

A38 Derby Junctions

TR010022

Volume 6

6.1 Environmental Statement
Chapter 4 – Environmental Impact
Assessment Methodology

Regulation 5(2)(a)

Planning Act 2008

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

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Infrastructure Planning

Planning Act 2008

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

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6.1 Environmental Statement Chapter 4 Environmental Impact Assessment Methodology

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4. Environmental Impact Assessment Methodology

4.1 Environmental scoping

- 4.1.1 Highways England undertook a scoping exercise in late 2017, early 2018, the purpose of which was to establish the form and nature of the assessments to be undertaken as part of the environmental impact assessment (EIA) of the Scheme, and the level of detail that they should be progressed to.
- 4.1.2 The EIA scoping exercise was undertaken based on the Scheme design presented within the Preferred Route Announcement on 31 January 2018 (refer to para. 1.2.6), and took into account the maximum extent of land that was considered by Highways England (at that time) as being necessary for its construction, operation and maintenance.
- 4.1.3 An EIA Scoping Report was submitted to The Inspectorate on 15 March 2018 (the EIA Scoping Report) (Highways England, 2018a) – refer to para. 1.3.5. The Inspectorate reviewed and consulted on the EIA Scoping Report and published a Scoping Opinion on 25 April 2018 (the Scoping Opinion) (Planning Inspectorate, 2018) – refer to para. 1.3.6. Late consultation responses were also published on 26 April 2018. The Scoping Opinion, including late responses, is provided in Appendix 4.1 [TR010022/APP/6.3].
- 4.1.4 Both the Scoping Opinion and the comments from the consultees have been considered in undertaking the EIA and in preparing this Environmental Statement (ES). The individual chapters within this ES provide a tabulated summary of Scoping Opinion comments relevant to that chapter. Where assessment has been undertaken in accordance with the Scoping Opinion, reference to the relevant ES section is provided; where the point is not agreed with or not addressed, an explanation of why is provided. Appendix 4.2 [TR010022/APP/6.3] provides responses to Scoping Opinion comments upon Chapters 1 - 4 of the EIA Scoping Report. ES topic Chapters 5 to 15 provide responses to respective Scoping Opinion comments on the various technical subjects considered herein.

Topics scoped into the EIA

- 4.1.5 The EIA Scoping Report and the Scoping Opinion identified that the following Design Manual for Roads and Bridges (DMRB) Volume 11 (Highways Agency, 1993 to date) topics should be scoped into the EIA on the basis that construction, operation and maintenance of the Scheme could potentially lead to significant effects on the environment:
- Air quality.
 - Cultural heritage.
 - Landscape and visual effects.
 - Biodiversity.
 - Geology and soils.
 - Material assets and waste.

- Noise and vibration.
- People and communities.
- Road drainage and the water environment.
- Climate.
- Assessment of cumulative effects.

Human health

- 4.1.6 The EIA Scoping Report (and confirmed by the Scoping Opinion) identified that matters relating to population and human health were potentially of relevance to many of the above topics – these issues are thus brought together and assessed qualitatively within Chapter 12: People and Communities. It is noted that the EIA Scoping Report proposed that human health issues be considered within the cumulative impact assessment. However, internal Highways England guidance now requires that health should be considered in the chapter that assesses impacts upon pedestrians, cyclists, communities and land use – thus health issues herein are reported within Chapter 12: People and Communities.

Major accidents and emergencies

- 4.1.7 The EIA Scoping Report (and confirmed by the Scoping Opinion) identified that matters associated with potential major accidents and disasters should consider the vulnerability of the Scheme to risks associated with man-made and naturally occurring events, and the extent to which they could alter the predicted environmental effects of the Scheme. An assessment of potential issues associated with major accidents and disasters is provided in Appendix 4.4 [TR010022/APP/6.3].
- 4.1.8 The analysis undertaken indicates that no accidents and disasters need to be taken forward for further environmental assessment, given that all accidents and disasters that could realistically occur are either:
- Already mitigated as far as reasonably practicable, or
 - The Scheme would be no more vulnerable than the existing road.
- 4.1.9 The assessment provided in Appendix 4.4 [TR010022/APP/6.3] concludes that with the mitigation measures included within the Scheme design, no significant adverse environmental effects from major accidents and disasters would be expected.

Monitoring

- 4.1.10 In relation to the monitoring of significant environmental effects (and monitoring of non-significant effects), the EIA scoping exercise identified that the requirement for such actions would be best presented within an Outline Environmental Management Plan (OEMP) (refer to Appendix 2.1 [TR010022/APP/6.3]). The OEMP has been prepared in line with environmental management guidance contained in DMRB Interim Advice Note (IAN) 183/14: Environmental Management Plans (Highways Agency, 2014). Monitoring requirements are also considered within technical Chapters 5 to 15.

