M5 Junction 10 Improvements Scheme

Preliminary Environmental Information Report (PEIR)

Cumulative Effects Assessment chapter

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Glossary

Term	Description
AADT	Annual Average Daily Traffic
AAWT	Annual Average Weekday Traffic
AEP	Annual Exceedance Probability
ALC	Agricultural Land Classification
AMP	Archaeological Management Plan
AONB	Area of Outstanding Natural Building
ARN	Affected Road Network
ASPT	Average Score Per Taxon
AQAL	Air Quality Assessment Level
AQMA	Air Quality Management Area
AQS	Air Quality Strategy
BAP	Biodiversity Action Plan
BCT	Bat Conservation Trust
BEIS	Department of Business, Energy and Industrial Strategy
BGS	British Geological Survey
BMV	Best and Most Versatile
BoQ	Bill of Quantities
BS	British Standards
BTO	British Trust for Ornithology
CAMS	Catchment Abstraction Management Strategy
CBC	Cheltenham Borough Council
CBC	Common Birds Census
CCC	Committee on Climate Change
CD&E	construction, Demolition and Excavation
CEA	Cumulative Effects Assessment
CEMP	Construction Environmental Management Plan
CIEEM	Chartered Institute of Ecology and Environmental Management
CIRIA	Construction Industry Research and Information Association
CL:AIRE	Contaminated Land: Applications in Real Environments
CLP	Classification, Labelling and Packaging
CMS	Continuous Monitoring Station
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
COP	Conference of the Parties
COSHH	Control of Substances Hazardous to Health
CPS	Connecting Places Strategies
CRoW	Countryside and Rights of Way
CRTN	Calculation of Road Traffic Noise
CSZs	Core Sustenance Zones
DCO	Development Consent Order
DfT	Department for Transport
DM	Do Minimum
DMOY	Do Minimum Scenario in the Opening Year
DMFY	Do Minimum Scenario in the Future Assessment Year
DMRB	Design Manual for Roads and Bridges
DoE	Department of the Environment
DoWCoP	Definition of Waste: Development Industry Code of Practice
DS	Do Something
DSFY	Do Something in the Future Assessment Year
DSOY	Do Something Scenario in the Opening Year
EC	European Commission
ECoW	Ecological Clerk of Works
eDNA	environmental DNA

Term	Description
EEA	European Economic Area
EFT	Emissions Factors Toolkit
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
END	Environmental Noise Directive
EPA	Environmental Protection Act
EPS	European Protected Species
EPUK	Environmental Protection UK
EQS	Environmental Quality Standards
EU	European Union
ES	Environmental Statement
FRA	Flood Risk Assessment
ES	Environmental Statement
GCC	Gloucester City Council
GCER	Gloucestershire Centre for Environmental Records
GCN	Great Crested Newt
GFirst LEP	Gloucestershire Local Enterprise Partnership
GHER	Gloucestershire Historic Environment Record
GHGs	Greenhouse Gases
GLNP	Gloucestershire Local Nature Partnership
GLVIA3	Guidelines for Landscape and Visual Impact Assessment
GLTA	Ground Level Tree Assessment
GPLC	Guiding Principles for Land Contamination
GWDTE	Groundwater Dependant Terrestrial Ecosystems
GWT	Gloucestershire Wildlife Trust
HDV	Heavy Duty Vehicles
HER	Historic Environment Record
HEWRAT	Highways England Water Risk Assessment Tool
HGVs	High Good Vehicles
HIF	Housing Infrastructure Fund
HLC	Historic Landscape Characterisation
HMC	Habitat Modification Class
HMS	Habitat Modification Score
HRA	Habitat Regulations Assessments
HSI	Habitat Suitability Index
IAQM	Institute of Air Quality Management
IDB	International Drainage Board
IPCC	International Panel on Climate Change
JCS	Joint Core Strategy
JNCC	Joint Nature Conservation Committee
LAQM	Local Air Quality Management
LCAs	Landscape Character Assessments
LCRM	Land Contamination: Risk Management
LCT	Landscape Character Type
LDV	Light Duty Vehicles
LLFA	Lead Local Flood Authority
LNR	Local Nature Reserves
LOAEL	Lowest observed adverse effect level
LTP	Local Transport Plans
LVIA	Landscape and Visual Impact Assessment
MAFF	Ministry of Agriculture, Fisheries and Food
MCHW	Manual of Contract Documents for Highway Works
MHCLG	Ministry of Housing, Communities and Local Government
MMP	Materials Management Plan
MSA	Mineral Safeguarding Areas
MW	Minor Watercourse

