. The document has changed codes from 'A' to 'D' due to a coding error. The letter 'D' denotes design requirements rather than 'A' for appraisal requirements.
[10] LD 118 replaces LA 118 which superseded HA 59/92, HA 67/93, HA 80/99, HA 81/99, HA 84/01, HA 97/01, HA 98/01, HA 116/05, IAN 116/08 and IAN 116/08(W). This full document has been re-written to make it compliant with the new Highways England drafting rules. LD 118 was originally published as LA 118 in November 2019 and is now republished as LD 118 as the requirements are design requirements (D) and it was incorrectly coded as appraisal requirements before this time (A).
[11] LD 119 replaces LA 119 which superseded HA 65/94 and HA 66/95. This full document has been re-written to make it compliant with the new Highways England drafting rules. LD 119 was originally published as LA 119 in October 2019 and is now republished as LD 119 as the requirements are design requirements (D) and it was incorrectly coded as appraisal requirements before this time (A).
[12] Revision 2 (March 2020) Update to references only. Revision 1 (January 2020) is for the update of the Scotland National Application Annex. Revision 0 (November 2019) CD 143 replaces TA 90/05, TA 91/05, TA 68/96 and TD 36/93. This full document has been re-written to make it compliant with the new Highways England drafting rules.
[13] Revision 1 (March 2020) Update to references in England NAA only. Revision 0 (September 2019) CD 195 replaces IAN 195/16. This full document has been re-written to make it compliant with the new Highways England drafting rules.
[14] Revision 1 (March 2020) Revision to update references only. Revision 0 (June 2019) CD 523 replaces HA 219/09. This full document has been re-written to make it compliant with the new Highways England drafting rules.

Superseded DMRB reference	Updated DMRB reference	Document title	Issue date
HA 107/04	CD 529	Design of outfall and culvert details	March 2020[15]
HA 118/06	CD 530	Design of soakaways	March 2020[16]
HA 40/01	CD 533	Determination of pipe and bedding combinations for drainage works	March 2020[17]
HD 43/04, IAN 147/12	CD 535	Drainage asset data and risk management	March 2020[18]
BD 94/17	CD 354	Design of minor structures	December 2019
BA 59/94	CD 356	Design of highway structures for hydraulic action	March 2020[19]
HD 22/08, BD 10/97, HA 120/08	CD 622	Managing geotechnical risk	March 2020[20]
-	CG 103	Introduction and general requirements for sustainable development and design	July 2019
HD 42/17	GG 142	Walking, cycling and horse-riding assessment and review	November 2019
TD 52/17	CG 152	Traffic signs to tourist destinations and leisure facilities	October 2019
TD 53/05	CG 153	Traffic signs to retail destinations and exhibition centres	October 2019
HD 33/16, TA 80/99	CG 501	Design of highway drainage systems	March 2020[21]
HD 49/16, HD 50/16	CG 502	The certification of drainage design	October 2019
BD 21/01, BA 16/97, BD 37/01	CS 454	Assessment of highway bridges and structures	June 2019
SD 15/03	CS 551	Drainage surveys	June 2019

Table Source: https://highwaysengland.co.uk/innovation-hub/our-approach/dmrb-updates/

[15] Revision 1 (March 2020) Revision to update references only. Revision 0 (December 2019) CD 529 replaces HA 107/04. This full document has been re-written to make it compliant with the new Highways England drafting rules.
[16] Revision 1 (March 2020) Revision to update references only. Revision 0 (December 2019) CD 530 replaces HA 118/06. This full document has been re-written to make it compliant with the new Highways England drafting rules.
[17] Revision 1 (March 2020) Update to references only. Revision 0 (December 2019) CD 533 replaces HA 40/01. This full document has been re-written to make it compliant with the new Highways England drafting rules.
[18] Revision 1 (January 2020) is an update to references in the England NAA. Revision 0 (June 2019) CD 535 replaces HD 43/04 and IAN 147/11. The full document has been re-written to make it compliant with the new Highways England drafting rules.
[19] Revision 1 (March 2020) Revision to update references only. Revision 0 (September 2019) CD 356 replaces BA 59/94. The full document has been re-written to make it compliant with the new Highways England drafting rules.
[20] Revision 1 (March 2020) Update to references and revised Scotland National Application Annex. Revision 0 (August 2019) CD 622 replaces HD 22/08, BD 10/97 and HA 120/08. The philosophy of the original document remains the same but the full document has been re-written to make it compliant with the new Highways England drafting rules.
[21] Revision 2 (March 2020) Revision to update references and typographical errors in clauses 3.18 and 3.19 where formation has been changed to sub-formation. Clause 3.9 from previous revision related to performance requirements specified in the design of a kerb and gully drainage system has been deleted as it is superfluous. Revision 1 (December 2019) contains a minor revision to Table 8.6.4N3. The stated suspended solids % removal for dry/detention basins has been amended from 5% to 50% which was a typographical error. Clause 4.10 that referenced IAN 161 has been deleted as this was a cyclical reference and is not required. Revision 0 (October 2019) CG 501 replaces HD 33/16 and TA 80/99. This full document has been re-written to make it compliant with the new Highways England drafting rules.

1.3 Structure of this document

1.3.1 The structure of this document is as follows:

- Section 1 identifies the DMRB guidance updates relevant to the EIA.
- Section 2 provides a high-level summary of the changes made in the updated DMRB guidance for the relevant environmental topics within the EIA for the Scheme.
- Section 3 provides a comparison between effects stated in the ES and predicted effects under the updated DMRB guidance for each environmental topic.
- Section 4 provides a comparison between effects stated in the HRA and predicted effects under the updated DMRB guidance for each environmental topic.
- Section 5 provides a comparison between requirements in the Outline CEMP for the Scheme and the updated DMRB guidance.
- Section 6 provides a summary of changes to reported effects (and any new predicted effects) in the ES and HRA for the Scheme under the updated DMRB guidance. It also summarises the review of the Outline CEMP under the updated DMRB guidance.

2. DMRB guidance updates relevant to the EIA

2.1 Overview

2.1.1 The ES outlines the environmental effects using the environmental assessment methodologies outlined in the DMRB guidance (up to June 2019) and using other best practice industry standard practices.

2.1.2 Table 2.1 provides a high-level summary of the changes made in the updated DMRB guidance for the environmental topics considered in the EIA for the Scheme.

2.1.3 The materials and waste assessment of the Scheme (presented in Chapter 12 of the ES) was undertaken using the updated DMRB guidance LA 110 Material assets and waste. Therefore, no assessment of the key changes to the updated DMRB guidance is required.

Table 2.1: Updated DMRB guidance relevant to the EIA methodologies

Environmental topic	Superseded DMRB document (assessed in ES)	Updated DMRB reference	Date issued	Key environmental methodology matters	Change to DMRB EIA methodology (No change / No significant change / Change / Significant change)	Key changes made to DMRB guidance
Air quality	HA 207/07, IAN 170/12, IAN 174/13, IAN 175/13, parts of IAN 185/15	LA 105	November 2019	Scoping	Change	Change to traffic scoping criteria to include speed band changes for determining study area. Criteria included to determine the type of assessment to be undertaken. Requirement for additional ecological receptors to be included in the assessment.
				Study area	Change	New requirement to examine for speed band changes rather than average speed changes.
				Baseline	Change	It is now required to obtain background maps for nitrogen oxides concentrations and nitrogen deposition for assessment of ecological receptors.
				Methodology	Change	The assessment requires revision to the assessment of compliance with the EU limit values and additional ecological receptors (locally designated sites, veteran trees, ancient woodland) need to be assessed.
				Assessment	Change	In addition to the changes above, the Highways England speed band emissions factors have been updated. No requirement for calculating pollutant emissions.
Noise and vibration	HD 213/11	LA 111	November 2019	Scoping	No significant change	LA 111 follows similar procedure to the superseded DMRB guidance (HD 213/11).
				Study area	No significant change	LA 111 is aligned with previous Highways England guidance and follows a similar procedure to superseded DMRB guidance (HD 213/11).

Environmental topic	Superseded DMRB document (assessed in ES)	Updated DMRB reference	Date issued	Key environmental methodology matters	Change to DMRB EIA methodology (No change / No significant change / Change / Significant change)	Key changes made to DMRB guidance
				Baseline	No change	Further clarification is provided on the use of published public data (e.g. DEFRA strategic noise mapping) in lieu of noise surveys.
				Methodology	Change	Some minor modifications to the Calculation of Road Traffic Noise (CRTN) calculation methodology are presented in LA 111; • Speed banding in accordance with IAN 185 is no longer required and speed pivoting is now used instead. • Low noise road surfacing corrections now use a correction of Road Surface Influence (RSI) directly rather than 0.7*RSI as required by the superseded DMRB guidance (HD 213/11), where applicable. • There are a number of additional minor clarifications and wording changes in LA 111. Examples include: how to determine the study area, excluding operational vibration from the assessment and no longer excluding night-time noise level changes below 55 dB from the reporting tables.
				Assessment	No change	Assessment methodology remains aligned with superseded Highways England's guidance.
Biodiversity	DMRB Vol 10, Section 4	LA 108Biodiversity	November 2019	Scoping	No change	LA 108 aligns with superseded guidance.
				Study area	No change	The methodology aligns with superseded guidance and refers to CIEEM guidance (via LA 118).

Environmental topic	Superseded DMRB document (assessed in ES)	Updated DMRB reference	Date issued	Key environmental methodology matters	Change to DMRB EIA methodology (No change / No significant change / Change / Significant change)	Key changes made to DMRB guidance
	DMRB Vol 11, Section 3, Part 4 IAN 130/10 Ecology and Nature Conservation: Criteria for Impact Assessment	LA 118 Biodiversity design		Baseline	Change	Additional text regarding future baseline has been added to guidance. Guidance for ecological surveys in LA 118 directs to standard survey approaches.
				Methodology	Change	LA 108 uses a matrix (importance of biodiversity resource x 'level of impact') to determine significance of effect. Superseded interim guidance did not include this. Language to describe 'importance' of biodiversity recourses and subsequent level of impact and significance of effect is presented in LA 108.
				Assessment	Change	LA 108 sets out a revised assessment methodology and language. Air Quality assessment (LA 105) includes additional 'ecology receptors' (locally designated sites, veteran trees, ancient woodland).
Road drainage and the water environment	HD 45/09	LA 113	August 2019	Scoping	No change	No new requirements
				Study area	No change	No new requirements
				Baseline	No change	No new requirements
				Methodology		A number of minor methodology clarifications have been introduced in LA 113. The main change concern modifications to copper Environmental Quality Standard (EQS) thresholds, which can directly affect the compliance of road runoff discharges. The copper EQS threshold is now set to 1 µg rather

Environmental topic	Superseded DMRB document (assessed in ES)	Updated DMRB reference	Date issued	Key environmental methodology matters	Change to DMRB EIA methodology (No change / No significant change / Change / Significant change)	Key changes made to DMRB guidance
						than determined by the hardness of the receiving water which for this scheme meant an EQS of 10 µg under the superseded guidance. The updated DMRB guidance is an order of magnitude more stringent for this test. For flood risk, the definition of Importance in LA 113 is now based on the vulnerability classification (as defined in NPPF) of the receptors.
				Assessment	No significant change	LA 113 reference the requirement to use the most up to date climate change allowances when assessing a Scheme. The updated DMRB guidance itself does not therefore introduce a change in the assessment, however the Flood Risk Assessment: Climate Change Allowances guidance was changed in December 2019 to specifically include more stringent requirements for the design of floodplain compensation storage. As of this update, an Essential Infrastructure scheme needs to design floodplain compensation storage using the Upper End climate change allowance (+70% peak flow).
Landscape and visual	IAN 135/10	LA 104 & 107	September 2019	Scoping	No significant change.	LA 107 references the Landscape Institute guidance on Landscape and Visual assessments (GLVIA 3), the current LVIA assessment (including Scoping) of the Proposed Scheme was already based on this guidance therefore no significant change.

Environmental topic	Superseded DMRB document (assessed in ES)	Updated DMRB reference	Date issued	Key environmental methodology matters	Change to DMRB EIA methodology (No change / No significant change / Change / Significant change)	Key changes made to DMRB guidance
				Study area	Change	The study area now needs to accommodate potential cumulative effects.
				Baseline	Change	The baseline should describe the 'future baseline scenario', with reasonable effort on the basis of the availability of environmental information and scientific knowledge.
				Methodology	Change	Updates to the following tables (categories and typical descriptions) have been introduced: • Environmental value (sensitivity) and descriptions; • Magnitude of impact and typical descriptions; • Significance categories and typical descriptions; • Significance matrix.
				Assessment	No significant change	LA 107 still aligns itself with the guidance within GLVIA 3rd edition. Slight changes have been identified within the wording relating to descriptions of magnitude and nature of effect on the landscape and visual receptors. There is greater emphasis on producing photomontages in this guidance to support EIA to help contextualise the impacts and the mitigation on visual landscape.
Geology and soils	Volume 11, section 3, parts 6 and 11	LA 109	October 2019	Scoping	Change	Change effects on geomorphology are now reported in LA 113 Road drainage and the water environment (where associated with hydromorphology) and/or LA 107 Landscape and visual effects (where associated with

Environmental topic	Superseded DMRB document (assessed in ES)	Updated DMRB reference	Date issued	Key environmental methodology matters	Change to DMRB EIA methodology (No change / No significant change / Change / Significant change)	Key changes made to DMRB guidance
						landform), rather than Geology and Soils. Geomorphology was part of the superseded Volume 11. Risks associated with geotechnical hazards and land stability are assessed separately in geotechnical assessments prepared under DMRB CD 622.
				Study area	No significant change	LA 109 provides clarity on defining the study area on a project by project basis.
				Baseline	Change	LA 109 includes additional text indicating the proportion of identified Agricultural Land Classification (ALC) / Land Capability for Agriculture (LCA) types within a region shall be reported in the baseline.
				Methodology	Change	LA 109 is amended to include tables for sensitivity (Table 3.11) and magnitude (Table 3.12 and Annex E/2 Table E/2).
				Assessment	Change	There are updates to the agricultural soils methodology and the significance of effects as detailed above.
Cultural heritage	HA 208/07, HA 60/92, HA 75/01	LA 106	September 2019	Scoping	No change	No new requirement
				Study area	No change	No new requirement
				Baseline	No change	No new requirement
				Methodology	Change	The methodology provides more flexibility in defining the appropriate methodology for a scheme.
				Assessment	No change	The updated DMRB guidance for cultural heritage has only changed in the detail of the

Environmental topic	Superseded DMRB document (assessed in ES)	Updated DMRB reference	Date issued	Key environmental methodology matters	Change to DMRB EIA methodology (No change / No significant change / Change / Significant change)	Key changes made to DMRB guidance
						language, not in the actual assessment methodology.
People and communities (Updated DMRB: Population and human health)	Volume 11, section 3, parts 6, 8 and 9	LA 112	October 2019	Scoping	Change	The updated DMRB guidance is now referred to as Population and Human Health. Scoping of effect on vehicular travellers is no longer required under the updated DMRB guidance.
				Study area	No change	No change has been made to defining the study areas.
				Baseline	No change	No change has been made to the baseline criteria. .
				Methodology	Change	The methodology for the assessment remains the same other than the Vehicular Traveller assessment is no longer being required.
				Assessment	Change	Vehicular Traveller assessment no longer required.
Climate effects	N/a	LA 114	October 2019	Scoping	Change	A more detailed approach to scoping is required, with a need to consider the likely change against the baseline for both construction and operation stages in a quantitative manner.
				Study area	No change	Both the previous and revised assessment guidance require the same study area to be assessed.
				Baseline	No change	Both the superseded and updated assessment guidance consider the baseline to the do-minimum scenario.

Environmental topic	Superseded DMRB document (assessed in ES)	Updated DMRB reference	Date issued	Key environmental methodology matters	Change to DMRB EIA methodology (No change / No significant change / Change / Significant change)	Key changes made to DMRB guidance
				Methodology	Change	There is a requirement to include emissions and removals due to land use change and sequestration. Emissions which have been or could be avoided by reusing and recycling materials should also now be included.
				Assessment	Change	No material changes to the assessment. However, a specific presentation of results in tabular form is now required.
Climate vulnerability	N/a	LA 114	October 2019	Scoping	No change	Both the original and the revised scoping assessment method identify whether anticipated changing climate conditions and weather events are likely to have significant adverse effects on the project (or elements of the project) during construction and operation.
				Study area	No change	Both the original and the revised study area definition are based on the construction footprint/project boundary (including compounds and temporary land take).
				Baseline	Change	The updated DMRB guidance provides more specific details on how the baseline should be prepared. For example, it states details of recent extreme weather events should be included.
				Methodology	Change	The receptors that require assessment have not changed. Additional climate vulnerability input to the major accidents and disasters chapters is required by the updated DMRB guidance.
				Assessment	No change	The assessment method has not changed.

Environmental topic	Superseded DMRB document (assessed in ES)	Updated DMRB reference	Date issued	Key environmental methodology matters	Change to DMRB EIA methodology (No change / No significant change / Change / Significant change)	Key changes made to DMRB guidance
Cumulative effects	N/A – Cumulative effects assessment follows methodology of PINS Advice Note 17	N/A	N/A	Scoping	No change	No new requirements.
				Study area	Change	If study areas would change for other chapters, this will affect sites to be considered.
				Baseline	No change	No new requirements.
				Methodology	No change	No new requirements.
				Assessment		If significant effects change for other chapters, this will affect the cumulative & in-combination effects.

3. Comparison between effects reported in the ES for the Scheme and predicted effects under the updated DMRB guidance

3.1 Overview

3.1.1 The following sections provide a comparison of effects between those reported in the ES for the Scheme and predicted effects under the updated DMRB guidance.

