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Examination Principle Issues	• **Climate Change** • **Scope of Development and Environmental Impact Assessment** • **Assessment of cumulative impacts**
Appendices	**Please note 4 of the Appendices (D, E, F & G) have been submitted as separate PDF files, according to the filenames given in the Appendix front sheets in this document**

WRITTEN REPRESENTATION

(including responses to ExQ1/CC.1.1(i) & (iv) at sections 2.9 and 4.2,
and comments on ExQ1/GC.4.7(b) at sections 2.2, 2.5 and 2.13)

INTRODUCTION: Climate Emergency Policy and Planning (CEPP)

I am an independent scientist and environmental consultant, working at the intersection of science, policy, and law, particularly relating to ecology and climate change. My doctoral work, at Oxford University after a BSc in chemistry at Imperial College London (1977), was in structural biology, protein binding sites and dynamics (DPhil, 1981)[1].

Most of my 40-year career was in scientific computation, including high performance climate models. Between 1985 and 1994, I was involved in the design and testing of software for the design and logic synthesis of Very Large Scale Integrated (VLSI) circuits: this included running software models of circuits, at that time[2], of up to 1 million transistors. Between 1995 and 2006, I ran the high-performance computer service at the University of East Anglia which supported the university's scientific research community in running models, across a range of sciences, on a small supercomputer. I have a wide understanding of the principles and practice of modelling complex systems which I bring to this submission.

Due to the climate crisis, from 2005 I have been involved in campaigning and politics, including being a Norfolk County Councillor for 12 years. The severity of the climate emergency is clear through science and has been for several decades, and my work through CEPP now is to promote the necessary rapid response to the Climate Emergency in mainstream institutions, such as local authorities and government, through the lenses of science, policy, and law. I am an Expert contributor to the proposed UK Climate and Ecological Emergency Bill[3], drafted by scientists, legal experts, ecological economists, and environmentalists, and designed specifically to reverse the climate and ecological breakdown that we are facing.

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[1] An area that has become quite alive for me again, 40 years later, during the COVID pandemic re: the structural biology of vaccine design, viral protein mutations and vaccine escape etc

[2] 1 million was cutting edge at the time! Transistor counts now exceed 2 trillion on a single chip https://en.wikipedia.org/wiki/Transistor_count,

[3] https://www.ceebill.uk/bill

SUMMARY - 18 NON-COMPLIANCE ISSUES

CEPP has reviewed the applicant's Environmental Statement with respect to carbon emissions, and cumulative carbon emissions, and compliance with the NPS NN, and its invocation of the EIA Regulations. Our detailed submission aims to guide the ExA through the issues. As part of this CEPP raise **18 non-compliance (N_C) issues**, listed below, within the text. These are listed here as our summary: they cover compliance to the NPS NN and EIA Regs, and other guidance such as DMRB; the Transport Decarbonisation Plan (TDP); the Aarhus Convention; national and local carbon budgets and targets; and compliance with the Paris agreement via science-based carbon budgets from UK academic experts.

Throughout this document we refer to the A47 - A11 Thickthorn Junction scheme as A47THI.

The related A47 Blofield to North Burlingham and A47 North Tuddenham to Easton schemes are referred to as A47BNB and A47NTE respectively.

N_C-1: The Environmental Statement does not comply with the requirements of the NPS NN and the EIA Regs. The absence of cumulative, and short, medium and long-term, impact assessment of carbon emissions renders the Environmental Statement inadequate under the EIA Regs, and CEPP respectfully request that the ExA consider this under EIA Reg 20 (see Appendix B).

N_C-2: The applicant has not complied with the NPS NN, EIA Regs, DMRB LA 103 as the Environmental Statement provides no cumulative assessment of carbon emissions.

N_C-3: The applicant has not complied with the EIA Regs and the guidance, nor with the NPS NN invocation of the EIA Regs, in only attempting to assess the scheme itself, and only providing a national assessment against national whole economy GHG targets (ie: no local and regional assessments have been attempted).

N_C-4: Local cumulative carbon assessment cannot currently be done because no rational choice of study area has been made which would enable it to be calculated coherently across different schemes. By definition, coherent cumulative assessment requires a common and standard study which enables all relevant schemes in the local area to be assessed against the same baseline area. The applicant, and also Norfolk County Council, have not chosen a standard study area across the relevant local schemes.

N_C-5: Carbon assessment requires a study area that reflects the specific characteristics of carbon. Appropriating a "study area" used for air quality assessment to carbon assessment ignores the differences in the fundamental physical science and impacts between air pollutants and carbon emissions. As the affected road network (ARN) derived for air quality is different across each scheme, cumulative carbon assessment across schemes in the area as part of compliance with the EIA regs is precluded.

N_C-6: The applicant has not complied with DMRB LA 104 by not considering road projects (locally, regionally and nationally) which are confirmed for delivery over a similar timeframe for cumulative carbon effects.

N_C-7: The applicant has not provided any assessment of national cumulative carbon emission impacts for the scheme despite the requirement for cumulative assessment across Highway's England networks under section 5.3(c) of the Highways England licence, and the requirement for national cumulative assessment in the EIA Regs guidance, and the NPS NN which requires compliance with the EIA Regs.

N_C-8: No assessment of the scheme has been made against the period 2038-2049[4] when the UK is required legally to achieve net-zero and over-all eliminate all carbon emissions. Significant additional emissions from road use in Norfolk are inherent in each year of this period from the applicant's data. Further additional emissions would accrue from cumulative assessment with other local schemes, which the applicant has not carried out. Together these have an, as yet not fully assessed, material impact on the ability of Government to meet its carbon reduction targets.

N_C-9: No assessment of the scheme has been made against the 35-year period 2050-2084, post the 2050 net-zero target. Irrespective of UK legislative dates, scientists are clear that a net-negative world, with massive extraction of CO2 is required urgently (ie actually before 2050[5]). Yet significant additional emissions from road use in Norfolk are inherent in each year of the 2050-2084 period in the Environmental Statement making the scheme net-positive. Further additional net-positive emissions would accrue from cumulative assessment with other local schemes, which the applicant has not carried out. Together these have an, as yet not fully assessed, material impact on the ability of the UK to its obligations under the global endeavour to stabilise global heating at 1.5°C enshrined in the Paris agreement.

N_C-10: The lack of transparent information and data about the traffic models on which operational carbon emissions are based does not allow any independent review and scrutiny of the high-level figures published in the Environmental Statement. The applicant is in contravention of the terms of the Aarhus Convention.

N_C-11: NB: This non-compliance applies directly to the A47NTE[6] scheme, and indirectly to the A47THI scheme. **The applicant has ignored PINS advice in the EIA Scoping opinion on the A47NTE scheme to do cumulative assessment with the Norwich Western link road (NWL) on**

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[4] CEPP assume that the applicant will shortly provide their assessment against the sixth carbon budget (6CB, 2033-2037)

[5] Report from Climate Crisis Advisory Group, established and chaired by **Sir David King, former UK Government's Chief Scientific Advisor from 2000 to 2007**, August 2021, commentary of the IPCC 6th Assessment report "The final warning bell", https://static1.squarespace.com/static/60ccae658553d102459d11ed/t/61275c5abba2ec034eefb534/1629969503477/CCAG+The+Final+Warning+Bell.pdf :

> "***The CCAG is clear that the current shift in global emissions is not sufficient to avoid global disaster, and there is no 'remaining Carbon Budget'.*** *If proper account is taken of all greenhouse gases, and their CO2 equivalence, the 450ppm" threshold has already passed, contradicting the widespread notion of a 'carbon budget' that could still be spent whilst remaining below 1.5°C temperature rise.*"

[6] CEPP have also produced this set of non-compliances for the A47NTE scheme, and we point any differences out where they exist.

the A47NTE schemes. It applies indirectly on the A47THI scheme as local cumulative carbon assessment of the A47THI should include both the A47NTE and NWL schemes.

N_C-12: In a recent DCO applications the SoS is requiring cumulative carbon assessment in line with the NPS NN and EIA Regs. This implies that the Environmental Statement for the scheme, which has no cumulative carbon assessment, is inadequate under the EIA Regs, and the ExA should consider this under EIA Reg 20.

N_C-13: NB: This non-compliance applies directly to the A47NTE scheme, and indirectly to the A47THI scheme. **PINS requested that cumulative environmental assessment is done for A47NTE including the NWL, but traffic modelling for the two schemes uses different base years, and there is a major loss of traffic from one model which remains unexplained. The applicant must provide new traffic modelling that allows cumulative environmental assessment, which is consistent between both schemes, and corrects errors.** It applies indirectly on the A47THI scheme as local cumulative carbon assessment of the A47THI should include both the A47NTE and NWL schemes.

N_C-14: Even before cumulative carbon emissions are considered, the applicant's carbon assessment does not reduce operational carbon emissions (from vehicle use) over the 60-year appraisal period, as is required to comply with the government's Transport Decarbonisation Plan (TDP[7]) for ambitious quantifiable carbon reductions in transport at the local level. It shows an addition of 136,725 tCO2e over the already very high baseline of over 53,000,000 tCO2e over the study area. In the critical 4th carbon budget that spans half of this decade in which United Nations have said we must halve emissions, an additional 29,706 tCO2e will be emitted from construction and operation of the scheme. Such additional carbon emissions without any mitigation plan are not acceptable in the Climate Emergency.

N_C-15: (reworded for A47THI) **The applicant has not provided the traded and non-traded operational emissions, and should make the 60-year appraisal and the TAG GHG workbook available to the Examination.**

N_C-16: CEPP do not accept that only comparing carbon emissions from the scheme against carbon budgets for the entire UK economy is a credible assessment method. It makes no sense from a scientific perspective where reference data for comparison should always carefully chosen. It is a deliberate tactic to "loose the signal in the noise", and it is antithetical to good science. Further, it does not comply with the EIA Regs guidance for local, regional and national assessment, against known local, regional and national carbon targets, as invoked by the NPS NN. The Environmental Statement is narrow, inadequate, and non-compliant in ignoring the wider scope of the EIA Regs.

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[7] "Decarbonising Transport: A Better, Greener Britain", Transport Decarbonisation Plan (TDP), July 2021, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1009448/decarbonising-transport-a-better-greener-britain.pdf, PDF Page 151:

> *"Going forward, local transport plans (LTPs) will also need to set out how local areas will deliver **ambitious quantifiable carbon reductions in transport**, taking into account the differing transport requirements of different areas. This will need to be in line with carbon budgets and net zero."*

N_C-17: Additional new local transport emissions are introduced by the scheme in the BBSNN area. Between 2025 to 2027, these would add between 2.6% (scheme alone) and 25.9% (scheme in cumulation with other schemes) new emission sources when compared against the 2019 transport emissions for the area, as reported by BEIS, as a baseline. When assessed against the opening year 2025 using the 4th carbon budget as the baseline, the equivalent figures are very similar at 2.3% and 23.1%. By not considering or assessing these impacts, the applicant does not comply with the EIA Regs guidance to take relevant greenhouse gas reduction targets at the national, regional, and local levels into account. These additional emissions also fall in the period leading up to the UK international commitment, via its NDC under the Paris Agreement, to reduce emissions by 68% by 2030 (relative to 1990 levels). Additional local emissions of this magnitude, with no evident mitigation strategy, will impact national efforts, and therefore create a serious risk against the UK delivering on its NDC commitment by 2030. Accumulated with other schemes in the local area, and nationally, this risk cannot be ignored, but has not been addressed in the Environmental Statement.

N_C-18: Even without cumulative effects, the applicant's figure for carbon emitted from the scheme and in the wider road network (ARN) is approximately 5 times the entire carbon budget from BBSNN (Broadland, Breckland, South Norfolk and Norwich, a larger area) area for the period from 2033 to the net-zero date 2050 using science-based carbon budgets from the Tyndall Centre. For the period, after 2050, the corresponding applicant's figure is approximately 100 times greater than the available science-based carbon budget, and infinitely greater than the Government and CCC's implied budget for the post net-zero era. The applicant has provided no indication of how these additional carbon emissions would be mitigated. This has a clear material impact on the ability of the UK to contribute to the global endeavour to stabilise global heating at 1.5^{o}C, and it does not comply with the UK obligations under the Paris Agreement.

This evidence is compelling that the Environmental Statement is inadequate in its assessment of carbon emissions, and cumulative carbon emissions. Given the amount of remedial work required, including reconfiguring the traffic modelling used to generate carbon data, **CEPP respectfully request that the ExA gives serious consideration to suspending the Examination under EIA Reg 20 so that the missing data and non-compliances may be resolved in the Environmental Statement.**

Contents

1 INTRODUCTION

1 This WR critically reviews the Environmental Statement and how it assesses carbon emissions, and cumulative carbon emissions, associated with the scheme against the requirements and obligations on the applicant under the relevant legislation, regulation and guidance for a DCO application.

2 The A47THI is an EIA development and the decision-making process, therefore, is required to comply with the EIA Regulations ("EIA Regs").[8]

1.1 Definitions

3 Within the Environmental Statement terms like "direct emissions", "indirect emissions", "cumulative effects of the Scheme" and "likely significant effect" are used. These terms need to be defined by the applicant within the Environmental Statement ("ES"), and specifically for greenhouse gas emissions as an environmental factor under the EIA Regs. CEPP has not found such definitions. As there are implied definitions of the terms within the ES, these will be highlighted later in this document.

4 CEPP uses the following additional terms, and our definitions are:

A. Absolute emissions – carbon emissions which are expresses in terms of **an absolute value** of emissions. The quantum of absolute emissions, as released into the atmosphere, represent a real measure of impact of greenhouse gases as an environmental factor.

B. Delta emissions, or differential emissions – carbon emissions, with an associated value which has been derived by differentiation of absolute emissions. The differentiation is usually performed by the difference between two traffic models, one with the scheme and one without. Delta values derived this way do not quantify of the real impact of atmospheric greenhouse gases in the traffic model with the scheme.

5 With respect to delta emissions, the applicant sometimes refers to these as "net" emissions. For example, Table 14-9 of the ES [APP-051] labels a column "*Net CO2 project GHG emissions (tCO2e) (Do something – Do minimum)* *". Net is usually used to mean the remainder of emissions after some process. Its usage here is misleading and it can be taken to mean the quantum of net emissions is all that is of concern. Delta is clearer as it indicates that the figure is derived by a differentiation of two large absolute carbon emissions figure, and that the underlying absolute carbon emissions figures are actually the real measure of impact, and therefore the figures of primary concern.

[8] Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.

Further explanation of these terms will be given in the relevant sections below.

6 Appendices A, B and C lays out the relevant background reference material on:

A. the National Policy Statement for National Networks ("NPS NN"). The NPS NN requires cumulative assessment of environmental factors, including carbon emissions, and it also **directly invokes** the EIA Regulations ("EIA Regs").

B. the EIA Regs[9], themselves. The regulations quite clearly require cumulative carbon emissions appraisal, as characterised by these *assessment parameters*:

i. ***climate (including the nature and magnitude of greenhouse gas emissions)*** as an environmental factor which should be assessed,
ii. for ***the scheme itself***,
iii. and the scheme in ***cumulation*** with other existing and/or approved projects/developments,
iv. over ***short-term, medium-term and long-term timeframes***,
v. and taking into account ***"environmental protection objectives"*** established both at EU or UK level, meaning relevant climate change targets set under UK law.

CEPP also note for the ExA and the SoS that guidance documents, from the EU Commission official webpage for the EIA Directive[10], written with the explicit aim that EIA Regs based Environmental Statements are "*focus[ed] on ensuring that the best possible information is made available during decision-making"* strongly recommend:

vi. relevant greenhouse gas reduction targets at the ***national, regional, and local levels*** should be taken into account

C. the Highways England Licence which requires Highways England (now "National Highways") to consider the ***cumulative environmental impact of its activities across its network, again including carbon emissions***.

7 Given these requirements, section 2 asks, and answers, the following questions with reference to the A47THI scheme and how carbon assessment should be done in compliance with the EIA Regs.

[9] Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.

[10] https://ec.europa.eu/environment/eia/eia-support.htm

What needs to be assessed? Key questions being:

i. ***what spatial scales*** of assessment are appropriate? (ie: how ***local, regional and national scale*** greenhouse gas impacts can be assessed)

ii. ***what developments*** should be included in an analysis of how other developments would combine and interact with the scheme for cumulative carbon emissions assessment?

iii. ***what types of carbon emissions*** (eg: embedded construction emissions, operational tail-gate emissions from vehicles, emissions from land-use and land-clearance) should be calculated?

iv. ***what short-term, medium-term and long-term timeframes*** are appropriate for carbon assessment?

8 Section 3 lays out a carbon assessment framework consistent with the answers to these questions and compliant with the EIA Regs, and Section 4 resolves some particular practical issues before sections 5 and 6 then perform an indicative carbon assessment based on the previous sections.