Term	Description
NCA	National Character Area
NERC	Natural Environment and Rural Communities
NHLE	National Heritage List for England
NIAs	Noise Important Areas
NMP	National Mapping Programme
NMU	Non- Motorised User
NNR	National Nature Reserves
NPS NN	National Policy Statement for National Networks
NOEL	No Observed Effect Level
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
NPSE	Noise Policy Statement for England
NSIP	Nationally Significant Infrastructure Projects
NSR	Noise Sensitive Receptors
NVC	National Vegetation Classification
OS	Ordnance Survey
PAH	Polyaromatic Hydrocarbons
PAS	Portable Antiquities Scheme
PCBs	Polychlorinated Biphenyls
PCF	Project Control Framework
PCL	Potential Contaminant Linkage
PCM	Pollution Climate Mapping
PCSM	Preliminary Conceptual Site Model
PEAOR	Preliminary Environmental Assessment of Options Report
PEIR	Preliminary Environmental Information Report
PINS	Planning Inspectorate
PPE	Personal Protective Equipment
PPGs	Pollution Prevention Guidelines
PPG	Planning Practice Guidance
PPS10	Planning Policy Statement 10
PPGN	Planning Practice Guidance: Noise
PRA	Preliminary Roost Assessment
PRoW	Public Right of Way
Q_{95}	The 5 percentile flow
RAMS	Risk Assessments, Method Statements
RBD	River Basin Districts
RBMP	River Basin Management Plans
RCP	Relative Concentration Pathway
RCS	River Corridor Survey
RFFPs	Reasonably Foreseeable Future Projects
RHS	River Habitat Survey
RNAG	Reason for not Achieving Good
RoWIP	Rights of Way Improvement Plan
SAC	Special Area of Conservation
SHMP	Soil Handling Management Plan
SM	Scheduled Monument
SOAEL	Significant Observed Adverse Effect Level
SoCC	Statement of Community Consultation
SPD	Supplementary Planning Document
SPA	Special Protection Area
SPZ	Source Protection Zones
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage Systems
SWMP	Site Waste Management Plan
TAMP	Transport Asset Management Plan
TBC	Tewkesbury Borough Council

Term	Description
TAR	Technical Appraisal Report
TSCS	Thin Surface Course System
UKCP18	United Kingdom Climate Projections 2018
UNFCCC	United Nations Framework Convention on Climate Change
UXO	Unexploded Ordnance
VfM	Value for Money
WCH	Walkers, Cyclists and Horse Riders
WEEE	Waste Electrical and Electronic Equipment
WER	Water Environment Regulations
WFD	Water Framework Directive
WHTP	Whalley, Hawkes, Paisley & Trigg
WSI	Written Scheme of Investigation
ZTV	Zone of Theoretical Visibility

Chapters 1-4 of this PEIR have been produced as a separate document.

1 Introduction

2 The Scheme

3 Assessment of Alternatives

4 Environmental Assessment Methodology

Table 4-1 - Significance Matrix

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

Table Source: DMRB LA 104 Environmental assessment and monitoring Table 3.8.1

Table 4-2 - Significance categories and typical descriptions

Value	Typical descriptors
Very Large	Effects at this level are material in the decision-making process.
Large	Effects at this level are likely to be material in the decision-making process.
Moderate	Effects at this level can be considered to be material decision-making factors.
Slight	Effects at this level are not material in the decision-making process.
Negligible	No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

Table Source: DMRB LA 104 Environmental assessment and monitoring Table 3.7

The discipline specific chapters of this PEIR have been produced as separate documents.

5 Air Quality

6 Noise and Vibration

7 Biodiversity

8 Road Drainage and the Water Environment

9 Landscape and Visual

10 Geology and Soils

11 Cultural Heritage

12 Materials and Waste

13 Population and Human Health

14 Climate

15 Cumulative Effects Assessment

15.1 Introduction

15.1.1 This chapter presents the cumulative effects assessment (CEA) part of the preliminary environmental assessment for the M5 Junction 10 Improvements Scheme (the Scheme), based on the Scheme as it is described in Chapter 2 (and detailed in the Design Fix 2 drawings in Appendix 2.1). This chapter expands upon the proposed approach to CEA for the Scheme, as described in Chapter 4. It confirms the type of cumulative impacts that will be considered in seeking to identify potentially significant cumulative effects; and the proposed methodology for inter-project CEA is described in more detail.

15.1.2 Chapter 4 indicates where the different aspects of CEA will be reported within the ES. This chapter refers to a preliminary long-list of planning applications that will form one category of projects that are termed Reasonably Foreseeable Future Projects (RFFPs), required to underpin inter-project CEA. Once fully identified, which will happen at the next stage of the EIA and be reviewed periodically, the RFFP long list will represent projects that are known to the planning system and may come forward within timescales that could interact with the Scheme. The way in which the RFFP long list will be reviewed and screened as the EIA process progresses is set out in this chapter.

15.2 Planning policy and topic legislative context

15.2.1 Paragraph 5 of Schedule 4 of the EIA Regulations 2017 requires an ES to include the assessment of cumulative effects. Part (e) references the requirement to consider the cumulation of effects with other existing and/or approved projects. Therefore, the environmental effects of the Scheme will also be assessed in combination with the effects of other projects as part of the EIA process, where relevant information is available. The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 and the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 provide the relevant interpretation, forming UK legislation for NSIP development and applications made through the Town and Country Planning Act 1990 (as amended), respectively.

15.2.2 The projects that should be considered as part of a 'cumulative' assessment for these purposes is not defined in the EIA Directive or EIA Regulations 2017 and there is no standard approach to the assessment of cumulative effects, with different projects adopting different approaches. However, potential cumulative impacts with other major developments that have the potential to give rise to significant cumulative effects need to be identified, as required by the Directive. To aid in this, the PINS Advice Note 17 suggests the categories of developments that should be included in such cumulative assessments. Guidance on the assessment and reporting of cumulative effects is also provided in DMRB Volume 11 Section 2, Part 4, LA 104: Environmental assessment and monitoring (LA 104). Guidance on determining the significance of environmental effects is contained within LA 104, including for cumulative effects, and for the management of those effects. IEMA publications and guidance provide a range of perspectives of CEA but conclude that there is no definitive methodology[1].