3.1.2 High level assessments and professional judgement has been used in undertaking the sensitivity test to determine whether the updates to the DMRB guidance result in a change to the effects outlined in the ES. The approach taken for each environmental topic is outlined in the individual sections of this appendix as listed in the ES:

- Section 3.2 - Chapter 5: Air quality
- Section 3.3 - Chapter 6: Noise and vibration
- Section 3.4 - Chapter 7: Biodiversity
- Section 3.5 - Chapter 8: Road drainage and the water environment
- Section 3.6 - Chapter 9: Landscape and visual
- Section 3.7 - Chapter 10: Geology and soils
- Section 3.8 - Chapter 11: Cultural heritage
- Section 3.9 - Chapter 13: People and communities
- Section 3.10 - Chapter 14: Climate
- Section 3.11 - Chapter 15: Cumulative effects

3.1.3 The materials and waste assessment of the Scheme (presented in Chapter 12 of the ES) was undertaken using the updated DMRB guidance LA 110 Material assets and waste. Therefore, no comparison or further assessment is required.

3.2 Air quality

3.2.1 The air quality assessment of the Scheme is presented in Chapter 5 of the ES (application document TR010029/APP/6.1). The methodology and assessment criteria adopted in the ES is in accordance with DMRB HA207 and the relevant IANs: IAN170/12, IAN174/13, IAN 175/13.

3.2.2 A sensitivity test has been undertaken to determine whether the changes in LA 105 would introduce any change to the effects with the Scheme as presented in the ES. The key changes that require an assessment are those during operation, in particular the assessment of compliance with the EU limit values, and the assessment of additional ecological sites. In accordance with a proportionate approach, it has been assumed for the purposes of this sensitivity test that there has been no change to the study area, as a result of the changes in LA 105 to the speed band criteria. Analysis of the speed band data showed that four additional links outside of the air quality study area would meet the criteria for assessment, although three of these links would be over 4 km from the Scheme. The other additional link (Nag's Head Lane) has already been included in the air quality model, and would have a beneficial change in the am peak, becoming less congested.

3.2.3 The modelling has not been updated with the most up to date speed band emission factors, however, a high level qualitative analysis of the changes to estimated pollutant concentrations as a result of the revisions to speed bands and emission factors has been undertaken. This showed that although there are changes in the speed band categories for road links, these mainly affect the M25 and M11 motorways as a result of the road links being classed in the new "free flow" category, rather than as a result of any change in congestion. These changes would most likely lead to imperceptible effects at nearby receptors. There is only one road link, the M25 clockwise off-slip at junction 28 which would now be classed as "heavy congestion" rather than "light congestion". However, there are no receptors in direct proximity to this road which would be affected by any consequent increase in emissions.

3.2.4 For the compliance assessment there are two road links in Defra's PCM model which are within the air quality study area. These are the A12 Colchester Road; and A1023 Brook Street. A receptor point was included at 4 metres from the kerbside of each of these road links. At both receptor points, annual mean nitrogen dioxide concentrations would be below the EU limit value in the opening year both with and without the Scheme. There is not expected to be a risk to the UK's reported ability to comply with the EU Air Quality Directive in the shortest possible timescale. Further details are provided in Appendix A.

3.2.5 An assessment has been undertaken for the additional ecological receptors specified in LA 105. The ecology receptors within the study area (200 m of the Affected Road Network (ARN)) include:

- 12[22] veteran trees
- Lower Vicarage Wood Local Wildlife Site (LWS) and Ancient Woodland
- The Oaks LWS
- Ingrebourne Valley Site of Metropolitan Importance for Nature Conservation (SMI)

3.2.6 Concentrations of NO_x from road vehicles were estimated at each receptor point in the same way as in the ES, and nitrogen deposition rates calculated following the method in LA 105, paragraphs 2.43 to 2.44. The background deposition rate for the base year was taken from the Air Pollution Information System (APIS) website (http://www.apis.ac.uk/) using the location of the receptors within the study area, and reduced for the opening year in line with trend information. The background deposition rates were added to the contribution from the road vehicles. The results are presented and discussed in Appendix A of this document. The receptors are shown in Figure B1 in Appendix B.

Table 3.1: Air quality - Comparison between effects stated in the ES and predicted effects under the updated DMRB guidance

Receptor	Construction / operation	Effects presented in the ES	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
Human health receptors	Construction	No residual significant adverse effects with appropriate mitigation measures	No residual significant adverse effects with appropriate mitigation measures.	No change	No additional mitigation or further assessment required.
	Operation	No overall significant adverse effect with the Scheme, as there are no exceedances of an air quality objective at any receptor with or without the Scheme, nor is the Scheme expected to pose a risk of not achieving compliance with the	No overall significant adverse effect with the Scheme. With the revised assessment the Scheme is still not expected to pose a risk of not achieving compliance with the	No change	No additional mitigation or further assessment required.

[22] There are 15 veteran trees within or on the DCO boundary. Two would be removed during construction. Twelve of the remaining 13 trees lie within the study area (200 m of the ARN).

Receptor	Construction / operation	Effects presented in the ES	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
		EU Air Quality Directive in the shortest possible time.	EU Air Quality Directive in the shortest possible time. High level qualitative analysis of the changes to estimated pollutant concentrations as a result of the revisions to speed bands and emission factors suggests there would be no material effect at receptors to that reported in the ES.		
Ecological receptors (veteran trees, ancient woodland, local wildlife sites) Note - ecological receptors were included in the ES for effects during construction	Construction	No residual significant adverse effects with appropriate mitigation measures	No residual significant adverse effects with appropriate mitigation measures.	No change	No additional mitigation or further assessment required.
	Operation	Not assessed	Slight Adverse (not significant) for Ingrebourne Valley SMI. Neutral for all other receptors. There may be changes in nitrogen deposition rates with the Scheme at ecological receptors in the study area, which in some instances exceed 1% of the critical load for	Not previously assessed	None required as not expected to be a significant adverse effect.

Receptor	Construction / operation	Effects presented in the ES	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
			the site. However, for the majority of the receptor points, nitrogen deposition rates are lower in the opening year than in the base year. The only receptor points to experience slightly higher rates than base are immediately adjacent to the new loop and realigned slip road close to the A12, within Ingrebourne Valley SMI (see Appendix A).		

3.3 Noise and vibration

3.3.1 The noise and vibration assessment of the Scheme is presented in Chapter 6 of the ES (application document TR010029/APP/6.1). The methodology and assessment criteria adopted in the ES is in accordance with the superseded DMRB guidance (HD 213/11) and Highways England guidance. The assessment criteria presented in LA 111 is aligned with Highways England guidance and the methodology is in many ways similar to the superseded DMRB guidance (HD 213/11) approach. Therefore, the general methodology and assessment criteria adopted in the ES for both construction and operational noise and vibration would be largely in accordance with LA 111. In addition, there are a number of minor methodology clarifications introduced in LA 111 that would not affect the assessment outcome.

3.3.2 The main changes that have the potential to change the ES predicted effects are the additional modifications to the CRTN prediction methodology (regarding road traffic speeds and road surface corrections) which could directly affect the predicted noise levels.

3.3.3 A sensitivity test has been undertaken to determine whether the CRTN modifications in LA 111 would introduce any change to the predicted effects presented in the ES. As part of this sensitivity test, road traffic noise levels predictions have been updated using pivoted speeds required by LA 111 as opposed to banded speeds (as per IAN 185) used in the ES. This exercise confirmed that there would be negligible noise changes (<1 dB change) at all receptors compared to those presented in the ES and there would be no resultant noise changes or absolute levels of noise that would result in new significant adverse effects.

3.3.4 The change in LA 111 to using a low noise surface correction equal to the RSI rather than 0.7*RSI, where this correction is applicable, has not been quantitatively modelled. However, where this correction is applicable there would be a small reduction in predicted noise level and therefore any road surface correction changes would not result in any new significant adverse effects.

3.3.5 It is concluded that an assessment updated to be in accordance with LA 111 is not likely to result in any changes to the effects presented in the ES. A summary is included below in Table 3.2.

Table 3.2: Noise and vibration - Comparison between effects stated in the ES and predicted effects under the updated DMRB guidance

Receptor	Construction / operation	Effects presented in the ES	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
All	Operation	No significant adverse effects	No significant adverse effects	No change	No additional mitigation or further assessment required.
All	Construction	No residual significant adverse effects	No residual significant adverse effects	No change	No additional mitigation or further assessment required.

3.4 Biodiversity

3.4.1 The biodiversity assessment of the Scheme is presented in Chapter 7 of the ES (application document TR010029/APP/6.1). The methodology and assessment criteria adopted in the ES is in accordance with IAN 130/10.

3.4.2 A sensitivity test has been undertaken to determine whether the changes in LA 108 would introduce any change to the effects of the Scheme on biodiversity recourses as presented in the ES. The following steps were undertaken for the sensitivity test:

- The baseline data collected for the Scheme (as described in Chapter 7 of the ES) was used to determine the 'biodiversity resource importance' on a geographical scale following the guidance in Table 3.9 of LA 108. Resource importance is described in the ES as resource 'value' following IAN 130/10, which also determined value on a geographical scale.
- The 'level of impact' on each biodiversity resource was determined in accordance with the criteria provided in Table 3.11 of LA 108. Permanent impacts can be reported as either 'major' or 'minor', and temporary impacts reported as 'moderate' or 'negligible'. Additional assessment carried out for the air quality sensitivity test (following LA 105, see 3.3 above) was used to inform the level of impact during operation of the Scheme on additional 'ecology receptors' that lie within 200m of the ARN. This is described in Appendix A.2. The importance of each biodiversity resource and level of impact were used to determine the significance of effect, as set out in the significance matrix table presented in Table 3.13 of LA 108. In the superseded interim guidance IAN 130/10, significance of effect is not based on a matrix but determined largely by the different levels of value of each biodiversity resource.

3.4.3 The results of the sensitivity test are set out in Table 3.3 below which lists the effects on biodiversity resources as presented in the ES, and predicted effects under LA 108. The predicted effects following LA 108 remain the same for the majority of the biodiversity resources. Where changes to the predicted effects are shown, this relates to the determination of 'level of impact' and how this informs the significance of effect following LA 108 which differs from the interim guidance IAN 130/10. The changes to effects identified are as follows:

- Ingrebourne Valley SMI, terrestrial invertebrates and otter: the temporary effect during construction changes from Moderate adverse to Slight adverse. These biodiversity resources are all valued at County or equivalent authority importance. Following LA 108, the temporary impacts identified during construction are considered to result in a moderate level of impact. This results in a slight adverse effect during construction.
- Bats: the operational effect changes from Neutral to Slight adverse. The operational impact of relating to displacement of foraging bats from habitats immediately adjacent to the road is not considered to significantly affect the conservation status of these bat populations. Nevertheless, this impact is permanent and following LA 108 the level of impact is considered to be 'minor' which results in a Slight adverse effect during operation. No additional mitigation is required as this Slight adverse effect is not considered to significantly affect the conservation status of the local populations of bats.

Table 3.3: Biodiversity - Comparison between effects stated in the ES and predicted effects under the updated DMRB guidance

Receptor	Construction / operation	Effects presented in the ES	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
Ancient Woodland	Construction	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
	Operation	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required
Veteran trees	Construction	Moderate adverse (significant)	Moderate adverse (significant)	No change	No additional mitigation or further assessment required.
	Operation	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required
The Manor LNR	n/a	No effects identified	No effects identified	No change	No additional mitigation or further assessment required.
Ingrebourne Valley SMI	Construction	Temporary Moderate adverse (significant) becoming Slight adverse on establishment of habitat and mitigation (not significant)	Slight adverse (not significant)	Positive – temporary significant effect removed based on new assessment guidelines	No additional mitigation or further assessment required.
	Operation	Slight adverse (not significant)	Slight adverse (not significant)	No change	No additional mitigation or further assessment required
Other non-statutory designated sites	Construction	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.

Receptor	Construction / operation	Effects presented in the ES	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
	Operation	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required
Weald Brook	Construction	Slight adverse becoming Neutral on establishment of mitigation features (not significant)	Slight adverse becoming Neutral on establishment of mitigation features (not significant)	No change	No additional mitigation or further assessment required.
	Operation	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
Ingrebourne River	Construction	Moderate adverse – in relation to the permeant loss of open water habitat only (significant)	Moderate adverse – in relation to the permeant loss of open water habitat only (significant)	No change	No additional mitigation or further assessment required.
	Operation	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
Ephemeral ditches	Construction	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
	Operation	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
Other habitats outside of Ingrebourne Valley SMI	Construction	Temporary Slight adverse becoming Neutral on establishment of mitigation and compensation habitat (not significant)	Temporary Slight adverse becoming Neutral on establishment of mitigation and	No change	No additional mitigation or further assessment required.

Receptor	Construction / operation	Effects presented in the ES	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
Broadleaved plantation woodland Semi-improved grassland Species-poor hedgerow Ponds			compensation habitat (not significant)		
	Operation	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
Terrestrial invertebrates (including stag beetle and alder flea-weevil)	Construction	Temporary Moderate adverse (significant) becoming Neutral (not significant) on establishment of mitigation and compensation habitat	Temporary Slight adverse becoming Neutral (not significant)	Positive – temporary significant effect removed based on new guidelines	No additional mitigation or further assessment required.
	Operation	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
Great crested newt	Construction	Temporary Slight adverse becoming Neutral (not significant)	Temporary Slight adverse becoming Neutral (not significant)	No change	No additional mitigation or further assessment required.
	Operation	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
Reptiles	Construction	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
	Operation	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
Birds (including kingfisher)	Construction	Temporary Slight adverse becoming Neutral on	Temporary Slight adverse becoming Neutral on	No change	No additional mitigation or further assessment required.

Receptor	Construction / operation	Effects presented in the ES	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
		establishment of habitats (not significant)	establishment of habitats (not significant)		
	Operation	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
Bats	Construction	Temporary Slight adverse becoming Neutral on establishment of habitats (not significant)	Temporary Slight adverse becoming Neutral on establishment of habitats (not significant)	No change	No additional mitigation or further assessment required.
	Operation	Neutral (not significant)	Slight adverse (not significant)	Adverse – change from Neutral to Slight adverse	No additional mitigation or further assessment required. The operational impact relating to displacement of foraging bats from habitats immediately adjacent to the road is not considered to significantly affect the conservation status of these bat populations. Nevertheless, this impact is permanent, and following LA 108 the level of impact is considered to be 'minor' which results in a Slight adverse effect during operation. No additional mitigation is required as this Slight adverse effect is not

Receptor	Construction / operation	Effects presented in the ES	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
					considered to significantly affect the conservation status of the local populations of bats.
Otter	Construction	Temporary Moderate adverse (significant) becoming Neutral (not significant) on establishment of habitat	Temporary Slight adverse becoming Neutral (not significant)	Positive – temporary significant effect removed based on new guidelines	No additional mitigation or further assessment required.
	Operation	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
Badger	Construction	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
	Operation	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
Other priority mammals – hedgehog and harvest mouse	Construction	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
	Operation	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.

3.5 Road drainage and the water environment

3.5.1 The road drainage and the water environment assessment of the Scheme is presented in Chapter 8 of the ES (application document TR010029/APP/6.1). For most of the water environment components, the updated DMRB guidance (LA 113) equates to that given within the superseded DMRB guidance (HD 45/09).

3.5.2 For surface water quality there are a few amendments to the methodology and assessment criteria. The general methodology and assessment criteria adopted in the ES for both construction and operation would be largely in accordance with the updated DMRB guidance (LA 113). However, in addition to a number of minor methodology clarifications introduced in LA 113, that would not affect the assessment outcome, the main change that has the potential to change the predicted effects presented in the ES are for surface water quality. Specifically, the modifications to copper Environmental Quality Standard (EQS) thresholds, which can directly affect the compliance of road runoff discharges. The copper EQS threshold is now set to 1 µg rather than determined by the hardness of the receiving water which for this scheme meant an EQS of 10 µg under the superseded DMRB guidance. The updated DMRB guidance is an order of magnitude more stringent for this test.

3.5.3 A sensitivity test has been undertaken to determine whether the modifications to the guidance/EQS would introduce any change to the predicted effects presented in the ES. As part of this sensitivity test, the predicted concentrations of copper from all road catchments and cumulative catchments were reviewed to see if any surpassed the new 1 µg limit. This exercise confirmed that the highest copper concentration recorded in the ES was 0.45 µg, below the 1 µg standard. Therefore, there would be no exceedances of the threshold for copper and thus no resultant changes to impact magnitude that could result in new significant adverse effects.

3.5.4 It is concluded that an assessment updated to be in accordance with LA 113 is not likely to result in any changes to the effects on surface water quality presented in the ES. A summary is included below in Table 3.4.

3.5.5 For flood risk, the only change to the DMRB guidance with the potential to impact the conclusions of the assessment for the current Scheme is the change to the definitions of the importance of flood risk receptors and the significance of effects. The definition of Importance in HD 45/09 was based on the estimated number of properties within the floodplain. The definition of Importance in LA 113 is now based on the vulnerability classification (as defined in the NPPF planning practice guidance[23]) of the receptors.

3.5.6 The Flood Risk Assessment and ES report the Importance of the receptors as Low for all sources of flood risk and the Significance of Effect was reported as Neutral. Adoption of LA 113 would change the Importance classification. Within the study area there are receptors that would be classified as Very High Importance (Essential Infrastructure and Highly Vulnerable), however for these the Impact would be No Change and therefore the Effect would remain Neutral. The receptors that could be affected would now be classed as Medium importance (Less Vulnerable) rather than Low. This would then place the significance of effect of the Scheme into the Neutral or Slight box of the significance matrix (Table 3.8.1 of LA 104). The conclusion would remain that there are no residual significant effects.