2 WHAT NEEDS TO BE ASSESSED?

2.1 The NPS regime (including NPS NN) requirements for environmental assessment

9 NPS NN Section 4.15 to 4.21 describes how environmental assessment should be done.

10 The NPS NN **directly invokes** the EIA Regulations ("EIA Regs") at NPS NN 4.15 and 4.16. These same invocations appear in most national policy statements NPSs[11], indicating the clear intention of the Government for environmental assessment in the NPS regime to be fully compliant with the EIA regime. CEPP note that the Courts are willing to enforce these requirements for environmental assessment, including cumulative assessment, as in the Pearce v BEIS[12] case.

11 The text of NPS NN 4.15, quoted below, is directly "cut and paste" from the wording in the EIA Regs themselves on which further information is given at Appendices A and B.

[11] For example, section 4.12 and 4.13 of "Airports National Policy Statement; section 4.2 of the Overarching National Policy Statement for Energy (EN-1) although this invokes the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 (SI 2009 No. 2263) ("the **2009** Regulations") rather than the more recent Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (SI 2017 No. 572) ("the **2017** Regulations").

[12] Pearce v BEIS, 149: "Here the Claimant has succeeded in establishing a breach of the 2009 Regulations, as well as a domestic error of public law (irrationality) and a breach of the duty to give reasons (which straddles both EU and domestic law, the 2009 Regulations and the PA 2008)".

> *"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 environmental statement (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.*** *When examining a proposal, the Examining Authority should ensure that likely significant effects at all stages of the project have been adequately assessed. Any requests for environmental information not included in the original environmental statement should be proportionate and focus only on significant effects. In this NPS, the terms 'effects', 'impacts' or 'benefits' should accordingly be understood to mean likely significant effects, impacts or benefits."* (our emphasis)

12 NPS NN 4.16 states:

> "*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). …"* (our emphasis)

Such cumulative assessment has not been presented in the Environmental Statement breaching NPS NN 4.16. CEPP explain this in more detail later.

13 Specifically on assessment of carbon emissions in the Environmental Statement, Section 5.17 states:

> *"Where the development is subject to EIA,* ***any Environmental Statement will need to describe an assessment of any likely significant climate factors in accordance with the requirements in the EIA Directive."***

14 The EIA Regs require cumulative assessment of environmental factors, including "climate", meaning both "greenhouse gas emissions" and "impacts relevant to adaptation" by EIA Regs, Schedule 4, Para 4 and EIA Regs, Schedule 4, Para 5 (f).

15 NPS NN 4.16, above, direct requires cumulative assessment. As the NPS NN invokes the EIA Regs, as above, it also requires cumulative assessment of "climate", meaning both "greenhouse gas emissions" and "impacts relevant to adaptation" via its invocation of the EIA Regs. (CEPP do not consider adaptation issues further).

N_C-1: The Environmental Statement does not comply with the requirements of the NPS NN and the EIA Regs. The absence of cumulative, and short, medium and long-term, impact assessment of carbon emissions renders the Environmental Statement inadequate under the EIA Regs, and CEPP respectfully request that the ExA consider this under EIA Reg 20 (see Appendix B).

2.2 Areas of confusion in the Environmental Statement re: EIA Regs compliance

16 Section 14.4.4 (entitled "Assessment criteria", "Effects on Climate") of the ES [APP-051] specifies EIA Directive (2014/52/EU) (and therefore the EIA Regs as transposed in UK law) as an assessment criteria:

> *"The EIA Directive (2014/52/EU) and subsequent updates to UK EIA regulations includes a requirement to assess the impacts of projects on climate and their vulnerability to climate change."*

17 Having clearly identified the EIA Regs in this context, the ES is scattered with references of perceived difficulties for the applicant. For example:

A. Section 14.4.7 says "*There is currently no definitive EIA guidance on the assessment of significance for carbon emissions.*". (CEPP note here that no reference appears to be made in the ES to guidance documents, from the EU Commission official webpage for the EIA Directive[13], including on assessment at local, regional and national levels as in next section).

B. At 14.5.5 "*The UK climate policy landscape and the associated approach to gauging climate significance in EIA is evolving, with uncertainty as to how increases in emissions such as those from the Proposed Scheme may be compatible with recently introduced national net zero targets. There are also currently no quantitative criteria for determining the (EIA) significance of carbon emissions*." CEPP note, that despite this, the applicant does make their own judgement on what those quantitative criteria of significance might be in the ES.

C. This is reflected in section 14.10.4 of the EIA Scoping Report [APP-120] which states: *"There is at present no single accepted methodology for the assessment of climate change within EIA."*

[13] https://ec.europa.eu/environment/eia/eia-support.htm

18 **This narrative of perceived difficulties is concerning because the applicant uses it to mask, and then not to attempt to comply with, the very clear requirements within the EIA Regs for dealing with climate impacts.** These requirements have not been taken on board by the applicant at all, and much of this critical review is pointing out how they have not been applied by the applicant. For example, the clear requirement for cumulative carbon emissions appraisal, as characterised by *assessment parameters* CEPP lay out in section 1 above, and the clear pointers to what needs to be assessed, as indicated by CEPP's *key questions* also in section 1 above.

19 CEPP note also Natural England's advice on the scoping report of March 8th 2018 which specifically highlights the need for cumulative assessment, and which projects should be included [APP-121, starting at PDF page 83]:

> **8. Cumulative and in-combination effects**
> A full consideration of the implications of the whole scheme should be included in the ES. All supporting infrastructure should be included within the assessment.
>
> The ES should include an impact assessment to identify, describe and evaluate the effects that are likely to result from the project in combination with other projects and activities that are being, have been or will be carried out. The following types of projects should be included in such an assessment, (subject to available information):
>
> a. existing completed projects;
> b. approved but uncompleted projects;
> c. ongoing activities;
> d. plans or projects for which an application has been made and which are under consideration by the consenting authorities; and
> e. plans and projects which are reasonably foreseeable, i.e. projects for which an application has not yet been submitted, but which are likely to progress before completion of the development and for which sufficient information is available to assess the likelihood of cumulative and in-combination effects.

20 CEPP note the ExA's question at ExQ1/GC.4.7(b) requesting "*an update of the assessment contained within ES Chapter 15 [APP-052] of the potential cumulative effects of the Proposed Development* ***with other existing and/or approved projects*** *on climate, including greenhouse gas emissions and climate change adaptation with regard to the sixth budget.*" (our emphasis).

The Applicant cannot answer this question as there is no existing, credible assessment of "cumulative effects of the Proposed Development with other existing and/or approved projects on climate, including greenhouse gas emissions" as we demonstrate in the critical review.

2.3 What spatial scales of assessment?

21 The EU Commission website hosts an official webpage for the EIA Directive[14], which lists a number of Guidance Documents.

22 Following the enactment of the reviewed EU EIA Directive "DIRECTIVE 2014/52/EU" in 2014, three guidance documents were published on the screening[15], scoping[16] and EUA report writing[17] stages in 2017.

23 Each of these 2017 guidance documents state that they "*aim[s] to help Developers and consultants alike prepare good quality Environmental Impact Assessment Reports and to guide competent authorities and other interested parties as they review the Reports. It focuses on ensuring that the best possible information is made available during decision-making*". The guidance on the "Preparation of the Environmental Impact Assessment Report" is provided at Appendix F.

24 Under *"Climate change mitigation: Project impacts on climate change"* on page 39 of the report, it states:

> *"The assessment should take relevant greenhouse gas reduction targets at the **national, regional, and local levels** into account, where available. The EIA may also assess the extent to which Projects contribute to these targets through reductions, as well as identify opportunities to reduce emissions through alternative measures."*

25 Whilst for cumulative effects[18] at page 50:

> *"[They] can arise from … the interaction between all of the different Projects in the same area;"*
>
> *"… can occur at different temporal and spatial scales. The spatial scale can **be local, regional or global**, while the frequency or temporal scale includes past, present and future impacts on a specific environment or region.*" (our emphasis)

26 Whilst not legally binding, the guidance is promoted by the EU, identifies that Competent Authorities reviewing the EIA Report and using the information for decision-making, as one of its target audiences.[19]

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[14] https://ec.europa.eu/environment/eia/eia-support.htm

[15] https://ec.europa.eu/environment/eia/pdf/EIA_guidance_Screening_final.pdf

[16] https://ec.europa.eu/environment/eia/pdf/EIA_guidance_Scoping_final.pdf

[17] https://ec.europa.eu/environment/eia/pdf/EIA_guidance_EIA_report_final.pdf

[18] https://ec.europa.eu/environment/eia/pdf/EIA_guidance_EIA_report_final.pdf, PDF page 52

[19] See "HOW TO USE THIS GUIDANCE DOCUMENT" section

27 From the same official webpage for the EIA Directive, further 2013 guidance is provided on "*Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment*". This guidance predates the 2014 Directive and was produced during the time of the 2011 EIA Directive "DIRECTIVE 2011/92/EU". The guidance was implemented for the European Commission under Study Contract No 07.0307/2010/580136/ETU/A3 with Members of the Commission Group of EIA/SEA National Experts and staff from three Directorate-General of the Commission[20]. Whilst not of a binding nature, it reflects the view of the Commission services of the best EIA practice, included those with transposed national regulations like the UK.

28 It is reproduced at Appendix G. Section 4.4.2 states:

> *"Judging an impact's magnitude and significance must be context-specific. For an individual project — e.g. a road project —* ***the contribution to GHGs may be insignificant on the global scale, but may well be significant on the local/regional scale, in terms of its contribution to set GHG-reduction targets.****"* (our emphasis)

In the context of the A47THI, "global" in the above may be read as "national". The Applicant claims that an appraisal of delta emissions is insignificant against national budgets. The guidance rightly suggests carbon emissions assessed at a local/regional scale may well be significant.

29 CEPP have not been able to find any UK specific guidance relating to the EIA Regs that would provide different advice to the existing guidance on the official EU Commission webpage for the EIA Regs. It is therefore rational to apply guidance which was written to "*focus[es] on ensuring that the best possible information is made available during decision-making"* under the EIA Directive within the UK. Failure to even consider such guidance, as appears to be the case in the Environmental Statement, is irrational.

30 CEPP have made clear above how the NPS NN invokes the EIA Regs at NPS NN sections 4.15 and 4.16. **The Applicant has ignored two separate guidance**

[20] This guidance is provided in Appendix 1. The front page states "This document benefited from Study Contract No 07.0307/2010/580136/ETU/A3, implemented for the European Commission by

> Milieu Ltd, Collingwood Environmental Planning Ltd and Integra Consulting Ltd. The main authors were: Jennifer McGuinn and Guillermo Hernandez from Milieu Ltd; Ric Eales, William Sheate and Jonathan Baker from Collingwood Environmental Planning; and Jiri Dusik from Integra Consulting. Maria Partidario of the Technical University of Lisbon and Helen Byron of the Royal Society for the Protection of Birds/Birdlife UK provided advice. Additional contributions about climate change were collected during the JASPERS workshops (March-April 2012). The text was also revised by Jiri Dusik. Members of the Commission Group of EIA/SEA National Experts (in particular, Paolo Boccardi, Susanna Eberhartinger-Tafill, Paul Fortuin, Aurora Hernando Garcinuno, Anna Kieniewicz, Gabrielle McKeown, Koen Maertens, Tadhg O'Mahony, Martine Moris, Kees Van Muiswinkel, Rainer Persidski, Claire Piens, Matthias Sauer, Roel Teeuwen, Adrian Vecino Varela) and staff of the European Commission's Directorate-General for Climate Action (Vaidotas Kuodys, Sami Zeidan), Directorate-General for Humanitarian Aid and Civil Protection (Yordanka Mincheva, Thomas de Lannoy) and Directorate-General for Environment (Stephanos Ampatzis, Szilvia Bosze, Marco Fritz, Milena Novakova and Przemyslaw Oginski) also Contributed"

documents, hosted on the official EU Commission EIA Regs webpage, which each recommend assessment of carbon emissions at the local and regional level, as well as national level, within Environmental Statements. In not even considering this guidance, the Applicant has failed to comply with NPS NN 4.15 and 4.16.

31 The EIA regulations require, then, that carbon assessment is done for the scheme itself and cumulation of effects of the scheme with other existing and/or approved projects, at the local and regional scale, as well as at the national scale.

N_C-3: The applicant has not complied with the EIA Regs and the guidance, nor with the NPS NN invocation of the EIA Regs, in only attempting to assess the scheme itself, and only providing a national assessment against national whole economy GHG targets (ie: no local and regional assessments have been attempted).

32 This renders the applicant's Environmental Statement inadequate, as under EIA Reg 20. The further information required to remedy this is as follows:

- Assessment of the scheme itself at the local and regional scale, and against relevant greenhouse gas reduction targets (ie steps ① and ②), and
- Assessment of the scheme in cumulation at the local, regional and national scale, and against relevant greenhouse gas reduction targets (ie step ③).
- Later CEPP show that the traffic modelling between schemes is incoherent, requiring substantive reworking of the traffic models to provide these assessments.

33 Given the scale of work identified by these omissions, CEPP respectively request that the ExA consider this under EIA Reg 20.

2.4 Baseline and cumulative assessment under the EIA regulations

34 The EIA regulations lay out that environmental **assessment** of an environmental **factor** should start from the current environmental **baseline** (step ①). Then the impacts of the scheme itself are assessed: for the case of carbon emissions as a climatic factor under the EIA Regs, this analysis will be across several different carbon emission types (step ②). Then the cumulative impacts of the scheme are assessed (step ③).

35 The DRMB "LA 103[21] Scoping projects for environmental assessment" defines "cumulative effects" as follows:

[21] https://www.standardsforhighways.co.uk/prod/attachments/fb43a062-65ad-48d3-8c06-374cfd3b8c23

> "*Impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project.*
>
> *NOTE: For the purposes of this document, a cumulative impact may arise as the result of:*
>
> *1) the combined impact of a number of different environmental factors;*
>
> *2) specific impacts from a single project on a single receptor/resource; and/or*
>
> *3) the combined impact of a number of different projects (in combination with the environmental impact assessment project) on a single receptor/resource."*

Whilst EIA Regs, Schedule 4, Para 5 (Appendix B) states "the cumulation of effects with other existing and/or approved projects".

For the A47THI, the relevant interpretation is ***the cumulation of effects with other existing and/or approved projects,*** and the DMRB LA 103 "receptor/resource" at 3) above is atmospheric CO2. This corresponds to the global carbon budget, or any appropriate sub-set of it (including down to the "local" level), as explained later.

36 As CEPP's questions above imply, further assessment parameters relating to carbon emission types, developments to include, timeframes and spatial scales need to be clearly scoped, for both assessing carbon on the scheme itself, and in cumulation with other projects.

37 However, in this section, CEPP are concerned with the simple, over-all sequentiality of assessment in the NPS NN and the EIA Regs, relevant to the A47THI, which can be summarised:

> **Step ①** Define the baseline – the current status of the environmental factor – for the foundation of the assessment process.
>
> **Step ②** Determine the impact from the "construction and existence of the development"
>
> **Step ③** Determine the impact from "cumulation of effects with other existing and/or approved projects"

38 It is important that these three distinct steps are understood. Step ② is an assessment of the impact of the scheme itself, and is required in the ES by EIA Schedule 4 Para 5 (a). Step ③ is a cumulative assessment of the scheme, and is required in the ES by EIA Schedule 4 Para 5 (e). CEPP note that in the

Environmental Statement and subsequent submissions on another Norfolk A47 scheme[22], that the Applicant has erroneously conflated Steps ② and ③.

39 To be clear, so that the same conflation is not erroneously assumed for the A47THI ES too, the word "cumulative" only appears <u>once</u> in the ES, Chapter 14 [APP-051] as a row label in Table 14-6 "*Whole appraisal period (60 years – cumulative)*". The meaning here appears to be "sum" as in the sum of each of the 60 years in the 60-year appraisal period. What is being summed is the absolute baseline emissions (do-minimum scenario) for the affected road network (ARN). This corresponds to part of assessing the scheme in itself (ie Step ② above). It does not correspond to the effects of the scheme in cumulation with other existing and/or approved projects (ie Step ③ above) which is the meaning in the EIA Regs. **Therefore, this use of the word "cumulative" is misleading[23], and certainly is not related to cumulative assessment of carbon emissions as required by the EIA Regs.**

40 As the word "cumulative" does not appear in any meaning related to the EIA Regs in the primary Environmental Statement chapter (ie Chapter 14) on carbon assessment, it is reasonable to conclude that the Applicant has not made any intentional, or explicit, attempt to do a cumulative carbon emissions assessment. This is despite confusions, and attempted retrofitting of the situation, which CEPP describe in the next section.

<u>N_C-2:</u> The applicant has not complied with the NPS NN, EIA Regs, DMRB LA 103 as the Environmental Statement provides no cumulative assessment of carbon emissions.