15.2.3 The National Policy Statement for National Networks (NN NPS) includes general principles of assessment. Of relevance to CEA, these assert that the Examining Authority and the Secretary of State should take into account cumulative adverse impacts as part of weighing adverse impacts against benefits. It reiterates the requirements of the EIA Directive in relation to considering the interaction between impacts arising through different topic areas, to be reported within the ES. Paragraphs 4.16 and 4.17 relate specifically to the consideration of significant cumulative effects – they require the ES to provide information on how the effects of the Scheme would combine and interact with those of other development (pre-existing and with consent). They also reinforce the need for the decision makers to *'consider how significant cumulative effects and the interrelationship between*

[1] IEMA EIA guide to delivering quality development July 2016; IEMA Impact Assessment Outlook Journal Vol 7: July 2020 – Demystifying Cumulative Effects

effects might as a whole affect the environment, even though they may be acceptable when considered on an individual basis with mitigation measures in place.'

15.2.4 The Town and Country Planning (Environmental Impact Assessment) Regulations 2017, whilst not the regulatory regime for a project of this scale / nature, is commonly used to provide thresholds for the inter-project cumulative effects assessments, intended to provide robustness to the assessment process and reduce the use of professional judgements (as indicated by PINS Advice Note 17). The National Planning Policy Framework (NPPF) 2021, which includes interpretation of these regulations; forms a material consideration in the determination of applications made for Development Consent Orders – it outlines principles to be applied to cumulative effect assessments, which have been used an informative in the preparation of this CEA chapter.

15.3 Methodology

15.3.1 For the purposes of this project, the CEA will explore the way in which the predicted effects of the Scheme on receptors/resources may alter when they are considered in their totality (i.e. across all topic assessments), as well as in the context of Reasonably Foreseeable Future Projects (RFFPs) that could potentially interact with the Scheme. For the purposes of this project, these two strands of CEA are referred to as intra-Scheme assessment and inter-project assessment, respectively. These are summarised below, based on the introduction provided in Chapter 4:

15.3.2 Intra-Scheme:

- Intra-Scheme **in-combination** (Figure 4-2 refers) cumulative impacts, identified **within** specialist topic chapters;
- Intra-Scheme **in-combination** cumulative impacts, drawing together findings **across topics**.

15.3.3 Inter-project:

- Inter-project **additive** (Figure 4-1 refers) cumulative impacts. For example, where a Scheme impact combines with the same type of impact from one or more RFFPs to generate a greater magnitude of impact;
- Inter-project **in-combination** cumulative impacts. For example, where a Scheme impact combines with a different type of impact anticipated from an RFFP to generate a third type of impact on a particular receptor).

15.3.4 It should be noted that for the purposes of this Scheme, the scope of the CEA will also consider the potential for inter-project in-combination effects to arise. This is not directly referenced in the IEMA guidance; however, professional experience has shown that it is valuable to capture instances where a range of impacts from different projects can generate additional types of impacts for specific receptors.

Approach to intra-Scheme CEA

15.3.5 The assessment methodology for intra-Scheme in-combination cumulative effects requires the identification of impact interactions associated with the Scheme on key environmental receptors. This will ensure that the ES for the Scheme is not a series of separate assessment collated into one document, but rather, a comprehensive assessment drawing together the environmental effects of the Scheme in the context of the most affected receptors.

15.3.6 The methodology for intra-Scheme CEA is set out in the relevant topic chapters.

Approach to inter-project CEA

15.3.7 The assessment methodology for inter-project cumulative effects (both additive and in-combination) requires the potential interaction of the Scheme with RFFPs (introduced in chapter 4 and described in the next sub-section) to be carefully considered. The principle of the assessment of the potential for inter-project cumulative effects to be reported in the ES will be based on the four-stage assessment approach to cumulative assessment, as

outlined in PINS Advice Note 17. This has been adapted to generate the following four steps:

- Stage 1: generate the RFFP long-list – the criteria for the long-list will set the study area for the inter-project CEA; and desk-based research will be undertaken to identify all qualifying projects;
- Stage 2: generate the RFFP short-list – apply threshold criteria based on temporal scope, the scale and nature of other development and any other relevant factors to assist (e.g., the level of assessment information that is available in relation to a given RFFP) in deciding whether to include or exclude RFFPs from detailed consideration in the CEA;
- Stage 3: information gathering – seek to compile detailed information on the shortlisted RFFPs, including proposed design and location, quantum and type(s) of development, programme of construction, operation and decommissioning and environmental assessment information. Some RFFPs may be screened out at this stage due, for example, to a lack of sufficient publicly available information; and
- Stage 4: assessment – assess the potential cumulative effects of the Scheme with the shortlisted RFFPs. This will be undertaken for the specialist topics in the first instance, considering factors such as the duration of effect, extent of effect, type of effect, frequency of the effect, value and resilience of affected receptors and the likely success of mitigation. The findings of the topic specific assessments will then be reviewed in their totality to enable cumulative effects to be reported by receptor and cross-topic.

15.3.8 At this stage of the EIA process, the focus for this element of the CEA is stage 1 – generating the RFFP long-list. It is too early in the EIA process for progression to stage 2 as the RFFP list requires periodic review to remain relevant and proportionate to the level of assessment required for the Scheme – this will commence at the next stage of the EIA process.

