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15 Cumulative and Combined Effects

15.1 Introduction

15.1.1 This chapter of the Preliminary Environmental Information (PEI) Report sets out the approach to the cumulative effects assessment including initial findings and proposed actions to be completed as part of the ongoing Environmental Impact Assessment (EIA).

15.1.2 Cumulative effects can be defined under two categories:

- Cumulative effects from different projects (together with the project being assessed).
- Combined effects from a single project – the interrelationship between different environmental factors where numerous different effects from a project impact a single receptor.

15.1.3 As the project comprises eight individual schemes it has been necessary for each environmental factor assessment to identify effects and propose mitigation specific to each scheme (including any options for those schemes) as well as considering the potential for route wide effects. The effects from multiple schemes on a single receptor are not considered to be cumulative effects. Route wide effects are reported in the individual environmental topic chapters of this PEI Report and are not considered within this chapter.

15.2 Cumulative Effects

Methodology

15.2.1 There is currently no standard methodology for cumulative effects assessment although there is a range of guidance available. The following guidance has been taken into consideration during the preparation of this PEI Report and will also be employed in the production of the Environmental Statement (ES):

- *Design Manual for Roads and Bridges (DMRB) LA 104 Environmental assessment and monitoring* (Highways England, 20200[1] (section 3.19 – 3.22), which sets out a high-level methodology for assessing cumulative effects on highways projects.
- *Planning Inspectorate advice note seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects* (Planning Inspectorate, 2019)[2].
- *Planning Inspectorate advice note nine: Rochdale Envelope* (Planning Inspectorate, 2018)[3].

[1] Highways England (2020) Design Manual for Roads and Bridges LA 104 Environmental assessment and monitoring, available at: https://standardsforhighways.co.uk/dmrb/search/0f6e0b6a-d08e-4673-8691-cab564d4a60a [accessed 28 July 2021]
[2] Planning Inspectorate (2019) Advice note seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects, Version 2, available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2015/12/Advice-note-17V4.pdf [Accessed 28 July 2021]
[3] Planning Inspectorate (2018) Advice note nine: Rochdale Envelope, Version 3, available at: https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-nine-rochdale-envelope/ [accessed 28 July 2021]

15.2.2 *Planning Inspectorate advice note seventeen* provides a systematic approach to cumulative effects assessment which can be split into four distinct phases explained in Table 15-1: Stages of cumulative effects assessment. The guidance notes that the recommended process focusses on cumulative effects with '*other developments'*.

Table 15-1: Stages of cumulative effects assessment

Stage	Activity
Stage 1: Establish the Zone of Influence (ZOI) of the scheme and identify long list of 'other developments'.	• identify the ZOI for each of the environmental topics • identify a long list of 'other developments' in the vicinity of the project which may have cumulative effects • undertake desktop review of available environmental information for identified cumulative developments
Stage 2: Identify short list of 'other developments'.	• identify which of the identified 'other developments' from Stage 1 has the potential to give rise to significant cumulative effects by virtue of overlaps in temporal scope, the scale and nature of the 'other development' and receiving environment; or any other relevant factors
Stage 3: Information gathering	• information related to the shortlisted cumulative developments is gathered and reviewed
Stage 4: Assessment	• cumulative effects assessment of shortlisted cumulative development is undertaken. Each individual 'other development' is reviewed in turn to identify whether there is potential for significant cumulative effects • mitigation measures are identified

15.2.3 The Planning Inspectorate guidance recommends that a wide range of future projects is included within the cumulative effects assessment which can be tiered (from Tier 1 to 3) according to how far advanced the development is within the planning system and to the level of detail that is likely to be available for each tier. The tiers are set out in Table 15-2: Project tiering for the purpose of cumulative effects assessment.

Table 15-2: Project tiering for the purpose of cumulative effects assessment

Tier 1	• Projects under construction • Permitted application(s), whether under the Planning Act 2008 or other regimes, but not yet implemented • Submitted application(s) whether under the Planning Act 2008 or other regimes but not yet determined	Decreasing level of detail likely to be available. 
Tier 2	• Projects on the Planning Inspectorate's Programme of Projects where a scoping report has been submitted	
Tier 3	• Projects on the Planning Inspectorate's Programme of Projects where a scoping report has not been submitted • Identified in the relevant Development Plan (and emerging Development Plans - with appropriate weight being given as they move closer to adoption) recognising that much information on any relevant proposals would be limited • Identified in other plans and programmes (as appropriate) which set the framework for future development consents and approvals, where such development is reasonably likely to come forward	

15.2.4 The less information that is available for the future projects (i.e. environmental impacts predicted, project definition), the less likely that the cumulative effects assessment will be able to make any robust assessment in relation to these projects.