2.5 Conflations and confusions about cumulative assessment in the ES

41 The guidance[24] on the preparation of the Environmental Impact Assessment reports ("the guidance", Appendix F) defines "Baseline Scenario" as "*Description of the **<u>current status</u>** of the environment in and around the area in which the Project will be located. It forms the foundation upon which the assessment will rest.*" And the Design Manual for Roads and Bridges (DMRB) "LA 104[25] - Environmental assessment and monitoring" defines baseline as "*A description of the **<u>current state</u>** of the environment without implementation of the project.*"

42 CEPP also note that in the Environmental Statement and subsequent submissions on another Norfolk A47 scheme[26], that the Applicant has erroneously included "other A47 schemes and the NWL" in the Do-Minimum scenario. This assumption does

[22] A47NTE: APPLICANT'S RESPONSE TO THE EXAMINING AUTHORITY'S FIRST WRITTEN QUESTIONS, TR010038/EXAM/9.6 [REP2-014]. The conflation is made in response to Q4.0.11. CEPP is currently drafting a response to this to explain the conflation.

[23] The word is redundant - *Whole 60 years appraisal period* – conveys the correct meaning of the data in this case

[24] https://ec.europa.eu/environment/eia/pdf/EIA_guidance_EIA_report_final.pdf, PDF page 7

[25] https://www.standardsforhighways.co.uk/prod/attachments/0f6e0b6a-d08e-4673-8691-cab564d4a60a

[26] A47NTE: APPLICANT'S RESPONSE TO THE EXAMINING AUTHORITY'S FIRST WRITTEN QUESTIONS, TR010038/EXAM/9.6 [REP2-014]. The conflation is made in response to Q4.0.11. CEPP is currently drafting a response to this to explain the error.

not comply with the definition of "baseline scenario" in the EIA guidance, nor in DMRB LA 104. A consequence of this erroneous assumption is that as the "other A47 schemes and the NWL" are already included in the baseline (step ① above), they cannot be assessed for their cumulative impact (step ③ above).

43 The same error has been made in the A47THI ES. Table 15-1 [APP-052] shows "study area extents", and under "Climate" states:

> *"As the construction and operational phase traffic data includes traffic associated with other developments, the emissions assessment reported within the climate chapter is inherently cumulative. Not included in the CEA to avoid double counting."*

44 Section 4.4.3 of the Environmental Assessment Methodology (Environmental Statement, Chapter 4 [APP-041]) describes the 7 transport assessment scenarios used, and is reproduced below with numbering added for clarity in the following text:

Seven transport assessment scenarios have been considered as part of the EIA for the Air quality, Noise and vibration, Population and human health, Road drainage and the water environment and Climate ES chapters. For clarification the following scenarios have been considered:

❶ Environmental baseline as defined by surveys of the existing environment and existing data (2015 for traffic data and 2018 -2020 for non-traffic related data)

❷ Construction (DM) - Baseline adapted to predict future baseline in 2019 **without** the Proposed Scheme

❸ Construction (DS) – baseline in 2019 **with** the Proposed Scheme

❹ Operational (DM) opening year - Baseline adapted to predict future baseline in 2025 **without** the Proposed Scheme

❺ Operational (DS) opening year - Baseline in 2025 **with** the Proposed Scheme

❻ Operational (DM) design year - Baseline adapted to predict future baseline in 2040 **without** the Proposed Scheme

❼ Operational (DS) design year - Baseline in 2040 **with** the Proposed Scheme

45 The Applicant's claim that "*the emissions assessment reported within the climate chapter is inherently cumulative*" is flawed as follows:

A. Construction emissions can be calculated without reference to the traffic modelling (ie ❷ & ❸). The cumulative impacts on construction carbon emissions of the A47THI with other existing and/or approved

projects may simply be calculated by summing up the construction emissions for each project. If the A47BNB, A47NTE, the NWL and the Long Stratton Bypass (LSB) are taken as relevant projects for a local assessment of cumulative construction emissions then these can be summed as in Table 4 (forward reference). As the construction emissions for the NWL and LSB are unknown, the only available figures are: A47 Blofield to North Burlingham, 25,765 tCO2e; A47 North Tuddenham to Easton, 87,727 tCO2e; A47 - A11 Thickthorn Junction, 25,946 tCO2e. These sum to 139,438 tCO2e. This is clearly a significant underestimate as construction and land use change carbon emissions are expected to be high on the NWL scheme due to construction emissions due to a 700m viaduct within the scheme requiring a large quantum of cement, and land-use emissions during construction being high due to the significant areas of woodlands, veteran and ancient trees, and carbon-rich soil that would be disrupted.

B. For operation emissions to be assessed cumulatively, it is first necessary to take steps ① and ② above. This requires the other road schemes such as A47BNB, A47NTE, NWL and LSB to be excluded from the baseline, and then the impact of the A47THI assessed as the scheme itself. However, in 2025 models ❹ & ❺, the other road schemes are included in "future baseline". Step ③ is made by then switching in the other road schemes such as A47BNB, A47NTE, NWL and LSB for local cumulative assessment: they cannot be switched in as they have already been switched out. The same "switching out" applies to the 2040 models at ❻ & ❼. The steps ①, ② & ③, required, currently cannot be done as a rational study area for the traffic modelling has not been defined.

C. Stating that the ES assessment is "inherently cumulative" because it "includes traffic associated with other developments" is a conflation and erroneous. What is essentially being performed is steps ① and ② with other developments being included. As the road scheme developments (A47BNB, A47NTE, NWL and LSB in this case) are included in the baseline, then by definition step ③ cannot be performed. Rather than "inherently cumulative", **the method by design excludes cumulative assessment**.

D. The "double-counting" issue is a red herring. Once a rational study area is defined, all the journeys associated with each scheme may be modelled in the same model study area. Journeys which are associated with more than one schemes. For example, a journey from Trowse to Dereham which would pass through both the A47THI and A47NTE schemes would be modelled as the single journey that it is in each of steps ①, ②, and ③.

46 The statement at Table 15-1, and the traffic models at 4.4.3, further corroborates that fact that no cumulative assessment of carbon emissions, which is EIA Regs compliant, has been carried out for the A47THI scheme, and, therefore, non-compliance **N_C-2.**

47 CEPP note that ExQ1/GC.4.7 (b) requests "*an update of the assessment contained within ES Chapter 15 [APP-052] of the potential cumulative effects of the Proposed Development with other existing and/or approved projects on climate, including greenhouse gas emissions and climate change adaptation with regard to the sixth budget*". As above, CEPP's view is that no assessment of cumulative effects with other existing and/or approved projects on climate, including greenhouse gas emissions, have been made in Chapter 14 [APP-051] or Chapter 15 [APP-052] (including with regard to the fourth and fifth carbon budgets).

2.6 What developments?: National spatial scale assessment

48 For cumulative impacts at the national spatial scale, European Case law (CJEU, C-531-13, Marktgemeinde Straßwalchen and Others) states:

> "*A national authority must examine [a Project's] potential impact jointly with other Projects*." (as quoted in the guidance[27])

49 This judgement supports section 5.23(c) of the Highways England License in requiring assessment of cumulative environmental impact of HE activities across its network.

50 This requires that the scheme should be assessed against "national" networks. This requires assessment against at least the 50 major road schemes under the RIS2 programme, and also the array of road schemes under Large Local Major funding programme which includes the Norwich Western Link (NWL) in the Greater Norwich area.

2.7 What study area?: Local and regional spatial scale

51 The guidance (see Appendices F and G) requires local and regional effects to be assessed both against local targets, and as part of a cumulative impacts assessment. **This requires interpretation on which road project developments should be included into the cumulative assessment. As above the applicant has not attempted this as the relevant road schemes have been considered the baseline, so precluding further assessment of their impacts.**

[27] https://ec.europa.eu/environment/eia/pdf/EIA_guidance_EIA_report_final.pdf, PDF page 52

52 As the guidance says "… assessment should take relevant greenhouse gas reduction targets at the national, **regional, and local levels** into account, where available", interpretation should start where carbon targets and budgets are available.

53 Local authority areas have their own carbon budgets, targets, and monitoring, and the Dept of Business and Industrial Strategy (BEIS) have historic emissions records by sector (ie Industrial, Domestic, Transport, and Land-use) since 2005. It is rational, then, for transport schemes to be assessed within the same boundaries where existing benchmark information is available ie based on these local authority areas. A meaningful local assessment is only possible if it is based on a spatial scale and area which corresponds to known and reliable carbon budgets.

54 For the A47THI, a rational approach would be to assess a regional comparison across the East of England – this would require including the cumulative effects of all existing and planned roads schemes across the region.

55 For the local comparison, CEPP note that the A47NTE is located within the administrative boundary of South Norfolk Council, Broadland District Council and Breckland Council with a small area north of the Affected Road Network (ARN) spanning into the administrative district of Norwich City Council[28].

56 A local comparison of the A47THI can be achieved at the district council level against emissions for Breckland, Broadland, South Norfolk and Norwich ("BBSNN"). These areas have well established historical emissions data for comparison at the relevant local authority level[29], and in some cases the councils may have relevant targets. This choice of study area also allows for cumulative assessment with other schemes such as the A47NTE and A47BNB.

57 This interpretation requires a consistent study area (see below) to be used for all schemes in the local area, and therefore has implications for the traffic modelling required, both for assessment of the scheme itself, and for the scheme in cumulation with other projects in the area.

58 **Currently a tangled web of data is being presented** by the applicant for the A47 schemes and NCC for its schemes (see below). The 3 A47 schemes around Norwich using different "study areas", none of which are contiguous with the local authority boundaries. The NCC NWL scheme, and the Long Stratton by-pass, use different study areas again. This precludes being able to perform the cumulative carbon emissions assessment required by the EIA Regs for the A47THI.

59 It is clearly rational to use a standard study area for all the relevant schemes, based on the BBSNN area, which captures all the schemes within it, and enables

[28] Volume 6, 6.1 Environmental Statement, Chapter 5 – Air Quality [APP-044 under TR010038 – A47 North Tuddenham to Easton], section 5.7.3

[29] https://data.gov.uk/dataset/723c243d-2f1a-4d27-8b61-cdb93e5b10ff/emissions-of-carbon-dioxide-for-local-authority-areas, latest data release 24th June 2021

cumulative carbon emission appraisal in compliance with the EIA Reg guidance, locally and against locally available carbon targets. It is not just irrational of the applicant to attempt the current piecemeal approach: it precludes compliance with the regulations on cumulative carbon emissions assessment.

N_C-4: Local cumulative carbon assessment cannot currently be done because no rational choice of study area has been made which would enable it to be calculated coherently across different schemes. By definition, coherent cumulative assessment requires a common and standard study which enables all relevant schemes in the local area to be assessed against the same baseline area. The applicant, and also Norfolk County Council, have not chosen a standard study area across the relevant local schemes.

60 CEPP note that Norfolk County Council decided[30] on August 27th, 2021, to submit Written Representations to the A47THI Examination which proposes that carbon emissions analysis on that scheme should be carried out at the county level, using county-based transport data (we assume that this WR will be published after Deadline D1). This aligns with the EIA guidance advice for local assessment, and partly aligns with CEPP's proposal for A47THI to be assessed against the BBSNN area. In suggesting that that carbon impacts are better not "*diluted*" into the overall UK economy, NCC are moving one step away from the "*losing the signal in the noise*" characteristic of the Environmental Statement which we highlighted at N_C_16. The relevant paragraph is:

> *"The Environmental Impact Assessment (EIA) aligns with government policy and relates all significant road network schemes to their 'material impact' on meeting national carbon budget targets. The county council would suggest using the context of transport in isolation* ***and provide analysis at a county level, using county-based transport data****; the impact would then not be diluted into the UK's overall impact. There is a need to demonstrate how each scheme will meet the path to net zero by 2050 on a scheme by scheme basis."*

61 CEPP expand on the lack of a clear study area for local assessment in the next section.

62 CEPP also provide an indicative local assessment for the BBSNN area later[31].

[30] https://bit.ly/2021Aug27_PlanDeleg, NCC Planning and Highways Delegations Committee, 27th August 2021, PDF page 102

[31] An indicative regional assessment is not provided as it would be too complex for this WR.

2.8 Spatial scale: Irrational choice of Affected Road Network (ARN) as study area for carbon assessment

63 Chapter 14 (Climate) of the Environmental Statement [AS-051] indicates that the study area is the ARN (eg: at 14.6.3, 14.7.3, underneath Table 14-10). The ARN itself is defined in Chapter 5 (Air Quality) of the Environmental Statement [APP-044] at 5.6.7, and it is shown at Figure 5.3 [APP-055].

64 This choice of study area is irrational for the traffic modelling for operational carbon emissions assessment. The study area has been chosen on criteria related to air quality assessment, and then appropriated for carbon assessment, as if the same criteria applied. **However, air pollutants and carbon emissions have completely different physical characteristics, environmental and health impacts, and accounting requirements, so the same criteria for choice of study area do not apply.** This is a long-standing error in assessment methodologies where carbon assessment is viewed as a sub-set of air quality assessment, when in fact carbon assessment requires its own very specific methodology. This error has both scientific and regulatory repercussions.

65 Air pollutant gases, such as NO2, have very short-range effects whereas **greenhouse gases such as CO2 have effects which are range-less**. Pollutants like particulates (eg PM 2.5) may disperse over a wider area, but their effects are still attributable and proximal to their source, rather than range-less as in the case of CO2.

66 Air pollutants have their environmental effect in the immediate short-range area where they impact human and ecological receptors directly. The human health impact is also short-range in this sense, and results from interaction of people directly with the pollutants, close to their source. By contrast, the environmental effect of carbon emissions is range-less – a gramme of CO2 emitted in Norfolk or in New Zealand essentially has the same environmental effect. Similarly, the health effects of a unit of carbon emissions are range-less – so emissions in Norfolk, or New Zealand, have the same health impact on a person, for example, in the global south subsequentially suffering an extreme heat or flooding event.

67 The critical factor for attributing carbon emissions is the point of source, and this is an accounting issue. The vehicle carbon emissions from the A47THI would be emitted in the combined BBSNN area, and therefore are accountable to the carbon budgets and targets of that area.

68 Carbon emissions assessment need their own specific "study area" which is developed on the basis of their unique physical characteristics, environmental and health impacts, and accounting requirements. Appropriating a study area developed for pollutants with very different characteristics and requirements is irrational.

N_C-5: Carbon assessment requires a study area that reflects the specific characteristics of carbon. Appropriating a "study area" used for air quality

assessment to carbon assessment ignores the differences in the fundamental physical science and impacts between air pollutants and carbon emissions. As the affected road network (ARN) derived for air quality is different across each scheme, cumulative carbon assessment across schemes in the area as part of compliance with the EIA regs is precluded.

69 Further, it does not follow the DMRB which states that a study area for each environmental factor should be clearly defined at the earliest opportunity, and take into account cumulative effects. "LA 104[32] Environmental assessment and monitoring" states at 3.13:

> "*The study area for an assessment shall be clearly defined for* ***each environmental factor*** *at the earliest opportunity."*

and at 3.13.1:

> "*The study area for an assessment should reflect the project and the surrounding environment over which effects are reasonably be thought to occur, taking into account cumulative effects."*

70 The applicant has failed to develop a rational study area for carbon emissions appraisal by:

- appropriating a model for pollutants with very different characteristics,
- making no attempt to develop a study area for carbon emissions as a unique environmental factor,
- not considering the accounting effects for carbon emissions which is the parameter that is most relevant to both their environmental impact, and to modelling their effects,
- not taking into account how to model and calculate cumulative effects.

71 Rational modelling for the A47THI scheme, that had EIA Reg compliant local and cumulative assessment for carbon emissions as its purpose, would start by modelling the baseline conditions in a model across the BBSNN area (ie step ① baseline). Then the scheme would be introduced into the model (ie step ② scheme by itself), then the schemes with other existing and/or approved projects included (ie step ③ scheme in cumulative assessment). Using the BBSNN area corrects the failures listed above.

[32] https://www.standardsforhighways.co.uk/prod/attachments/0f6e0b6a-d08e-4673-8691-cab564d4a60a

72 CEPP note that the ARN study area is completely unusable for EIA Reg compliant local and cumulative assessment for carbon emissions. The map at Figure 5.3 [APP-055] shows that the ARN area does not include the A47BNB, A47NTE, NWL or LSB schemes.

2.9 What developments?: Schemes to be assessed for local cumulative impacts

73 DMRB "LA 104[33] Environmental assessment and monitoring" states at 3.19:

> "*EIAs must include cumulative effects in accordance with the requirements of the EIA Directive 2014/52/EU [Ref 1.N].*"

and at 3.21.2:

> "*The assessment of cumulative effects should report on:*
> *1)* ***roads projects which have been confirmed for delivery over a similar timeframe****;*
> *2) other development projects with valid planning permissions or consent orders, and for which EIA is a requirement; and*
> *3) proposals in adopted development plans with a clear identified programme for delivery."*

N_C-6: The applicant has not complied with DMRB LA 104 by not considering road projects (locally, regionally and nationally) which are confirmed for delivery over a similar timeframe for cumulative carbon effects.