RFFPs

15.3.9 RFFPs are projects that are known to the planning system or already in the consenting process or under construction at the same time as the Scheme. The locational criteria that will be applied to this Scheme has been developed in consideration of the study areas defined within the preceding topic chapters, taking account of the likely zones of influence for interactions between the Scheme and different types of RFFPs to give rise to significant cumulative effects. The RFFP long-list will therefore include projects that fall into one of the following categories:

- major planning applications within 500 m of the Scheme. This encompasses planning applications for 10 or more dwellings, planning applications incorporating commercial/recreational floorspace over 1,000 sqm, or a site exceeding 1 ha;
- planning applications within or up to 250 m from the Scheme boundary that have been granted planning permission or are pending determination within a time frame that reflects the 3-year period within which granted developments must commence works (at the point at which the RFFP long list is first produced; and updated at each subsequent review of the RFFP long list);
- planning applications or consented development that are accompanied by an ES or non-statutory environmental report, situated within 5 km of the Scheme boundary;
- proposals registered with the Planning Inspectorate as forthcoming applications for DCO, or for which an application for a DCO has already been made. Professional judgement will be used to determine which are of relevance to the Scheme in the context of possible cumulative impacts, using proximity to the Scheme boundary as a key consideration, starting at an outer limit of 5 km;
- registered Transport and Works Act Order (TWAO) applications near to the Scheme. Professional judgement will be used to determine which are of relevance to the Scheme in the context of possible cumulative impacts, using proximity to the Scheme boundary as a key consideration; and
- Development Plan projects such as the site allocations, safeguarded sites and transport initiatives scheduled for development within the JCS (therefore proposed for

implementation by 2031, which pre-dates the operational future baseline for the Scheme) that are within 5 km of the Scheme boundary. The inclusion of such projects will be subject to desk-based validation of sufficient evidence available relating to the projects to allow a meaningful cumulative effects assessment for the Scheme, together with consideration of whether such projects are dependent upon the Scheme for their progression.

15.3.10 An initial review of planning applications that may merit inclusion in the RFFP long-list for the Scheme has been undertaken and is provided at Appendix 15-1. This appendix does not currently include any projects registered with PINS, TWAO applications and development plan allocations – this will be added to the next iteration.

15.3.11 The RFFP long-list will require expansion to embrace all development types, together with review and update during the next stage of the EIA. The zone of influence will also be confirmed at the next stage of the EIA, reflecting the final study areas selected for each topic assessment, allowing for any deviations from standard based on professional judgement. This is the necessary precursor to producing an RFFP short-list, which would be shared with relevant stakeholders, including the local planning authorities (LPAs) and National Highways (NH), for comment and confirmation.

RFFP Short-listing

15.3.12 The RFFP long-list will be reviewed to scope out those that are unlikely to have notable interactions with the Scheme. This is based on professional judgement, typically considering factors such as the type of development proposed, proximity to the Scheme and the level of publicly available information to support meaningful CEA.

15.3.13 At the appropriate stage in the EIA process, each short-listed RFFP will be reviewed to determine progression through the consenting and development processes, based on publicly available information and any relevant stakeholder comments. This will enable assumptions to be made about the most likely stage of their development in relation to the Scheme construction period (to 2025), opening year future baseline (2025) and operational future baseline (2039).

15.3.14 Each RFFP would then be assigned to one of the following categories to inform the completion of the inter-project CEA work:

- construction baseline - **'undeveloped site'**, which is used for a site at which construction is not expected to commence until the Scheme is operational;
- construction baseline - **'under construction'** in same timeframe as the Scheme, reflecting at least a partial overlap in construction timeframes;
- construction baseline - **'receptor'**, which is used for a site where construction is expected to be complete prior to the start of construction of the Scheme and may therefore have the potential to experience construction impacts from the Scheme;
- future opening year baseline - **'under construction'** as the Scheme commences operation; and
- future opening year baseline - **'receptor'**, which is used for a site where development will be complete and in occupation, therefore forming a receptor and/or biophysical feature for the operational Scheme and, possibly, having potential to experience operational impacts from the Scheme.

15.3.15 Given the projected timescale for the future operational year baseline for the Scheme, there will be a blanket assumption that all short-listed RFFPs will be operational by that time. Consequently, each must be considered as having the potential to experience operational impacts from the Scheme.

15.3.16 At the next stage of the EIA, each of the topic specialists would screen the RFFP shortlist, to identify those projects that have reasonable potential to interact with the Scheme in respect of their topic and, therefore, potentially give rise to impacts that could result in cumulative effects. The methodology and considerations applied by each topic specialist to complete the screening will be set out in the CEA sections of each topic chapter, supported by a screening appendix if appropriate.

15.3.17 Where appropriate, specialists will then also complete a scoping exercise to exclude detailed consideration of RFFPs where there is a robust justification for assuming that cumulative impacts will not occur between the Scheme and the RFFP – this will also be set out in individual topic chapters of the ES. This approach is necessary to tighten the scope of consideration of RFFPs and specialist topic assessment to cumulative impacts with the potential to give rise to significant cumulative effects; and that therefore bring meaningful inputs to the overall ES findings. This approach is intended to deliver a proportional assessment that focuses on the potential for significant inter-project cumulative effects.

15.4 Consultation

15.4.1 No consultation has been undertaken specifically in relation to the CEA.

15.4.2 Consultation will be used to verify the RFFP shortlisting process. It is anticipated that relevant LPA officers will be contacted to confirm the completeness of the RFFP long list as close to the application date as reasonably practicable in order to allow for integration of the CEA process with the timescales for ES production. NH and the LPAs will also be invited to comment on the accuracy and completeness of the short list derived from the RFFP long list in due course.