15.2.5 Where 'other developments' are expected to be completed before construction of the project and the effects of those 'other developments' are understood, effects arising from them will be considered within the ES as part of the future baseline within environmental topics and will therefore be included as part of both the construction and operational assessment.

Stage 1 Establishing the ZOI and longlist of 'Other Development'

15.2.6 The cumulative effects assessment has commenced in line with the approach detailed in *Planning Inspectorate advice note seventeen*. As part of Stage 1, an initial Zone of Influence (ZOI) was established for each environmental topic. Table 15-3: Cumulative assessment zone of influence by topic, presents the ZOI extent by each environmental factor[4]. Figure 15.1: Cumulative Zones of Influence shows the areas adopted for each of the environmental topic ZOIs. An overall combined ZOI representing a search area around the draft DCO boundary (or draft alternative boundary where alternatives are under consideration for schemes) was defined comprising a 2km buffer within which 'other development' has been identified. The draft DCO boundary includes the land anticipated at this stage as being likely to be required temporarily and/or permanently for the construction, operation and

[4] The ZOI is generally the same as the study area defined for each topic assessment. As detailed in Chapter 6: Biodiversity, a study area of 30km was defined for SAC where bats are noted as one of the qualifying interests, however no SACs designated for bats have been identified within this study area. A 30km ZOI for biodiversity has not therefore been defined.

maintenance of the project, including environmental mitigation. Where the ongoing consideration of alternatives affects some schemes, the draft DCO boundary is based on the widest geographical limits of each of the alternatives, with the 2km buffer applying to those widest limits.

Table 15-3: Cumulative assessment zone of influence by topic

Environmental Topic	Zone of Influence
Air quality	**Construction**: The ZOI extends 200m from the draft DCO boundary. **Operation**: As the operational phase traffic data includes traffic associated with other developments, the air quality impact assessment to be reported in the ES will be inherently cumulative. No separate cumulative assessment will be undertaken due to the inherent nature of the topic assessment.
Noise and vibration	**Construction**: The ZOI extends 300m from the draft DCO boundary. **Operation**: As the operational phase traffic data includes traffic associated with other developments, the noise and vibration impact assessment to be reported in the ES will be inherently cumulative. No separate cumulative assessment will be undertaken due to the inherent nature of the topic assessment.
Landscape and visual	**Construction and Operation**: The ZOI extends 2km from the draft DCO boundary for visual receptors. Beyond this, any other development in combination with the project will be unlikely to give rise to any significant effects on visual receptors due to the distance reducing the perceived scale and massing of the built elements and associated operational elements (i.e. the traffic moving along the road); and the screening from intervening landform and vegetation. Professional judgement, informed by the Zone of Theoretical Visibility (see Chapter 10: Landscape and Visual Effects) will be used to consider potential cumulative impacts on higher sensitivity landscape and visual receptors extending to 7km or more from the draft DCO boundary where judgement suggests a significant effect is possible.
Cultural heritage	**Construction and Operation**: The ZOI extends 2km from the draft DCO boundary.
Biodiversity	**Construction and Operation**: The ZOI extends 2km from the draft DCO boundary. Within this, the ZOI for assessment purposes varies according to specific biodiversity receptors and is informed by best practice guidance from Natural England and the Chartered Institute of Ecology and Environmental Management and other sources. As the operational phase traffic data includes traffic associated with other developments, the nitrogen deposition impact assessment to be reported in the ES will be inherently cumulative.
Road drainage and the water environment	**Construction and Operation**: The ZOI extends extends 1km from the draft DCO boundary for surface water and groundwater features. This is based on the 'source-pathway-receptor' pollutant linkage principle. Extension of the ZOI beyond 1km may be

Environmental Topic	Zone of Influence
	necessary to capture potential impacts to receptors beyond the ZOI boundary (i.e. where the project is likely to impact surface water receptors upstream or downstream of the study area or groundwater receptors where there is hydraulic connectivity).
Geology and soils	**Construction and Operation**: The ZOI extends 250m from the draft DCO boundary for geology and soils. The ZOI extends extends 1km from the draft DCO boundary for groundwater and surface waters.
Population and human health	**Construction and Operation**: The ZOI extends 500m from the draft DCO boundary. Extension of the ZOI beyond 500m may be necessary to capture potential impacts to receptors beyond the ZOI boundary (i.e. where changes to land use and accessibility or health determinants are identified outside this area (e.g. due to impacts identified by other EIA topics)).