74 For cumulative impacts, the EIA guidance notes European Case law (CJEU, C-531-13, Marktgemeinde Straßwalchen and others):

> *"where nothing is specified, that obligation is not restricted only to Projects of the same kind*" (as quoted in the guidance[34])

75 In this WR, CEPP are concerned primarily with road construction projects, as these are associated with the largest carbon emission impacts. Only considering road projects provides an incomplete assessment but, as CEPP show later, available data is limited and incomplete even on the road projects. Ideally, carbon from other infrastructure developments such as rail, and from any large building developments[35] should be included, but CEPP do not consider these further for this review.

[33] https://www.standardsforhighways.co.uk/prod/attachments/0f6e0b6a-d08e-4673-8691-cab564d4a60a

[34] https://ec.europa.eu/environment/eia/pdf/EIA_guidance_EIA_report_final.pdf, PDF page 52

[35] House construction is typically 100 tCO2e per home, and poor spatial planning can lead to high additional transport emissions

76 For local assessment, CEPP identify these projects in the BBSNN area with proposal for construction before the end of the 4th Carbon budget (2023-2027) as below.

i. A47 Blofield to North Burlingham (A47BNB)
ii. A47 North Tuddenham to Easton (A47NTE)
iii. A47/A11 Thickthorn Junction (A47THI) – this scheme
iv. Norwich Western Link (NWL)
v. Long Stratton Bypass (LSB)

77 It should be noted that this excludes schemes that may be proposed for later than 2025.

78 On October 13th 2021 Norfolk County Council launched[36] a campaign of lobbying the Chancellor for funding for dualling of the A47 Acle Straight and A47 Tilney to East Winch with an objective of the work to be scheduled between 2025 and 2030 (ie falling in the 4th and 5th carbon budgets). They also request a commitment from the Government to make funding available for dualling the entire length of the A47. Both requests, if successful and reached the construction stage, would add additional construction and operation emissions within the Norfolk County Council area. They would clearly impact the cumulative carbon assessment. Although, no data on possible quanta of additional emissions has been published, we request that the ExA request further information from the applicant relating to this. **Please take this as a response from CEPP to ExQ1/CC.1.1(i)&(iv).**

79 The list of schemes suggested above is therefore optimistic.

2.10 What developments?: Schemes to be assessed for national cumulative impacts

80 For national assessment, this should include at least the 50 major road schemes under the RIS2 scheme, and also the array of road schemes under Large Local Major funding programme which includes the Norwich Western Link (NWL) in the Greater Norwich area.

N_C-7: The applicant has not provided any assessment of national cumulative carbon emission impacts for the scheme despite the requirement for cumulative assessment across Highway's England networks under section 5.3(c) of the Highways England licence, and the requirement for national cumulative assessment in the EIA Regs guidance, and the NPS NN which requires compliance with the EIA Regs.

[36] See https://twitter.com/NorfolkCC/status/1448177959500754947?s=20

2.11 What types of carbon emissions?

81 Emeritus Professor of Transport Policy, Phil Goodwin[37], has outlined 5 main ways in which increasing road capacity increases CO2 emissions[38], in summary:

- Construction, embodied carbon in concrete, tailpipe emissions for vehicles, and land clearance and preparation;
- Operation, maintenance, servicing, lighting;
- Vehicle emissions from use, including induced traffic and effects of changes of traffic speed;
- Wider impacts from induced development and car-dependent lifestyles and car ownership
- Synergetic effects

82 Whilst PAS 2080 defines these categories:

A. Capital carbon, "GHG emissions associated with the creation, refurbishment and end of life treatment of an asset"

B. Operational carbon "associated with the operation of infrastructure required to enable it to operate and deliver its service"

C. User carbon - "GHG emissions associated with Users' utilisation of infrastructure and the service it provides during operation"

83 In PAS 2080, these are coded into detailed "modules" which each have their own carbon emissions quantification. For example, module A-1 is embedded emissions from "raw material supply".

84 For this review, CEPP introduce a simplified model for the carbon emissions that should be assessed, which is closer to the applicant's presentation, but also can be mapped to, **and is consistent** with the PAS-2080 modules. It uses seven carbon emission types for quantification, as follows:

[37] Emeritus Professor of Transport Policy at University College London and at the University of the West of England, also Senior Fellow (Transport and Climate Change) of the Foundation for Integrated Transport Policy

[38] Witness statement, Prof Phil Goodwin, for case CO/2003/2020, https://transportactionnetwork.org.uk/wp-content/uploads/2021/03/Witness-statement-of-Phil-Goodwin-23-10-2020-16-03-2021_Redacted.pdf, section 6

	Accounting phase / ***<emission type>***	**Description**	
Construction	*Construction* ***<CONST>***	Material supply including primary extraction, manufacturing, transportation and construction process and site works associated with the scheme	PAS-2080 module A
Land-use emissions from land-clearance	*Construction* ***< CONST-LUC>***	Carbon released in land-clearance (eg: for carbon rich soils or woodland destroyed)	PAS-2080 module A-5
Loss of carbon sequestration	*Construction* ***<CONST-SEQ>***	Future loss of ability to sequester carbon from habitats lost during construction	PAS-2080 module D
Operation	*Operation* ***<OP>***	Associated with the maintenance and refurbishment of the scheme, and lighting	PAS-2080 module B
Road user carbon emissions (operation)	*Operation* ***<OP-USE>***	Vehicle emissions	PAS-2080 module B-9
Carbon sequestration gained	*Operation* ***<OP-SEQ>***	Future ability to sequester carbon from habitats gained	PAS-2080 module D
End of life	*End of life* ***<EOL>***		PAS-2080 module C

Table 1

85 Each of the seven types of carbon emissions identified is given a code for future reference. So far, this just identifies the type of emissions but not its temporal, or time-frame, characteristics with respect to carbon budgets which is expanded later.

86 The land-use change emission types ***< CONST-LUC>, <CONST-SEQ>,*** and ***<OP-SEQ>*** are separated out as they operate in different ways and timescales**.** It is important to be clear on how these emissions are accounted to understand the assignment of PAS-2080 modules:

i. ***< CONST-LUC>*** are land-clearance emissions created at construction time, these are then accounted as construction emissions under PAS-2080 module A-5. This interpretation is consistent with other Highways England schemes[39],[40].

ii. ***<CONST-SEQ>*** are future carbon sequestration losses which would not occur if construction did not happen (ie "habitats lost"). These come under PAS-2080 Module D "Benefits and loads beyond the system boundary". However, these emissions are accounted for at construction time as they result from construction. This interpretation is consistent with other Highways England applications[41].

[39] See Table 2-1 in "NORTH WEST RELIEF ROAD Carbon Management Report" where "*Land use change – removal of biomass*" emissions are listed as PAS-2080 Module A-5 emissions.

[40] See "Table 1.2 PAS 2080:2016 modules in the carbon model" in "Lower Thames Crossing

6.3/ Environmental Statement/ Appendices Appendix 15.1 Carbon and Energy Plan" [TR010032/APP/6.3], https://www.thamescrossingactiongroup.com/wp-content/uploads/2020/12/6.3-ES-Appendix-15.1-Carbon-and-Energy-Plan.pdf

[41] See Table 14-15 in "A417 Missing Link [TR010056] 6.2 Environmental Statement Chapter 14 Climate" where "*Land use change (D)*" emissions are accounted as Construction stage emissions.

iii. ***<OP-SEQ>*** future carbon sequestration gains which occur if compensatory habitat is developed over the scheme lifetime (ie "habitats gained"). These are accounted over the 60-year appraisal period. This interpretation is consistent with other Highways England applications[42].

87 The applicant has reported emissions under the ***<CONST>, <OP>, <OP-USE>*** types. Land use change emissions have not been determined for the A47THI and the significance of their quantum is unknown: this requires clarification from the applicant. End of life emissions, PAS-2080 module C, have not been determined for the A47THI: this requires clarification from the applicant.

88 With respect to land use change emissions, when the cumulative carbon impacts are considered across several local schemes, the nature of some of the local habitats are high-carbon and therefore have a very significant level of emissions associated with them. These should be assessed for all schemes, as part of cumulative carbon impact accounting, and are included in the above Table of emission types.

2.12 Short-term, medium-term and long-term assessment timeframes

89 For context, Figure 1 lays out some key time-frames related to carbon assessment of the A47THI. This includes two *"**environmental protection objectives**"* established at the UK level (as per EIA Regs Schedule 4, paragraph 5), as future carbon budgets and relevant climate change targets set under UK law for the EIA Regs: the UK Nationally Determined Contribution (NDC) under the Paris agreement and the 6th Carbon budget (6CB). The figure includes:

- The first 44 years (2025-2068) of the scheme 60-year appraisal period (2025-2084) – the last 16 years omitted for space reasons.
- The first nine 5-year carbon budgets (4CB, 5CB … 12CB) including the three budgets already set in law: 4CB, 5CB, and 6CB. The 78% reduction of carbon emissions by 2035 associated with the 6CB and set in law.
- The availability of applicant data.
- Indicative periods, for which we justify the choice later, for the EIA Regs short-term, medium-term and long-term assessment timeframes.
- The 2050 net-zero year as set in law.

[42] See Table 14-16 in "A417 Missing Link [TR010056] 6.2 Environmental Statement Chapter 14 Climate" where "*Land use and forestry (D)*" emissions are accounted for each year over the 60-year appraisal period. https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR010056/TR010056-000221-6.2%20Environmental%20Statement%20-%20Chapter%2014%20-%20Climate.pdf

- The UK's Nationally Determined Contribution (NDC) under the Paris Agreement, set in law as 68% reduction in carbon emissions against 1990 level by 2030.

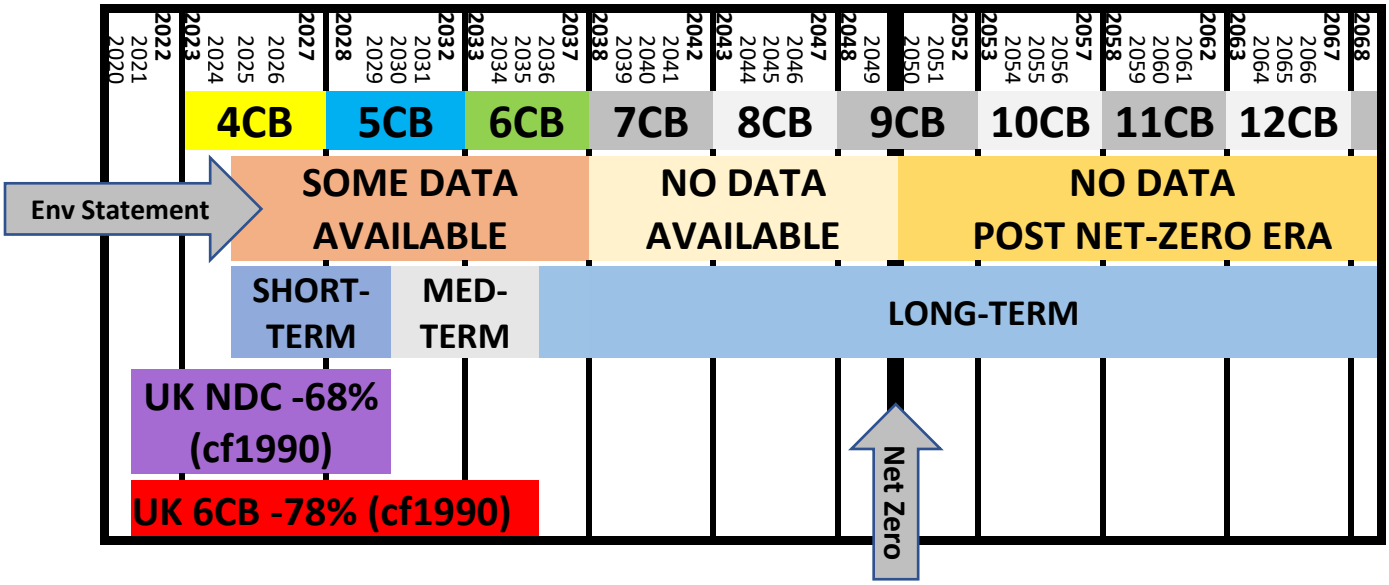

Figure 1

90 The existence of the extremely challenging NDC and the 6CB targets strongly suggest that the first five years of the scheme (2025-2030), and the first ten years (2025-2035) are critical periods for meeting UK climate change laws. This is also consistent with the advice from the United Nations that "*to avoid the worst impacts of hotter conditions, global carbon emissions needed to be cut by 45% by 2030*"[43], which implies greater reductions in the northern, minority world of western nations following the Paris equity principle of Common but Differentiated Responsibilities and Respective Capabilities (CBDR–RC)[44]. CEPP also note the letter signed by many prominent scientists[45] to be delivered to the Prime Minister before the COP26 summit in Glasgow which requests that "the COP26 parties must agree to stick to the remaining global carbon budget that gives us a 66% chance of limiting warming to 1.5°C"[46].

[43] https://www.bbc.co.uk/news/science-environment-58600723

[44] 'fair' meaning equitable under the Paris Agreement equity principles between developing and developed nations, known as Common but Differentiated Responsibilities and Respective Capabilities (CBDR–RC) https://www.oxfordclimatesociety.com/blog/what-you-need-to-know-aboutcommon-but-differentiated-responsibility

[45] Including Prof. Sir David King (Centre for Climate Repair, Cambridge University), Prof. EJ Milner-Gulland (Interdisciplinary Centre for Conservation Science, Oxford University) and Prof. Kevin Anderson (CUSP, Surrey University), longer list at https://www.ceebill.uk/cop26-cop15

[46] "The COP26 parties must agree to stick to the remaining global carbon budget that gives us a 66% chance of limiting warming to 1.5°C. This budget must be allocated fairly on a per capita basis and in keeping with the principle of common but differentiated responsibilities. Every country has to account for its entire carbon footprint – not just the emissions produced on its own soil, as is currently the case. All countries need individual carbon budgets, which add up to the total remaining global carbon budget.", see https://www.ceebill.uk/cop26-cop15 and https://www.ceebill.uk/three_cop_outcomes

91 For these reasons, CEPP suggest that appropriate indicative timeframes for EIA Reg short-term, medium-term and long-term periods as: 2025-2030, 6 years, *short-term* period covering progress to the NDC target; 2031-2035, 6 years, *medium-term* period covering progress to the 6CB 78% target; and 2036-2084, 48 years, *long-term* and the remainder of the 60-year appraisal period. This reflects short-term and medium-term national targets which are legally binding in the UK which both fall within the first 12 years of the 60-year appraisal period.

The proposed *short-term* period is also strongly relevant to the UK's international obligations as it ends at the end of this decade which has been identified by the United Nations and the Intergovernmental Panel on Climate Change as the critical decade in which to reduce carbon emissions globally by 50%. The proposed 48-year long-term period covers the crucial period from 2035 in which net carbon emissions first need to be eliminated completely, and then the post net-zero era in which carbon emissions need to be extracted from the atmosphere (ie: "net-negative").

92 A further note on terminology, CEPP refers here only to the period in which the emitting happens as short-term, or medium-term. We do not refer to the environmental effect from those periods as being short-term. Scientific clarity is required to understand why we make this semantic point. In physical science[47], and the greenhouse gas radiative forcing[48] effect, all emissions are long-term as carbon emissions from the short-term and medium-term period will remain in the atmosphere for centuries, unless sunk by natural or artificial carbon removal later. As shown in the footprint, the effects are devastating over the long-term, and to future people who are not present now represent their interests.

93 CEPP next review the Application for assessment in short-term, medium-term and long-term timeframes.

2.13 Issues with application in short-term, medium-term and long-term timeframes

The applicant has not attempted short-term, medium-term and long-term assessment of carbon emissions required by the EIA Regs (N_C-1)

94 The Sixth Carbon budget has only recently been legislated[49], after the applicant's submission. The applicant's carbon assessment [APP-051] now requires updating at Tables 14-9 and 14-10 to reflect this. CEPP also note ExQ1/GC.4.7(a) in this context. So far data has been provided for the 4CB and 5CB periods, and CEPP assume that the applicant will be shortly submitting data to the ExA for the 6CB.

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[47] https://twitter.com/KenCaldeira/status/1141849042189578240?s=20 Eminent climate scientist, Prof Ken Caldeira, Carnegie Institution for Science, Stanford lead author for the U.N.'s Intergovernmental Panel on Climate Change (IPCC) AR5 report: "*If you burn a lump of coal, the greenhouse effect from the carbon dioxide released from burning that coal will, over its lifetime in the atmosphere, heat the Earth about 100,000 times more than the thermal energy released from burning that coal.*"

[48] https://en.wikipedia.org/wiki/Radiative_forcing

[49] https://www.legislation.gov.uk/ukdsi/2021/9780348222616,

Assuming this, the "Some Date Available" period on Figure 1 covers from 2025-2037.

95 Assuming the applicant shortly provides the 6CB data in their current Chapter 14 format, the data for 2025-2037 is incomplete, and erroneous, in the following ways:

- no cumulative carbon assessment has been done;
- no local or regional assessment has been made, either on the scheme by itself, or cumulatively;
- not all carbon emission types have been calculated;
- the flawed study area chosen does not allow meaningful local assessment, or cumulative assessment, to be made.