- 4.1.11 The OEMP forms part of the Development Consent Order (DCO) application [TR010022/APP/6.12].
- 4.1.12 The OEMP would be developed into a more detailed Construction Environmental Management Plan (CEMP) by the construction contractor once the Scheme detailed design has been finalised (subject to gaining the DCO). DCO Schedule 2, Requirement 3 (2) [TR010022/APP/3.1] states that the contractor's CEMP must be substantially in accordance with the OEMP.

Topics scoped out of the EIA

- 4.1.13 Aspects that the Scoping Opinion (Planning Inspectorate, 2018) confirmed could be scoped out of the EIA were as follows (also refer to Appendix 4.1 [TR010022/APP/6.3]):
- Scheme decommissioning and demolition (see para. 4.1.18).
 - Minor reconfiguration and signalisation works at the Ford Lane junction with the A6 (Duffield Road) (refer to Chapter 2: The Scheme para. 2.5.35).
 - Air quality effects upon construction workers and maintenance workers (refer to Chapter 5: Air Quality).
 - Effects arising from carbon monoxide (CO), 1-3 butadiene, benzene, lead and sulphur dioxide (SO₂) (refer to Chapter 5: Air Quality).
 - Ecological impacts upon European sites (refer to Section 4.5, Chapter 8: Biodiversity and Appendix 8.2 [TR010022/APP/6.3]).
 - Impacts upon great crested newts (refer to Chapter 8: Biodiversity).
 - Operational ground-borne vibration (refer to Chapter 9: Noise and Vibration).
 - Impacts of contaminated soils on construction workers, maintenance workers and construction materials (refer to Chapter 10: Geology and Soils).
 - Effects upon agricultural soils at Kingsway junction and Markeaton junction (refer to Chapter 10: Geology and Soils).
 - Operation phase material resource use and waste generation (refer to Chapter 11: Material Assets and Waste).
 - Scheme effects associated with heat and radiation (refer to para. 4.1.14).
 - Transboundary effects (refer to para. 4.1.15 and 4.1.16, and the transboundary effects screening matrix in Appendix 4.3 [TR010022/APP/6.3]).

Heat and radiation

- 4.1.14 The EIA Scoping Report (and confirmed by the Scoping Opinion) concluded that heat and radiation were not relevant matters requiring consideration in the EIA given that the form and nature of the Scheme was such that these emissions would not occur. Accordingly, these matters were scoped out and are not considered further in this ES.

Transboundary effects

- 4.1.15 Regulation 32 of the EIA Regulations 2017 requires the consideration of any likely significant effects on the environment of another European Economic Association (EEA) State. Guidance upon the consideration of transboundary effects is provided in the Inspectorate's Advice Note 12: Transboundary Impacts (Planning Inspectorate, 2018).
- 4.1.16 Following the undertaking of a preliminary screening exercise, the scoping exercise concluded no potential for significant transboundary effects to occur within the above topics, these being effects that could arise on other EEA States as a result of the Scheme (refer to Appendix 1.2: Transboundary Effects Screening Matrix, within the EIA Scoping Report (Highways England, 2018a)). This was attributed to factors such as the characteristics of the Scheme, the geographical area within which effects would be confined, and the intervening distance to the nearest EEA State (the Republic of Ireland located approximately 300km away).
- 4.1.17 The preliminary screening exercise presented in the EIA Scoping Report has been updated to reflect the final form of the Scheme and the outcomes of the EIA process. The outcomes of the transboundary screening exercise are presented in Appendix 4.3 [TR010022/APP/6.3] which confirms that the original conclusions remain valid and that the Scheme is not anticipated to generate any potentially significant transboundary effects. Thus transboundary effects are scoped out of the assessment and not mentioned further within this ES.

Decommissioning

- 4.1.18 The EIA scoping exercise examined whether the decommissioning of the Scheme could result in significant effects within the topic areas scoped into the assessment. This concluded that it would be highly unlikely that the Scheme would be decommissioned as the new and improved infrastructure would form an integral part of the local and strategic transportation network. Therefore, Scheme decommissioning has not been considered further within this ES.

Key policy considerations and guidance

- 4.1.19 The Scoping Opinion has been used to guide and inform the contents of this EIA, whilst reference has also been made to the key policy documents and guidance as detailed in the sections below.

The National Policy Statement - National Networks (NPSNN)

- 4.1.20 The NPSNN sets out the need for and the Government's policies to deliver NSIPs on the national road and rail networks in England (Department for Transport (DfT), 2014). The NPSNN is used by the Secretary of State as the primary basis for making decisions on DCO applications for NSIPs in accordance with s104 of the Planning Act 2008 (PA 2008).

4.1.21 Given the Scheme is a road network NSIP, Highways England has ensured that the EIA approach adopted is in accordance with the NPSNN. In particular, the EIA adheres to the methodology requirements cited within NPSNN Section 5: Generic Impacts. Mitigation measures have been developed in accordance with the mitigation requirements also set out in Section 5 of the NPSNN. There are a number of more generic policy requirements relating to EIA within the NPSNN and these are identified in Table 4.1, together with details of where such issues are addressed within this ES.