[23] https://www.gov.uk/guidance/flood-risk-and-coastal-change

3.5.7 HD 45/09 and now LA 113 reference the requirement to use the most up to date climate change allowances when assessing a Scheme. The updated DMRB guidance itself does not therefore introduce a change in the assessment, however the Flood Risk Assessment: Climate Change Allowances[24] guidance was changed in December 2019 to specifically include more stringent requirements for the design of floodplain compensation storage. As of this update an Essential Infrastructure scheme needs to design floodplain compensation storage using the Upper End climate change allowance (+70% peak flow).

3.5.8 The Flood Risk Assessment included a test to determine the potential impact of the Scheme with the Upper End climate change allowance. The flood model was run to simulate this Upper End flood event and the results showed that the conclusions remain the same, in that there is no adverse impact and the overall significance of effect remains Neutral or Slight.

3.5.9 The Environment Agency has confirmed that their acceptance of the design standard for the Scheme remains valid based on the previous agreement to use the Higher Central climate change allowance and the results are reported in the Flood Risk Assessment (application document TR010029/APP/6.6). No additional mitigation or further assessment will therefore be required.

Table 3.4: Road drainage and the water environment - Comparison between effects stated in the ES and predicted effects under the updated DMRB guidance

Receptor	Construction / operation	Effects presented in the ES	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
Weald Brook	Construction	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
	Operation	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
River Ingrebourne	Construction	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
	Operation	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
Groundwater	Construction	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
	Operation	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.

[24] https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

Receptor	Construction / operation	Effects presented in the ES	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
Flood Risk	Construction	Neutral (not significant)	Neutral or Slight (not significant)	No change	No additional mitigation or further assessment required.
	Operation	Neutral (not significant)	Neutral or Slight (not significant)	No change	No additional mitigation or further assessment required.
WFD (Water Framework Directive)	Construction	Neutral (not significant) – the Scheme is considered compliant with the WFD	Neutral (not significant) – the Scheme is considered compliant with the WFD	No change	No additional mitigation or further assessment required.
	Operation	Neutral (not significant) – the Scheme is considered compliant with the WFD)	Neutral (not significant) – the Scheme is considered compliant with the WFD	No change	No additional mitigation or further assessment required.

3.6 Landscape and visual

3.6.1 The landscape and visual assessment of the Scheme is presented in Chapter 9 of the ES (application document TR010029/APP/6.1). The methodology and assessment criteria adopted in the ES are presented in the Landscape Effects (section 11.3.5) and follows IAN 135/10.

3.6.2 A sensitivity test was undertaken by reviewing the current findings (based on previous IAN 35/10) against the updated DMRB guidance (LA 107), whilst there are differences between the two sets of guidance it is considered they would not materially affect the overall findings. It is concluded that an assessment updated to be in accordance with LA 107 is not likely to result in any changes to the landscape and visual effects presented in the ES. A summary is included below in Table 3.5. The extents and locations of the Local Landscape Characters Areas are shown on Figure 9.2 of the ES. The locations of Visual Receptors are shown in Figure 9.7 of the ES.

3.6.3 The Visual Representation of Development Proposals Technical Guidance Note 06/19, which is referred to in LA107, places greater emphasis on the importance of photomontages being produced to aid assessments. In the case of the Scheme there is a relatively low number of visual receptors that would be considered as suitable candidates for photomontage locations. This is because the Scheme is generally well screened either through landform or vegetation, or a combination of both, and this limits the

number of receptors which might be significantly adversely affected. In applying IAN 135/10 to the assessment, photomontages were not considered to be necessary. Our design and mitigation measures ensure that the Scheme will be effectively screened (year 15) from the majority of receptors. However, in view of the greater emphasis placed upon photomontages within the updated guidance within LA107, and having conducted a sensitivity test of the assessment as against the new guidance, the Applicant is content to prepare photomontages for the limited number of suitable locations and proposes that these will be made available prior to the commencement of any examination of the DCO application.

Table 3.5: Landscape and visual - Comparison between effects stated in the ES and predicted effects under the updated DMRB guidance

Receptor	Construction / operation	Effects presented in the ES	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
Landscape – A: Tyler's Common	Construction	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
	Operation year 1	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
	Operation year 15	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
Landscape – B: Alder Wood	Construction	Large adverse (significant)	Large adverse (significant)	No change	No additional mitigation or further assessment required.
	Operation year 1	Large adverse (significant)	Large adverse (significant)	No change	No additional mitigation or further assessment required.
	Operation year 15	Moderate adverse (significant)	Moderate adverse (significant)	No change	No additional mitigation or further assessment required.
Landscape – C: Maylands Golf Club	Construction	Large adverse (significant)	Large adverse (significant)	No change	No additional mitigation or further assessment required.
	Operation year 1	Large adverse (significant)	Large adverse (significant)	No change	No additional mitigation or further assessment required.
	Operation year 15	Moderate adverse (significant)	Moderate adverse (significant)	No change	No additional mitigation or further assessment required.

Receptor	Construction / operation	Effects presented in the ES	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
Landscape – D: A12 Corridor	Construction	Large adverse (significant)	Large adverse (significant)	No change	No additional mitigation or further assessment required.
	Operation year 1	Moderate adverse (significant)	Moderate adverse (significant)	No change	No additional mitigation or further assessment required.
	Operation year 15	Large adverse (significant)	Large adverse (significant)	No change	No additional mitigation or further assessment required.
Landscape – E: Urban fringe of Brentwood	Construction	Slight adverse (not significant)	Slight adverse (not significant)	No change	No additional mitigation or further assessment required.
	Operation year 1	Slight adverse (not significant)	Slight adverse (not significant)	No change	No additional mitigation or further assessment required.
	Operation year 15	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
Landscape – F: Urban fringe of Harold Park	Construction	Slight adverse (not significant)	Slight adverse (not significant)	No change	No additional mitigation or further assessment required.
	Operation year 1	Slight adverse (not significant)	Slight adverse (not significant)	No change	No additional mitigation or further assessment required.
	Operation year 15	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
Landscape – G: South Weald	Construction	Slight adverse (not significant)	Slight adverse (not significant)	No change	No additional mitigation or further assessment required.
	Operation year 1	Slight adverse (not significant)	Slight adverse (not significant)	No change	No additional mitigation or further assessment required.

Receptor	Construction / operation	Effects presented in the ES	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
	Operation year 15	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
Visual – 1	Construction	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
	Operation year 1	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
	Operation year 15	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
Visual – 2A & 2B	Construction	Slight adverse (not significant)	Slight adverse (not significant)	No change	No additional mitigation or further assessment required.
	Operation year 1	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
	Operation year 15	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
Visual – 2C	Construction	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
	Operation year 1	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
	Operation year 15	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
Visual – 2E	Construction	Slight adverse (not significant)	Slight adverse (not significant)	No change	No additional mitigation or further assessment required.
	Operation year 1	Slight adverse (not significant)	Slight adverse (not significant)	No change	No additional mitigation or further assessment required.
	Operation year 15	Slight adverse (not significant)	Slight adverse (not significant)	No change	No additional mitigation or further assessment required.

Receptor	Construction / operation	Effects presented in the ES	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
Visual - 2F	Construction	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
	Operation year 1	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
	Operation year 15	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
Visual - 4	Construction	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
	Operation year 1	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
	Operation year 15	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
Visual - 5	Construction	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
	Operation year 1	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
	Operation year 15	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
Visual – 6A	Construction	Moderate adverse (significant)	Moderate adverse (significant)	No change	No additional mitigation or further assessment required.
	Operation year 1	Moderate adverse (significant)	Moderate adverse (significant)	No change	No additional mitigation or further assessment required.
	Operation year 15	Moderate adverse (significant)	Moderate adverse (significant)	No change	No additional mitigation or further assessment required.
Visual – 6B	Construction	Moderate adverse (significant)	Moderate adverse (significant)	No change	No additional mitigation or further assessment required.

Receptor	Construction / operation	Effects presented in the ES	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
	Operation year 1	Moderate adverse (significant)	Moderate adverse (significant)	No change	No additional mitigation or further assessment required.
	Operation year 15	Slight adverse (not significant)	Moderate adverse (significant)	Adverse – increase in adverse findings from Slight adverse to Moderate adverse	No additional mitigation or further assessment required. The elevated nature of the visual receptor only slightly benefits from the proposed mitigation and would form a noticeable feature within the view.
Visual - 7	Construction	Very large adverse (significant)	Very large adverse (significant)	No change	No additional mitigation or further assessment required.
	Operation year 1	Very large adverse (significant)	Very large adverse (significant)	No change	No additional mitigation or further assessment required.
	Operation year 15	Large adverse (significant)	Large adverse (significant)	No change	No additional mitigation or further assessment required.
Visual – 8	Construction	Very large adverse (significant)	Very large adverse (significant)	No change	No additional mitigation or further assessment required.
	Operation year 1	Large adverse (significant)	Large adverse (significant)	No change	No additional mitigation or further assessment required.
	Operation year 15	Moderate adverse (significant)	Moderate adverse (significant)	No change	No additional mitigation or further assessment required.
Visual – 9A	Construction	Very large adverse (significant)	Very large adverse (significant)	No change	No additional mitigation or further assessment required.
	Operation year 1	Very large adverse (significant)	Very large adverse (significant)	No change	No additional mitigation or further assessment required.

Receptor	Construction / operation	Effects presented in the ES	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
	Operation year 15	Moderate adverse (significant)	Moderate adverse (significant)	No change	No additional mitigation or further assessment required.
Visual – 9B	Construction	Moderate adverse (significant)	Moderate adverse (significant)	No change	No additional mitigation or further assessment required.
	Operation year 1	Moderate adverse (significant)	Moderate adverse (significant)	No change	No additional mitigation or further assessment required.
	Operation year 15	Slight adverse (not significant)	Slight adverse (not significant)	No change	No additional mitigation or further assessment required.
Visual – 10	Construction	Slight adverse (not significant)	Slight adverse (not significant)	No change	No additional mitigation or further assessment required.
	Operation year 1	Slight adverse (not significant)	Slight adverse (not significant)	No change	No additional mitigation or further assessment required.
	Operation year 15	Slight adverse (not significant)	Slight adverse (not significant)	No change	No additional mitigation or further assessment required.
Visual – 11	Construction	Slight adverse (not significant)	Slight adverse (not significant)	No change	No additional mitigation or further assessment required.
	Operation year 1	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
	Operation year 15	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
Visual – 12	Construction	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.

Receptor	Construction / operation	Effects presented in the ES	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
	Operation year 1	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
	Operation year 15	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
Visual – 14	Construction	Slight adverse (not significant)	Slight adverse (not significant)	No change	No additional mitigation or further assessment required.
	Operation year 1	Slight adverse (not significant)	Slight adverse (not significant)	No change	No additional mitigation or further assessment required.
	Operation year 15	Slight adverse (not significant)	Slight adverse (not significant)	No change	No additional mitigation or further assessment required.
Visual – A	Construction	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
	Operation year 1	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
	Operation year 15	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
Visual – B	Construction	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
	Operation year 1	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
	Operation year 15	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
Visual – C	Construction	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
	Operation year 1	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.

Receptor	Construction / operation	Effects presented in the ES	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
	Operation year 15	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
Visual – D	Construction	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
	Operation year 1	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
	Operation year 15	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
Visual – E	Construction	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
	Operation year 1	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.
	Operation year 15	Neutral (not significant)	Neutral (not significant)	No change	No additional mitigation or further assessment required.

3.7 Geology and soils

3.7.1 The geology and soils assessment of the Scheme is presented in Chapter 10 of the ES (application document TR010029/APP/6.1). The assessment of effects for each element is summarised in section 10.10 and the full land contamination assessment of effects is presented in Appendix 10.7 of the ES (application document TR010029/APP/6.3).

3.7.2 A sensitivity test has been undertaken to determine whether the updates to the DMRB guidance in relation to agricultural soils would introduce any change to the predicted effects presented in the ES. The methodology for the assessment of land contamination, geomorphology and ground stability and agricultural land are presented in section 10.5 of the ES. The ES methodology for the assessment of agricultural soils uses an Atkins bespoke system in the absence of a specific assessment methodology in the superseded DMRB guidance. Differences include ALC Grade 4 being Low sensitivity instead of Medium (using Atkins system) and the loss of 1 to 2 0ha of BMV land as Moderate, compared to 5 ha to 20ha with Atkins system. The changes to the agricultural land methodology in the updated DMRB guidance were reviewed to assess whether the loss of 2ha of ALC Grade 3b land would result in a significant effect.

3.7.3 Risks associated with land stability/geotechnical hazards were not part of Volume 11 although they were assessed within the Geology and soils chapter of the ES. LA 109 notes that these risks are to be assessed as part of geotechnical documents which form DMRB CD 622. A Ground Investigation Report (GIR) is currently being prepared for the Scheme which will include an assessment of stability and settlement issues. Since the GIR is still in progress no comparison of effects has been completed as part of the sensitivity assessment

3.7.4 The assessment of effects for each element is summarised in section 10.10 and the full land contamination assessment of effects is presented in Appendix 10.7 of the ES (application document TR010029/APP/6.3). Effects on agricultural holdings were not part of Volume 11 (only effects on agricultural soils) but an assessment was included in the Geology and Soils chapter of the ES. Under the updated DMRB guidance, effects on agricultural land holdings are reported in LA 112 Population and human health. The assessment of relevant agricultural land holdings set out in LA 112 has been incorporated into Chapter 13 (People and communities). The assessment of change to effect is presented in Table 3.6 below.

Table 3.6: Geology and soils - Comparison between effects stated in the ES and predicted effects under the updated DMRB guidance

Receptor	Construction / operation	Effects presented in the ES	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
Land contamination assessment					
On-site members of the public	Construction	Negligible to Moderate Adverse (significant), becoming Negligible (not significant) with mitigation	Negligible to Moderate Adverse (significant), becoming Negligible (not significant) with mitigation	No change	No additional mitigation or further assessment required.
	Operation	Negligible to Minor Beneficial (not significant)	Negligible to Minor Beneficial (not significant)	No change	No additional mitigation or further assessment required.

Receptor	Construction / operation	Effects presented in the ES	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
On-site future workers	Construction	Moderate Adverse (significant), becoming Negligible (not significant) with mitigation	Moderate Adverse (significant), becoming Negligible (not significant) with mitigation	No change	No additional mitigation or further assessment required.
	Operation	Negligible (not significant)	Negligible (not significant)	No change	No additional mitigation or further assessment required.
Off-site workers/visitors/users	Construction	Negligible to Minor Adverse (not significant), becoming Negligible (not significant) with mitigation.	Negligible to Minor Adverse (not significant), becoming Negligible (not significant) with mitigation.	No change	No additional mitigation or further assessment required.
	Operation	Negligible (not significant)	Negligible (not significant).	No change	No additional mitigation or further assessment required.
On-site groundwater (superficial Secondary A aquifer and Secondary Undifferentiated aquifer) and surface water features	Construction	Negligible to Minor Adverse (not significant), becoming Negligible (not significant)	Negligible to Minor Adverse (not significant, becoming Negligible (not significant) with mitigation.	No change	No additional mitigation or further assessment required.

Receptor	Construction / operation	Effects presented in the ES	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
(Ingrebourne River and Weald Brook)		with mitigation.			
	Operation	Negligible to Minor Beneficial (not significant) with mitigation.	Negligible (not significant) to Minor Beneficial (not significant) with mitigation.	No change	No additional mitigation or further assessment required.
Off-site groundwater (superficial Secondary A aquifer and Secondary Undifferentiated aquifer) and surface water features (Ingrebourne River and Weald Brook)	Construction	Minor Adverse (not significant), becoming Negligible (not significant) with mitigation.	Minor Adverse (not significant), becoming Negligible (not significant) with mitigation.)	No change	No additional mitigation or further assessment required.
	Operation	Negligible (not significant) to Minor Beneficial (not significant).	Negligible (not significant) to Minor Beneficial (not significant)	No change	No additional mitigation or further assessment required.
On-site underground services	Construction	Negligible (not significant)	Negligible (not significant)	No change	No additional mitigation or further assessment required.
	Operation	Negligible (not significant) to Minor Beneficial (not significant)	Negligible (not significant) to Minor Beneficial (not significant) with mitigation.	No change	No additional mitigation or further assessment required.

Receptor	Construction / operation	Effects presented in the ES	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
		with mitigation.			
Off-site existing structures, services piles and foundations	Construction	Negligible (not significant)	Negligible l (not significant)	No change	No additional mitigation or further assessment required.
	Operation	Negligible (not significant) to Minor Beneficial (not significant) with mitigation.	Negligible (not significant) to Minor Beneficial (not significant) with mitigation	No change	No additional mitigation or further assessment required.
Geomorphology and ground stability					
Geomorphology (Topography)	Construction	Negligible (not significant)	N/A[1]	N/A[1]	N/A[1]
	Operation	Negligible (not significant)			
Ground Stability	Construction	Minor Adverse to Minor Beneficial (not significant)	N/A[2]	N/A[2]	N/A[2]
	Operation	Negligible (not significant)			
Agricultural land assessment					

Receptor	Construction / operation	Effects presented in the ES	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
Agricultural soils	Construction	Neutral (not significant)	Moderate Adverse (significant)	Adverse	No additional environmental mitigation or further assessment required - there is no mitigation for permanent loss of agricultural land beyond financial compensation which is not an environmental mitigation .
	Operation	Neutral (not significant)	Moderate Adverse (significant)	Adverse	No additional environmental mitigation or further assessment required - there is no mitigation for permanent loss of agricultural land beyond financial compensation which is not an environmental mitigation.
Agricultural holdings	Construction	Moderate Adverse (significant)	N/A[3]	N/A[3]	N/A[3]
	Operation	Slight Adverse (not significant)			

Notes:
1. Not applicable – under the updated DMRB guidance effects are assessed and reported in LA 107 Landscape and visual effects
2. Not applicable – under the updated DMRB guidance effects are assessed and reported in geotechnical assessments in accordance with CD 622
3. Not applicable – under the updated DMRB guidance effects are assessed and reported in LA 112 Population and human health

3.8 Cultural heritage

3.8.1 The cultural heritage assessment of the Scheme is presented in Chapter 11 of the ES (application document TR010029/APP/6.1). The methodology for the assessment of cultural heritage is presented in section 11.5. The assessment of effects for each receptor can be found in section 11.10 of the ES.