96 When the modelling is re-aligned to use a rational study area, for example the proposed BBSNN study area, the numerical values will change. However, based on the flawed study area and limited carbon types, the proportion of assessed delta emissions for the scheme itself as presented by the applicant falls across timeframes as follows: 18.1% in 4CB; 4.9% in 5CB; and 76.9% in 6CB and 7CB to 16CB. So a large proportion of emissions in the Environmental Statement are after 2032 (and after 2037 when the 6CB data is presented).

97 Within the proposed long-term timeframe, "No data available" in Figure 1 covers the period from 2037 until 2049 when the UK must be net-zero by law, and the applicant provides no assessment of this period.

N_C-8: No assessment of the scheme has been made against the period 2038-2049[50] when the UK is required legally to achieve net-zero and over-all eliminate all carbon emissions. Significant additional emissions from road use in Norfolk are inherent in each year of this period from the applicant's data. Further additional emissions would accrue from cumulative assessment with other local schemes, which the applicant has not carried out. Together these have an, as yet not fully assessed, material impact on the ability of Government to meet its carbon reduction targets.

98 35 years of the 60-year appraisal period, 2050-2084, are in the "post net-zero era" and the Environmental statement shows that significant levels of **additional emissions** for this period which will be necessarily net-negative due to the need to extract CO2 from the atmosphere to stabilise temperature rise. The applicant has provided no assessment of how the scheme will operate in a net-zero/net-negative world, despite this being the majority time-frame within the appraisal. As the scheme, in cumulation with other schemes (locally, regionally and nationally) will

[50] CEPP assume that the applicant will shortly provide their assessment against the sixth carbon budget (6CB, 2033-2037)

be net-positive in this period, then the applicant must provide a mitigation, carbon sequestration strategy at the minimum. The applicant appears not to have considered this issue, nor to have tried to answer it.

N_C-9: No assessment of the scheme has been made against the 35-year period 2050-2084, post the 2050 net-zero target. Irrespective of UK legislative dates, scientists are clear that a net-negative world, with massive extraction of CO2 is required urgently (ie actually before 2050[51]). Yet significant additional emissions from road use in Norfolk are inherent in each year of the 2050-2084 period in the Environmental Statement making the scheme net-positive. Further additional net-positive emissions would accrue from cumulative assessment with other local schemes, which the applicant has not carried out. Together these have an, as yet not fully assessed, material impact on the ability of the UK to its obligations under the global endeavour to stabilise global heating at 1.5ºC enshrined in the Paris agreement.

99 This is of great concern, as the recent IPCC report (AR6, WG1) makes it incontrovertibly clear[52] that global heating of 1.5ºC will be *very likely,* or *likely,* breached by 2040. Whilst the Climate Crisis Advisory Group (CCAG)[53], a group of prominent climate scientists, commenting on the IPCC AR6 say "*it is likely that the increase in global average temperature for a month and quite possibly a year will first breach 1.5°C prior to 2030 and 2°C before mid-century*" and advise moving globally to a net-negative society as soon as possible, and well before 2050.

[51] Report from Climate Crisis Advisory Group, established and chaired by **Sir David King, former UK Government's Chief Scientific Advisor from 2000 to 2007**, August 2021, commentary of the IPCC 6th Assessment report "The final warning bell", https://static1.squarespace.com/static/60ccae658553d102459d11ed/t/61275c5abba2ec034eefb534/1629969503477/CCAG+The+Final+Warning+Bell.pdf :

> "***The CCAG is clear that the current shift in global emissions is not sufficient to avoid global disaster, and there is no 'remaining Carbon Budget'.*** *If proper account is taken of all greenhouse gases, and their CO2 equivalence, the 450ppm" threshold has already passed, contradicting the widespread notion of a 'carbon budget' that could still be spent whilst remaining below 1.5°C temperature rise.*"

[52] IPCC "Climate Change 2021, The Physical Science Basis, Summary for Policymakers, Working Group I contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change", "https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM.pdf, Section B.1 "*Global t of 1.5°C and 2°C will be exceeded during the 21st century unless deep reductions in CO2 and other greenhouse gas emissions occur in the coming decades.*", Section B.1.3 "*Under the five illustrative scenarios, in the near term (2021-2040), the 1.5°C global warming level is* ***very likely*** *to be exceeded under the very high GHG emissions scenario (SSP5-8.5),* ***likely*** *to be exceeded under the intermediate and high GHG emissions scenarios (SSP2-4.5 and SSP3-7.0), more likely than not to be exceeded under the low GHG emissions scenario (SSP1-2.6) and more likely than not to be reached under the very low GHG emissions scenario (SSP1-1.9)*" Footnote 4 indicates that *very likely* and *likely* are technical terms defined as follows "The following terms have been used to indicate the assessed likelihood of an outcome or a result: virtually certain 99–100% probability, very likely 90–100%, likely 66–100%, about as likely as not 33–66%, unlikely 0–33%, very unlikely 0–10%, exceptionally unlikely 0–1%."

[53] CCAG report, August 2021, "The final warning bell", https://static1.squarespace.com/static/60ccae658553d102459d11ed/t/61275c5abba2ec034eefb534/1629969503477/CCAG+The+Final+Warning+Bell.pdf

3 COMBINED ASSESSMENT FRAMEWORK FOR CUMULATIVE IMPACTS, SPATIAL SCALE, TYPES OF CARBON AND TIME-FRAMES

100 In the previous section, CEPP have identified considerable information that is lacking from the Environmental Statement so it fails compliance with the EIA Regs, NPS NN, DMRB and the HE Licence. This and the following section drill into these areas in more detail to identify missing data that is required for the Application to comply. To enable this, Table 2 brings together the requirements from the previous sections into one table, and also shows the available published data for each emission type.

101 A ✓ means data exists, not that its calculation is necessarily correct, or agreed with, or endorsed by CEPP. The relevant traffic models have not been made available, or even described in an accessible or transparent way, to the public. They are therefore closed data systems. As a former software engineer and scientific modeller, CEPP would require detailed information about the traffic model internals to have any confidence in the very-high level data values that are presented, from this closed system, in Chapter 14 of the Environmental Assessment. The non-disclosure of the relevant information, despite it pertaining to the biggest emergency that we face as a society, precludes independent review and scrutiny.

102 UK is signatory to the Aarhus Convention[54] which at Article 4 grants the public rights regarding access to information, public participation and access to justice, in governmental decision-making processes on matters concerning the local, national and transboundary environment, and at Article 6 highlights the requirement for early public involvement. The applicant is in contravention of the terms of the Aarhus Convention.

N_C-10: The lack of transparent information and data about the traffic models on which operational carbon emissions are based does not allow any independent review and scrutiny of the high-level figures published in the Environmental Statement. The applicant is in contravention of the terms of the Aarhus Convention.

103 A ✖ means that as far as CEPP know published data is not available.

104 The ?✓for the national cumulative data means that data may be available for some of the schemes in each of the RIS2 and LLM categories, but the ☒ for RIS2 indicates its calculation is currently contested in the Courts[55] and by experts[56]. Following a judgement in the lower court, the claimant in this case, Transport

[54] https://unece.org/DAM/env/pp/documents/cep43e.pdf

[55] https://transportactionnetwork.org.uk/ris2-legal-case/ - Transport Action Network Limited v The Secretary of State for Transport (And Highways England Company Limited), CO/2003/2020

[56] Witness statement, Prof Jillian Anable, for case CO/2003/2020, https://transportactionnetwork.org.uk/wp-content/uploads/2021/03/Witness-statement-of-Jill-Anable-23-10-2020-16-03-2021_Redacted.pdf

Action Network, released a press statement on the day of the judgement[57] stating that they have sought permission to appeal the ruling.

105 The ? × for national cumulative data means that largely this data is not known, and cumulative total across the sum of relevant schemes has not been published by any authorities.

106 The ×↑↑ indicates that construction and land use change carbon emissions are expected to be high on the NWL scheme: <CONST> emissions due to a 700m viaduct within the scheme requiring a large quantum of cement; < CONST-LUC> due to significant areas of woodlands, veteran and ancient trees, and carbon-rich soil that would be disrupted; and <CONST-SEQ> due to loss of significant areas of woodlands, veteran and ancient trees, and carbon-rich soil sinks that currently provide ecological services as carbon sinks. Data on this is required for the cumulative assessment to be completed for this scheme, but NCC have made no information available on these impacts yet.

CEPP note that the EIA Scoping Opinion for the A47 North Tuddenham to Easton scheme [TR0100038/APP-136] by the Planning Inspectorate on behalf of the SoS states on Combined and Cumulative Effects (Scoping Report section 15) at ID 4.11.4 (in the "Aspect Based Scoping Tables" section 4):

> "***The cumulative assessment should include the Norwich [Western – sic] Link Road*** *which is proposed to be built in proximity to the Proposed Development and may have an overlapping construction period with the Proposed Development.*" *(our emphasis)*

The applicant has not provided this data in the A47NTE Environmental Statement. This is required to meet the EIA Regs, and PINS Scoping Opinion on it. Provision of this data requires urgent resolution between NCC and the applicant.

N_C-11: The applicant has ignored PINS advice in the EIA Scoping opinion on the A47NTE scheme to do cumulative assessment with the Norwich Western link road (NWL) on the A47NTE schemes.

107 The "Temporal" column indicates which carbon budget period the emissions fall.

108 In Table 2, CEPP have broken down some emission types for assessment, over the next three published UK carbon budgets (4CB, 5CB and 6CB), and their 60-year assessment period. This corresponds to the applicant's submission for <CONST>, <OP> and <OP-USE> types.

[57] https://transportactionnetwork.org.uk/wp-content/uploads/Court-protects-stability-of-roads-programme-over-climate-RIS2-decision-press-release.pdf

		This scheme	BBSNN area cumulative				National cumulative	
Type and accounting period	Temporal	A47THI	A47BNB	A47NTE	NWL	LSB	RIS2	LLM
<CONST> [4CB]	*4CB*	✓	✓	✓	✗↑↑	✗	?✗	?✗
< CONST-LUC> [4CB]	*4CB*	✗	✗	✗	✗↑↑	✗	?✗	?✗
<CONST-SEQ> [4CB]	*4CB*	✗	✗	✗	✗↑↑	✗	?✗	?✗
NB: Schemes beyond 4CB construction excluded								
<OP>[4CB]	*4CB*	✓	✓	✓	✗	✗	?✗	?✗
<OP>[5CB]	*5CB*	✓	✓	✓	✗	✗	?✗	?✗
<OP>[6CB]	*6CB*	✓✦	✓✦	✓✦	✗	✗	?✗	?✗
<OP>[60YR]	*Long-term*	✓	✓	✓	✗	✗	?✗	?✗
<OP-USE> [4CB]	*4CB*	✓	✓	✓	✓	✓	?✓☒	?✓
<OP-USE> [5CB]	*5CB*	✓	✓	✓	✓	✓	?✓☒	?✓
<OP-USE> [6CB]	*6CB*	✓✦	✓✦	✓✦	✗	✓	?✓☒	?✓
<OP-USE>[60YR]	*Long-term*	✓	✓	✓	✓	✓	?✓☒	?✓
<OP-SEQ>[60YR]	*Long-term*	✗	✗	✗	✗	✗	?✗	?✗
<EOL>	-	✗	✗	✗	✗	✗	?✗	?✗

Table 2

✦ CEPP assume 6CB data will be provided during the respective examination periods for these schemes if it hasn't already

109 Table 2 shows that the required data is very incomplete. For local cumulative assessment especially, reliable construction and land-use change emissions for the Norwich Western link scheme, as high-lighted above, are missing.

110 For national cumulative assessment, much of the data is missing or contested, suggesting that a national cumulative assessment may not be possible within the timeframe of the Examination. If the data is not available to the Examination, then a conclusion may not be possible, on whether the A47THI, or the RIS1/2 programmes of which it is part, are consistent with the legal and policy requirements and obligations (eg: the 4CB, 5CB and 6CB Carbon budgets, the 2030 national target of 68% reduction in the UK National Determined Contribution under the Paris Agreement[58], and the 6CB 2035 78% reduction by 2035[59] target). The Secretary of State may be required to make an assessment for the DCO decision.

111 CEPP note a recent DCO application where the Secretary of State has required further information on cumulative effects of the development on climate, including greenhouse gas emissions, "*which should be set in light of the requirements set out in the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 and in light of paragraphs 5.17 and 5.18 of the National Policy Statement for*

[58] 12th December 2020, https://www.gov.uk/government/publications/the-uks-nationally-determined-contribution-communication-to-the-unfccc

[59] https://www.legislation.gov.uk/ukdsi/2021/9780348222616

National Networks". This is for the A38 Derby Junctions (see letter of August 2nd, 2021, in Appendix D) and indicates that the Secretary of State is requiring cumulative assessment of carbon emissions, in line with the NPS NN and EIA Regs, in order to be able to decide DCOs for road schemes. The scheme is now out to consultation on this issue by the SoS.

N_C-12: In a recent DCO application, the SoS is requiring cumulative carbon assessment in line with the NPS NN and EIA Regs. This implies that the Environmental Statement for the scheme, which has no cumulative carbon assessment, is inadequate under the EIA Regs, and the ExA should consider this under EIA Reg 20.

4 PRACTICAL ISSUES: CARBON IMPACTS ASSESSMENT OF THE PROJECT

112 The carbon assessment architecture described in the previous section has several practical requirements, especially for the calculation of vehicle emissions that derive from transport models, in order for a coherent carbon assessment to be made which are now described.

4.1 Study areas for vehicle use emissions in cumulative assessment

113 To sum the vehicle emissions (<OP-USE>) to determine an overall cumulative figure for this emission type, the modelling study areas must be the same. Currently, they are not. The only solution is start with the same study for all schemes. CEPP have already discussed this above and proposed that the BBSNN area which provides a common study area which is also contiguous with local authority areas for which common carbon budgets and targets may be provided.

4.2 Model baseline years for vehicle use emissions

114 CEPP note that ExQ1/CC.1.1(i) requests "*Is there any more detail or reasoning on likely climate change effects to be submitted taking into account other planned schemes and any changes that may have occurred?*" and ExQ1/CC.1.1(iv) to Interested Parties notes "*Do interested parties have any further comments on the information presently being considered with respect to climate change matters. If so, clarify if you have not done so already.*". We request that the ExA takes this section on the use of multiple model baseline years, and on the loss of significant traffic from the NWL model, as a response to this ExQ1 questions.

115 The Norwich Area Transport Strategy (NATS) models are used both by the applicant for the A47 schemes and by the County Council for their schemes. Despite, apparent standardisation on overall choice of NATS, the models are run from different baseline years. NCC has chosen to adopt a different NATS model (base year 2019 – "NATS-2019") for its NWL scheme whilst Highways England use an earlier model (base year 2015 – "NATS-2015") for the A47 schemes.

116 This raises an initial concern that the applicant is using a NATS-2015 baseline when the local transport authority, NCC, have made a preference for NATS-2019.

117 However, NCC have not adequately demonstrated that the NATS-2019 model is a closer reflection of real and predicted traffic patterns. This is shown by a CEPP analysis of data from NCC for the NWL modelled with an earlier study with NATS-2015 (for a Strategic Outline Business Case, SOBC in 2019), and their current Outline Business Case (OBC in 2021) study at NATS-2019, as below.

118 Table 3 shows a comparison of high-level vehicle km data from the studies. The ticks ✓ indicate that the A47NTE scheme is included within all models of the NWL shown as already existing.

	NWL/SOBC (2019)		NWL/OBC (2021)	
	NATS-2015		NATS-2019	
NWL	Do Minimum	Do Something	Do Minimum	Do Something
A47NTE	✓	✓	✓	✓
Vehicle km	SOBC-DM	SOBC-DS	OBC-DM	OBC-DS
2025 km	*5950805*[60]	*5707558*[61]	*4136000*[62]	*4087000*[63]
2040 km	*6788116*[64]	*6853722*[65]	*4904000*[66]	*4767000*[67]
2025 OBC/SOBC Vkm			-30.50%	-28.39%
2040 OBC/SOBC Vkm			-27.76%	-30.45%
2025 DS-DM Vkm		-243247		-49000
2040 DS-DM Vkm		65606		-137000

Table 3

CEPP observe two key effects:

[60] Table 5.29, NWL SOBC, OSR, PDF page 112, https://bit.ly/2019Jul15_NWL_OSR

[61] Table 5.29, NWL SOBC, OSR, PDF page 112, https://bit.ly/2019Jul15_NWL_OSR

[62] NWL OBC, Environmental Impact Report, 4.7.3, p33, https://www.norfolk.gov.uk/-/media/norfolk/downloads/roads-and-transport/nwl/environmental-impact-report.pdf

[63] NWL OBC, Environmental Impact Report, 4.7.3, p33, https://www.norfolk.gov.uk/-/media/norfolk/downloads/roads-and-transport/nwl/environmental-impact-report.pdf

[64] Table 5.29, SOBC, OSR, PDF page 112, https://bit.ly/2019Jul15_NWL_OSR

[65] Table 5.29, SOBC, OSR, PDF page 112, https://bit.ly/2019Jul15_NWL_OSR

[66] OBC, Environmental Impact Report, 4.7.3, p33, https://www.norfolk.gov.uk/-/media/norfolk/downloads/roads-and-transport/nwl/environmental-impact-report.pdf

[67] OBC, Environmental Impact Report, 4.7.3, p33, https://www.norfolk.gov.uk/-/media/norfolk/downloads/roads-and-transport/nwl/environmental-impact-report.pdf

119 Blue shaded area: There is a reduction of around 30% of vehicle km in the modelling between the SOBC and OBC modelling, on all scenarios (ie: DM/DS, 2025/2040).