15.2.7 The air quality and noise assessments draw upon traffic data derived from an inherently conservative regional model in that it already includes allowance for future developments (collated from planning application data and strategic development within local plans) considered 'near certain' or 'more than likely', as defined by *Transport Analysis Guidance: WebTAG* (Department for Transport, 2017)[5]. These developments inform the traffic model. Therefore, the preliminary air quality and noise assessments for the operation phase presented in the topic chapters are inherently cumulative in respective of those developments. WebTAG approach is wider than that specified in *Planning Advice Note seventeen* under the tiered approach and therefore include all the developments considered within the cumulative assessment.

15.2.8 These assessments are therefore comprehensive and include a worst case within the defined assessment parameters, no additional cumulative assessment of these aspects is required (separate consideration may be required of the accumulation or inter-relationship of these effects on an individual set of receptors e.g. as part of a socio-economic assessment).

15.2.9 For the materials and waste assessment, the estimated materials availability and waste capacity data used in Chapter 11: Material Assets and Waste are based on future regional demand and so the assessment is considered to be inherently cumulative. It is currently anticipated that no separate cumulative assessment will be undertaken due to the inherent nature of the assessment, and this will be subject to further engagement with stakeholders.

15.2.10 Climate impacts (that is those as a consequence of global heating) are observable at a national and global scale. Assessment of significance is based on whether a project's Greenhouse Gas (GHG) emissions cumulatively represent a considerable contribution to the global atmosphere. The net GHG effect of the proposed development has been preliminary assessed and reported within the context of baseline local and regional GHG emissions, as well as future carbon budgets. The approach to climate assessment within the *DMRB LA 114 Climate* methodology is inherently cumulative through the inclusion of the project and other locally committed development within the traffic model on which the GHG emissions calculations is based, and through the consideration of the project against the UK carbon budgets,

[5] Department for Transport (2017) Transport Analysis Guidance: WebTAG, available at: https://www.gov.uk/guidance/transport-analysis-guidance-webtag

which consider and report on the carbon contributions across all sectors. It is currently anticipated that no separate cumulative assessment will be undertaken, and this will be subject to further engagement with stakeholders.

15.2.11 As part of Stage 1, relevant 'other developments' have been identified through a combination of consultation with relevant planning authorities and directly from published sources. Relevant planning authorities within 2km of the draft DCO boundary (the greatest ZOI) were included.

15.2.12 Information on planning applications and local plan allocations has been gathered from the following data sources:

- The Planning Inspectorate (for Nationally Significant Infrastructure Project (*NSIP*) applications (Planning Inspectorate, 2012)[6])
- The Department for Transport (for *Transport and Works Act Order applications* (Department for Transport, 2013)[7])
- Eden District Council
- Durham County Council
- Cumbria County Council
- Richmondshire District Council

15.2.13 The above planning authorities were contacted in July 2021 to identify development proposals within the ZOI (2km buffer around the draft DCO boundary) that could potentially generate cumulative effects with the project. Information was requested on planning applications received within five years preceding the date of the request. The majority of planning permissions will include a condition requiring their implementation within five years from the date they were issued. Therefore, it is possible that any project that has been granted planning permission in the last five years would remain capable of being implemented at the point the list was compiled.

15.2.14 A search of the nationally significant infrastructure planning website was also undertaken to identify proposed nationally significant projects within 7km of the draft DCO boundary.

15.2.15 The wider Highways England RIS2 programme also has the potential to lead to cumulative effects on the wider Strategic Route Network. All RIS2 schemes within the north are included within the transport model used for the project, therefore as set out in paragraph 15.2.7 and 15.2.10, the Air Quality, Noise and Climate assessments reported within this PEI Report already include consideration of those proposed schemes. There are no RIS2 schemes in close enough proximity to the project to have a cumulative effect other than through changes to traffic movements.