3.8.2 There is no change to the recommended methodology in the updated DMRB guidance (LA 106) compared to the superseded

DMRB guidance (HA 208/07, HA 60/92, HA 75/01). It is considered that the superseded guidance is more specific than the updated guidance and that the DMRB guidance has only changed in relation to the language used rather than any change to the actual assessment methodology. Furthermore, “Sensitivity” in the updated DMRB guidance is also identified as “Value” and the ES chapter already includes that assessment. A sensitivity test has been undertaken to determine whether the updates to the DMRB guidance in relation to cultural heritage would introduce any change to the predicted effects presented in the ES. The assessment of change to effect is presented In Table 3.7.

Table 3.7: Cultural heritage - Comparison between effects stated in the ES and predicted effects under the updated DMRB guidance

Receptor	Construction / operation	Effects presented in the ES	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
London to Colchester Roman Road (APA)	Construction	Slight adverse, not significant	Slight adverse, not significant	No change	No additional mitigation or further assessment required.
	Operation	Neutral	Neutral	No change	No additional mitigation or further assessment required.
Alluvial Deposits (Geology) (APZ)	Construction	Slight adverse, not significant	Slight adverse, not significant	No change	No additional mitigation or further assessment required.
	Operation	Neutral	Neutral	No change	No additional mitigation or further assessment required.
Former Maylands Aerodrome Site	Construction	Slight adverse, not significant	Slight adverse, not significant	No change	No additional mitigation or further assessment required.
	Operation	Neutral	Neutral	No change	No additional mitigation or further assessment required.
Post-medieval park at Dagnam	Construction	Slight adverse, not significant	Slight adverse, not significant	No change	No additional mitigation or further assessment required.
	Operation	Neutral	Neutral	No change	No additional mitigation or further assessment required.
Stony Hills Farm (Grade	Construction	Slight adverse, not significant	Slight adverse, not significant	No change	No additional mitigation or further assessment required.

Receptor	Construction / operation	Effects presented in the ES	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
II listed building)	Operation	Neutral	Neutral	No change	No additional mitigation or further assessment required.

3.9 Population and human health

3.9.1 The population and human health assessment of the Scheme is presented in Chapter 13 (People and Communities) of the ES (application document TR010029/APP/6.1). People and communities is now termed Population and Human Health under the updated DMRB guidance. Section 13.5 of Chapter 13 outlines the methodology and Section 13.7 provides the baseline conditions which remain consistent with the updated guidance within LA 112. Section 13.8 outlines the potential impacts of the Scheme and section 13.10 details the assessment of the effects which are again considered to be in line with the guidance set out in LA 112.

3.9.2 Table 3.8 provides a summary of the changes between the superseded and updated DMRB guidance on Population and Human Health. This is based on the relevant assessments being undertaken again against the guidance set out in LA 112. In some instances, the table below has collated receptors where impacts are expected to be the same. Where consideration is required to be given to an individual receptor, this has been noted in the table below. All receptors are set out in detail in section 13.7 of Chapter 13.

Table 3.8: Population and human health - Comparison between effects stated in the ES and predicted effects under the updated DMRB guidance

Receptor	Construction / operation	Effects presented in the ES	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
Private dwellings and	Construction	Large adverse (significant)	Large adverse (significant)	No change	No additional mitigation or further assessment required.

Receptor	Construction / operation	Effects presented in the ES	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
property: Land Take – Grove Farm	Operation	Large adverse (significant)	Large adverse (significant)	No change	No additional mitigation or further assessment required.
Private dwellings and property: Land Take – Maylands Cottages	Construction	Neutral	Neutral	No change	No additional mitigation or further assessment required.
	Operation	Neutral	Neutral	No change	No additional mitigation or further assessment required.
Private dwellings and property: Land Take – All other dwellings	Construction	Neutral	Neutral	No change	No additional mitigation or further assessment required.
	Operation	Neutral	Neutral	No change	No additional mitigation or further assessment required.
Private dwellings and property: Amenity – Grove Farm	Construction	Large adverse (significant)	Large adverse (significant)	No change	No additional mitigation or further assessment required.
	Operation	Large adverse (significant)	Large adverse (significant)	No change	No additional mitigation or further assessment required.
Private dwellings and property: Amenity – Maylands Cottages	Construction	Large adverse (significant)	Large adverse (significant)	No change	No additional mitigation or further assessment required.
	Operation	Large adverse (significant)	Large adverse (significant)	No change	No additional mitigation or further assessment required.
Private dwellings and property:	Construction	Slight Adverse or Neutral	Slight Adverse or Neutral	No change	No additional mitigation or further assessment required.

Receptor	Construction / operation	Effects presented in the ES	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
Amenity – All other dwellings	Operation	Slight Adverse or Neutral	Slight Adverse or Neutral	No change	No additional mitigation or further assessment required.
Community Assets: Land take and severance – Maylands Golf Course	Construction	Neutral	Neutral	No change	No additional mitigation or further assessment required.
	Operation	Neutral	Neutral	No change	No additional mitigation or further assessment required.
Community Assets: Land take and severance – Land at Oak Farm	Construction	Slight adverse	Slight adverse	No change	No additional mitigation or further assessment required.
	Operation	Neutral	Neutral	No change	No additional mitigation or further assessment required.
Community Assets: Land take and severance – All other receptors	Construction	Neutral	Neutral	No change	No additional mitigation or further assessment required.
	Operation	Neutral	Neutral	No change	No additional mitigation or further assessment required.
Community Assets: Amenity– Maylands Golf Course	Construction	Moderate adverse (significant)	Moderate adverse (significant)	No change	No additional mitigation or further assessment required.
	Operation	Slight adverse	Slight adverse	No change	No additional mitigation or further assessment required.
Community Assets: Amenity –	Construction	Slight Adverse (landscape and visual impact)	Slight Adverse (landscape and visual impact)	No change	No additional mitigation or further assessment required.

Receptor	Construction / operation	Effects presented in the ES	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
Land at Oak Farm	Operation	Slight Adverse (landscape and visual impact)	Slight Adverse (landscape and visual impact)	No change	No additional mitigation or further assessment required.
Community Assets: Amenity – All other receptors	Construction	Neutral or slight adverse	Neutral or slight adverse	No change	No additional mitigation or further assessment required.
	Operation	Neutral or slight adverse	Neutral or slight adverse	No change	No additional mitigation or further assessment required.
Rural enterprises – Glebelands Estate	Construction	Slight adverse	Slight adverse	No change	No additional mitigation or further assessment required.
	Operation	Slight adverse	Slight adverse	No change	No additional mitigation or further assessment required.
Rural enterprises – All other receptors	Construction	Neutral	Neutral	No change	No additional mitigation or further assessment required.
	Operation	Neutral	Neutral	No change	No additional mitigation or further assessment required.
Development land – All receptors	Construction	Neutral	Neutral	No change	No additional mitigation or further assessment required.
	Operation	Slight beneficial	Slight beneficial	No change	No additional mitigation or further assessment required.
Non-motorised uses: Severance – All receptors	Construction	Neutral	Neutral	No change	No additional mitigation or further assessment required.
	Operation	Neutral to slight beneficial	Neutral to slight beneficial	No change	No additional mitigation or further assessment required.

Receptor	Construction / operation	Effects presented in the ES	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
Non-motorised uses: Changes in amenity – All receptors	Construction	Slight adverse	Slight adverse	No change	No additional mitigation or further assessment required.
	Operation	Neutral	Neutral	No change	No additional mitigation or further assessment required.
Vehicle Travellers – Views from the road	Construction	Slight adverse	Assessment no longer required	N/A	N/A
	Operation	Slight adverse	Assessment no longer required	N/A	N/A
Vehicle travellers – Driver stress	Construction	N/A	Assessment no longer required	N/A	N/A
	Operation	Moderate beneficial (significant)	Assessment no longer required	N/A	N/A
Human Health – All receptors	Construction	Neutral	Neutral	No change	No additional mitigation or further assessment required.
	Operation	Neutral	Neutral	No change	No additional mitigation or further assessment required.

3.10 Climate

Climate effects

3.10.1 The climate effects assessment of the Scheme is presented as a sub-chapter in Chapter 14 (Climate) of the ES (application document TR010029/APP/6.1). A detailed review of the relevant updated DMRB guidance has been completed and key

differences between them and the now superseded guidance have been established. Building on this exercise professional judgement has been used to complete Table 3.9. Minor changes to the assessment method have been identified, however these are not anticipated to affect the outcome of the significance assessment.

Table 3.9: Climate effects - Comparison between effects stated in the ES and predicted effects under the updated DMRB guidance

Receptor	Construction / operation	Effects presented in the ES	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
Atmosphere	Construction	Not significant	Not significant	No change	No additional mitigation or further assessment required.
	Operation	Not significant	Not significant	No change	No additional mitigation or further assessment required.

Climate vulnerability

3.10.2 The climate vulnerability assessment of the Scheme is presented as a sub-chapter in Chapter 14 (Climate) of the ES (application document TR010029/APP/6.1).

3.10.3 A detailed review of the relevant updated DMRB guidance has been completed and key differences between them and the now superseded guidance have been established. Building on this exercise professional judgement has been used to complete Table 3.10. It shows no changes to the outcome of the climate vulnerability assessment would be anticipated following an update to align it with the updated DMRB guidance.

3.10.4 It is noted that the updated DMRB guidance states the baseline data timeframe should be 1961-1990 and that the baseline in the ES prepared for the Scheme currently uses data from 1981-2010. Both are acceptable baseline periods for comparison to climate change projections. A baseline data timeframe was not specified in the superseded guidance. An update of this would require both the historic climate and future projected climate sections of the baseline to be redone but would not change the impact assessment outcome.

Table 3.10: Climate vulnerability - Comparison between effects stated in the ES and predicted effects under the updated DMRB guidance

Receptor	Construction / operation	Effects presented in the ES	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
Construction process, assets and end-users	Construction	Not significant	Not significant	No change	No additional mitigation or further assessment required.
	Operation	Not significant	Not significant	No change	No additional mitigation or further assessment required.

3.11 Assessment of cumulative effects

3.11.1 The assessment of cumulative effects for the Scheme is presented in Chapter 15 of the ES (application document TR010029/APP/6.1). The assessment methodology for this chapter is outlined in section 15.5, whilst the assessments for in-combination effects and for cumulative effects are given in full in sections 15.8 and 15.9 respectively. The longlist of 'other developments' considered for the cumulative effects assessment forms Appendix 15.1 (application document TR010029/APP/6.3), and Figure 15.1 (application document TR010029/APP/6.2) has also been produced, overlaying the location of the developments considered in the cumulative effects assessment, topic chapter study areas, and the development tiers (as explained in the methodology) of each site.

3.11.2 The cumulative effects assessment is undertaken following the methodology laid out in the Planning Inspectorate's Advice Note Seventeen: Cumulative Effects, and is not detailed within the DMRB guidance. The most recent update to Advice Note Seventeen was published in August 2019; Chapter 15 of the ES already accords with the methodology outlined in this update.

3.11.3 However, as the in-combination and cumulative effects assessment observe the interrelationships between the effects observed in the other environmental topic chapters with each other, and with other developments, any changes to effects observed elsewhere may impact those observed in the Assessment of cumulative effects chapter.

3.11.4 Therefore, a sensitivity test has also been carried out with regard to these effects on the basis of the above information in discussion with the various topic specialists. No changes are observed following the publication of the updated DMRB guidance and alterations to assessment methodologies therein.

Table 3.11: In-combination effects - Comparison between effects stated in the ES and predicted effects under the updated DMRB guidance

Receptor	Construction / operation	Effects presented in the ES	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
Human - residents, including community and private assets, sensitive receptors and vulnerable groups	Construction	Large adverse	Large adverse	No change	No additional mitigation or further assessment required.
	Operation	Slight adverse	Slight adverse	No change	
Human - all travellers, i.e. vehicle travellers, cyclists, and pedestrians	Construction	Slight adverse	Slight adverse	No change	No additional mitigation or further assessment required.
	Operation	Moderate beneficial	Moderate beneficial	No change	
Ecological receptors – protected species and existing habitats	Construction	Moderate adverse	Moderate adverse	No change	No additional mitigation or further assessment required.
	Operation	Slight adverse	Slight adverse	No change	
The water environment	Construction	Slight adverse	Slight adverse	No change	No additional mitigation or further assessment required.
	Operation	Neutral	Neutral	No change	
Landscape and townscape	Construction	Moderate adverse	Moderate adverse	No change	No additional mitigation or further assessment required.
	Operation	Slight adverse	Slight adverse	No change	
Geology and soils	Construction	Slight adverse	Slight adverse	No change	No additional mitigation or further assessment required.
	Operation	Neutral	Neutral	No change	
Heritage assets	Construction	Slight adverse	Slight adverse	No change	

Receptor	Construction / operation	Effects presented in the ES	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
	Operation	Neutral	Neutral	No change	No additional mitigation or further assessment required.

Table 3.12: Cumulative effects - Comparison between effects stated in the ES and predicted effects under the updated DMRB guidance

Receptor	Construction / operation	Effects presented in the ES	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
Lower Thames Crossing	Construction	Slight Adverse (Landscape) Slight Adverse to Neutral (Biodiversity)	Slight Adverse (Landscape) Slight Adverse to Neutral (Biodiversity)	No change	No additional mitigation or further assessment required.
	Operation	Slight Beneficial (Population & Health)	Slight Beneficial (Population & Health)	No change	
Gallows Corner Reconfiguration	Construction	Slight Adverse (Landscape)	Slight Adverse (Landscape)	No change	No additional mitigation or further assessment required.
	Operation	Neutral	Neutral	No change	
Small, Medium, Large Wind Development Sites	Construction	Moderate Adverse (Population & Health) Moderate to Slight Adverse (Biodiversity) Slight Adverse (Noise)	Moderate Adverse (Population & Health) Moderate to Slight Adverse (Biodiversity) Slight Adverse (Noise)	No change	No additional mitigation or further assessment required.
	Operation	Slight Adverse (Biodiversity, Population & Health)	Slight Adverse (Biodiversity, Population & Health)	No change	

Receptor	Construction / operation	Effects presented in the ES	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
The Caravan Park, Putwell Bridge	Construction	Slight Adverse (Noise, Population & Health)	Slight Adverse (Noise, Population & Health)	No change	No additional mitigation or further assessment required.
	Operation	Slight Beneficial (Population & Health)	Slight Beneficial (Population & Health)	No change	
Land at Oak Farm, Maylands Fields	Construction	Slight Adverse (Noise, Biodiversity) Slight Adverse to Neutral (Heritage)	Slight Adverse (Noise, Biodiversity) Slight Adverse to Neutral (Heritage)	No change	No additional mitigation or further assessment required.
	Operation	Slight Adverse to Neutral (Population & Health)	Slight Adverse to Neutral (Population & Health)	No change	
Former Harold Wood Hospital	Construction	Slight Adverse (Landscape)	Slight Adverse (Landscape)	No change	No additional mitigation or further assessment required.
	Operation	Neutral	Neutral	No change	
Cycleway Proposals	Construction	Slight Adverse (Noise)	Slight Adverse (Noise)	No change	No additional mitigation or further assessment required.
	Operation	Neutral	Neutral	No change	
Land East of Nags Head Lane	Construction	Slight Adverse (Noise)	Slight Adverse (Noise)	No change	No additional mitigation or further assessment required.
	Operation	Slight Adverse (Landscape) Slight Beneficial (Population & Health)	Slight Adverse (Landscape) Slight Beneficial (Population & Health)	No change	
Boyles Court Farm	Construction	Neutral	Neutral	No change	No additional mitigation or further assessment required.
	Operation	Slight Beneficial (Population & Health)	Slight Beneficial (Population & Health)	No change	
Regent House	Construction	Slight Adverse (Noise, Landscape)	Slight Adverse (Noise, Landscape)	No change	No additional mitigation or further assessment required.
	Operation	Neutral	Neutral	No change	

Receptor	Construction / operation	Effects presented in the ES	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
Essex Police & La Plata House	Construction	Slight Adverse (Landscape)	Slight Adverse (Landscape)	No change	No additional mitigation or further assessment required.
	Operation	Neutral	Neutral	No change	
141-147 High Street	Construction	Slight Adverse (Landscape)	Slight Adverse (Landscape)	No change	No additional mitigation or further assessment required.
	Operation	Neutral	Neutral	No change	
Land formerly known as NV Tools	Construction	Slight Adverse (Landscape)	Slight Adverse (Landscape)	No change	No additional mitigation or further assessment required.
	Operation	Neutral	Neutral	No change	
Kings House, 131-135 Kings Road	Construction	Slight Adverse (Landscape)	Slight Adverse (Landscape)	No change	No additional mitigation or further assessment required.
	Operation	Neutral	Neutral	No change	
Dunton Hills Garden Village	Construction	Neutral	Neutral	No change	No additional mitigation or further assessment required.
	Operation	Slight Adverse (Landscape)	Slight Adverse (Landscape)	No change	
All remaining ‘other developments’	Construction	Neutral	Neutral	No change	No additional mitigation or further assessment required.
	Operation	Neutral	Neutral	No change	

4. Comparison between effects reported in the HRA for the Scheme and predicted effects under the updated DMRB guidance

4.1 Overview

4.1.1 The following section provides a comparison of effects between those reported in the HRA no significant effects report for the Scheme (application document TR010029/APP/6.9) and predicted effects under the updated DMRB guidance.