120 Orange shaded area: In the SOBC model, introduction of the NWL reduces overall vehicle km at the opening year. Traffic then expands over time faster with the NWL, so that by the forecast year, Vkm are relatively greater with the NWL. **By contrast,** in the OBC model, after an initial reduction of traffic with the NWL, traffic expands less slowly with the NWL so that by the forecast year, there is a relatively greater reduction in Vkm with the NWL.

121 An explanation is required from NCC as to why these significant differences are observed between the models.

- **Simply, how have 30% of vehicle km been lost between the modelling using different base years?**

- **And how has the relative traffic growth been switched from year-on-year increasing with an NWL in the SOBC model run to year-on-year decreasing with an NWL in the OBC model run?**

122 As far as the A47THI, the applicant needs to provide a rationale for continuing with an older traffic model when NCC has upgraded. For the A47NTE given that the A47NTE and NWL are physically connected, and that PINS previously requested that cumulative environmental assessment is done for A47NTE including the NWL**, the applicant must provide new traffic modelling that allows cumulative environmental assessment which is consistent between both schemes.**

N_C-13: PINS requested that cumulative environmental assessment is done for A47NTE including the NWL, but traffic modelling for the two schemes uses different base years, and there is a major loss of traffic from one model which remains unexplained. The applicant must provide new traffic modelling that allows cumulative environmental assessment, which is consistent between both schemes, and corrects errors.

4.3 What needs to be done to facilitate cumulative assessment of vehicle emissions (<OP-USE>)

123 In summary, the precursor for assessing cumulative operational carbon emissions across these schemes is a coherent and consistent modelling environment. To achieve this, it is necessary:

A. To choose an appropriate "study area" which covers all the schemes. A rational approach would be to choose BBSNN area.

B. To set a common base year for the model version, agreed between Highways England and NCC.

C. To develop a consistent set of model assumptions to apply. CEPP cannot say further what these should be, as the traffic models and their assumptions have not been made publicly available by the applicant.

D. To set the "Do Minimum" (DM) model run at the correct current environmental baseline in which none of these schemes exist. Currently, in 2021, as far as vehicle carbon emissions, none are emitted from any of the A47 schemes, nor from the NWL scheme or the LSB scheme. This is the correct baseline for DM modelling, and, as the current environmental baseline, aligns with the EIA Regs guidance, described above, on the choice of the baseline for an EIA.

5 LOCAL CUMULATIVE ASSESSMENT

124 Despite limited and faulty data, as described above, CEPP now provide an indicative local cumulative assessment.

	1	2	3	4	5			
	tCO2e		**No schemes**	**This scheme**	**BBSNN cumulative DS^{ACCU}**			
	Accounting type	Temporal	DM	DS^{A47THI}	A47BNB	A47NTE	NWL	LSB
A	<CONST> ^{4CB}	*4CB*	0	25,946[68]	25,765[69]	87,727[70]	✖↑↑	✖
B	< CONST-LUC> ^{4CB}	*4CB*	0	✖	✖	✖	✖↑↑	✖
C	<CONST-SEQ> ^{4CB}	*4CB*	0	✖	✖	✖	✖↑↑	✖
	NB: Schemes beyond 4CB construction excluded							
D	<OP>^{4CB}	*4CB*	0	54	66	39	✖	✖
E	<OP>^{5CB}	*5CB*	0	90	110	63	✖	✖
F	<OP>^{6CB}	*6CB*	0	90	110	63	✖	✖
G	<OP>^{60YR}	*Long-term*	0	1,080[71]	1,320[72]	780[73]	✖	✖
H	<OP-USE> ^{4CB}	*4CB*	2,868,208[74]	2,871,914✦	Requires modelling			
I	<OP-USE> $^{4CB\Delta}$	*4CB* Δ	0	3,706✱	Derivable H5-H3			
J	<OP-USE> ^{5CB}	*5CB*	4,673,125[75]	4,681,042✦	Requires modelling			
K	<OP-USE> $^{5CB\Delta}$	*5CB* Δ	0	7,917✱	Derivable J5-J3			
L	<OP-USE> ^{6CB}	*6CB*	✖	✖	Requires modelling			
M	<OP-USE> $^{6CB\Delta}$	*6CB* Δ	0	✖	Derivable L5-L3			
N	<OP-USE>^{60YR}	*Long-term*	5,3504,201[76]	53,640,926✦	Requires modelling			
O	<OP-USE>$^{60YR\Delta}$	*Long-term* Δ	0	136,725✱	Derivable N5-N3			
P	<OP-SEQ>	*Long-term*	0	✖	✖	✖	✖	✖
Q	<OP-SEQ>^{60YR}							
R	<EOL>	-	0	✖	✖	✖	✖	✖

Table 4

(✦Derived as <ES Chapter 14 "Operation DS"> - <OP>; ✱Derived as <OP-USE>^{DS} - <OP-USE>^{DM})

[68] Section 14.8.3, A47/A11 THICKTHORN JUNCTION, Environmental Statement Chapter 14 Climate [TR010037/APP/6.1, APP-051]

[69] Section 14.8.3, A47 BLOFIELD TO NORTH BURLINGHAM DUALLING, Environmental Statement Chapter 14 [TR010040/APP/6.1, REP2-002]

[70] Section 14.8.3, A47 NORTH TUDDENHAM TO EASTON DUALLING, Environmental Statement Chapter 14 Climate [TR010038/APP/6.1, APP-053]

[71] Section 14.8.4, A47/A11 THICKTHORN JUNCTION, Environmental Statement Chapter 14 Climate [TR010037/APP/6.1, APP-051],

[72] Section 14.8.4, A47 BLOFIELD TO NORTH BURLINGHAM DUALLING, Environmental Statement Chapter 14 [TR010040/APP/6.1, REP2-002]

[73] Section 14.8.4, A47 NORTH TUDDENHAM TO EASTON DUALLING, Environmental Statement Chapter 14 Climate [TR010038/APP/6.1, APP-053]

[74] Table 14-10, A47/A11 THICKTHORN JUNCTION, Environmental Statement Chapter 14 Climate [TR010037/APP/6.1, APP-051]

[75] Table 14-10, A47/A11 THICKTHORN JUNCTION, Environmental Statement Chapter 14 Climate [TR010037/APP/6.1, APP-051]

[76] Table 14-10, A47/A11 THICKTHORN JUNCTION, Environmental Statement Chapter 14 Climate [TR010037/APP/6.1, APP-051]

125 Table 4 shows the sequential cumulative assessment as laid out in "Requirements of the EIA regulations" above, and fills in figures where they are published. This indicates 3 model runs: Step ① Baseline ie "No schemes"; Step ② Impact of "this scheme"; and Step ③ Impact of cumulative schemes in the BBSNN Area. (Each of these 3 model runs would be done for the opening year and the design year etc.)

126 For the cumulative model run across BBSNN, the same 'rational' study area would be run, as for the scheme itself and the baseline, but with the inclusion of the further schemes into the modelling.

127 All three model runs also require the same NATS model (same base year) and the same configuration of it for a reliable cumulative impact assessment to be made.

5.1 Notes on Table 4

128 CEPP introduce the **Δ** symbol to indicate where differential, or *delta*, data is used as opposed to *absolute* carbon emissions.

129 It is important to note that the Δ data is very often small differences between exceptionally large base absolute emissions, and it is the very large quantum of absolute carbon emissions which are being generated year-on-year in the BBSNN area. The small differential, delta, figures reported, as in the 60-year vehicle carbon appraisal, masks the underlying massive erosion of any available carbon budgets by the continuing with a UK and Norfolk transport system which profiles a very high absolute carbon footprint (eg: transport is >40% of the total BEIS carbon footprint in the BBSNN area as we calculate in Table 5). For example, the 60-year absolute carbon emissions across the ARN (a smaller area than BBSNN) for the scheme are over 53 MtCO2e, but the delta figure reported is 136,725 tCO2e (0.25%). When comparing emissions to carbon budgets, it is preferrable to use absolute data, as the carbon budgets themselves are absolute, finite, and actually already used up[77].

N_C-14: Even before cumulative carbon emissions are considered, the applicant's carbon assessment does not reduce operational carbon emissions (from vehicle use) over the 60-year appraisal period, as is required to comply with the government's Transport Decarbonisation Plan (TDP[78]) for ambitious quantifiable carbon reductions

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[77] Report from Climate Crisis Advisory Group, established and chaired by **Sir David King, former UK Government's Chief Scientific Advisor from 2000 to 2007**, August 2021, commentary of the IPCC 6th Assessment report "The final warning bell", https://static1.squarespace.com/static/60ccae658553d102459d11ed/t/61275c5abba2ec034eefb534/1629969503477/CCAG+The+Final+Warning+Bell.pdf :

> "***The CCAG is clear that the current shift in global emissions is not sufficient to avoid global disaster, and there is no 'remaining Carbon Budget'.*** *If proper account is taken of all greenhouse gases, and their CO2 equivalence, the 450ppm" threshold has already passed, contradicting the widespread notion of a 'carbon budget' that could still be spent whilst remaining below 1.5°C temperature rise.*"

[78] "Decarbonising Transport: A Better, Greener Britain", Transport Decarbonisation Plan (TDP), July 2021, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1009448/decarbonising-transport-a-better-greener-britain.pdf, PDF Page 151:

in transport at the local level. It shows an addition of 136,725 tCO2e over the already very high baseline of over 53,000,000 tCO2e over the study area. In the critical 4th carbon budget that spans half of this decade in which United Nations have said we must halve emissions, an additional 29,706 tCO2e will be emitted from construction and operation of the scheme. Such additional carbon emissions without any mitigation plan are not acceptable in the Climate Emergency.

130 The orange shaded area reproduces the data from the Environmental Statement, or derived from the data, as indicated. However, it should be noted that this is effectively a 'placeholder' in the Table for correctly assessed data that does not exist yet: this would be new calculations of data made via the cumulative assessment architecture described. As stated above, this would require a rational study area – the current ARN used is not. When this is corrected, the scheme is run on a new study area, the figures will be different.

131 CEPP note that the applicant has not reported changes in traded and non-traded emissions which is data that should have been produced in the 60-year appraisal and is usually reported.

N_C-15: The applicant has not provided the traded and non-traded operational emissions, and should make the 60-year appraisal and the TAG GHG workbook available to the Examination.

5.2 "Three carbon totals" to assess against local budgets

132 CEPP identify three carbon totals to take forward to an indicative assessment against local budgets for the 4th carbon budget. These are:

A. The applicant's "Difference (DS-DM)" figure for the 4th Carbon budget from APP-051, Table 14-10 of 29,706 tCO2e (label in Table 5 below: "**A47THI**").

B. This figure with the <CONST> 4CB and <OP>4CB figures for A47BNB and A47NTE schemes added to A. This is *29,706* +25,765+87,727+66+39 = 143,303 tCO2e ("**A47THI_CUMU1**"). This figure is *far below even a minimum estimate* of the BBSNN cumulative total for 4CB but represents the sum of known data. The additional <OP-USE> vehicle emissions data is not known in the cumulative case, and nor are other carbon emissions for the NWL schemes, expected to be high (see below).

C. A more realistic guess-estimate of the BBSNN cumulative total for 4CB of 300,000 tCO2e ("**A47THI_CUMU2**"). This is a guess-estimate for a final

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*"Going forward, local transport plans (LTPs) will also need to set out how local areas will deliver **ambitious quantifiable carbon reductions in transport**, taking into account the differing transport requirements of different areas. This will need to be in line with carbon budgets and net zero."*

figure of additional emissions which must include the <CONST> [4CB], <CONST-LUC> [4CB], and <CONST-SEQ> [4CB] for the NWL and other emissions on the NWL and LSB. CEPP have already indicated that the construction, land-use, and sequestration-loss figures for the NWL are expected to be large.

133 As our comment above, the A, B and C figures above have been produced from modelling which has several issues including incoherent study areas, different NATS base years, different model configuration. By taking these figures forward as indicative values, CEPP do not endorse them, or accept them as correct.

134 Note that most of these carbon emissions figures, from construction emissions, can be expected to be accounted for in 1 year, 2025, although vehicle use, and operation emissions are also included for 2026 and 2027. The data, therefore, represents various estimates of an emissions spike which would predominantly occur in 2025.

135 The next section makes the assessment, first providing some background on carbon budgets.

6 ASSESSMENT AGAINST LOCAL CARBON BUDGETS

6.1 What is a carbon budget and how does it point to the truth?

136 A financial budget is defined as 'a plan to show how much money a person or organisation will earn and how much they will need or be able to spend'[79]. A carbon budget is similar, but instead of money, it sets out "the cumulative amount of carbon dioxide (CO2) emissions permitted over a period of time to keep within a certain temperature threshold[80]." **Unlike money, for carbon budgets, there are no overdraft facilities, nor national deficits, not quantitative easing mechanisms from central banks.** Once a CO2 budget is spent, it cannot be recovered, and the laws of physics determine the consequences for the planet and for humanity[81]. Carbon budgets reveal the truth of this situation.

137 The "laws of physics" can now provide increasingly accurate modelling of the global and local carbon budgets. In the last five years the reports of the Intergovernmental Panel on Climate Change (IPCC) have highlighted that our political institutions, businesses, and society have not started to respond to the

[79] https://dictionary.cambridge.org/dictionary/english/budget

[80] https://carbontracker.org/carbon-budgets-explained/

[81] Greenhouse gas removals (GGR) and negative emissions technologies may provide extremely costly, speculative, and unproven at scale methods which proxy for an "overdraft facility". Even if these work, they would be like paying back a loan at a huge interest rate. See, Kevin Anderson , John F. Broderick & Isak Stoddard (2020): A factor of two: how the mitigation plans of 'climate progressive' nations fall far short of Paris-compliant pathways, Climate Policy, DOI: 10.1080/14693062.2020.1728209, Appendix A "*However, there is wide recognition that the efficacy and global rollout of such technologies are highly speculative, with a non-trivial risk of failing to deliver at, or even approaching, the scales typically assumed in the models. … Whilst the authors of this paper are supportive of funding further research, development and, potentially, deployment of NETs, the assumption that they will significantly extend the carbon budgets is a serious moral hazard (Anderson & Peters, 2016).*"

climate emergency with the urgency required. Simply put we are living outside of our budget.

138 Collectively, we now know that this decade is the most crucial decade for reversing 200 years of carbon polluting activities, reversing the rash, profligate spending of our collective carbon budget, and building a new future based on a non-polluting global society. It is crucial that we address this emergency using every tool possible, and this includes carbon budgets and their capacity to point to the truth of where we are not doing enough, **and what we may be unable to do or build consequently.**

139 The Paris Agreement 2015 is a legally binding international treaty on climate change. It was adopted by 196 Parties at COP 21 in Paris, on 12 December 2015 and entered into force on 4 November 2016[82]. The UK is a signatory to the agreement. Its goal is to limit global heating to well below 2ºC degrees, preferably to 1.5 ºC, compared to pre-industrial levels.

140 Scientists have established models that calculate how much more carbon dioxide[83] may be emitted globally into the atmosphere before breaching various temperatures of global overheating – eg: how many billions of tonnes (or Gigatonnes, GtCO2) before breaching 1.5 degrees, how many billions of tonnes before breaching 2.0 degrees etc. These are referred to as carbon budgets, and CEPP have previous explained them above as a bank account analogy but with no overdraft, deficit, or quantitative easing facilities available.

141 **It is important to understand the difference between science-based carbon budgets and political targets like the net-zero target in the UK**. Net-zero by 2050 can be achieved by many different paths or trajectories of annual carbon emissions, and the carbon emitted is basically the area under the curve. Annual emissions cuts may be backloaded or front loaded. Backloaded, or less steeply front-loaded, cuts will have a much greater quantum of carbon emissions emitted under the curve, and therefore also use much more of the carbon budget. Science-based carbon budgets by contrast aim to define a trajectory which meet a criterion – in the examples here, the path necessary to meet the temperature target in the Paris agreement. The UK Committee on Climate Change publish paths and budgets, but their ability to meet the criteria of the Paris temperature target has not been demonstrated scientifically – although CCC may claim, and genuinely, endeavour to meet that criterion. In fact, the CCC budgets, and assumptions, and hence UK carbon budgets, are increasingly challenged by scientists, see below.