15.5 Future baseline conditions

15.5.1 The future baseline environment comprises the existing baseline, together with new or changed characteristics and conditions that can reasonably be predicted to be present during construction and/or operation of the Scheme. These characteristics are derived from the collation of the list of RFFPs; and the published information available for each regarding construction timescales.

15.5.2 The CEA will make use of two future baselines for the Scheme to be considered against, making informed assumptions to categorise the likely progression of RFFPs for the purposes of consistent assessment:

- **Opening year future baseline (2025):** RFFPs may be categorised as 'undeveloped'; 'under construction' in the same timeframe as the opening of the Scheme; or form new 'receptors/resources' that would be in place and operational in the same timeframe as the opening of the Scheme.
- **Operational future baseline (2039):** RFFPs may be anticipated to be 'under construction' in the same timeframe as the future baseline; or form new 'receptors/resources' that would be in place and operational.

15.5.3 There are two main contributing elements in the definition of the future baselines that will be considered within the ES.

- RFFPs sourced in the manner described above.
- Forecast changes in traffic conditions projected within local authority traffic forecast models. These have been provided by GCC through incorporation within the traffic and transport modelling of future growth scenarios (principally the growth levels proposed in the JCS) once the Project is operational. Further details about this will be referenced in the air quality and noise and vibration topic chapters of the ES, which will draw on traffic modelling outputs. It should be noted that these topic assessments will avoid duplicating or artificially magnifying impacts associated with traffic and transport, where specific RFFPs are known to already be accounted for within the traffic modelling upon which these assessments rely.

15.6 Potential impacts

15.6.1 The CEA will build upon the findings of the specialist topic assessments. The value and significance of impact is therefore determined by the criteria set within the individual topic chapters. The description of significance also takes account of the guidance in PINS Advice Note 17 to consider the capacity of environmental resources and receptors to accommodate any changes that are likely to occur.

15.6.2 The assessment of cumulative effects will consider the following factors:

- the duration of the effect (temporary or permanent);
- the extent of the effect (geographical area of an effect);
- the type of the effect (additive or synergistic);
- the source of the effect experienced by the receptor (intra-Scheme, inter-project, or potentially both);
- the frequency of the effect;
- the value and resilience of receptors; and
- the likely success of proposed mitigation

15.6.3 Where there is sufficient information and certainty, effects will be identified as short term or long term and temporary or permanent.

Intra-Scheme cumulative impacts

15.6.4 At this stage of the project, the specialist topics have offered a limited assessment, focusing principally on highlighting the most affected receptors based on analysis of the types of impacts anticipated from the Scheme. Consequently, it is too early in the EIA process for a meaningful assessment of likely significant intra-Scheme in-combination cumulative effects to be made.

15.6.5 Notwithstanding this, the initial findings reported in the specialist chapters have been considered and Table 15-1 highlights the interactions between environmental topics that are considered most likely to yield the potential for intra-Scheme cumulative effects, based on professional judgement. This cross-references the specialist topics against the following groups of receptors, as described in the corresponding chapter of this PEIR. No distinction is made at this point between potential construction and operation impacts.

- Air Quality
- Biodiversity
- Climate
- Cultural Heritage
- Geology and Soils
- Landscape and Visual
- Noise and Vibration
- Population and Human Health
- Road Drainage and the Water Environment
- Materials and Waste

15.6.6 The interaction of impacts arises from the combined action of several different environmental topic-specific impacts upon a single receptor. Table 15-1 uses blue shading to illustrate the most likely combinations of topic specific impacts that could lead to the identification of cumulative effects. For example, the removal of trees to construct the Scheme will have a direct impact upon landscape, visual amenity and ecology receptors due to the loss of the visual feature, amenity and habitat. Furthermore, this could also have an indirect impact on residential receptors in the area, by way of increasing air quality impacts.

Table 15-1 - Potential interaction between environmental topics

Topics	Air Quality	Biodiversity	Climate Change	Cultural Heritage	Geology and Soils	Landscape and Visual Amenity	Noise and vibration	Population and Human Health	Water Environment	Waste and Materials
Air Quality		■	■	■				■		
Biodiversity	■		■	■		■	■	■	■	
Climate Change	■							■	■	■
Cultural Heritage	■	■				■	■	■		
Geology and Soils								■	■	■
Landscape and Visual		■		■				■		
Noise and Vibration		■		■				■		
Population and Human Health	■	■	■	■	■	■	■			
Water Environment		■			■			■		■
Materials and Waste			■		■			■	■	

15.6.7 The CEA findings will also draw on environmental design measures and mitigation proposals that have either already been proposed for incorporation into the Scheme, or will be developed from the iterative process of assessment and design. These will be used to illustrate how the Scheme has evolved to address intra-Scheme impacts, in accordance with the mitigation hierarchy, which are often cross-topic. For example, ecological mitigation areas may target more than one species, as well as incorporate new water attenuation features – such design elements are inherently designed to address intra-Scheme cumulative impacts identified through the ecological and water environment assessments that would, in the absence of the proposals, give rise to potentially significant cumulative effects. Similarly, combined landscape and environmental design measures may target locations where, in the absence of the proposals, intra-Scheme cumulative effects on ecological and landscape resources, visual receptors and human health may potentially be significant.