4.1.2 The methodology and assessment criteria adopted in the HRA screening assessment is in accordance with HD 44/09.

4.1.3 Table 4.1 provides a high-level summary of the changes made in the updated DMRB guidance for HRA (LA 115) compared to the superseded guidance (HA 44/09).

4.1.4 A sensitivity test has been undertaken to determine whether the changes in LA 115 would introduce any change to the effects of the Scheme on European sites.

4.1.5 The study area was reviewed in line with LA 115 to determine whether any additional European sites should be included in the assessment. No additional sites were identified, as air quality and potential hydrological links were already considered.

4.1.6 There is no significant change to the baseline, methodology or assessment guidelines of LA 115 compared to HD 44/09. Therefore, the conclusions of the HRA screening assessment in relation to European sites would not be altered if it were to be undertaken using the LA 115. The results of the sensitivity test are presented in Table 4.2.

Table 4.1: Updates to DMRB guidance documents relevant to HRA screening assessment for the Scheme

Environmental topic	Superseded DMRB Document (assessed in HRA)	Updated DMRB reference	Date issued	Key environmental methodology matters	Change to DMRB EIA methodology (No change / No significant change / Change / Significant Change)	Key changes made to DMRB environmental assessment methodology
Habitats Regulations Assessment	HD 44/09	LA 115	October 2019	Scoping	Change	LA 115 makes specific reference to ensuring sites are included that: Have potential hydrological or hydrogeological linkage to a European site containing a groundwater depending terrestrial ecosystem which would trigger the need for assessment in accordance with LA 113. Has an ARN which triggers the criteria for assessment of European sites in accordance with LA 105.
				Study area	Change	As above.
				Baseline	No change	LA 115 aligns with superseded guidance. Baseline information or evidence required to inform assessment taken from desk based work or field survey sources as appropriate.
				Methodology	No change	LA 115 aligns with superseded guidance regarding methodology and consultation.
				Assessment	No change	LA 115 broadly aligns with superseded guidance, with some slight changes to the layout of the assessment tables.

Table 4.2: Comparison between effects stated in the HRA and predicted effects under the updated DMRB guidance

Receptor	Construction / operation	Effects presented in the HRA	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
Thames Estuary Marshes Special Protection Area	Construction and operation	No likely significant effects	No likely significant effects	No change	No additional mitigation or further assessment required.
Thames Estuary and Marshes Wetland of International Importance (Ramsar site)	Construction and operation	No likely significant effects	No likely significant effects	No change	No additional mitigation or further assessment required.

5. Comparison between requirements in the Outline CEMP for the Scheme and the updated DMRB guidance

5.1 Overview

5.1.1 The following section considers whether the Outline Construction Environmental Management (CEMP) (application document TR010029/APP/7.2) would require to be revised due to changes made by the updated DMRB guidance (LA 120 Environmental Management Plans). It supersedes IAN 183/14 Environmental Management Plans.

5.1.2 LA 120 provides a framework to manage the environmental effects of projects to demonstrate compliance with environmental legislation, by providing a plan for the delivery of the project's design, mitigation, enhancement and monitoring commitments.

5.1.3 Table 5.1 outlines whether the Outline CEMP for the Scheme includes the content and structure outlined in Appendix A Table A.1 of the updated DMRB guidance.

5.2 Outline CEMP content and structure

Table 5.1: Assessment of Outline CEMP for the Scheme under updated DMRB guidance

Chapter	Updated DMRB guidance: LA 120	Inclusion in Outline CEMP
1. Introduction and background to project		
1.1 Purpose of the report	Produced at this stage to include a brief description of the purpose of the EMP.	This is included in Section 1.3: Purpose of the Outline CEMP.
1.2 The project	Produced at this stage to include: • project name • location • programme • why it is needed • brief outline of proposed works	This is included in Section 1.1: Scheme description. The location is also shown in Appendix A.
1.3 Project objectives	Produced at this stage to include a brief outline of the project objectives (aligning with the objectives set out in the environmental assessment report / environmental statement). NOTE: Project objectives to align with the requirements in LA 117	This is included in Section 1.2 Scheme objectives.
2. Project team roles and responsibilities		
	Produced at this stage to include: • competent expert statements • roles involved in the delivery of the EMP • responsibilities • organisations involved	This is included in Section 3.2: Project management organisation. Note: Competent expert statements are not included in the Outline CEMP, but this is covered in the ES.
3. Environmental actions and commitments		
	Produced at this stage (in table format) to include: • clear and specific description of the action/commitment, including the specific location • the assumptions on which the action is based • the objective of the action, including alignment with those set out in Section 1.3. Reference to relevant legislation requirements • how the action is to be implemented/ achieved, including details of risk management	• This is addressed in the Register of environmental actions and commitments (REAC) – Table 1.2 (application document TR010029/APP/7.3)

Chapter	Updated DMRB guidance: LA 120	Inclusion in Outline CEMP
	• the source of the action (e.g. EAR/ES, Habitat Regulations assessment, Equality Impact Assessment, Traffic Management Plan) including confirmation of commitments agreed with stakeholders • name of the person responsible for the action • achievement criteria • the anticipated project stage, date of implementation or achievement • details of any monitoring required (including in relation to likely significant adverse effects). Note: Include reference to mitigation commitments relied on within the EIA screening (determination).	• Assumptions are included in the REAC– Table 1.2 • Objectives of the environmental actions and commitments are included in the REAC – Table 1.2. • A register of environmental legislation will be included in Appendix I • The approach to risk management is detailed in Section 11: Environmental risk assessments • The source of the action is detailed in the REAC including confirmation of agreements with stakeholders – Table 1.2 • The role of the responsible person (e.g. Principal Contractor) is included in the REAC – Table 1.2 • Achievement criteria is outlined in the REAC – Table 1.2 • The anticipated project stage for environmental actions is outlined in the REAC – Table 1.2 • The anticipated project stage for environmental actions is outlined in the REAC – Table 1.2

Chapter	Updated DMRB guidance: LA 120	Inclusion in Outline CEMP
4. Consents and permissions		
	Produced at this stage to include a summary of anticipated consents / permissions required to deliver the EMP.	This is included in Section 7.1: Consent and agreement position statement.
5. Environmental asset data and as built drawings		
	Produced at this stage to include: • confirmation of submission arrangements for providing as built drawings and environmental asset data to the Overseeing Organisation • species surveys obtained until this point	This is included in Section 10: Environmental asset data and As Built drawings.
6. Details of maintenance and EMP monitoring activities		
	Produced at this stage to include a brief description of maintenance and EMP monitoring activities.	This is included in section 10.1.4.
7. Induction, training and briefing procedures for staff		
	Produced at this stage to include: 1. brief description of induction, training and briefing procedures for staff. 2. criteria for evaluation of training effectiveness.	This is included in Section 4.2: Training and briefing procedures
8. References and glossary		These are included.
9. Annexes		
Annex A: Constraints map	Produced at this stage.	This is included in Appendix B.
Annex B: Relevant management plans	Produced at this stage where commitments have been made to produce specific management plans in outline format.	Placeholder for the Principal Contractor to produce this is included in Appendix F
Annex C: Environmental method statements	Produced at this stage where commitments have been made to produce specific management plans in outline format, including relevant method statements where commitments have been made to do so	Placeholder for the Principal Contractor to produce this is included in Appendix D.
Annex D: Emergency procedures and record of any environmental incidents	Produced at this stage to provide a brief description of emergency procedures and environmental incident record management.	Placeholder for the Principal Contractor to produce this is included in Appendix M.

Chapter	Updated DMRB guidance: LA 120	Inclusion in Outline CEMP
Annex E: Copy of evaluation of change register	Produced at this stage to provide a brief description of evaluation of change register	This is not included.
Annex F: Final environmental investigation and monitoring reports	Produced at this stage to provide a brief description environmental investigation and monitoring.	Placeholder for the Principal Contractor to produce this is included in Appendix K.

6. Summary and conclusions

6.1 Summary overview

6.1.1 This technical note provides a summary of the key changes to DMRB methodologies and assessments for each environmental discipline considered as part of the ES for the Scheme. It provides a high level assessment of how these updates impact the effects reported in the ES.

6.1.2 It considers the potential for any changes to the environmental effects concluded in the ES and whether there are new effects which would be required to be taken into consideration through the project life cycle.

6.1.3 The following environmental topics concluded that predicted changes to the environmental effects or potential additional mitigation measures would be required if the updated DMRB guidance were applied to the EIA for the Scheme:

- Air quality
- Biodiversity
- Geology and soils

6.1.4 Table 6.1 identifies effects that are predicted to change under the updated DMRB guidance for all environmental disciplines and whether further assessments or mitigation would be required.

Table 6.1: Summary of changes to effects stated in the ES and predicted effects under the updated DMRB guidance

Topic	Receptor	Construction / operation	Effects presented in the ES	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
Air quality	Ecological receptors (veteran trees, ancient woodland, local wildlife sites) Note - ecological receptors were included in the ES for effects during construction	Operation	Not assessed	Slight Adverse (not significant) for Ingrebourne Valley SMI. Neutral for all other receptors. There may be changes in nitrogen deposition rates with the Scheme at ecological receptors in the study area, which in some instances exceed 1% of the critical load for the site. However, for the majority of the receptor points, nitrogen deposition rates are lower in the opening year than in the base year. The only receptor points to experience slightly higher rates than base are immediately adjacent to the new loop and realigned slip road close to the A12, within Ingrebourne Valley SMI (see Appendix A).	Not previously assessed	None required as not expected to be a significant adverse effect.
Biodiversity	Ingrebourne Valley SMI	Construction	Temporary Moderate adverse (significant) becoming Slight adverse on establishment of habitat and mitigation (not significant)	Slight adverse (not significant)	Positive – temporary significant effect removed based on new assessment guidelines	No additional mitigation or further assessment required.

Topic	Receptor	Construction / operation	Effects presented in the ES	Predicted effects (or new effects) under updated DMRB guidance	Change to effects presented in the ES (positive/adverse/or no change/not previously assessed)	Additional mitigation or further assessment likely to be required
	Terrestrial invertebrates (including stag beetle and alder flea-weevil)	Construction	Temporary Moderate adverse (significant) becoming Neutral (not significant) on establishment of mitigation and compensation habitat	Temporary Slight adverse becoming Neutral (not significant)	Positive – temporary significant effect removed based on new guidelines	No additional mitigation or further assessment required.
	Bats	Operation	Neutral (not significant)	Slight adverse (not significant)	Adverse – change from Neutral to Slight adverse	No additional mitigation or further assessment required as no significant effect on conservation status is predicted.
	Otters	Construction	Temporary Moderate adverse (significant) becoming Neutral (not significant) on establishment of habitat	Temporary Slight adverse becoming Neutral (not significant)	Positive – temporary significant effect removed based on new guidelines	No additional mitigation or further assessment required.
Geology and soils	Agricultural soils	Construction	Neutral (not significant)	Moderate Adverse (significant)	Adverse – change from Neutral to Moderate Adverse	No additional environmental mitigation or further assessment required.
		Operation	Neutral (not significant)	Moderate Adverse (significant)	Adverse – change from Neutral to Moderate Adverse	No additional environmental mitigation or further assessment required.

HRA

6.1.5 The study area for the HRA screening assessment was reviewed in line with LA 115 to determine whether any additional European sites should be included in the assessment. No additional sites were identified, as air quality and potential hydrological links were already considered.

6.1.6 There is no significant change to the baseline, methodology or assessment requirement of LA 115 compared to superseded HD 44/09. Therefore, the conclusions of the HRA screening assessment in relation to European sites would not be altered if it were to be undertaken using the LA 115.

Outline CEMP

6.1.7 It is considered that the Outline CEMP is broadly in line with the contents and structure requirements outlined in the updated DMRB guidance (LA 120 Environmental management plans) as demonstrated in Section 5.2 of this document.

6.2 Conclusions

6.2.1 This sensitivity test demonstrates that the updated DMRB guidance would not change the result of the EIA presented in the ES chapters and the environmental mitigation measures proposed for the Scheme are appropriate.

Appendices

Appendix A. Air quality

A.1 Compliance risk assessment

A.1.1 The compliance risk assessment was undertaken in accordance with LA 105, paragraphs 2.64 to 2.87).

A.1.2 As shown in Figure 5.1 of the ES, there are two road links in the ARN which overlap with the PCM model so an assessment is required for the following links: A12 Colchester Road; and A1023 Brook Street.

A.1.3 Both links have qualifying features in the form of footpaths running parallel within 15m of the kerbside. As per LA 105 guidance, local model validation points have been modelled to represent the worst case air quality concentrations adjacent to these links. The points were modelled 4m from the kerbside at 2m in height and were positioned 25m away from “major motorway junctions” which includes the end of the slip road.

A.1.4 Local modelled air quality results for each PCM link are presented in Table A.1 alongside the modelled PCM concentration at the same location for comparison.

Table A.1: Modelled Worst Case PCM NO_2 Concentrations (µg/m^3)

PCM Census ID	X	Y	2022 DM	2022 DS	Change	2022 PCM Modelled NO_2
46211	556161	191997	23.6	23.8	+0.2	31.6
7478	556943	192392	28.9	29.1	+0.2	21.5

A.1.5 There are differences between the locally modelled NO_2 concentrations and those modelled using the PCM model which are greater than 10%. However, given the results are well below the EU limit value of 40 µg/m^3, at low risk of non-compliance, this difference is not considered to be material, particularly acknowledging the limitations and differences between the PCM model and the local model.

A.1.6 This assessment concludes there is no risk to the UK’s reported ability to comply with the Air Quality Directive in the shortest timescale possible as:

- There are no modelled exceedances of the air quality thresholds for any PCM link; and
- The change in annual mean NO_2 concentrations between the do-minimum and do-something is less than ±0.4 µg/m^3.

A.2 Assessment of ecological receptors

A.2.1 The receptor points for within ecological sites and for the veteran trees are provided in Table A.2, along with the distance to the nearest road edge. The receptor points are shown in Figure B1 in Appendix B. Points were included up to 200m from the road edge. The receptor points lie within woodland and grassland habitats. For all receptor points the habitat was taken to be woodland, with a critical load for nitrogen deposition of 10 – 20 kg N/ha/yr, which is lower than the critical load for grassland of 20-30 kg N/ha/yr, and is therefore adopting a precautionary approach.

A.2.2 The receptor points have been modelled as per the approach set out in the Environmental Statement. Modelled results have been factored using the most conservative Highways England IAN 170/12v3 projection factors. The factors derived for the ecological receptors are presented in Table A.3 below.

A.2.3 The annual mean NOx concentrations and the magnitude of the change between Do-Minimum and Do-Something are presented in Table A.4. The results show that:

- NOx concentrations exceeded the critical level of 30 µg/m^3 at all sites in the base year (even if at just one transect point) except for veteran tree T114, which is over 180 metres from the nearest road.
- NOx concentrations exceeded the critical level of 30 µg/m^3 at all sites in the opening year (even if at just one transect point) except for veteran trees T065, T059, T077, T114, T112.
- NO_x concentrations were estimated to be lower in 2022 than in 2015, as a result of improvements in vehicle technology.

A.2.4 The background deposition rates used in the assessment are presented in Table A.5 (due to the relatively small study area, the deposition rate applies to all receptors). The calculated nitrogen dry deposition rates are provided in Table A.6.

A.2.5 Nitrogen deposition rates exceeded the critical load of 10kg N/ha/yr in both the base year and the opening year both with and without the Scheme. This is due to the background nitrogen deposition rate being over 10 kg N/ha/yr.

A.2.6 There was expected to be an increase of over 1% of the lower range of the critical load at the following sites: T002, T004, T065, T180, T059, T077, Ingrebourne Valley SMI South to North transect (north of the M25 west of junction 28), Ingrebourne Valley SMI East to West transect (west of the M25 north of junction 28), and Ingrebourne Valley SMI transect running north of the proposed loop road.

A.2.7 Where there is an increase over 1% the change in nitrogen deposition is examined and noted where it is above 0.4kg N/ha/yr (paragraph 2.99 of LA 105), as this is the increase required to reduce species richness by 1 in certain habitats at a background. The only sites with an increase of over 0.4kg N/ha/yr (LA 105) are:

- Ingrebourne Valley SMI South to North transect points 10 to 100
- Ingrebourne Valley SMI East to West transect points 0 to 60

A.2.8 It should be noted that with the Scheme some of the transect points will be located under a new or realigned road. The changes at these locations are therefore not representative. This includes transect points Ingrebourne S_N 10, 20, 50 and 60, and Ingrebourne E_W 10 and 20. Therefore, the only transect points where changes of over 0.4 kg N/ha/yr are expected that are not beneath the new or realigned roads are:

- Ingrebourne Valley SMI South to North transect points 30 and 40 (between the realigned A12 eastbound off-slip and the loop, and points 70, 80, 90 and 100 inside the southern edge of the loop.
- Ingrebourne Valley SMI East to West transect points 30, 40, and 50, just north of the loop, near to the re-aligned northbound on-slip.

A.2.9 All the ecological receptors considered in the assessment lie in proximity to the existing road infrastructure. Data shows nitrogen deposition rates at all receptor points exceeded the critical load of 10 kg N/ha/yr in the base year. This is due to the background nitrogen deposition rate being over 10 kg N/ha/yr. Receptor points near to the re-aligned eastbound on-slip (Ingrebourne Valley SMI South to North transect points 30, 40 and 70) are higher in the opening year of the Scheme than in the base year. At all other receptor points the predicted nitrogen deposition rates are lower in the opening year of the Scheme than in the base year. Transect points which would be located under the new or realigned road are not considered here. Therefore, during operation of the Scheme, these habitats are not expected to be affected by nitrogen deposition rates higher that those currently experienced by these habitats. At Ingrebourne Valley SMI South to North transect points 30, 40 and 70, the predicted nitrogen deposition rates during operation of the Scheme are slightly higher than the base year. Receptor points 30 and 40 lie between the realigned eastbound on-slip and the southern edge of the new loop, and receptor point 70 lies immediately adjacent to the edge of the loop. These receptor points are located in temporary construction working areas which would be planted with grassland habitats following construction of the Scheme. At the north section of the new loop road, receptor points either side of the road do not show an expected increase in nitrogen deposition higher than the base year, so the same pattern of increase is not expected along the entire loop.