[82] https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement

[83] In fact, the models assess a variety of Greenhouse Gases, but for simplicity we restrict this document to CO2 (carbon dioxide) carbon budgets

142 It is further worth noting that a recent report[84] from Climate Crisis Advisory Group (CCAG) has recently said that there is no remaining carbon budget and policy should be directed towards net-negative carbon emissions as soon as possible. The report says:

> *"**The CCAG is clear that the current shift in global emissions is not sufficient to avoid global disaster, and there is no 'remaining Carbon Budget'**. If proper account is taken of all greenhouse gases, and their CO2 equivalence, the 450ppm threshold has already passed, contradicting the widespread notion of a 'carbon budget' that could still be spent whilst remaining below 1.5°C temperature rise."*

The CCAG was founded, and is chaired, by the eminent scientist Professor Sir King, Fellow the Royal Society (FRS), and former UK Government's Chief Scientific Advisor from 2000 to 2007. CCAG comprises prominent climate scientists. It was created in response to the Climate Emergency this year, as a new advisory group to help inform the public, governments and financial institutions providing them with the most comprehensive science, and more crucially, guiding them towards action for climate repair. CCAG's important scientific commentary on the climate crisis can be made by their small group on a faster cycle than the IPCC.

6.2 Science-based carbon budget assessment of compliance against UK obligations under the Paris agreement

143 To understand what emission reductions should be made in UK local authority areas to make a 'fair' contribution[85] towards the Paris Climate Change Agreement, scientists at Manchester Tyndall centre have taken IPCC global carbon budgets and produced the so-called SCATTER budgets for UK local authorities. SCATTER stands for Setting City Area Targets and Trajectories for Emissions Reduction project and was funded by the Department for Business Energy and Industrial Strategy (BEIS). It developed a methodology for Local Authorities to set carbon emissions targets that are consistent with United Nations Paris Climate Agreement[86]. The Tyndall budget for the BBSNN area is given in Appendix F.

144 These budgets translate the "well below 2°C and pursuing 1.5°C" global temperature target, and the equity principles enshrined in the United Nations Paris

[84] CCAG report, August 2021, "The final warning bell", https://static1.squarespace.com/static/60ccae658553d102459d11ed/t/61275c5abba2ec034eefb534/1629969503477/CCAG+The+Final+Warning+Bell.pdf

[85] 'fair' meaning equitable under the Paris Agreement equity principles between developing and developed nations, known as Common but Differentiated Responsibilities and Respective Capabilities (CBDR–RC) https://www.oxfordclimatesociety.com/blog/what-you-need-to-know-aboutcommon-but-differentiated-responsibility

[86] https://carbonbudget.manchester.ac.uk/about/

Agreement, to a national UK carbon budget which is then split between sub-national areas using different allocation regimes.

145 The assumptions for this transformation from global to local budgets in given in two sources:

a) a 2020 Climate Policy paper[87], widely referred to as the "Factor of Two" paper

b) the "full" report from the Tyndall Carbon Budget Tool for UK Local Authorities[88], widely referred to SCATTER budgets

These two sources are authored by the same research group and are internally consistent. The "Factor of Two" paper is a landmark in 2020 in appraising national carbon budgets.

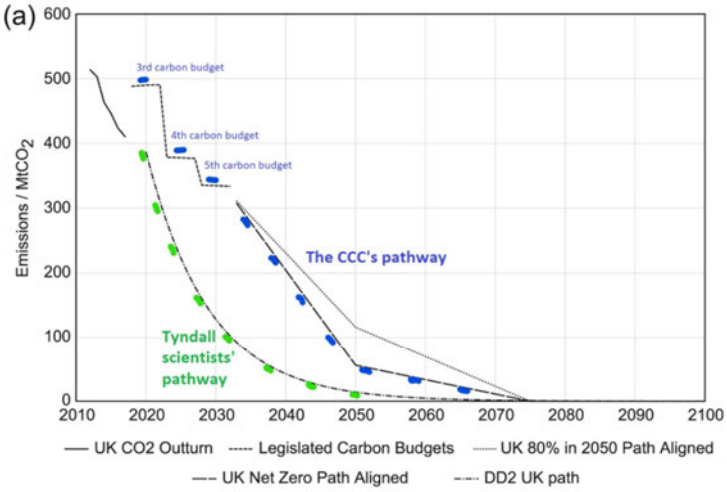
6.3 Relevant carbon budgets/targets derivable from the Climate Change Committee

146 The Climate Change Committee (CCC) has recently published its sixth Carbon Budget (6CB) report. Its headline recommendation is for the UK to deliver a reduction in net annual emissions of 78%, against a 1990 baseline, by 2035. Previous UK ambition was targeting an 80% reduction against 1990 figures by 2050 under the original Climate Change Act, so this represents a halving of the time to get to around 80% emission cuts (against 1990 baseline) from 2020.

147 However, the CCC do not show anywhere how the 6th Carbon Budget (6CB) can be derived directly by a stepwise downscaling from a scientifically established global carbon budget (in contrast to the Manchester Tyndall references above which do demonstrate this). The derivation of the 6CB is focussed more on meeting the national, politically set, net zero-target of 2050 via an array of policy interventions rather than fitting to a specific carbon budget (relating to the back-loading and front-loading point above).

[87] Kevin Anderson, John F. Broderick & Isak Stoddard (2020): A factor of two: how the mitigation plans of 'climate progressive' nations fall far short of Paris-compliant pathways, Climate Policy, DOI: 10.1080/14693062.2020.1728209

[88] https://carbonbudget.manchester.ac.uk/reports/



This graph is from the Factor of Two paper by climate scientists at the Tyndall centre. People & Nature added the highlights. The pathway for UK carbon emissions highlighted in green is one that, the scientists argue, is compatible with the Paris agreement. The pathway highlighted in blue is one they have plotted to reflect the CCC's emissions reductions proposals: it implies cutting emissions at about half the pace that the scientists' pathway implies

Figure 2

148 Generally, the difference between the Tyndall and CCC carbon budgets is that the Tyndall ones are 2 – 3 times smaller (and tighter). As shown above, the Tyndall budgets have rapid decarbonisation from 2020 in order to meet the overall budget (area under the curve). The Tyndall trajectory is derived from the IPCC budget for 1.7°C, supporting the point from CCAG that there is no remaining budget for 1.5°C.

149 The graph above is taken from[89] and illustrates the difference between CCC and Tyndall carbon budgets. In simple terms, the carbon budget is the area under the annual emissions trajectory curve. Issues such the shape of the curve, front-loading or back-loading emissions reductions can produce vastly different curves and corresponding *areas under the curve*. So it is possible for the UK to meet net-zero at 2050 via vastly different overall carbon budgets. Therefore "net-zero", in itself, is not a good measure of compliance with the Paris agreement temperature target whereas a science-based carbon budget is.

150 Further, the details of the carbon accounting differ, so it is non-trivial to get a like-for-like comparison between the science-based carbon budget from Manchester Tyndall and the Climate Change Committee budgets. For further information, see footnotes[90].

[89] https://peopleandnature.wordpress.com/2021/07/08/how-the-uk-climate-change-committee-steals-from-the-carbon-budget/

[90] "How the UK Climate Change Committee steals from the carbon budget", blog post by Professor Peter Somerville, 8th July 2021, https://peopleandnature.wordpress.com/2021/07/08/how-the-uk-climate-change-committee-steals-from-the-carbon-budget/ and "Calculating a fair

6.4 Short-term assessment against local carbon budgets

151 CEPP now assess three carbon emissions totals **- "A47THI", "A47THI_CUMU1", "A47THI_CUMU2"** derived above - against three carbon budgets from historic BEIS data, the published 4th carbon budget, and science-based budgets from the Tyndall Centre.

tCO2e		***A47THI - 29,706 tCO2e***	***A47THI_CUMU1 - 143,303 tCO2e***	***A47THI_CUMU2 - 300,000 tCO2e***
2019 BEIS ANNUAL	BBSNN area	BBSNN area	BBSNN area	BBSNN area
Transport total 2019 ANNUAL	1,157,866	2.57%	12.38%	25.91%
LA area 2019	2,885,555			
% Transport of Total	40.13%			
4th Carbon Budget				
Transport (2023-2027) 5-YEAR	6,503,733	0.46%	2.20%	4.61%
Transport (2023-2027) ANNUAL	1,300,747	2.28%	11.02%	23.06%
LA Area (2023-2027) by population ANNUAL	3,241,631			
% UK Population	0.83%			
Carbon Budget ANNUAL	390,000,000			
Tyndall SCATTER budget				
Transport (2023-2027) 5-YEAR	2,371,464	1.25%	6.04%	12.65%
Transport (2023-2027) ANNUAL	474,293	6.26%	30.21%	63.25%
LA Area (2023-2027) ANNUAL	1,182,000			

Table 5

152 Table 5 gives the assessment. The left-hand side of the table displays the budgets.

153 The latest BEIS data for local authorities is given[91], corresponding the reported emissions in 2019 for BBSNN (Broadland, Breckland, South Norfolk and Norwich emissions summed). The transport total is separated out, and its percentage of the total is also given. Assessment against the "Transport total 2019 ANNUAL" figure for each area is then as assessment against the actual reported data for 2019 of the "three carbon totals" for 4th carbon budget which each include the emissions spike that is expected to occur in 2025 (with some in 2026 and 2027).

carbon budget for the UK". blog post by Professor Peter Somerville, 8th July 2021, https://peopleandnature.wordpress.com/2021/07/08/calculating-a-fair-carbon-budget-for-the-uk/

[91] https://data.gov.uk/dataset/723c243d-2f1a-4d27-8b61-cdb93e5b10ff/emissions-of-carbon-dioxide-for-local-authority-areas, 2005-2019 data, downloaded June 25th, 2021

154 The data for the "4th Carbon budget" takes the annual legislated carbon budget for the 4th Carbon budget and distributes it on the basis of % of UK population[92]. Annual and 5-year transport budgets are calculated on this basis for the BBSNN area (assuming the BBSNN transport sector % already calculated from the 2019 BEIS data).

155 The data for the "Tyndall SCATTER budget" takes the annual budgets from the Tyndall local carbon budgets website[93] for BBSNN (see Appendix F), and calculates the Tyndall budget corresponding to the 5-year 4CB budget. This is then apportioned into a 5-year and average annual transport budget for the 4CB period, using the 2019 transport shares of the overall BEIS budget.

156 No evidence is provided in the application that the underlying transport emissions in the BBSNN area will reduce over the 4th carbon budget, and from 2019 to the 4th carbon budget, so CEPP assume **the "three carbon totals" are <u>additional emissions</u> on top of existing trends in Norfolk transport emissions** (see below).

6.5 Discussion of short-term local carbon budget assessment

157 The assessment results are on the right-hand side of Table 5. The percentages on the right-hand side of the table are the proportion of the relevant budget that the particular carbon footprint "carbon total" for the scheme would use. So, for example, the applicant's non-cumulative assessment figure of 29,706 tCO2e for the 4th carbon budget ("**A47THI**") corresponds to 2.57% of the BBSNN total transport footprint in 2019.

158 In the year of construction and initial use (2025), the scheme alone ("**A47THI**"), based on the applicant's non-cumulative assessment figure accounts for 2.3% - 6.3% of BBSNN's transport budget across the range of carbon budget benchmarks (2.28%, 4th carbon budget; 2.57% BEIS 2019 data; 6.26% Tyndall Centre science-based budget).

159 When a realistic <u>indicative cumulative</u> assessment ("**A47THI_CUMU2**") is made in-combination with other schemes planned, then scheme in-combination accounts for 23.1% - 63.2% of the 2025 transport budget for the BBSNN area.

6.6 Discussion of long-term local carbon budget assessment

160 The applicant has not published data beyond the 5th carbon budget period (2028-2032), nor the 60-year appraisal and TAG GHG workbook. However, Table 14-10

[92] Using mid-2019 ONS population data at https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/datasets/populationestimatesforukenglandandwalesscotlandandnorthernireland and the population data reported each local authority for mid-2019 in https://data.gov.uk/dataset/723c243d-2f1a-4d27-8b61-cdb93e5b10ff/emissions-of-carbon-dioxide-for-local-authority-areas,

[93] https://carbonbudget.manchester.ac.uk/reports/

indicates that 46,088,906 tCO2e are modelled to be emitted in the ARN area (a much smaller area that the BBSNN area) for the 52 years 2033-2084 if the scheme is built (ie DS).

161 Based on this, and the 5th carbon budget figures in Table 14-10, approximately 15,915,849 tCO2e may be emitted in the 17year period 2033-2049, and 30,173,057 tCO2e in the 35-year period 2050-2084, corresponding to the post net-zero era, as on Figure 1. To align with 5-year budget periods the 15-year period 2033-2047 corresponds to c. 14,043,396 tCO2e.

162 The Tyndall Centre budgets for the entire BBSNN area, across all energy sectors, are 2,700,000 tCO2e for 2033-2047, and 3,000,000 tCO2 for 2033-2100, the Tyndall budget for 2048-2100 being 300,000 tCO2.

163 Ignoring the fact that the ARN is much smaller that BBSNN area, which includes a significant proportion of traffic on the A11, and makes the comparison optimistic (ie smaller rations than if even equivalent areas were compared), the DS traffic carbon emissions associated with the A47THI scheme assessed in isolation use c.5.2 times the entire Tyndall budget for the 2033-2047 period in the 2033-2049 years, and c.100.6 times the budget for the 35 years 2050-2084 post net-zero era. This indicative calculation is summarised in Table 6.

tCO2e	Do Something (DS)	Tyndall Budget	Ratio: DS/Tyndall
2033-2047	14,043,396	2,700,000	5.2
2050-2084	30,173,057	300,000	100.6

Table 6

164 Note that the CCC and Government carbon budget for the 2050-2084 period is effectively zero, although as CEPP have said above the period needs to be net-negative, based on the latest statements from scientists.

6.7 Discussion of local carbon budget assessment

165 This local assessment for the 4th carbon budget needs to be considered against the following:

A. There is already a significant policy gap identified by the Climate Change Committee in meeting the 4th carbon budget, so any new emissions **add to the shortfall** in meeting the UK legally binding net-zero commitment for 2050.

B. The key decade for reducing emissions is 2020-2030, including the vital 4CB period, in the UK. As the UN has continually warned:

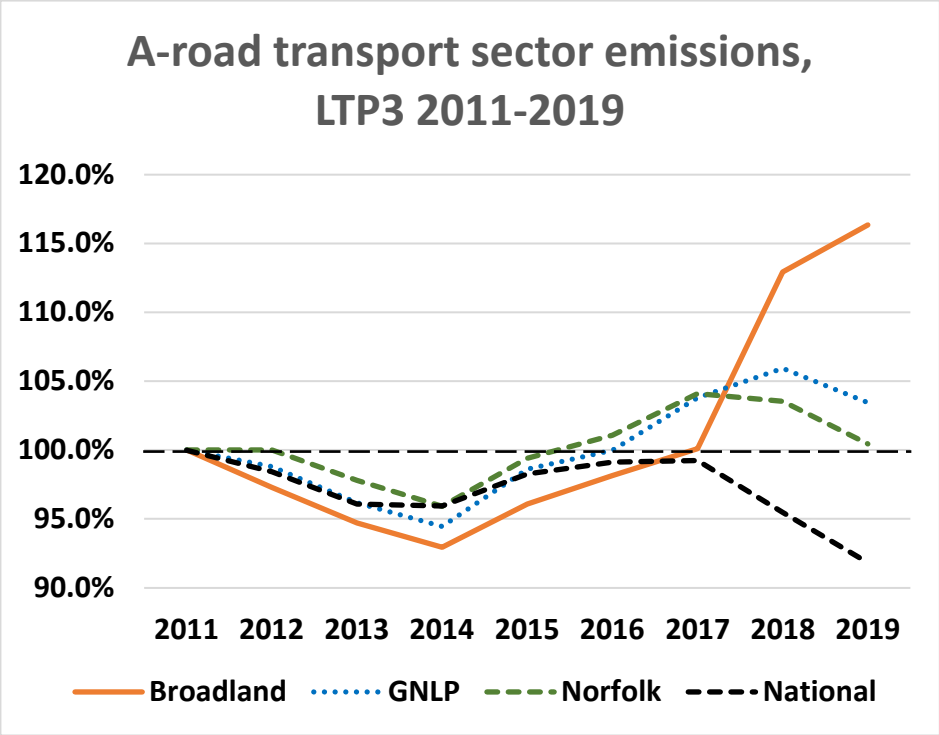
> "*As the scientific community has told us again and again, we need to cut greenhouse emissions [globally] by 45% by 2030*"
> Antonio Guterres, UN General Secretary, 23rd September 2019

> "*What we do in the next five years will determine the future of humanity for the next millennium.*"
> Professor Sir David King, FRS, former UK chief scientific adviser and chair of Climate Crisis Advisory Group, 2021

C. The emissions reported for the scheme alone and for the two indicative cumulative assessments do not occur in isolation. **They are additional emissions on top of the existing extremely high transport carbon footprints** (>40% of BBSNN BEIS reported emissions in 2019 are for transport).