Table 4.1: NPSNN – Requirements relating to EIA

NPSNN para. number	Requirement	Where addressed
4.15 (Environmental Impact Assessment)	All proposals for projects that are subject to the European Union's Environmental Impact Assessment Directive and are likely to have significant effects on the environment, must be accompanied by an ES, describing the aspects of the environment likely to be significantly affected by the project. The Directive specifically requires an environmental impact assessment to identify, describe and assess effects on human beings, fauna and flora, soil, water, air, climate, the landscape, material assets and cultural heritage, and the interaction between them. Schedule 4 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 sets out the information that should be included in the environmental statement including a description of the likely significant effects of the proposed project on the environment, covering the direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects of the project, and also the measures envisaged for avoiding or mitigating significant adverse effects. Further guidance can be found in the online planning portal... In this NPSNN, the terms 'effects', 'impacts' or 'benefits' should accordingly be understood to mean likely significant effects, impacts or benefits.	This ES has been prepared in accordance with the EIA Regulations.
4.16	When considering significant cumulative effects, any environmental statement should provide information on how the effects of the applicant's proposal would combine and interact with the effects of other development (including projects for which consent has been granted, as well as those already in existence).	Refer to Chapter 15: Assessment of Cumulative Effects.

NPSNN para. number	Requirement	Where addressed
4.18	In some instances it may not be possible at the time of the application for development consent for all aspects of the proposal to have been settled in precise detail. Where this is the case, the applicant should explain in its application which elements of the proposal have yet to be finalised, and the reasons why this is the case.	Maximum development extents and activities have been identified for the purposes of assessment. These are set out within Chapter 2: The Scheme (refer to para. 2.5.37 to 2.5.43). Also refer to the Works Plans [TR010022/APP/2.5].
4.19	Where some details are still to be finalised, applicants are advised to set out in the environmental statement, to the best of their knowledge, what the maximum extent of the proposed development may be (for example in terms of site area) and assess the potential adverse effects which the project could have to ensure that the impacts of the project as it may be constructed have been properly assessed.	Maximum development extents and activities have been identified for the purposes of assessment. These are set out within Chapter 2: The Scheme (refer to para. 2.5.37 to 2.5.43). Also refer to the Works Plans [TR010022/APP/2.5].
4.26 (Alternatives)	<p>Applicants should comply with all legal requirements and any policy requirements set out in this NPSNN on the assessment of alternatives. In particular:</p> <ul style="list-style-type: none"> • The EIA Directive requires projects with significant environmental effects to include an outline of the main alternatives studied by the applicant and an indication of the main reasons for the applicant's choice, taking into account the environmental effects. • There may also be other specific legal requirements for the consideration of alternatives, for example, under the Habitats and Water Framework Directives. • There may also be policy requirements in this NPSNN, for example the flood risk sequential test and the assessment of alternatives for developments in National Parks, the Broads and Areas of Outstanding Natural Beauty (AONB). 	<p>Refer to Chapter 3: Scheme History and Assessment of Alternatives.</p> <p>Refer to Habitats Regulations Assessment (HRA) – No Significant Effects Report (NSER) in Appendix 8.2 [TR010022/APP/6.3] and the Water Framework Directive (WFD) Assessments in Appendices 13.3A and 13.3B [TR010022/APP/6.3].</p> <p>Refer to Flood Risk Assessments (FRAs) in Appendices 13.2A, 13.2B and 13.2C [TR010022/APP/6.3].</p>

NPSNN para. number	Requirement	Where addressed
4.27	All projects should be subject to an options appraisal. The appraisal should consider viable modal alternatives and may also consider other options (in light of the paragraphs 3.23 to 3.27 of this NPSNN). Where projects have been subject to full options appraisal in achieving their status within Road or Rail Investment Strategies or other appropriate policies or investment plans, option testing need not be considered by the examining authority or the decision maker. For national road and rail schemes, proportionate option consideration of alternatives will have been undertaken as part of the investment decision making process. It is not necessary for the Examining Authority and the decision maker to reconsider this process, but they should be satisfied that this assessment has been undertaken.	Refer to Chapter 3: Scheme History and Assessment of Alternatives.

The Design Manual for Roads and Bridges (DMRB)

- 4.1.22 Guidance published by the Government for the preparation of environmental assessments of proposed road schemes is contained in the DMRB Volume 11 (Highways Agency, 1993 to date). This sets out both the general process and the methods for assessing individual environmental topics. This ES takes into account IAN 125/15 Environmental Assessment Update (Highways Agency, 2015), which provides a new structure for DMRB Volume 11.
- 4.1.23 DMRB Volume 11 advises on the environmental topics to be included in an EIA, and the methods to be used in the assessment for each of those topics. The topics identified in Chapters 5 to 15 of this ES are those required by DMRB and by the EIA Regulations (refer to Chapter 1: Introduction, para. 1.7.2).
- 4.1.24 The EIA undertaken adheres to up-to-date guidance contained in DMRB and Highways England IANs. The methodologies used for the assessments for individual topics in this ES are based on those set out in the EIA Scoping Report (Highways England, 2018a), having regard to the Scoping Opinion (refer to Appendix 4.1 [TR010022/APP/6.3]), feedback on the Preliminary Environmental Information Report (PEIR) (Highways England, 2018b) (refer to Chapter 1: Introduction, para. 1.3.11), and discussions with relevant statutory bodies. Methodologies applied are described in topic Chapters 5 to 15 in this ES.