15.2.16 The planning applications data was initially screened through a filtering process to remove the following:

- Any planning applications older than five years (taken as prior to July 2016 for the recent July 2021 data checks[8])
- Small scale applications for example:
- Construction of small-scale agricultural buildings

[6] Planning Inspectorate (2012) National Infrastructure Planning, available at: https://infrastructure.planninginspectorate.gov.uk/ [accessed 28 July 2021]
[7] Department for Transport (2013) Transport and Works Act (TWA) applications and decisions, available at: https://www.gov.uk/government/collections/twa-inspector-reports-and-decision-letters [accessed 28 July 2021]
[8] This planning search will be updated for the ES to ensure any new developments brought forward are assessed

- House extensions or cosmetic changes to buildings
- Micro-generation wind turbines
- Roof mounted solar PV panels
- Renewal of planning permission for retention of existing operational use
- Tree works
- Listed building applications
- Withdrawn applications
- Dismissed appeals
- Refused applications where the opportunity for appeal has passed (six months)
- Prior notification (Notice of Intention) applications
- Non-material amendments
- Discharge or variation of conditions.

15.2.17 The cumulative study for the project is currently at Stage 1 and is focussed on the identification of relevant developments and land allocations within the combined ZOI which have the potential to generate potentially significant cumulative effects. The long-list developments are being reviewed to assess their potential temporal and spatial interactions with the proposed project in order to identify whether they should be scoped into the cumulative assessment.

15.2.18 Based on a review of the initial long list of developments and allocations within the combined ZOI (2km buffer), key developments identified that may have the potential to generate cumulative impacts with the project include:

- Proposed residential development at Raiselands, Penrith, CW11 9JW (located approximately 1.9km from draft DCO boundary) (Eden District Council Planning ref: 14/0405) - erection of 229 new build homes, including 30% affordable homes on an approximate site of 7.8ha.
- Proposed commercial development at Scotch Corner Design Village, Barracks Bank, Scotch Corner (located approximately 174m from draft DCO boundary) (various applications including Richmondshire District Council 15/00806/FULL,16/00002/CALLIN, 19/00164/FULL).
- Various development allocations including housing allocations at Carleton Hall Farm (E4) (located adjacent to draft DCO boundary) and Carleton East (E3), Penrith, adjacent to the A66 (located approximately 90m from draft DCO boundary), employment allocation at land adjacent to Skirsgill Depot, Penrith, adjacent to the A66 (located adjacent to draft DCO boundary), and housing allocations at Station Yard (located approximately 2.5m from draft DCO boundary), and to the south of Station Road, Appleby (located approximately 246m from draft DCO boundary).

Stage 2 identify shortlist of 'Other Development'

15.2.19 Further consideration will be given to these developments following further review of their nature, temporal scope, location and scale.

15.2.20 In addition to the shortlisted projects identified above, proposals are under development for the restoration of part of Trout Beck, being led by the Eden Rivers Trust. This project is under development, part funded by Highways England through their Environmental and Wellbeing Designated Funds programme. The project team are working closely with Eden Rivers Trust to understand any potential interactions between the two proposals, and this project will be considered in further detail within the ES, both in relation to how it may change the future baseline within this area, but also any potential for cumulative effects to occur.

15.2.21 Each of the developments and allocations in the longlist identified under Stage 1 will be considered in terms of whether they would be likely to generate impacts which could combine to result in cumulative effects in combination with the project using the criteria outlined in Table 15-4: Criteria for shortlist of 'Other Development'. Criteria has been adapted from the Planning Inspectorate guidance and the EIA Regulations 2017.

Table 15-4: Criteria for shortlist of 'Other Development'

Threshold	Description
The temporal scope of 'other development' potential for interaction.	Consideration of relative construction, operation and decommissioning programmes of the 'other development' identified in the ZOI with the project programme, to establish whether there is overlap, or similar temporal scope for construction and operation phases, and any potential for interaction.
The scale and nature of 'other development'	Consideration of whether the scale and nature of the developments identified in the ZOI are likely to interact with the project and to result in a cumulative effect; Characteristics of other developments in relation to impacts to sensitive receptors, use of natural resources, pollution and nuisances, and risks to human health; The scale of developments which are more than 1 hectare of urban development which is not a dwelling development; or The development includes more than 150 dwellings; or The overall area of the development exceeds 5 hectares.
Any other relevant factors	Nature and/or capacity of the receiving environment that would make a significant cumulative effect with 'other development'. The sensitivity of the receiving environment includes whether the sites are within: a) known species locations b) wetlands, riparian areas, river mouths c) coastal zones and the marine environment d) mountain and forest areas e) nature reserves and parks f) European sites and other areas classified or protected under international and national legislation g) areas in which there has already been a failure to meet the environmental quality standards, laid down in European Union legislation and relevant to the project, or in which it is considered that there is such a failure h) densely populated areas i) landscapes and sites of historical, cultural, geological or archaeological significance. The relative abundance, availability, quality and regenerative capacity of natural resources in the area. Potential for creation of source-pathway-receptor impacts.