A.2.10 Whilst habitats within Ingrebourne Valley SMI close to the new loop road and realigned slip roads have an expected increase of over 0.4 kg N/ha/year in the opening year compared to the ‘do minimum’ scenario, these affects are expected on only a very small proportion of the habitats within this large SMI (which extends south of the Scheme, with a total area of approximately 263ha). If the increase in nitrogen deposition led to the loss of one plant species from this small proportion of the SMI, this would be unlikely to undermine the overall condition of habitats within the SMI taking into account the level of nitrogen deposition currently experienced by these habitats.

A.2.11 It should also be noted that the predicted loss of one species is itself unlikely, as this is based on extrapolation of results from long-term field studies in heathland habitats[25] (in the absence of similar studies specific to woodland or grassland) at background nitrogen deposition levels much lower than the 28 kg N/ha/yr predicted for this location in the opening year. Indeed, the same study predicts that a 2.0kgN/ha/yr increase in nitrogen deposition is required to reduce species richness by one species in heathland habitats where the background long-term nitrogen deposition level is 25.0kg/N/ha/yr.

A.2.12 Overall, the habitats within Ingrebourne Valley SMI expected to experience nitrogen deposition rates slightly higher than the baseline are immediately adjacent to the realigned slip road and new loop near to the A12. These are all areas replanted with grassland habitat following construction and are not locations of retained grassland or woodland habitats. The area of habitat affected within Ingrebourne Valley SMI is a very small proportion of the whole SMI and any slight changes to these habitats as a result of changes in air quality (positive or adverse) would not affect the overall integrity of the SMI. Therefore, the level of impact is expected to be minor adverse (with reference to LA 108). For a receptor of County level importance LA 108 allows a significance of effect conclusion of Neutral or Slight Adverse. A precautionary assessment of the significant of expected effect would be Slight Adverse and not significant.

Table A.2: Modelled ecological receptors

Receptor ID	Site type	Distance to road edge in Base Year (m)	X	Y	Local Authority
T019	Veteran Tree	14.0	556759	192270	Havering
T002	Veteran Tree	66.6	556585	192422	Havering
T004	Veteran Tree	70.0	556576	192429	Havering
T065	Veteran Tree	195.4	556363	192519	Havering
T180	Veteran Tree	245.0	556254	192600	Havering
T059	Veteran Tree	176.2	556294	192666	Havering
T077	Veteran Tree	168.8	556251	192753	Havering
T114	Veteran Tree	182.1	556206	192805	Havering
T112	Veteran Tree	143.1	556187	192911	Havering
T109	Veteran Tree	82.7	556189	193015	Havering
T095	Veteran Tree	50.7	556172	193094	Havering
T168	Veteran Tree	61.2	556869	192656	Brentwood
Ingrebourne_S_N_0	Ingrebourne Valley (SMI)	9.5	556473	192219	Havering
Ingrebourne_S_N_10	Ingrebourne Valley (SMI)	19.5	556468	192229	Havering
Ingrebourne_S_N_20	Ingrebourne Valley (SMI)	29.5	556464	192238	Havering
Ingrebourne_S_N_30	Ingrebourne Valley (SMI)	39.5	556460	192248	Havering
Ingrebourne_S_N_40	Ingrebourne Valley (SMI)	49.5	556456	192257	Havering
Ingrebourne_S_N_50	Ingrebourne Valley (SMI)	59.5	556452	192266	Havering
Ingrebourne_S_N_60	Ingrebourne Valley (SMI)	69.5	556448	192275	Havering
Ingrebourne_S_N_70	Ingrebourne Valley (SMI)	79.5	556444	192284	Havering
Ingrebourne_S_N_80	Ingrebourne Valley (SMI)	89.5	556440	192293	Havering
Ingrebourne_S_N_90	Ingrebourne Valley (SMI)	99.5	556436	192302	Havering
Ingrebourne_S_N_100	Ingrebourne Valley (SMI)	109.5	556432	192312	Havering
Ingrebourne_S_N_110	Ingrebourne Valley (SMI)	119.5	556428	192321	Havering
Ingrebourne_S_N_120	Ingrebourne Valley (SMI)	129.5	556424	192330	Havering
Ingrebourne_S_N_130	Ingrebourne Valley (SMI)	139.5	556420	192339	Havering
Ingrebourne_S_N_140	Ingrebourne Valley (SMI)	149.5	556416	192348	Havering

Receptor ID	Site type	Distance to road edge in Base Year (m)	X	Y	Local Authority
Ingrebourne_S_N_150	Ingrebourne Valley (SMI)	159.5	556412	192357	Havering
Ingrebourne_S_N_160	Ingrebourne Valley (SMI)	169.5	556408	192366	Havering
Ingrebourne_S_N_170	Ingrebourne Valley (SMI)	179.5	556404	192376	Havering
Ingrebourne_S_N_180	Ingrebourne Valley (SMI)	189.5	556399	192385	Havering
Ingrebourne_S_N_190	Ingrebourne Valley (SMI)	199.5	556395	192394	Havering
Ingrebourne_E_W_0	Ingrebourne Valley (SMI)	15	556411	192798	Havering
Ingrebourne_E_W_10	Ingrebourne Valley (SMI)	25	556401	192794	Havering
Ingrebourne_E_W_20	Ingrebourne Valley (SMI)	35	556391	192791	Havering
Ingrebourne_E_W_30	Ingrebourne Valley (SMI)	45	556382	192788	Havering
Ingrebourne_E_W_40	Ingrebourne Valley (SMI)	55	556372	192785	Havering
Ingrebourne_E_W_50	Ingrebourne Valley (SMI)	65	556363	192781	Havering
Ingrebourne_E_W_60	Ingrebourne Valley (SMI)	75	556353	192778	Havering
Ingrebourne_E_W_70	Ingrebourne Valley (SMI)	85	556344	192775	Havering
Ingrebourne_E_W_80	Ingrebourne Valley (SMI)	95	556335	192771	Havering
Ingrebourne_E_W_90	Ingrebourne Valley (SMI)	105	556325	192768	Havering
Ingrebourne_E_W_100	Ingrebourne Valley (SMI)	115	556316	192765	Havering
Ingrebourne_E_W_110	Ingrebourne Valley (SMI)	125	556306	192761	Havering
Ingrebourne_E_W_120	Ingrebourne Valley (SMI)	135	556297	192758	Havering
Ingrebourne_E_W_130	Ingrebourne Valley (SMI)	145	556287	192755	Havering
Ingrebourne_E_W_140	Ingrebourne Valley (SMI)	155	556278	192752	Havering
Ingrebourne_E_W_150	Ingrebourne Valley (SMI)	165	556268	192748	Havering
Ingrebourne_E_W_160	Ingrebourne Valley (SMI)	175	556259	192745	Havering
Ingrebourne_E_W_170	Ingrebourne Valley (SMI)	185	556250	192742	Havering

Receptor ID	Site type	Distance to road edge in Base Year (m)	X	Y	Local Authority
Ingrebourne_E_W_180	Ingrebourne Valley (SMI)	195	556240	192738	Havering
The_Oaks_W_E_0	The Oaks LWS	26.9	556444	192895	Havering
The_Oaks_W_E_10	The Oaks LWS	36.9	556453	192899	Brentwood
The_Oaks_W_E_20	The Oaks LWS	46.9	556462	192902	Brentwood
The_Oaks_W_E_30	The Oaks LWS	56.9	556472	192906	Brentwood
The_Oaks_W_E_40	The Oaks LWS	66.9	556481	192909	Brentwood
The_Oaks_W_E_50	The Oaks LWS	76.9	556490	192913	Brentwood
The_Oaks_W_E_60	The Oaks LWS	86.9	556500	192917	Brentwood
The_Oaks_W_E_70	The Oaks LWS	96.9	556509	192920	Brentwood
The_Oaks_W_E_80	The Oaks LWS	106.9	556518	192924	Brentwood
The_Oaks_W_E_90	The Oaks LWS	116.9	556528	192927	Brentwood
The_Oaks_W_E_100	The Oaks LWS	126.9	556537	192931	Brentwood
The_Oaks_W_E_110	The Oaks LWS	136.9	556546	192935	Brentwood
The_Oaks_W_E_120	The Oaks LWS	146.9	556556	192938	Brentwood
The_Oaks_W_E_130	The Oaks LWS	156.9	556565	192942	Brentwood
The_Oaks_W_E_140	The Oaks LWS	166.9	556574	192945	Brentwood
The_Oaks_W_E_150	The Oaks LWS	176.9	556584	192949	Brentwood
The_Oaks_W_E_160	The Oaks LWS	186.9	556593	192953	Brentwood
The_Oaks_W_E_170	The Oaks LWS	196.9	556602	192956	Brentwood
Ingrebourne_N_S_0	Ingrebourne Valley (SMI)	5.4	556375	192114	Havering
Ingrebourne_N_S_10	Ingrebourne Valley (SMI)	15.4	556379	192105	Havering
Ingrebourne_N_S_20	Ingrebourne Valley (SMI)	25.4	556384	192096	Havering
Ingrebourne_N_S_30	Ingrebourne Valley (SMI)	35.4	556389	192087	Havering

Receptor ID	Site type	Distance to road edge in Base Year (m)	X	Y	Local Authority
Ingrebourne_N_S_40	Ingrebourne Valley (SMI)	45.4	556393	192078	Havering
Ingrebourne_N_S_50	Ingrebourne Valley (SMI)	55.4	556398	192069	Havering
Ingrebourne_N_S_60	Ingrebourne Valley (SMI)	65.4	556403	192060	Havering
Ingrebourne_N_S_70	Ingrebourne Valley (SMI)	75.4	556407	192052	Havering
Ingrebourne_N_S_80	Ingrebourne Valley (SMI)	85.4	556412	192043	Havering
Ingrebourne_N_S_90	Ingrebourne Valley (SMI)	95.4	556417	192034	Havering
Ingrebourne_N_S_100	Ingrebourne Valley (SMI)	105.4	556421	192025	Havering
Ingrebourne_N_S_110	Ingrebourne Valley (SMI)	115.4	556426	192016	Havering
Ingrebourne_N_S_120	Ingrebourne Valley (SMI)	125.4	556430	192007	Havering
Ingrebourne_N_S_130	Ingrebourne Valley (SMI)	135.4	556435	191998	Havering
Ingrebourne_N_S_140	Ingrebourne Valley (SMI)	145.4	556440	191990	Havering
Ingrebourne_N_S_150	Ingrebourne Valley (SMI)	155.4	556444	191981	Havering
Ingrebourne_N_S_160	Ingrebourne Valley (SMI)	165.4	556449	191972	Havering
Lower_Vicarage_S_N_0	Lower Vicarage Wood LWS and Ancient Woodland	68.2	556990	192751	Brentwood
Lower_Vicarage_S_N_10	Lower Vicarage Wood LWS and Ancient Woodland	78.2	556985	192760	Brentwood
Lower_Vicarage_S_N_20	Lower Vicarage Wood LWS and Ancient Woodland	88.2	556981	192769	Brentwood
Lower_Vicarage_S_N_30	Lower Vicarage Wood LWS and Ancient Woodland	98.2	556976	192778	Brentwood
Lower_Vicarage_S_N_40	Lower Vicarage Wood LWS and Ancient Woodland	108.2	556972	192786	Brentwood
Lower_Vicarage_S_N_50	Lower Vicarage Wood LWS and Ancient Woodland	118.2	556967	192795	Brentwood
Lower_Vicarage_S_N_60	Lower Vicarage Wood LWS and Ancient Woodland	128.2	556963	192804	Brentwood

Receptor ID	Site type	Distance to road edge in Base Year (m)	X	Y	Local Authority
Lower_Vicarage_S_N_70	Lower Vicarage Wood LWS and Ancient Woodland	138.2	556958	192813	Brentwood
Lower_Vicarage_S_N_80	Lower Vicarage Wood LWS and Ancient Woodland	148.2	556953	192822	Brentwood
Lower_Vicarage_S_N_90	Lower Vicarage Wood LWS and Ancient Woodland	158.2	556949	192831	Brentwood
Lower_Vicarage_S_N_100	Lower Vicarage Wood LWS and Ancient Woodland	168.2	556944	192840	Brentwood
Lower_Vicarage_S_N_110	Lower Vicarage Wood LWS and Ancient Woodland	178.2	556940	192849	Brentwood
Lower_Vicarage_S_N_120	Lower Vicarage Wood LWS and Ancient Woodland	188.2	556935	192858	Brentwood
Lower_Vicarage_S_N_130	Lower Vicarage Wood LWS and Ancient Woodland	198.2	556930	192866	Brentwood
Ingrebourne_S_N_Loop_0	Ingrebourne Valley (SMI)	24.4	556296	192750	Havering
Ingrebourne_S_N_Loop_10	Ingrebourne Valley (SMI)	34.4	556293	192759	Havering
Ingrebourne_S_N_Loop_20	Ingrebourne Valley (SMI)	44.4	556290	192769	Havering
Ingrebourne_S_N_Loop_30	Ingrebourne Valley (SMI)	54.4	556286	192778	Havering
Ingrebourne_S_N_Loop_40	Ingrebourne Valley (SMI)	64.4	556283	192788	Havering
Ingrebourne_S_N_Loop_50	Ingrebourne Valley (SMI)	74.4	556280	192797	Havering
Ingrebourne_S_N_Loop_60	Ingrebourne Valley (SMI)	84.4	556277	192807	Havering
Ingrebourne_S_N_Loop_70	Ingrebourne Valley (SMI)	94.4	556274	192816	Havering
Ingrebourne_S_N_Loop_80	Ingrebourne Valley (SMI)	104.4	556270	192826	Havering
Ingrebourne_S_N_Loop_90	Ingrebourne Valley (SMI)	114.4	556267	192835	Havering
Ingrebourne_S_N_Loop_100	Ingrebourne Valley (SMI)	124.4	556264	192845	Havering
Ingrebourne_S_N_Loop_110	Ingrebourne Valley (SMI)	134.4	556261	192854	Havering
Ingrebourne_S_N_Loop_120	Ingrebourne Valley (SMI)	144.4	556258	192864	Havering
Ingrebourne_S_N_Loop_130	Ingrebourne Valley (SMI)	154.4	556254	192873	Havering

Receptor ID	Site type	Distance to road edge in Base Year (m)	X	Y	Local Authority
Ingrebourne_S_N_Loop_140	Ingrebourne Valley (SMI)	164.4	556251	192883	Havering
Ingrebourne_S_N_Loop_150	Ingrebourne Valley (SMI)	174.4	556248	192892	Havering
Ingrebourne_S_N_Loop_160	Ingrebourne Valley (SMI)	184.4	556245	192902	Havering
Ingrebourne_S_N_Loop_170	Ingrebourne Valley (SMI)	194.4	556242	192911	Havering

Table A.3: NOx gap factors used in the assessment

Receptor ID	Base 2015 NOx	Projected base NOx	Ratio B	Ratio A	Gap factor (Ratio B/ Ratio A)
T019	69.3	38.3	0.55	0.86	1.55
T002	43.8	25.0	0.57	0.86	1.50
T004	42.8	24.5	0.57	0.86	1.50
T065	30.0	18.7	0.62	0.86	1.38
T180	27.8	17.7	0.64	0.86	1.35
T059	30.2	18.6	0.62	0.86	1.39
T077	30.3	18.6	0.61	0.86	1.40
T114	29.6	18.3	0.62	0.86	1.39
T112	31.7	19.0	0.60	0.86	1.42
T109	39.7	22.1	0.56	0.86	1.53
T095	48.6	25.6	0.53	0.86	1.63
T168	40.9	24.1	0.59	0.86	1.45
Ingrebourne_S_N_0	56.2	35.0	0.62	0.86	1.37
Ingrebourne_S_N_10	44.3	27.8	0.63	0.86	1.36
Ingrebourne_S_N_20	39.6	24.9	0.63	0.86	1.36
Ingrebourne_S_N_30	36.9	23.3	0.63	0.86	1.36
Ingrebourne_S_N_40	35.2	22.2	0.63	0.86	1.35
Ingrebourne_S_N_50	33.9	21.5	0.63	0.86	1.35
Ingrebourne_S_N_60	33.0	21.0	0.63	0.86	1.35
Ingrebourne_S_N_70	32.4	20.5	0.63	0.86	1.35
Ingrebourne_S_N_80	31.8	20.2	0.63	0.86	1.35
Ingrebourne_S_N_90	31.4	19.9	0.64	0.86	1.35
Ingrebourne_S_N_100	31.0	19.7	0.64	0.86	1.35
Ingrebourne_S_N_110	30.7	19.5	0.64	0.86	1.35
Ingrebourne_S_N_120	30.5	19.4	0.64	0.86	1.35
Ingrebourne_S_N_130	30.3	19.2	0.64	0.86	1.35
Ingrebourne_S_N_140	30.1	19.1	0.63	0.86	1.35
Ingrebourne_S_N_150	30.0	19.0	0.63	0.86	1.35