15.6.8 The cross-topic intra-Scheme CEA will be described in a receptor-centric manner, focusing on common receptor types and/or geographic locations where at least two different types of impacts are predicted to interact to result in significant cumulative effects. The ES structure will be developed to allow for separate sections for CEA to be written up within the specialist topic chapters, to capture in-combination cumulative impacts relative to the topic; therefore facilitating consideration of the potential for significant cross-topic intra-Scheme in-combination cumulative impacts within the CEA chapter.

Inter-project cumulative impacts

15.6.9 The inter-project CEA findings will be identified by considering the interaction of the Scheme with short listed RFFPs, during construction, in the Scheme opening year and the operational future baseline. This will be reviewed in the following way:

- additive and/or in-combination impacts during construction and operation within the specialist topic area; and
- additive and/or in-combination impacts during construction and operation across two or more topic areas (cross-topic).

15.6.10 The findings of the specialist topic assessment of significant cumulative inter-project effects informs the identification of the cross-topic effects. This is achieved by correlating the predicted impacts arising from interactions with specific RFFPs and linking, where appropriate, to affected receptors and/or biophysical features. The reporting in the CEA chapter of the ES will then be organised by relevant RFFP, noting that in some instances the RFFP will contribute to the potentially significant cumulative effects identified; but in others, users of the RFFP may become the receptors that will experience the cumulative effects identified.

15.6.11 The RFFP short-listing process will be undertaken at a later stage of the ES, to reduce the limitations associated with reliance on third party publicly available information about projects within the planning system. Consequently, the inter-project cumulative effects assessment will appear later in the EIA process.

15.7 Potential mitigation measures

15.7.1 These will be considered at the next stage of the ES, once the CEA work is completed for all technical areas.

15.8 Residual impacts

15.8.1 These will be considered at the next stage of the EIA, once the potential mitigation measures are known and have been considered in the context of the CEA.

15.9 NPS compliance

15.9.1 The requirements of the NN NPS in respect of CEA are understood. The methodology proposed addresses these requirements and the proposed approach to reporting the CEA will provide the requisite information to ensure that the ES complies with the NN NPS.

15.10 Assumptions and limitations

15.10.1 The principal limitations for the CEA relate to the inter-project element of the process, as follows:

- RFFP lists can only ever be a snapshot in time, as activity within the planning system can change on a daily basis;
- assumptions have to be made about how progressed each RFFP will be relative to the Scheme on the basis of information within the public domain only – this may not accurately reflect behind-the-scenes progression on any project included within an RFFP short-list;
- Until a project seeking planning permission (and that is outside an allocated or safeguarded site) is formally entered into the planning system, it is not eligible for inclusion within the RFFP short-listing process – projects that may be in a pre-application consultation phase do not qualify, irrespective of scale.

15.10.2 The CEA process can help to identify appropriate proposals for mitigation measures for inclusion within the Scheme. It can also identify opportunities for delivering combined mitigation with other RFFPs that may have multiple benefits; however, the ability to alter other projects is limited to influence through engagement only. The findings of the CEA will therefore necessarily be limited by this factor in relation to the certainty of proposed mitigation when residual effects are assessed.

15.11 Chapter summary

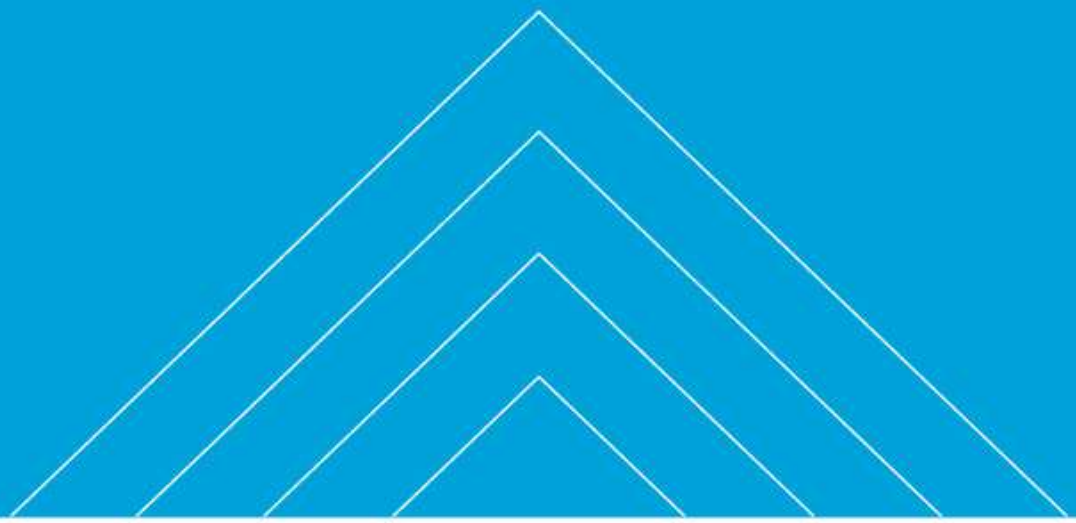
15.11.1 This chapter provides clarification of the CEA methodology and the way in which the CEA findings will be reported within the ES. It builds on the introduction to types of cumulative impacts presented in Chapter 4.

15.11.2 Potential interactions that could lead to inter-Scheme cumulative impacts are introduced.

15.11.3 A preliminary RFFP long-list covering planning applications only is provided as an appendix – this will be further developed at the next stage of the EIA process, to cover all of the categories of RFFPs described in this chapter. This will then underpin the assessment of inter-project cumulative impacts and their consequential effects.