4.2 Survey, predictive techniques and methods

- 4.2.1 The principal guidance documents used to assess and report environmental effects in this ES are the DMRB Volume 11 (Highways Agency, 1993 to date) and IAN 125/15 (Highways Agency, 2015).

4.2.2 In undertaking the EIA, Highways England has applied the key principles, topics, approaches and criteria set out in these documents; however, where appropriate these have been supplemented using guidance contained in the following policy documents, advice notes and best practice guidelines:

- **NPSNN (DfT, 2014):** this sets out the need and government policies for NSIPs on the road network in England.
- **National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government (2019):** this provides policy guidance on the treatment of environmental impacts and the achievement of good design.
- **The Inspectorate's Advice Notes (The Planning Inspectorate publications dated 2015 - 2018):** these provide guidance on EIA technical and procedural matters for NSIPs. Of most relevance to the EIA are Advice Note Three (EIA Consultation and Notification); Advice Note Seven (EIA: Process, Preliminary Environmental Information and Environmental Statements); Advice Note Nine (Rochdale Envelope); Advice Note Ten (Habitat Regulations Assessment relevant to Nationally Significant Infrastructure Projects); Advice Note Twelve (Transboundary Impacts and Process); Advice Note Seventeen (Cumulative Effects Assessment); and Advice Note Eighteen (The Water Framework Directive).
- **Institute of Environmental Management and Assessment (IEMA) Guidelines for Environmental Impact Assessment (IEMA, 2004):** this provides best practice guidance for undertaking an EIA.
- **IEMA Environmental Impact Assessment: Guide to Shaping Quality Development (IEMA, 2015):** this sets out principles and a framework for maximising the interaction between environmental thinking and project design within the decision-making process.

4.2.3 A number of the assessments reported in this ES have also referenced and applied other topic-specific guidance published by public authorities and professional bodies, the details of which are presented within Chapters 5 to 15 where applicable.

Study area and site boundary

4.2.4 The study area assessed for the EIA for each environmental topic is described in the relevant topic chapter (Chapters 5 to 15). The study area is based on the DCO application boundary (referred to herein as the Scheme boundary – refer to Figures 2.4a and 2.4b – all figures referred to within this chapter are found in **TR010022/APP/6.2**) which represents the land anticipated to be required temporarily and permanently for the construction, operation and maintenance of the Scheme.

Existing baseline and future conditions

- 4.2.5 In order to identify the effects of the Scheme on the environment, it is important to understand the environment that would be affected by the Scheme ('baseline conditions'). Understanding baseline conditions allows the measurement of changes that would be caused by the Scheme.
- 4.2.6 Existing baseline environmental conditions have been defined in order to identify the presence of environmental resources and receptors that may be affected by the Scheme within defined study areas in order to determine their relative value, importance or sensitivity towards change.
- 4.2.7 Resources comprise environmental aspects which support and are essential to natural or human systems. These include areas or elements of population, ecosystems, watercourses, air and climatic factors, landscape, and material assets.
- 4.2.8 Receptors comprise people (i.e. occupiers of dwellings and users of recreational areas, places of employment and community facilities) and elements within the environment (e.g. flora and fauna) that rely on environmental resources.
- 4.2.9 Baseline environmental data, information and records were obtained using a combination of sources and techniques, namely:
- **Desk-based sources:** including previously published studies undertaken as part of the Scheme; published literature; databases, records and schedules relating to environmental designations; national and local planning policy documents; historic and current mapping; aerial photography; and data gathered from previous environmental investigations.
 - **Site-based surveys:** these have been undertaken to verify and consolidate information gathered during the desk-based review, and to evaluate the relationships between specific environmental interests and their wider environmental value.
 - **Consultation:** engagement with statutory and non-statutory organisations was undertaken to obtain factual baseline environmental information and records.
- 4.2.10 Defined baseline environmental conditions are not necessarily the same as those that exist at the current time; they are the conditions that would exist in the absence of the Scheme at:
- a) The time that Scheme construction is expected to start (preliminary works associated with the Scheme are anticipated to start in late 2020 (subject to securing a DCO) with the main construction works starting in early 2021 (refer to Chapter 2: The Scheme, Section 2.6)), for impacts arising from construction.
 - b) The time that the Scheme is expected to open to traffic (assumed to be 2024), for impacts arising from the operation of the Scheme.

- c) Fifteen years after Scheme opening, for impacts arising from the long term operation of the Scheme (and following maturation of Scheme landscape planting).