Receptor ID	Base 2015 NOx	Projected base NOx	Ratio B	Ratio A	Gap factor (Ratio B/ Ratio A)
Ingrebourne_S_N_160	29.8	18.9	0.63	0.86	1.35
Ingrebourne_S_N_170	29.7	18.8	0.63	0.86	1.35
Ingrebourne_S_N_180	29.6	18.8	0.63	0.86	1.35
Ingrebourne_S_N_190	29.5	18.7	0.63	0.86	1.35
Ingrebourne_E_W_0	90.1	42.4	0.47	0.86	1.82
Ingrebourne_E_W_10	67.8	33.3	0.49	0.86	1.74
Ingrebourne_E_W_20	58.0	29.4	0.51	0.86	1.69
Ingrebourne_E_W_30	51.7	26.9	0.52	0.86	1.64
Ingrebourne_E_W_40	47.3	25.2	0.53	0.86	1.61
Ingrebourne_E_W_50	44.0	23.9	0.54	0.86	1.57
Ingrebourne_E_W_60	41.4	22.9	0.55	0.86	1.55
Ingrebourne_E_W_70	39.4	22.1	0.56	0.86	1.52
Ingrebourne_E_W_80	37.7	21.5	0.57	0.86	1.50
Ingrebourne_E_W_90	36.3	20.9	0.58	0.86	1.49
Ingrebourne_E_W_100	35.1	20.5	0.58	0.86	1.47
Ingrebourne_E_W_110	34.1	20.1	0.59	0.86	1.45
Ingrebourne_E_W_120	33.2	19.7	0.59	0.86	1.44
Ingrebourne_E_W_130	32.4	19.4	0.60	0.86	1.43
Ingrebourne_E_W_140	31.7	19.1	0.60	0.86	1.42
Ingrebourne_E_W_150	31.1	18.9	0.61	0.86	1.41
Ingrebourne_E_W_160	30.5	18.7	0.61	0.86	1.40
Ingrebourne_E_W_170	30.0	18.5	0.62	0.86	1.39
Ingrebourne_E_W_180	29.5	18.3	0.62	0.86	1.38
The_Oaks_W_E_0	81.0	38.5	0.48	0.86	1.80
The_Oaks_W_E_10	69.9	34.1	0.49	0.86	1.75
The_Oaks_W_E_20	62.4	31.1	0.50	0.86	1.71
The_Oaks_W_E_30	56.9	29.0	0.51	0.86	1.68
The_Oaks_W_E_40	52.7	27.3	0.52	0.86	1.65
The_Oaks_W_E_50	49.4	26.1	0.53	0.86	1.62
The_Oaks_W_E_60	46.7	25.0	0.54	0.86	1.60
The_Oaks_W_E_70	44.6	24.2	0.54	0.86	1.58
The_Oaks_W_E_80	42.7	23.5	0.55	0.86	1.56
The_Oaks_W_E_90	41.1	22.8	0.56	0.86	1.54
The_Oaks_W_E_100	39.8	22.3	0.56	0.86	1.53
The_Oaks_W_E_110	38.6	21.8	0.57	0.86	1.51
The_Oaks_W_E_120	37.5	21.4	0.57	0.86	1.50
The_Oaks_W_E_130	36.6	21.1	0.58	0.86	1.49
The_Oaks_W_E_140	35.7	20.8	0.58	0.86	1.47
The_Oaks_W_E_150	35.0	20.5	0.58	0.86	1.46

Receptor ID	Base 2015 NOx	Projected base NOx	Ratio B	Ratio A	Gap factor (Ratio B/ Ratio A)
The_Oaks_W_E_160	34.3	20.2	0.59	0.86	1.45
The_Oaks_W_E_170	33.7	20.0	0.59	0.86	1.45
Ingrebourne_N_S_0	60.1	36.8	0.61	0.86	1.40
Ingrebourne_N_S_10	45.3	28.4	0.63	0.86	1.37
Ingrebourne_N_S_20	39.3	24.9	0.63	0.86	1.35
Ingrebourne_N_S_30	35.9	23.0	0.64	0.86	1.34
Ingrebourne_N_S_40	33.7	21.7	0.64	0.86	1.33
Ingrebourne_N_S_50	32.2	20.8	0.65	0.86	1.32
Ingrebourne_N_S_60	31.1	20.2	0.65	0.86	1.32
Ingrebourne_N_S_70	30.2	19.7	0.65	0.86	1.31
Ingrebourne_N_S_80	29.5	19.3	0.65	0.86	1.31
Ingrebourne_N_S_90	28.9	18.9	0.66	0.86	1.31
Ingrebourne_N_S_100	28.4	18.7	0.66	0.86	1.30
Ingrebourne_N_S_110	28.0	18.4	0.66	0.86	1.30
Ingrebourne_N_S_120	27.7	18.2	0.66	0.86	1.30
Ingrebourne_N_S_130	29.1	19.1	0.66	0.86	1.30
Ingrebourne_N_S_140	28.8	19.0	0.66	0.86	1.30
Ingrebourne_N_S_150	28.6	18.8	0.66	0.86	1.30
Ingrebourne_N_S_160	28.4	18.7	0.66	0.86	1.30
Lower_Vicarage_S_N_0	36.7	22.5	0.61	0.86	1.40
Lower_Vicarage_S_N_10	35.5	21.8	0.61	0.86	1.39
Lower_Vicarage_S_N_20	34.6	21.3	0.62	0.86	1.39
Lower_Vicarage_S_N_30	33.8	20.9	0.62	0.86	1.38
Lower_Vicarage_S_N_40	33.1	20.6	0.62	0.86	1.38
Lower_Vicarage_S_N_50	32.6	20.3	0.62	0.86	1.37
Lower_Vicarage_S_N_60	32.1	20.0	0.62	0.86	1.37
Lower_Vicarage_S_N_70	31.6	19.8	0.63	0.86	1.37
Lower_Vicarage_S_N_80	31.2	19.6	0.63	0.86	1.37
Lower_Vicarage_S_N_90	30.9	19.4	0.63	0.86	1.36
Lower_Vicarage_S_N_100	30.6	19.2	0.63	0.86	1.36
Lower_Vicarage_S_N_110	30.3	19.1	0.63	0.86	1.36
Lower_Vicarage_S_N_120	30.0	19.0	0.63	0.86	1.36
Lower_Vicarage_S_N_130	29.8	18.8	0.63	0.86	1.35
Ingrebourne_S_N_Loop_0	32.8	19.6	0.60	0.86	1.44
Ingrebourne_S_N_Loop_10	32.9	19.6	0.60	0.86	1.44
Ingrebourne_S_N_Loop_20	33.1	19.7	0.59	0.86	1.44
Ingrebourne_S_N_Loop_30	33.2	19.7	0.59	0.86	1.44
Ingrebourne_S_N_Loop_40	33.4	19.8	0.59	0.86	1.45
Ingrebourne_S_N_Loop_50	33.6	19.8	0.59	0.86	1.45

Receptor ID	Base 2015 NOx	Projected base NOx	Ratio B	Ratio A	Gap factor (Ratio B/ Ratio A)
Ingrebourne_S_N_Loop_60	33.8	19.9	0.59	0.86	1.45
Ingrebourne_S_N_Loop_70	33.9	20.0	0.59	0.86	1.45
Ingrebourne_S_N_Loop_80	34.1	20.0	0.59	0.86	1.46
Ingrebourne_S_N_Loop_90	34.3	20.1	0.59	0.86	1.46
Ingrebourne_S_N_Loop_100	34.5	20.2	0.58	0.86	1.46
Ingrebourne_S_N_Loop_110	34.7	20.3	0.58	0.86	1.47
Ingrebourne_S_N_Loop_120	34.9	20.3	0.58	0.86	1.47
Ingrebourne_S_N_Loop_130	35.2	20.4	0.58	0.86	1.47
Ingrebourne_S_N_Loop_140	35.4	20.5	0.58	0.86	1.48
Ingrebourne_S_N_Loop_150	35.7	20.6	0.58	0.86	1.48
Ingrebourne_S_N_Loop_160	36.0	20.7	0.58	0.86	1.48
Ingrebourne_S_N_Loop_170	36.2	20.8	0.57	0.86	1.49

Table A.4: Estimated NOx concentrations

Receptor ID	Background 2015 NOx	Base 2015 NOx	Background 2022 NOx	2022 DM NOx	2022 DS NOx	2022 Change
T019	19.4	69.3	14.2	64.6	62.9	-1.7
T002	19.4	43.8	14.2	39.7	40.9	1.2
T004	19.4	42.8	14.2	38.7	39.9	1.2
T065	19.4	30.0	14.2	26.5	27.2	0.7
T180	19.4	27.8	14.2	24.4	25.8	1.4
T059	19.4	30.2	14.2	26.6	28.5	1.9
T077	19.4	30.3	14.2	26.8	27.6	0.8
T114	19.4	29.6	14.2	26.1	26.4	0.3
T112	19.4	31.7	14.2	28.0	28.2	0.2
T109	20.9	39.7	14.7	35.6	35.7	0.1
T095	20.9	48.6	14.7	44.2	44.3	0.1
T168	19.4	40.9	14.2	37.0	37.3	0.3
Ingrebourne_S_N_0	19.4	56.2	14.2	53.6	41.5	-12.1
Ingrebourne_S_N_10	19.4	44.3	14.2	41.2	47.8	6.6
Ingrebourne_S_N_20	19.4	39.6	14.2	36.3	42.6	6.3
Ingrebourne_S_N_30	19.4	36.9	14.2	33.6	40.0	6.4
Ingrebourne_S_N_40	19.4	35.2	14.2	31.8	42.2	10.4
Ingrebourne_S_N_50	19.4	33.9	14.2	30.6	54.8	24.2
Ingrebourne_S_N_60	19.4	33.0	14.2	29.7	60.2	30.5

Receptor ID	Background 2015 NOx	Base 2015 NOx	Background 2022 NOx	2022 DM NOx	2022 DS NOx	2022 Change
Ingrebourne_S_N_70	19.4	32.4	14.2	29.0	39.0	10.0
Ingrebourne_S_N_80	19.4	31.8	14.2	28.4	34.1	5.7
Ingrebourne_S_N_90	19.4	31.4	14.2	28.0	31.8	3.8
Ingrebourne_S_N_100	19.4	31.0	14.2	27.6	30.5	2.9
Ingrebourne_S_N_110	19.4	30.7	14.2	27.3	29.6	2.3
Ingrebourne_S_N_120	19.4	30.5	14.2	27.1	28.9	1.8
Ingrebourne_S_N_130	19.4	30.3	14.2	26.9	28.4	1.5
Ingrebourne_S_N_140	19.4	30.1	14.2	26.7	28.0	1.3
Ingrebourne_S_N_150	19.4	30.0	14.2	26.6	27.7	1.1
Ingrebourne_S_N_160	19.4	29.8	14.2	26.4	27.5	1.1
Ingrebourne_S_N_170	19.4	29.7	14.2	26.3	27.3	1.0
Ingrebourne_S_N_180	19.4	29.6	14.2	26.2	27.1	0.9
Ingrebourne_S_N_190	19.4	29.5	14.2	26.1	27.0	0.9
Ingrebourne_E_W_0	19.4	90.1	14.2	82.9	79.8	-3.1
Ingrebourne_E_W_10	19.4	67.8	14.2	62.0	74.5	12.5
Ingrebourne_E_W_20	19.4	58.0	14.2	52.7	100.2	47.5
Ingrebourne_E_W_30	19.4	51.7	14.2	46.8	57.6	10.8
Ingrebourne_E_W_40	19.4	47.3	14.2	42.6	48.1	5.5
Ingrebourne_E_W_50	19.4	44.0	14.2	39.6	43.3	3.7
Ingrebourne_E_W_60	19.4	41.4	14.2	37.2	40.1	2.9
Ingrebourne_E_W_70	19.4	39.4	14.2	35.2	37.8	2.6
Ingrebourne_E_W_80	19.4	37.7	14.2	33.7	35.9	2.2
Ingrebourne_E_W_90	19.4	36.3	14.2	32.3	34.4	2.1
Ingrebourne_E_W_100	19.4	35.1	14.2	31.2	33.2	2.0
Ingrebourne_E_W_110	19.4	34.1	14.2	30.3	32.0	1.7

Receptor ID	Background 2015 NOx	Base 2015 NOx	Background 2022 NOx	2022 DM NOx	2022 DS NOx	2022 Change
Ingrebourne_E_W_120	19.4	33.2	14.2	29.4	31.1	1.7
Ingrebourne_E_W_130	19.4	32.4	14.2	28.7	30.2	1.5
Ingrebourne_E_W_140	19.4	31.7	14.2	28.0	29.4	1.4
Ingrebourne_E_W_150	19.4	31.1	14.2	27.4	28.7	1.3
Ingrebourne_E_W_160	19.4	30.5	14.2	26.9	28.1	1.2
Ingrebourne_E_W_170	19.4	30.0	14.2	26.5	27.5	1.0
Ingrebourne_E_W_180	19.4	29.5	14.2	26.0	26.9	0.9
The_Oaks_W_E_0	19.4	81.0	14.2	75.6	75.2	-0.4
The_Oaks_W_E_10	19.4	69.9	14.2	64.7	64.5	-0.2
The_Oaks_W_E_20	19.4	62.4	14.2	57.4	57.3	-0.1
The_Oaks_W_E_30	19.4	56.9	14.2	52.1	52.1	0.0
The_Oaks_W_E_40	19.4	52.7	14.2	48.1	48.1	0.0
The_Oaks_W_E_50	19.4	49.4	14.2	44.9	45.0	0.1
The_Oaks_W_E_60	19.4	46.7	14.2	42.4	42.4	0.0
The_Oaks_W_E_70	19.4	44.6	14.2	40.3	40.4	0.1
The_Oaks_W_E_80	19.4	42.7	14.2	38.5	38.6	0.1
The_Oaks_W_E_90	19.4	41.1	14.2	37.0	37.1	0.1
The_Oaks_W_E_100	19.4	39.8	14.2	35.7	35.8	0.1
The_Oaks_W_E_110	19.4	38.6	14.2	34.6	34.7	0.1
The_Oaks_W_E_120	19.4	37.5	14.2	33.6	33.7	0.1
The_Oaks_W_E_130	19.4	36.6	14.2	32.7	32.8	0.1
The_Oaks_W_E_140	19.4	35.7	14.2	31.9	32.0	0.1
The_Oaks_W_E_150	19.4	35.0	14.2	31.2	31.3	0.1
The_Oaks_W_E_160	19.4	34.3	14.2	30.6	30.7	0.1
The_Oaks_W_E_170	19.4	33.7	14.2	30.0	30.1	0.1

Receptor ID	Background 2015 NOx	Base 2015 NOx	Background 2022 NOx	2022 DM NOx	2022 DS NOx	2022 Change
Ingrebourne_N_S_0	19.4	60.1	14.2	55.8	53.7	-2.1
Ingrebourne_N_S_10	19.4	45.3	14.2	41.5	40.3	-1.2
Ingrebourne_N_S_20	19.4	39.3	14.2	35.6	34.9	-0.7
Ingrebourne_N_S_30	19.4	35.9	14.2	32.4	31.9	-0.5
Ingrebourne_N_S_40	19.4	33.7	14.2	30.3	30.0	-0.3
Ingrebourne_N_S_50	19.4	32.2	14.2	28.8	28.6	-0.2
Ingrebourne_N_S_60	19.4	31.1	14.2	27.7	27.6	-0.1
Ingrebourne_N_S_70	19.4	30.2	14.2	26.9	26.8	-0.1
Ingrebourne_N_S_80	19.4	29.5	14.2	26.2	26.2	0.0
Ingrebourne_N_S_90	19.4	28.9	14.2	25.6	25.6	0.0
Ingrebourne_N_S_100	19.4	28.4	14.2	25.2	25.2	0.0
Ingrebourne_N_S_110	19.4	28.0	14.2	24.8	24.8	0.0
Ingrebourne_N_S_120	19.4	27.7	14.2	24.4	24.5	0.1
Ingrebourne_N_S_130	21.1	29.1	15.2	25.6	25.7	0.1
Ingrebourne_N_S_140	21.1	28.8	15.2	25.4	25.4	0.0
Ingrebourne_N_S_150	21.1	28.6	15.2	25.1	25.2	0.1
Ingrebourne_N_S_160	21.1	28.4	15.2	24.9	25.0	0.1
Lower_Vicarage_S_N_0	19.4	36.7	14.2	33.0	33.3	0.3
Lower_Vicarage_S_N_10	19.4	35.5	14.2	31.9	32.1	0.2
Lower_Vicarage_S_N_20	19.4	34.6	14.2	31.0	31.2	0.2
Lower_Vicarage_S_N_30	19.4	33.8	14.2	30.2	30.4	0.2
Lower_Vicarage_S_N_40	19.4	33.1	14.2	29.6	29.8	0.2
Lower_Vicarage_S_N_50	19.4	32.6	14.2	29.0	29.2	0.2

Receptor ID	Background 2015 NOx	Base 2015 NOx	Background 2022 NOx	2022 DM NOx	2022 DS NOx	2022 Change
Lower_Vicarage_S_N_60	19.4	32.1	14.2	28.5	28.7	0.2
Lower_Vicarage_S_N_70	19.4	31.6	14.2	28.1	28.3	0.2
Lower_Vicarage_S_N_80	19.4	31.2	14.2	27.7	27.9	0.2
Lower_Vicarage_S_N_90	19.4	30.9	14.2	27.4	27.6	0.2
Lower_Vicarage_S_N_100	19.4	30.6	14.2	27.1	27.2	0.1
Lower_Vicarage_S_N_110	19.4	30.3	14.2	26.8	27.0	0.2
Lower_Vicarage_S_N_120	19.4	30.0	14.2	26.6	26.7	0.1
Lower_Vicarage_S_N_130	19.4	29.8	14.2	26.3	26.5	0.2
Ingrebourne_S_N_Loop_0	19.4	32.8	14.2	29.1	31.1	2.0
Ingrebourne_S_N_Loop_10	19.4	32.9	14.2	29.2	30.7	1.5
Ingrebourne_S_N_Loop_20	19.4	33.1	14.2	29.3	30.5	1.2
Ingrebourne_S_N_Loop_30	19.4	33.2	14.2	29.5	30.5	1.0
Ingrebourne_S_N_Loop_40	19.4	33.4	14.2	29.6	30.5	0.9
Ingrebourne_S_N_Loop_50	19.4	33.6	14.2	29.8	30.5	0.7
Ingrebourne_S_N_Loop_60	19.4	33.8	14.2	30.0	30.6	0.6
Ingrebourne_S_N_Loop_70	19.4	33.9	14.2	30.1	30.7	0.6
Ingrebourne_S_N_Loop_80	19.4	34.1	14.2	30.3	30.8	0.5
Ingrebourne_S_N_Loop_90	19.4	34.3	14.2	30.5	31.0	0.5