15.11.4 No CEA has yet been undertaken for the Scheme. This will be undertaken at the next stage of the EIA process and reported in the ES in due course.

Appendices



Appendix 15.1

Table 15-2A - RFFP Long List

Number	Location	Application ref	Distance to the red line boundary	Application description
1	Mill Farm Mill Lane Stoke Orchard Cheltenham Gloucestershire GL52 7SG	16/01065/FUL	278m	6 no 4 bedroom houses.
2	A & B Buildings At Pilgrove Farm Pilgrove Farm Old Gloucester Road Boddington Cheltenham Gloucestershire GL51 0SW	19/00907/PDAD	365m	Prior approval for conversion of agricultural buildings into 2no. larger dwellinghouse (use class C3) and associated building operations.
3	Pilgrove Farm Old Gloucester Road Boddington Cheltenham Gloucestershire GL51 0SW	21/00286/PDAD	360m	Prior approval for conversion of agricultural building into 1no. larger dwellinghouse (use class C3) and associated building operations.
4	Land At Meadow View Gloucester Road Staverton Cheltenham Gloucestershire GL51 0TF	21/00777/PIP	279m	Permission in principle for the erection of up to 3 dwellings and associated access (Rural Exception Site).
5	Willowdene Gloucester Road Staverton Cheltenham Gloucestershire GL51 0TF	16/01066/FUL	326m	Proposed new agricultural building
6	Land Adjacent To 1 St Clair Cottages Staverton Cheltenham GL51 0TW	19/01229/FUL	323m	New 3 Bedroom Detached Dwelling Adjacent to 1 St. Clair Cottages

Number	Location	Application ref	Distance to the red line boundary	Application description
7	1 St Clair Cottages Staverton Cheltenham Gloucestershire GL51 0TW	17/00943/FUL	334m	Proposed side extension and detached garage
8	Dial Cottage Boddington Road Boddington Cheltenham Gloucestershire GL51 0TN	18/00966/CLP	345m	Erection of a single storey rear extension.
9	8 St Clair Cottages Staverton GL51 0TW	18/00013/FUL	399m	Erection of a two storey dwelling.
10	Land Adjacent To Rosedale Boddington Road Boddington Cheltenham Gloucestershire GL51 0TN	19/00090/FUL	417m	Construction of three affordable dwellings with landscaping and associated works
11	Part Parcel 8227 Tewkesbury Road Elmstone Hardwicke Cheltenham Gloucestershire	16/00579/FUL	437m	Erection of two buildings for Industrial/Factory development (Use Classes B1(c), B2 and B8) with ancillary offices (Use Class B1(a)) together with associated access road, landscaping, drainage ponds, car and cycle parking, service yards and access to Tewkesbury Road (A4019) and improvements to junction with Stoke Road.

Number	Location	Application ref	Distance to the red line boundary	Application description
12	Part Parcel 8227 Tewkesbury Road Elmstone Hardwicke Cheltenham Gloucestershire	16/00323/FUL	437m	Erection of two buildings for Industrial/Factory development (Use Classes B1(c), B2 and B8) with ancillary offices (Use Class B1(a) together with associated access road, landscaping, drainage ponds, car and cycle parking, service yards and access to Tewkesbury Road (A4019) and improvements to junction with Stoke Road.
13	Part Parcel 8227 Tewkesbury Road Elmstone Hardwicke Cheltenham Gloucestershire	15/01126/FUL	437m	Erection of two buildings for Industrial/Factory development (Use Classes B1(c), B2 and B8) with ancillary offices (Use Class B1(a)) together with associated access road, landscaping, drainage ponds, car and cycle parking, service yards and access to Tewkesbury Road (A4019).
14	2 Blaisdon Way Cheltenham Gloucestershire GL51 0WR	19/00433/FUL	358m	Erection of a new detached dwelling
15	2 Blaisdon Way Cheltenham Gloucestershire GL51 0WR	20/00801/FUL	358m	Erection of detached dwelling, re-submission of 19/00433/FUL to allow for a small area of land to be included into the site and the addition of fencing. (part retrospective)
16	Warners Of Cheltenham Blaisdon Way Cheltenham Gloucestershire GL51 0WH	15/00578/OUT	329m	Outline application for the redevelopment of land at the junction of Blaisdon Way and Pilgrove Way for residential use with indicative layout of 10 dwellings and including removal of car wash facility (approval sought for means of access with other matters reserved)

Number	Location	Application ref	Distance to the red line boundary	Application description
17	33 William Gough Close Cheltenham	17/02338/FUL	478m	New detached dwelling
18	Phase 1 Land At Old Gloucester Road Cheltenham Gloucestershire	21/00872/REM	292m	Approval of reserved matters (access, appearance, landscaping, layout and scale) pursuant to outline planning permission ref. 17/01411/OUT for residential development of up to 90 dwellings, associated open space, landscaping and infrastructure, including new vehicular access to Old Gloucester Road (revised application following grant of 20/00272/REM). Details are also submitted in relation to outline conditions: 4, 5, 6, 7, 8, 9, 10, 12, 13, 14, 15, 17, 18, 19.1, 19.2, 20, 22 and 23
19	Pilgrove Cottage Old Gloucester Road Cheltenham Gloucestershire GL51 0SW	20/01832/FUL	301m	Proposed new dwelling, garage and drive
20	Cotswold BMW Tewkesbury Road Cheltenham Gloucestershire GL51 9SG	17/00936/FUL	350m	Full planning application for erection of 2,856 sq.m food store (Use Class A1) and 223 sq.m of coffee shop retail and drive-thru (Use Class A1/A3) with associated landscaping, parking and infrastructure
21	M And S Home Unit 10 Kingsditch Retail Park Tewkesbury Road Cheltenham Gloucestershire GL51 9PG	17/01523/FUL	442m	Demolition, reconfiguration and extension of part of an existing class A1 retail building to create two new class A1 retail units and associated works