4.2.11 Therefore, the identification of baseline conditions involves predicting changes that are likely to happen in the intervening periods, for reasons unrelated to the Scheme. Definition of future baseline conditions thus entails taking current conditions and potential future development into consideration, and using experience and professional judgment to predict what the baseline conditions might look like prior to the start of Scheme construction and during Scheme operation. Details regarding potential future development considered as part of both the future baseline and the cumulative assessment are discussed within Chapter 15: Assessment of Cumulative Effects.

4.2.12 As detailed in Chapter 2: The Scheme, para. 2.4.5, baseline conditions at the start of Scheme construction need to take account of Derby City Council's (DCiC) plans to introduce a series of traffic management measures to manage the flow of traffic in and around Stafford Street in order to improve air quality. These measures are planned to be in place in mid-2019, and thus well in advance of Scheme construction. Traffic modelling associated with Scheme construction has thus taken account of such measures (refer to para. 4.2.14).

4.2.13 Where there are any potential differences in the 2020 and 2024 baseline conditions, this is identified within the 'Future baseline' sub-sections within the 'Baseline' section of each topic chapter (if relevant).

Predictive techniques

4.2.14 In order to assess the potential environmental effects associated with the construction and operation of the Scheme, a number of predictive techniques have been used, which are summarised below:

- **Construction phase traffic modelling:** as detailed in the Transport Assessment Report [TR010022/APP/7.3], a traffic model covering the local and strategic road network has been used to model traffic effects during the various construction traffic management scenarios as detailed in Illustration 2.1 (includes the likely number of Heavy Goods Vehicles (HGVs) and private vehicles that would be added to the road network taking advice from Highway England's appointed buildability advisors for the Scheme). Construction phase modelling has taken into account DCiC planned traffic management measures based around Stafford Street that aim to improve air quality. Such measures are anticipated to be in place in mid-2019 (refer to Chapter 2: The Scheme, para. 2.4.5 and 4.2.12). Modelling outcomes have been used in order to determine the potential effect of the Scheme construction activities on the environment surrounding the Scheme (e.g. noise and air quality effects), as well as Scheme effects upon air quality along Stafford Street during Scheme construction (refer to Chapter 5: Air Quality).

- **Operational phase traffic modelling:** as detailed in the Transport Assessment Report [TR010022/APP/7.3], a traffic model covering the strategic and local road network was developed to forecast future traffic flows, both with and without the Scheme (taking into account future development patterns). Modelling outcomes have been used in order to determine the potential effect of the Scheme operation on the environment surrounding the Scheme (e.g. noise, air quality, severance, driver stress, water quality effects), as well as Scheme effects upon air quality along Stafford Street during Scheme operation (refer to Chapter 5: Air Quality).
- **Other computer modelling techniques:** Other forms of computer modelling have been undertaken as part of the EIA within the topics of air quality, noise and vibration, and road drainage and the water environment. These have used a combination of traffic data, monitoring data and environmental factors (such as those relating to climate change) to model the conditions that would occur within the different scenarios and years adopted in the assessment of the Scheme.

4.3 Potential significant effects and mitigation

Defining assessment years and future scenarios

- 4.3.1 The assessment of effects involves comparing a scenario with the Scheme against one without the Scheme over time. The absence and presence of the Scheme are referred to as the 'Do Minimum'¹ and 'Do Something' scenarios respectively. The 'Do Minimum' scenario represents the future baseline and assumes the current routine highway maintenance regime is followed with no major changes to the existing highway infrastructure.
- 4.3.2 Depending on the topic, the effects are assessed for the 'Do Minimum' and 'Do Something' scenarios in the baseline year (assumed to be the year of Scheme opening, 2024 for the purposes of the ES) and a future assessment year (assumed to be 15 years after Scheme opening).
- 4.3.3 Demolition of the Scheme has been scoped out of the EIA on the basis that the road would become an integral part of national infrastructure and would not be decommissioned (refer to para. 4.1.18).
- 4.3.4 The following assessment years and scenarios have been defined and adopted within the EIA, where relevant to the topics under consideration:
- **Current baseline (2017/2018):** reflective of the conditions which exist at the time of gathering baseline environmental data and undertaking the EIA.
 - **Future baseline (2020):** reflective of the conditions that would be experienced in the future, immediately prior to implementation of the Scheme construction works.

¹ Do Minimum differs from Do-Nothing as it captures works that would be carried out in the future regardless of whether or not the Scheme is built e.g. even without the Scheme, the A38 would be subject to ongoing maintenance works, with some sections being resurfaced with low noise surfacing. The Do Minimum scenario captures this change, whereas the Do Nothing scenario does not. Refer to Chapter 17: Glossary and Abbreviations for further details.

- **Construction (2020 - 2024):** reflective of the conditions that would be experienced during the period over which construction of the Scheme is planned to take place (preliminary works are planned to start in late 2020 (subject to securing a DCO), with the main construction works following in early 2021).
- **Operation (2024²):** reflective of the conditions that would be experienced when the Scheme would become operational and open to traffic (this is referred to as the opening year or the year of opening).
- **Future conditions (2039):** reflective of the conditions that would be experienced at a point 15 years after the year of opening of the Scheme (this is referred to as the design year or year 15).