Receptor ID	Background 2015 NOx	Base 2015 NOx	Background 2022 NOx	2022 DM NOx	2022 DS NOx	2022 Change
Ingrebourne_S_N_Loop_100	19.4	34.5	14.2	30.7	31.1	0.4
Ingrebourne_S_N_Loop_110	19.4	34.7	14.2	30.9	31.3	0.4
Ingrebourne_S_N_Loop_120	19.4	34.9	14.2	31.1	31.5	0.4
Ingrebourne_S_N_Loop_130	19.4	35.2	14.2	31.3	31.7	0.4
Ingrebourne_S_N_Loop_140	19.4	35.4	14.2	31.6	31.9	0.3
Ingrebourne_S_N_Loop_150	19.4	35.7	14.2	31.8	32.1	0.3
Ingrebourne_S_N_Loop_160	19.4	36.0	14.2	32.1	32.4	0.3
Ingrebourne_S_N_Loop_170	19.4	36.2	14.2	32.3	32.6	0.3

Table A.5: Background N deposition rates kg N/ha/yr

2015 Base Year	2022 Opening Year
28.7*	28.0
*data provided on the APIS website is for 2017, reduction of 0.5% assumed per year from 2017 in line with trends between 2005 and 2017 at two SSSIs within 5 km of junction 28	

Table A.6: Estimated N Dep rates

Receptor ID	Total N Dep rate (kg N/ha/yr)				% Change in relation to lowest critical load level
	2015 Base	2022 DM	2022 DS	Change	
T019	35.63	34.49	34.24	-0.25	-2.5%
T002	32.29	30.94	31.13	0.19	1.9%
T004	32.15	30.81	30.99	0.18	1.8%
T065	30.31	29.16	29.28	0.12	1.2%
T180	29.98	28.89	29.12	0.23	2.3%
T059	30.34	29.15	29.45	0.30	3.0%
T077	30.36	29.15	29.29	0.14	1.4%
T114	30.25	29.07	29.12	0.05	0.5%
T112	30.56	29.29	29.32	0.03	0.3%
T109	31.49	30.08	30.10	0.02	0.2%
T095	32.73	31.17	31.19	0.02	0.2%
T168	31.90	30.66	30.70	0.04	0.4%

Receptor ID	Total N Dep rate (kg N/ha/yr)				% Change in relation to lowest critical load level
	2015 Base	2022 DM	2022 DS	Change	
Ingrebourne_S_N_0	33.96	33.38	31.53	-1.85	-18.4%
Ingrebourne_S_N_10	32.36	31.52	32.54	1.02	10.2%
Ingrebourne_S_N_20	31.70	30.79	31.77	0.98	9.9%
Ingrebourne_S_N_30	31.32	30.36	31.37	1.01	10.1%
Ingrebourne_S_N_40	31.07	30.08	31.73	1.65	16.5%
Ingrebourne_S_N_50	30.89	29.89	33.66	3.77	37.7%
Ingrebourne_S_N_60	30.76	29.74	34.46	4.72	47.1%
Ingrebourne_S_N_70	30.66	29.63	31.23	1.60	16.0%
Ingrebourne_S_N_80	30.58	29.55	30.46	0.91	9.2%
Ingrebourne_S_N_90	30.52	29.48	30.10	0.62	6.2%
Ingrebourne_S_N_100	30.46	29.42	29.88	0.46	4.6%
Ingrebourne_S_N_110	30.42	29.37	29.73	0.36	3.6%
Ingrebourne_S_N_120	30.38	29.33	29.62	0.29	2.9%
Ingrebourne_S_N_130	30.35	29.29	29.54	0.25	2.5%
Ingrebourne_S_N_140	30.33	29.26	29.48	0.22	2.2%
Ingrebourne_S_N_150	30.30	29.24	29.43	0.19	1.9%
Ingrebourne_S_N_160	30.29	29.22	29.39	0.17	1.7%
Ingrebourne_S_N_170	30.27	29.20	29.35	0.15	1.6%
Ingrebourne_S_N_180	30.25	29.18	29.32	0.14	1.4%
Ingrebourne_S_N_190	30.24	29.16	29.30	0.14	1.4%
Ingrebourne_E_W_0	38.10	36.24	35.81	-0.43	-4.3%
Ingrebourne_E_W_10	35.45	33.62	35.39	1.77	17.7%
Ingrebourne_E_W_20	34.20	32.43	39.03	6.60	66.1%

Receptor ID	Total N Dep rate (kg N/ha/yr)				% Change in relation to lowest critical load level
	2015 Base	2022 DM	2022 DS	Change	
Ingrebourne_E_W_30	33.37	31.66	33.28	1.62	16.2%
Ingrebourne_E_W_40	32.77	31.13	31.97	0.84	8.4%
Ingrebourne_E_W_50	32.32	30.74	31.32	0.58	5.8%
Ingrebourne_E_W_60	31.96	30.44	30.90	0.46	4.6%
Ingrebourne_E_W_70	31.68	30.19	30.59	0.40	4.0%
Ingrebourne_E_W_80	31.43	29.99	30.35	0.36	3.6%
Ingrebourne_E_W_90	31.23	29.83	30.16	0.33	3.3%
Ingrebourne_E_W_100	31.06	29.69	30.00	0.31	3.1%
Ingrebourne_E_W_110	30.91	29.58	29.86	0.28	2.8%
Ingrebourne_E_W_120	30.78	29.47	29.74	0.27	2.7%
Ingrebourne_E_W_130	30.66	29.38	29.62	0.24	2.4%
Ingrebourne_E_W_140	30.56	29.30	29.52	0.22	2.2%
Ingrebourne_E_W_150	30.47	29.24	29.43	0.19	2.0%
Ingrebourne_E_W_160	30.38	29.17	29.36	0.19	1.9%
Ingrebourne_E_W_170	30.31	29.11	29.28	0.17	1.7%
Ingrebourne_E_W_180	30.24	29.06	29.22	0.16	1.5%
The_Oaks_W_E_0	37.04	35.33	35.27	-0.06	-0.6%
The_Oaks_W_E_10	35.74	34.00	33.97	-0.03	-0.3%
The_Oaks_W_E_20	34.79	33.07	33.05	-0.02	-0.2%
The_Oaks_W_E_30	34.08	32.38	32.37	-0.01	-0.1%
The_Oaks_W_E_40	33.52	31.86	31.86	0.00	0.0%
The_Oaks_W_E_50	33.08	31.45	31.45	0.00	0.0%
The_Oaks_W_E_60	32.72	31.12	31.13	0.01	0.1%

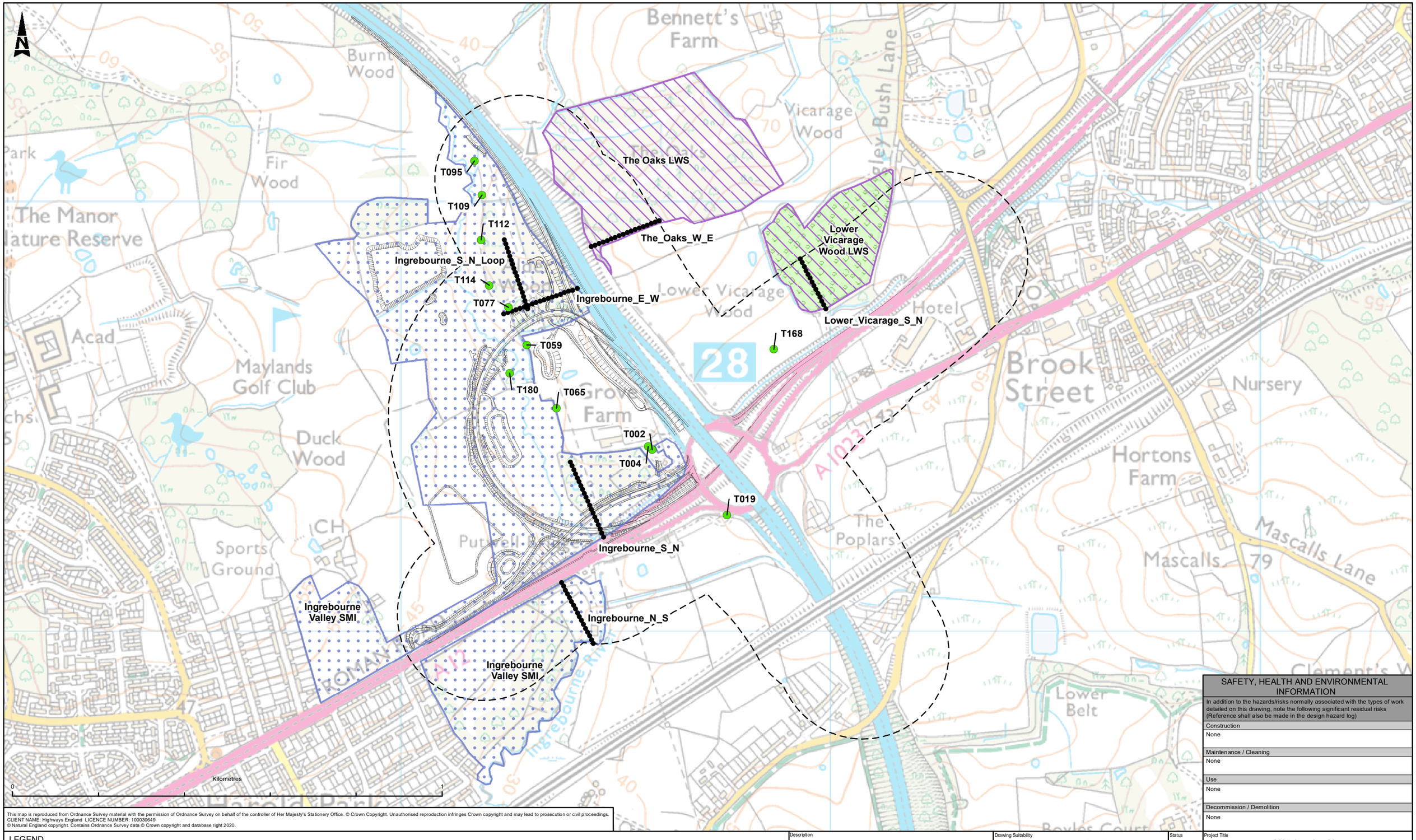
Receptor ID	Total N Dep rate (kg N/ha/yr)				% Change in relation to lowest critical load level
	2015 Base	2022 DM	2022 DS	Change	
The_Oaks_W_E_70	32.41	30.85	30.87	0.02	0.1%
The_Oaks_W_E_80	32.15	30.63	30.64	0.01	0.1%
The_Oaks_W_E_90	31.93	30.44	30.45	0.01	0.1%
The_Oaks_W_E_100	31.74	30.27	30.29	0.02	0.2%
The_Oaks_W_E_110	31.57	30.13	30.15	0.02	0.2%
The_Oaks_W_E_120	31.41	30.00	30.02	0.02	0.2%
The_Oaks_W_E_130	31.28	29.89	29.91	0.02	0.2%
The_Oaks_W_E_140	31.16	29.79	29.81	0.02	0.2%
The_Oaks_W_E_150	31.05	29.71	29.72	0.01	0.2%
The_Oaks_W_E_160	30.95	29.63	29.65	0.02	0.2%
The_Oaks_W_E_170	30.86	29.56	29.58	0.02	0.2%
Ingrebourne_N_S_0	34.48	29.49	29.51	0.02	0.2%
Ingrebourne_N_S_10	32.50	29.44	29.46	0.02	0.2%
Ingrebourne_N_S_20	31.66	29.38	29.40	0.02	0.2%
Ingrebourne_N_S_30	31.17	33.62	33.31	-0.31	-3.1%
Ingrebourne_N_S_40	30.86	31.56	31.38	-0.18	-1.8%
Ingrebourne_N_S_50	30.63	30.70	30.58	-0.12	-1.1%
Ingrebourne_N_S_60	30.47	30.21	30.14	-0.07	-0.7%
Ingrebourne_N_S_70	30.34	29.89	29.85	-0.04	-0.4%
Ingrebourne_N_S_80	30.23	29.67	29.64	-0.03	-0.3%
Ingrebourne_N_S_90	30.15	29.51	29.49	-0.02	-0.2%
Ingrebourne_N_S_100	30.07	29.38	29.37	-0.01	-0.1%
Ingrebourne_N_S_110	30.01	29.06	29.07	0.01	0.1%

Receptor ID	Total N Dep rate (kg N/ha/yr)				% Change in relation to lowest critical load level
	2015 Base	2022 DM	2022 DS	Change	
Ingrebourne_N_S_120	29.96	29.01	29.02	0.01	0.1%
Ingrebourne_N_S_130	29.91	28.97	28.98	0.01	0.1%
Ingrebourne_N_S_140	29.87	28.93	28.94	0.01	0.1%
Ingrebourne_N_S_150	29.83	28.90	28.90	0.00	0.1%
Ingrebourne_N_S_160	29.80	28.86	28.88	0.02	0.1%
Lower_Vicarage_S_N_0	31.30	30.16	30.20	0.04	0.5%
Lower_Vicarage_S_N_10	31.13	30.00	30.04	0.04	0.4%
Lower_Vicarage_S_N_20	30.99	29.86	29.90	0.04	0.4%
Lower_Vicarage_S_N_30	30.88	29.75	29.79	0.04	0.3%
Lower_Vicarage_S_N_40	30.78	29.66	29.69	0.03	0.3%
Lower_Vicarage_S_N_50	30.70	29.58	29.61	0.03	0.3%
Lower_Vicarage_S_N_60	30.62	29.51	29.54	0.03	0.3%
Lower_Vicarage_S_N_70	30.56	29.44	29.47	0.03	0.3%
Lower_Vicarage_S_N_80	30.50	29.39	29.42	0.03	0.2%
Lower_Vicarage_S_N_90	30.45	29.34	29.37	0.03	0.3%
Lower_Vicarage_S_N_100	30.40	29.30	29.32	0.02	0.2%
Lower_Vicarage_S_N_110	30.36	29.26	29.28	0.02	0.2%
Lower_Vicarage_S_N_120	30.32	29.23	29.25	0.02	0.2%
Lower_Vicarage_S_N_130	30.29	29.19	29.22	0.03	0.2%
Ingrebourne_S_N_Loop_0	30.72	29.43	29.75	0.32	3.2%
Ingrebourne_S_N_Loop_10	30.74	29.45	29.69	0.24	2.4%
Ingrebourne_S_N_Loop_20	30.77	29.46	29.65	0.19	1.9%
Ingrebourne_S_N_Loop_30	30.79	29.48	29.64	0.16	1.6%

Receptor ID	Total N Dep rate (kg N/ha/yr)				% Change in relation to lowest critical load level
	2015 Base	2022 DM	2022 DS	Change	
Ingrebourne_S_N_Loop_40	30.81	29.50	29.63	0.13	1.3%
Ingrebourne_S_N_Loop_50	30.84	29.51	29.63	0.12	1.2%
Ingrebourne_S_N_Loop_60	30.86	29.53	29.64	0.11	1.0%
Ingrebourne_S_N_Loop_70	30.89	29.55	29.65	0.10	0.9%
Ingrebourne_S_N_Loop_80	30.92	29.58	29.66	0.08	0.8%
Ingrebourne_S_N_Loop_90	30.94	29.60	29.67	0.07	0.7%
Ingrebourne_S_N_Loop_100	30.97	29.62	29.69	0.07	0.7%
Ingrebourne_S_N_Loop_110	31.01	29.64	29.71	0.07	0.7%
Ingrebourne_S_N_Loop_120	31.04	29.67	29.73	0.06	0.6%
Ingrebourne_S_N_Loop_130	31.07	29.70	29.75	0.05	0.5%
Ingrebourne_S_N_Loop_140	31.10	29.73	29.78	0.05	0.5%
Ingrebourne_S_N_Loop_150	31.14	29.76	29.80	0.04	0.4%
Ingrebourne_S_N_Loop_160	31.18	29.79	29.83	0.04	0.4%
Ingrebourne_S_N_Loop_170	31.22	29.82	29.87	0.05	0.4%

Appendix B. Ecological receptors used in the air quality sensitivity test

B.1 Ecological receptors used in the air quality sensitivity test



LEGEND

- Proposed Alignment
- 200m study area around Affected Road Network
- Ancient Woodland
- Sites of Importance for Nature Conservation (SINCs)
- Local Wildlife Sites (LoWS)
- Veteran Trees
- Ecological Transect Points

Description	Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date
Description							
Description							
Description							
Description PUBLISHED	A1	C01	SD	VS	EM	PG	21/05/20

Drawing Suitability: PUBLISHED
Status: A1

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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 in the design hazard log)

Construction
None

Maintenance / Cleaning
None

Use
None

Decommission / Demolition
None

Project Title: M25 Junction 28

Drawing Title: FIGURE B1
ECOLOGICAL RECEPTORS ASSESSED
IN THE AIR QUALITY SENSITIVITY TEST

Drawing Number: Project | Originator | Volume
HE551519 - ATK - EAQ
XX - GS - GI - 000009
Location | Type | Role | Number

Original Size:	Scale	Project Ref. No:	Sheet:	Rev:
A3	1:8,000	---	1 of 1	C01

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