15.2.22 The longlist will be reviewed by each technical topic in relation to the relevant ZOI to identify 'other developments' which have the potential to result in cumulative effects with the project. Generally, only 'other developments' where an EIA is required are

considered appropriate for inclusion in the cumulative assessment but topics will consider all of the factors in Table 15-4: Criteria for shortlist of 'Other Development'.

15.2.23 A proportionate list (shortlist) of developments to be assessed within the cumulative impact assessment will be identified. This will be reported in the ES.

Stage 3 information gathering

15.2.24 In line with advice note seventeen, the following information on the 'other developments' shortlisted will be compiled from publicly available information as outlined under 'Stage 1' above:

- proposed design and location information
- proposed programme of construction, operation and decommissioning; and
- environmental assessments that set out baseline data and effects arising from the 'other existing development and/or approved development'"

Stage 4 assessment

15.2.25 *DMRB LA 104 Environmental assessment and monitoring* notes that cumulative effects should be assessed when the conclusions of individual environmental factor assessments have been reached and reported. The assessment of significance of the cumulative effects will be presented in the ES and will be determined in accordance with the significance assessment as detailed under Chapter 4: Environmental Assessment Methodology of this PEI Report.

15.2.26 Where multiple effects of varying significance occur on the same receptor as a result of the project and 'other development', professional judgement will be used to determine the overall level of significance. The significance criteria for cumulative effects will be based on that detailed in *DMRB LA 104 "Environmental assessment and monitoring*" (Highways England, 2020) using the significance matrix in Table 3.8.1. This approach is in line with *Planning advice note seventeen*. Significant effects are generally those where the significance of the effect is 'moderate' or greater.

15.2.27 The ES will report the results of the assessment with particular consideration given to any significant cumulative effects that are identified, and the need for mitigation to be developed by this project. These effects will be reported within the cumulative and combined chapter of the ES with full details of Stages 1 to 4, including the final other development schedule (the search will be repeated prior to the ES being completed, and the longlist updated with any new proposed developments identified).

15.3 Combined Effects

Methodology

15.3.1 The assessment of combined effects requires assessment of the impacts of a proposed development on the same receptor. These occur where a number of separate impacts (e.g. noise and air quality) affect a single receptor (e.g. fauna). The assessment of potential combined effects therefore considers the scope for all such effects to interact spatially and temporally to create inter-related impacts on a receptor. The assessment of combined effects considers only those effects produced by the project and not from 'other developments'. The assessment includes consideration of where multiple non-significant effects could combine to become significant. The assessment of combined effects will be undertaken prior to, and feed into, the assessment of cumulative effects from other developments.

15.3.1 Where sufficient information is available at this preliminary assessment stage, combined effects have been considered and reported within the topic chapters of this PEI Report. For example, Chapter 8: Cultural Heritage considers effects from different sources on heritage assets, such as visual impacts during construction and noise impacts during operation. Chapter 6: Biodiversity considers effects on ecological receptors of a number of individual environmental impacts such as air quality, water quality and noise and vibration. Chapter 13: Population and Human Health considers effects arising from noise, air quality and visual on people.

15.3.2 The ES will report the results of the combined effects assessment with particular consideration given to any significant residual combined effects that are identified, and the need for mitigation. The significance criteria for cumulative effects will be based on that detailed in DMRB LA 104 “Environmental assessment and monitoring” (Highways England, 2020) using the significance matrix in Table 3.8.1. A qualitative assessment will be undertaken, informed by a matrix setting out the effects from relevant environmental topics per receptor or receptor group. Professional judgement will be used to combine the differing significance effects from multiple topics to give a combined effect.

15.4 Summary

15.4.1 This chapter of the PEI Report sets out the assessment methodology for the cumulative and combined effects assessment. In addition, the initial findings of the Stage 1 cumulative effects assessment are presented.

15.4.2 A full cumulative effects assessment and combined effects assessment will be undertaken as part of the EIA and will be reported in the ES.