Identifying potential impact and effects

4.3.5 Impacts comprise the following identifiable changes to baseline environmental conditions:

- Direct impact: such as the loss of an ecological habitat to accommodate the Scheme.
- Indirect impact: such as pollution downstream arising from silt deposition during earthworks.
- Secondary impact: such as changes to ecological species as a result of water pollution.
- Short-term (or temporary) impact: such as dust generated as a result of construction activities.
- Medium-term impact: such as the cutting back of planting which is then allowed to regenerate.
- Long-term (or permanent) impact: such as the introduction of new built form into an established view.

4.3.6 These types of impact have been classified as being either:

- Beneficial (positive): for example, the introduction of planting to screen visually detracting elements.
- Adverse (negative): for example, loss of a valuable environmental feature.

4.3.7 Impacts have been defined in accordance with accepted terminology and standardised methodologies to predict the magnitude of impact (or change) resulting from the Scheme, in accordance with DMRB Volume 11 (Highways Agency, 1993 to date) and IAN 125/15 (Highways Agency, 2015) guidance³.

² The Scheme junctions would open sequentially, with Kingsway junction being open to traffic in 2023, and with Markeaton and Little Eaton junctions being open for traffic in 2024.

³ The guidance refers to magnitude differently across assessment topics, adopting either the term 'magnitude of impact' or 'magnitude of change'. This is a consequence of DMRB Volume 11 being updated over a long period of time, which has resulted in inconsistency of terminology. Both terms have therefore been used interchangeably within the ES.

- 4.3.8 The impact assessments undertaken have been both quantitative and qualitative in nature, depending on the nature of the topic under consideration and the techniques used to identify and predict the magnitude of impacts (or change). For example, the assessment of noise and vibration has used computer modelling to calculate changes in noise levels resulting from the Scheme, whereas the assessment of visual effects has relied upon the professional experience, perception and opinion of the individual undertaking the assessment, using available information and professional judgement. Details of technical staff qualifications and experience are provided in Appendix 1.1 [TR010022/APP/6.3].
- 4.3.9 An acknowledgement has been made within each impact assessment of any uncertainties or assumptions attached to the prediction of impacts, such as those arising from the validity of baseline data decreasing with the passage of time or where assessments use data provided by others. In instances where uncertainty exists, a precautionary approach assuming a worst case impact has been adopted for the assessment – also refer to Section 4.4.

Assessing significance

- 4.3.10 This ES addresses the requirements of the EIA Regulations in presenting: “The description of the likely significant effects” of the Scheme on the environment, covering “*the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development*” (see Schedule 4 paragraph 5 of the EIA Regulations).
- 4.3.11 The significance of an environmental effect is typically a function of the ‘value’ or ‘sensitivity’ of the receptor and the ‘magnitude’ or ‘scale’ of the impact (or change).
- 4.3.12 DMRB Volume 11, Section 2, Part 5 HA 205/08 ‘Assessment and Management of Environmental Effects’ (Highways Agency, 2008) provides advice on typical descriptors of environmental value, magnitude of change (or impact) and significance of effects. Table 4.2 to Table 4.5 reproduce these descriptors and explain how the significance of effect category is derived. Assessments against these criteria have been made on the basis of professional judgement.

Table 4.2: Environmental value (or sensitivity) and typical descriptors

Value	Typical descriptors
Very high	Very high importance and rarity, international scale and very limited potential for substitution.
High	High importance and rarity, national scale, and limited potential for substitution.
Medium	High or medium importance and rarity, regional scale, limited potential for substitution.
Low (or lower)	Low or medium importance and rarity, local scale.
Negligible	Very low importance and rarity, local scale.

Table 4.3: Magnitude of change (impact) and typical descriptors

Magnitude of change	Typical descriptors
Major	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (Adverse).
	Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial).
Moderate	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements (Adverse).
	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial).
Minor	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements (Adverse).
	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial).
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse).
	Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial).
No Change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.

4.3.13 Table 4.4 demonstrates how combining the environmental value of the resource or receptor with the magnitude of change (or impact) produces a significance of effect category.

Table 4.4: Significance of effects matrix

Magnitude of impact (degree of change)	Environmental value (sensitivity)				
	Very High	High	Medium	Low	Negligible
Major	Very Large	Large or Very Large	Moderate or Large	Moderate	Slight
Moderate	Large or Very Large	Moderate or Large	Moderate	Slight	Neutral
Minor	Moderate or Large	Moderate	Slight	Neutral	Neutral
Negligible	Slight	Slight	Neutral	Neutral	Neutral
No Change	Neutral	Neutral	Neutral	Neutral	Neutral

- 4.3.14 The DMRB recognises: “the approach to assigning significance of effect relies on reasoned argument, professional judgement and taking on board the advice and views of appropriate organisations. For some disciplines, predicted effects may be compared with quantitative thresholds and scales in determining significance. Assigning each effect to one of the five significance categories enables different topic issues to be placed upon the same scale, in order to assist the decision-making process at whatever stage the project is at within that process”.
- 4.3.15 Table 4.5 illustrates how DMRB describes the significance of effect categories. In arriving at the significance of effect, the assessor considers whether effects are direct, indirect, secondary, cumulative, short, medium or long-term, permanent or temporary, beneficial or adverse (refer to para. 4.3.5).