Number	Location	Application ref	Distance to the red line boundary	Application description
22	M And S Home Unit 10 Kingsditch Retail Park Tewkesbury Road Cheltenham Gloucestershire GL51 9PG	18/00872/FUL	442m	Erection of two new retail units (Class A1) and associated works
23	C D Bramel Van Centre Manor Road Swindon Village Cheltenham Gloucestershire GL51 9NR	17/01310/FUL	494m	To construct 20 space car park and access ramp
24	Elms Park Tewkesbury Road Cheltenham Gloucestershire	16/02000/OUT	Adjacent	16/02000/OUT | Up to 4115 new homes providing a range and choice of mix and tenure, including affordable housing (C3) and elderly persons accommodation (C2 up to 200 rooms), 24 ha of employment generating uses including 10 ha B1 business park (up to 40,000 sqm), a hotel (C1 up to 100 rooms), and mixed use centres providing retail uses and community facilities (A1 - A5 up to 6,150 sqm, D1/D2 up to 1,000 sqm) A transport hub and public transport inter change, primary and secondary school education (D2), new areas of green infrastructure including areas of play sports hub, woodland planting, allotments and habitat at creation, creation of new means of access onto Tewkesbury Road and Manor Road, new footways and cycleways, and drainage infrastructure.

Number	Location	Application ref	Distance to the red line boundary	Application description
25	J Sainsburys Plc Gallagher Retail Park Tewkesbury Road Cheltenham Gloucestershire GL51 9RR	16/02253/ADV	Adjacent	2 no. replacement totem signs; 4 no. amended pedestrian totem signs; 1 no. new fascia sign; and 3 no. new wall mounted buildings signs.
26	J Sainsburys Plc Gallagher Retail Park Tewkesbury Road Cheltenham Gloucestershire GL51 9RR	18/01465/ADV	Adjacent	2 no. amended illuminated totem signs, 4 no. amended non-illuminated pedestrian totem signs, 1 no. replacement illuminated fascia sign and 1 no. replacement non-illuminated wall mounted building sign.
27	Gallagher Retail Park Tewkesbury Road Cheltenham Gloucestershire	17/00097/FUL	135m	Planning permission to allow the erection of temporary Class A1/A3/A5 retail pop-up units within defined areas encompassing 276 sqm of the existing Gallagher Retail Park car park.
28	Gallagher Retail Park Tewkesbury Road Cheltenham Gloucestershire	21/01204/FUL	144m	Change of use of twelve car parking spaces to a waterless hand car wash and valeting service with associated canopies, portacabin and protective screen (revised scheme to approved application 20/01868/FUL).
29	Warners Of Cheltenham Blaisdon Way Cheltenham Gloucestershire GL51 0WH	20/02132/FUL	246m	Erection of 12 no. business incubator units with flexible B2, B8, E(a)(c)(e) and (g) use.
30	Elms Park Tewkesbury Road Cheltenham Gloucestershire	20/00759/FUL	250m	Demolition of a dwelling and the erection of 260 dwellings (Use Class C3), new vehicular and pedestrian access off Manor Road, attenuation basin and ancillary infrastructure
31	Laburnum Cottage Tewkesbury Road Uckington Cheltenham Gloucestershire GL51 9SX	18/00988/FUL	Adjacent	Erection of attached double garage, single storey side & rear extension, first floor rear extension and demolition of detached garage and rear porch.

Number	Location	Application ref	Distance to the red line boundary	Application description
32	Tredington House Farm Tredington Tewkesbury Gloucestershire GL20 7BU	19/00230/FUL	Adjacent	Erection of a livestock building to be used as a TB isolation unit.
33	Manor Farm Yard Stoke Road Stoke Orchard Cheltenham Gloucestershire GL52 7RY	20/00213/FUL	108m	Redevelopment of the site including demolition of existing buildings and erection of 3 No. (B1 and B8) units and associated works.
34	1 Withybridge Gardens Boddington Cheltenham Gloucestershire GL51 9TL	20/00108/FUL	Adjacent	Erection of a rear extension
35	Laburnum Cottage Tewkesbury Road Uckington Cheltenham Gloucestershire GL51 9SX	18/00988/FUL	Adjacent	Erection of attached double garage, single storey side & rear extension, first floor rear extension and demolition of detached garage and rear porch
36	Dunvegan Cooks Lane Uckington Cheltenham Gloucestershire GL51 9SU	21/00786/FUL	Adjacent	Erection of a front porch extension, single storey front and side extensions, two storey side extension. Side and rear balconies.
37	Gallagher Retail Park Tewkesbury Road Uckington Cheltenham Gloucestershire GL51 9RR	17/00827/FUL	Adjacent	Erection of a Class A1 retail unit comprising 929 sqm at ground floor with full cover mezzanine (total floorspace 1,858 sqm), car parking, re-alignment of service yard access, renewal/adjustment of service yard drainage, diversion of a Class 5 highway, and associated works to the west of Unit A Gallagher Retail Park.

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