Table 4.5: Descriptors of the significance of effects categories

Significance category	Typical descriptors of effect
Very large	Only adverse effects are normally assigned this level of significance. They represent key factors in the decision making process. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change (e.g. loss or severe damage to key characteristics) in a site or feature of local importance may also enter this category.
Large	These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process.
Moderate	These beneficial or adverse effects may be important, but are not likely to be key decision-making factors. The cumulative effects of such factors may influence decision making if they lead to an increase in the overall adverse effect on a particular resource or receptor.
Slight	These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision making process, but are important in enhancing the subsequent design of the project.
Neutral	No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

- 4.3.16 Moderate, large and very large effects are deemed to be significant. Effects determined to be slight or neutral are not deemed to be significant, and as such are not reported in detail in the ES and do not require specific mitigation. The exception to this is where a combination of multiple slight effects has the potential to lead to a significant (i.e. moderate or above) cumulative effect (refer to Chapter 15: Assessment of Cumulative Effects).
- 4.3.17 Not all of the environmental topics have used the above criteria or approach. For example, some topics do not use a matrix based approach, but instead use numerical values to identify impacts (e.g. noise and vibration), whilst some topics do not have agreed methods of assessment or scales of measurement for either receptor value or sensitivity (e.g. geology and soils). Therefore, each environmental topic specialist has used the information provided above, their topic specific guidance, as well as their professional judgement to assess the significance of effects. However, irrespective of the criteria or approach that is

required by a topic, the descriptors of significance listed in Table 4.5 have been used.

- 4.3.18 Further topic-specific details of the methodology for determining effect significance are presented in Chapters 5 to 15.

Mitigation measures, enhancement and residual effects

- 4.3.19 The assessments within this ES have taken into account the design measures that have been incorporated into the Scheme design (embedded mitigation measures), as well as any standard construction management activities that the Scheme would implement through the OEMP (refer to Appendix 2.1 [TR010022/APP/6.3]) and in accordance with the NPSNN.
- 4.3.20 Highways England has included the mitigation measures necessary to address the Scheme's potentially significant adverse environmental effects identified during the EIA process as far as is reasonably practicable. Mitigation of potentially significant adverse environmental effects (including, where appropriate, any proposed monitoring arrangements) was an iterative part of the Scheme design development following the hierarchy below:
- a) **Avoidance:** incorporation of measures to avoid the effect, for example, alternative design options or modifying the Scheme programme to avoid environmentally sensitive periods.
 - b) **Reduction:** incorporation of mitigation measures to lessen the effect, for example, fencing off sensitive areas during construction and implementing a CEMP to reduce the potential impacts from construction activities.
 - c) **Compensation or remediation:** where it is not possible to avoid or reduce a significant effect, then offsetting mitigation measures have been considered, for example the provision of replacement habitat to replace that lost to the Scheme or remediation such as the clean-up of contaminated soils.
 - d) **Enhancement:** where possible enhancement measures have been incorporated into the Scheme design. Enhancement measures are considered to be over and above any avoidance, mitigation and compensation measures required to remove the adverse impacts of the Scheme. Enhancement measures are not factored into the determination of residual significant effects. However, the potential additional benefits are still identified within the ES.
- 4.3.21 With regard to the protection of internationally designated or inscribed sites, Highways England has liaised throughout the EIA process with the relevant stakeholders to ensure that the Scheme includes the requisite measures to ensure that the Outstanding Universal Value (OUV) of the Derwent Valley Mills World Heritage Site (WHS) is maintained – refer to Chapter 6: Cultural Heritage and Appendix 6.1: Heritage Impact Assessment (HIA) [TR010022/APP/6.3].

- 4.3.22 Within this ES, the individual technical chapters identify the mitigation required to mitigate any potential significant adverse effects. This mitigation has been identified and incorporated into the Scheme design and is referred to as embedded mitigation. The embedded mitigation is shown on the Environmental Masterplans (Figures 2.12a to 2.12h [TR010022/APP/6.2]) and detailed in Table 3.2c in the OEMP presented in Appendix 2.1 [TR010022/APP/6.3]. Effects that remain after mitigation are referred to as residual effects. The identification of the significance of residual effects after mitigation is the key outcome of the ES.

Construction and operational effects

- 4.3.23 The EIA has considered impacts during the construction and operation of the Scheme. The construction phase assessment addresses both the temporary activities involved in building the Scheme, and the subsequent permanent presence of the Scheme once constructed. Where relevant, temporary and permanent effects are described separately.
- 4.3.24 The operational assessment considers the situation when the Scheme is being used by traffic.
- 4.3.25 For in combination effects (described below), the effects of both the construction and the operational phases on a single receptor are considered.

Assessment of cumulative and in-combination effects

- 4.3.26 Cumulative effects are the result of multiple impacts on environmental receptors or resources. There are principally two types of cumulative impact:
- The combined action of a number of different projects, cumulatively with the Scheme, on a single resource or receptor (cumulative effects).
 - The combined action of a number of different environmental topic specific impacts as associated with the Scheme upon a single resource or receptor (in combination effects).
- 4.3.27 The cumulative and in combination effects assessment is provided in Chapter 15: Assessment of Cumulative Effects.

4.4 General assessment assumptions and limitations

- 4.4.1 A number of general limitations have been identified during the EIA process. Those that have influenced data collection, modelling and assessments are reported within the ES technical chapters (Chapters 5 to 15) and have principally been related to:
- The availability and accuracy of third-party data and records to inform the establishment of baseline conditions.
 - The availability of land access to undertake environmental surveys and monitoring in the field, to supplement and verify third-party information.
 - The need to undertake certain ecological surveys at sub-optimal times of the year.

- The availability and reliability of information regarding future planned development projects, for inclusion in the cumulative effects assessment.

4.4.2 In response, a number of assumptions have been made in the assessment where information or survey access has been lacking or incomplete. These include:

- Adopting a precautionary approach in the assessment of impacts and effects where necessary.
- Applying worst-case assumptions regarding the Scheme where information is unavailable or incomplete.
- Using a combination of modelling and professional judgement to predict the baseline conditions that could occur in the future (in the absence of the Scheme).

4.4.3 Further details regarding assumptions and limitations adopted within the topic-specific assessments are presented within Chapters 5 to 15.

4.5 Duplication of assessment

4.5.1 Information gathered and assessed as part of the EIA process has been used to inform the following assessments undertaken for the Scheme, which form part of Volume 3 of this ES [TR010022/APP/6.3] and other reports comprising the DCO application:

- **Water Framework Directive Assessments:** Water Framework Directive (WFD) assessments have been undertaken and WFD compliance assessment reports are provided in Appendices 13.3A and 13.3B [TR010022/APP/6.3]. The reports consider the extent to which the Scheme could impact on the current and future target WFD status of relevant water bodies (Bramble Brook and the River Derwent). Where potential adverse effects are identified, the assessments have informed the mitigation measures incorporated into the Scheme design.
- **Flood Risk Assessments:** A Flood Risk Assessment (FRA) for each junction has been undertaken – these are provided in Appendices 13.2A, 13.2B and 13.2C [TR010022/APP/6.3]. These detail how the Scheme could influence local flooding and the measures integrated within the Scheme design that would avoid significant flooding effects.
- **Heritage Impact Assessment:** A Heritage Impact Assessment (HIA) is provided as Appendix 6.1 [TR010022/APP/6.3]. HIA is recommended by the International Council on Monuments and Sites (ICOMOS) for development which may affect cultural World Heritage properties, in order to evaluate effectively the potential impact of development upon the OUV, Integrity and Authenticity of World Heritage Sites (WHS). The HIA has been used to inform the Scheme design and mitigation proposals, especially the design of the floodplain compensation area to the west of the River Derwent. The HIA focuses on the impact of the Scheme on the OUV of the Derwent Valley Mills WHS and the attributes that convey the OUV. The HIA indicates that the

Scheme would not have a significant effect on the OUV of the Derwent Valley Mills WHS as a whole.

- **Habitat Regulations Assessment:** When preparing applications for NSIPs under the PA 2008, applicants need to consider the potential effects of the application on European Sites. It is a requirement of the Habitats Directive 92/43/EEC that the potential for proposed schemes to impact upon European Sites (also referred to as Natura 2000 sites) is investigated, where such sites are designated for their nature conservation interests. This process is referred to as a Habitats Regulations Assessment (HRA) and as an Assessment of Implications on European Sites (AIES) for highways schemes. An HRA screening exercise was undertaken for the Scheme before the incorporation of mitigation. The HRA Screening Report in the format of an HRA – No Significant Effects Report (NSER) is provided as Appendix 8.2 [TR010022/APP/6.3] and concludes that an HRA is not required for the Scheme (also refer to Chapter 8: Biodiversity). It is noted that the HRA – NSER has been reviewed by Natural England who confirm that they are satisfied that the Scheme would have no likely significant effect on these sites (refer to Appendix E of the HRA – NSER provided in Appendix 8.2 [TR010022/APP/6.3]). Thus it is considered that the Scheme would have no likely significant effects on European Sites.
- **Planning Statement:** The Planning Statement [TR010022/APP/7.2] includes assessments as related to public open space losses and replacement public open space offered in exchange, as well as the planning policy considerations of the Scheme being located within green belt. Chapter 7: Landscape and Visual also gives consideration to Scheme impacts upon the openness of green belt.

4.6 References

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Planning Inspectorate (2017) Advice Note Eighteen: The Water Framework Directive.

Planning Inspectorate (2018) Scoping Opinion: Proposed A38 Derby Junctions. Case Reference: TR010022.