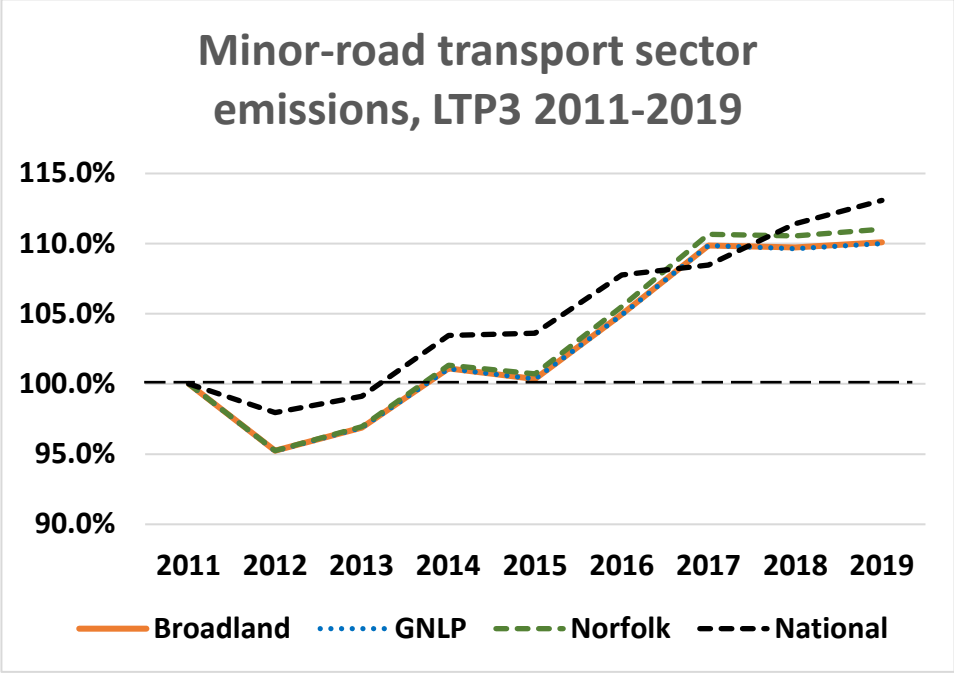
D. **Transport carbon emission profiles have been rising in Norfolk, and faster than nationally**, until very recently. In Broadland itself, where a large segment of the A47THI is proposed, transport emissions continue to rise, as shown below which shows the A-roads transport emissions as reported in the latest BEIS data [GNLP[94] area is Broadland, South Norfolk and Norwich on Figure below]. These are plotted for the period since the current local transport plan (LTP3) was adopted in 2011 (normalised in 2011 as 100% for each data series).

[94] This acronym derives from the local plan for the Greater Norwich area, the Greater Norwich Local Plan



The spike on the Broadland data in 2018 and 2019 is due in a large part to the opening of the Norwich Northern Distributor Road (NDR) early in 2018, showing the impact that road schemes have on carbon emissions. CEPP have made an indicative assessment of the emissions spike that will occur with the A47THI and other associated schemes in 2025 in Table 5 above.

A similar plot is shown for the Minor-road data below. These have drastically increase over the LTP3 period:



166 The evidence is clear that that transport emissions have been out-of-control in Norfolk for nearly a decade since the adoption of the LTP3. To introduce additional emissions from transport infrastructure, and use, is unacceptable in a climate emergency. The additional emissions from the A47THI scheme alone, and especially in-combination with other planned schemes, in the crucial 4th carbon budget have been shown above to add up to significant percentage increases to local transport carbon budgets.

167 Local assessment is required under the EIA regulations as CEPP have shown above. In every case in Table 5, emissions increase with the A47THI scheme, alone or in-combination, over the existing background of extremely high transport emissions in Norfolk. The emissions calculated in the local assessment undermine vital national endeavours to meet national climate obligations as listed in the "Summary of Assessment" section below. Each these require significant emissions reductions, locally and nationally, in the 4th carbon budget period: **not increases and additions in emissions.**

N_C-16: CEPP do not accept that only comparing carbon emissions from the scheme against carbon budgets for the entire UK economy is a credible assessment method. It makes no sense from a scientific perspective where reference data for comparison should always carefully chosen. It is a deliberate tactic to "loose the signal in the noise", and it is antithetical to good science. Further, it does not comply with the EIA Regs guidance for local, regional and national assessment, against known local, regional and national carbon targets, as invoked by the NPS NN. The Environmental Statement is narrow, inadequate, and non-compliant in ignoring the wider scope of the EIA Regs.

N_C-17: Additional new local transport emissions are introduced by the scheme in the BBSNN[95] area. Between 2025 to 2027, these would add between 2.6% (scheme alone) and 25.9% (scheme in cumulation with other schemes[96]) new emission sources when compared against the 2019 transport emissions for the area, as reported by BEIS, as a baseline. When assessed against the opening year 2025 using the 4th carbon budget as the baseline, the equivalent figures are very similar at 2.3% and 23.1%. By not considering or assessing these impacts, the applicant does not comply with the EIA Regs guidance to take relevant greenhouse gas reduction targets at the national, regional, and local levels into account. These additional emissions also fall in the period leading up to the UK international commitment, via its NDC under the Paris Agreement, to reduce emissions by 68% by 2030 (relative to 1990 levels). Additional local emissions of this magnitude, with no evident mitigation strategy, will impact national efforts, and therefore create a serious risk against the UK delivering on its NDC commitment by 2030. Accumulated with other schemes in the local area, and nationally, this risk cannot be ignored, but has not been addressed in the Environmental Statement.

N_C-18: Even without cumulative effects, the applicant's figure for carbon emitted from the scheme and in the wider road network (ARN) is approximately 5 times the entire carbon budget from BBSNN (Broadland, Breckland, South Norfolk and Norwich, a larger area) area for the period from 2033 to the net-zero date 2050 using science-based carbon budgets from the Tyndall Centre. For the period, after 2050, the corresponding applicant's figure is approximately 100 times greater than the available science-based carbon budget, and infinitely greater than the Government and CCC's implied budget for the post net-zero era. The applicant has provided no indication of how these additional carbon emissions would be mitigated. This has a clear material impact on the ability of the UK to contribute to the global endeavour to stabilise global heating at 1.5°C, and it does not comply with the UK obligations under the Paris Agreement.

6.8 Summary of assessment

168 The scheme would create additional transport carbon emissions which according to the applicant's Environmental Statement introduce a spike of emissions in the 4th carbon budget, and then a sustained high-level of carbon emissions enduring past several significant climate deadlines for the UK, and climate policy directives, too late in the century. These include:

A. UK obligations under the Paris agreement including the UK's Nationally Determined Contribution (NDC) – legal binding emissions reductions for the

[95] Broadland, Breckland, South Norfolk and Norwich local authority areas

[96] CEPP's realistic indicative estimate for scheme in cumulation with other schemes in the same period as in Table 5

national targets by 2030 (68% reduction from 1990 levels in the UK National Determined Contribution under the Paris Agreement[97])

B. the UK Sixth Carbon Budget (6CB) - (legally binding emissions reductions of 78% reduction from 1990 levels by 2035[98])

C. the legally binding target under the Climate Change Act 2008 to meet net-zero carbon emissions by 2050

D. the commitment from the Government in the July 14th, 2021, Transport Decarbonisation Plan[99] to drive "decarbonisation and transport improvements at a local level by making quantifiable carbon reductions a fundamental part of local transport planning and funding"

E. the government's requirement in its Transport Decarbonisation Plan (TDP) for local areas to deliver ambitious quantifiable carbon reductions in transport, in line with carbon budgets and net zero[100].

F. the revised NPPF[101] 152 planning requirement for "radical reductions of greenhouse gas emissions"

G. the statutory duty on Highways England under the Infrastructure Act 2015 section 5(2) to have regard for the environment, including cumulative assessments of the network, and carbon emissions assessments

169 Finally at the level of local environmental policy, 2019 NCC Environmental Policy[102] states:

> "Striving to meet this collective global challenge, we will work with our neighbours within the region, specifically Suffolk County Council and the Broads Authority, to collectively achieve 'net zero' carbon emissions on our

[97] 12th December 2020, https://www.gov.uk/government/publications/the-uks-nationally-determined-contribution-communication-to-the-unfccc

[98] https://www.legislation.gov.uk/ukdsi/2021/9780348222616

[99] "Decarbonising Transport: A Better, Greener Britain", https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1002241/decarbonising-transport-a-better-greener-britain.pdf

[100] "Decarbonising Transport: A Better, Greener Britain", Transport Decarbonisation Plan (TDP), July 2021, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1009448/decarbonising-transport-a-better-greener-britain.pdf, PDF Page 151:

> *"Going forward, local transport plans (LTPs) will also need to set out how local areas will deliver **ambitious quantifiable carbon reductions in transport**, taking into account the differing transport requirements of different areas. This will need to be in line with carbon budgets and net zero."*

[101] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf

[102] https://www.norfolk.gov.uk/what-we-do-and-how-we-work/policy-performance-and-partnerships/policies-and-strategies/natural-environment-policies/environmental-policy

estates by 2030, but within our wider areas, **work towards 'carbon neutrality' also by 2030**"

170 The scheme, and especially cumulative effects with other planned schemes, introduces large additional carbon emissions to transport budgets in the vital 4th carbon budget period, and will render futile attempts to decarbonise, and work towards carbon neutrality, within Norfolk by 2030, and beyond.

7 CONCLUSIONS

CEPP have reviewed the applicant's Environmental Statement.

We have identified 18 non-compliances against the NPS NN and EIA Regs, and other guidance such as DMRB; the Transport Decarbonisation Plan (TDP); the Aarhus Convention; national and local carbon budgets and targets; and compliance with the Paris agreement via science-based carbon budgets from UK academic experts.

This evidence is compelling that the Environmental Statement is inadequate in its assessment of carbon emissions, and cumulative carbon emissions. Given the amount of remedial work required, including reconfiguring the traffic modelling used to generate carbon data, **CEPP respectfully request that the ExA gives serious consideration to suspending the Examination under EIA Reg 20 so that the missing data and non-compliances may be resolved in the Environmental Statement.**

[redacted]

Dr Andrew Boswell,
Climate Emergency Policy and Planning, October 13th, 2021

8 APPENDIX A: NPS NN, Relevant sections on EIA Regs

171 The National Policy Statement for National Networks ("NPS NN") was promoted through the Planning Act 2008 ("PA2008"), approved by Parliament and published by the Secretary of State for Transport in December 2014.

172 Chapter 4 of the NPS NN (Department for Transport, 2014) sets out the principles for assessment of schemes such as the A47THI under the PA2008 DCO planning regime.

173 Section 4.3 lays out that the Examining Authority and the Secretary of State, for any proposed development, should take into account:

- *"its potential benefits, including the facilitation of economic development, including job creation, housing and environmental improvement, and any long-term or wider benefits;*

- *its potential adverse impacts, including* ***any longer-term and cumulative adverse impacts****, as well as any measures to avoid, reduce or compensate for any adverse impacts." (our emphasis)*

174 The A47THI is an Environmental Impact Assessment (EIA) project – see [APP-120, EIA Scoping Report], and legislative context and need for EIA at section 1.5 of APP-120.

175 NPS NN Section 4.15 to 4.21 describes how environmental assessment should be done.

> *"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.*** *" (our emphasis)*

176 Section 4.16 states:

> "*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)." (our emphasis)

177 Specifically on assessment of carbon emissions in the Environmental Statement, Section 5.17 states:

> *"Where the development is subject to EIA,* ***any Environmental Statement will need to describe an assessment of any likely significant climate factors in accordance with the requirements in the EIA Directive.****"*

178 Relating to other relevant schemes, CEPP also note that the EIA Scoping Opinion for the A47NTE [APP-136 under TR010038 – A47 North Tuddenham to Easton] by the Planning Inspectorate on behalf of the SoS states on Combined and Cumulative Effects (Scoping Report section 15) at ID 4.11.4 (in the "Aspect Based Scoping Tables" section4):

> "***The cumulative assessment should include the Norwich Link Road*** *which is proposed to be built in proximity to the Proposed Development and may have an overlapping construction period with the Proposed Development.*" *(our emphasis)*

179 Further, Natural England (in letter 18th October 2019) makes these comments on the EIA Scoping opinion [APP-136 under TR010038 – A47 North Tuddenham to Easton]. Following quoting Schedule 4 of the EIA Regs (see Appendix B), it states:

> *"It will be important for any assessment to consider the potential cumulative effects of this proposal, including all supporting infrastructure, with other similar proposals (****in particular the proposed Norwich Western Link Road****) and a thorough assessment of the 'in combination' effects of the proposed development with any existing developments and current applications. A full consideration of the implications of the whole scheme should be included in the ES. All supporting infrastructure should be included within the assessment."* (Emphasis as in original)

9 APPENDIX B: EIA Regulations

180 The A47THI is an EIA development and the decision-making process, therefore, needs to comply with the EIA Regs.[103] As CEPP note above in Appendix A, the NPS NN Section 4.15 to 4.21 also requires compliance with the EIA Regs.

181 Reg 4(2) prohibits the granting of development consent for EIA development "unless an EIA has been carried out in respect of that application". The EIA is defined in Reg 5 as:

> *(1) The environmental impact assessment ("the EIA") is a process consisting of—*
> *(a) the preparation of an Environmental Statement or updated Environmental Statement, as appropriate, by the applicant;*
> *(b) the carrying out of any consultation, publication and notification as required under these Regulations or, as necessary, any other enactment in respect of EIA development; and*
> *(c) the steps that are required to be undertaken by the Secretary of State under regulation 21 or by the relevant authority under regulation 25, as appropriate.*
> *(2) The EIA must identify, describe and assess in an appropriate manner, in light of each individual case, the direct and indirect significant effects of the proposed development on the following factors—*
> *(a) population and human health;*
> *(b) biodiversity, with particular attention to species and habitats protected under any law that implemented Directive 92/43/EEC[104] and Directive 2009/147/EC[105];*
> *(c) land, soil, water, air and **climate**;*
> *(d) material assets, cultural heritage and the landscape;*
> *(e) the interaction between the factors referred to in sub-paragraphs (a) to (d).*
> *(3) The effects referred to in paragraph (2) on the factors set out in that paragraph must include the operational effects of the proposed development, where the proposed development will have operational effects.*
> *(…) (our emphasis)*

182 The Environmental Statement, is further defined in Reg 14:

> *(1) An application for an order granting development consent for EIA development must be accompanied by an Environmental Statement.*

[103] Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.

[104] Habitats Directive

[105] Wild Birds Directive

(2) An Environmental Statement is a statement which includes at least—

(a) a description of the proposed development comprising information on the site, design, size and other relevant features of the development;
(b) a description of the likely significant effects of the proposed development on the environment;
(c) a description of any features of the proposed development, or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;
(d) a description of the reasonable alternatives studied by the applicant, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment;
(e) a non-technical summary of the information referred to in sub-paragraphs (a) to (d); and
(f) any additional information ***specified in Schedule 4*** *relevant to the specific characteristics of the particular development or type of development and to the environmental features likely to be significantly affected. (our emphasis)*

183 Schedule 4 of the EIA Regs then sets out in more detail the information to be included in Environmental Statements. This includes, *inter alia*:

"Para 1:
A description of the development, including in particular—
*… (c) a description of the main characteristics of the operational phase of the development (in particular any production process), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (****including water, land, soil and biodiversity[106]****) used;*

Para 4:
A description of the factors specified in regulation 5(2) likely to be significantly affected by the development: population, human health, biodiversity (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydromorphological changes, quantity and quality), air, ***climate (for example greenhouse gas emissions****, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape.*

Para 5

[106] This is relevant to land-use and land-clearance emissions from roads infrastructure construction as discussed in main text

A description of the likely significant effects of the development on the environment resulting from, inter alia—

(a) the construction and existence of the development, including, where relevant, demolition works;

(b) the use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources;

*(c) the **emission of pollutants**, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste;*

(d) the risks to human health, cultural heritage or the environment (for example due to accidents or disasters);

*(e) **the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to** areas of particular environmental importance likely to be affected or the use of natural resources;*

*(f) the impact of the project on **climate (for example the nature and magnitude of greenhouse gas emissions)** and the vulnerability of the project to climate change;*

(g) the technologies and the substances used.

*The description of the likely significant effects on the factors specified in regulation 5(2) should cover 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.*

*This description **should take into account the environmental protection objectives established at Union level** (as they had effect immediately before exit day) or United Kingdom level which are relevant to the project, including in particular those established under [the law of any part of the United Kingdom that implemented Council Directive 92/43/EEC and Directive 2009/147/EC." (our emphasis)*

184 Paragraph 5 of Schedule 4 above shows that the Environmental Statement must cover "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", taking into account the "**environmental protection objectives**" established both at EU or UK level. The "objectives" include relevant climate change targets set under UK law including:

- the UK's Nationally Determined Contribution (NDC) under the Paris agreement
- the legally binding target under the Climate Change Act 2008 to meet net-zero carbon emissions by 2050
- the UK Sixth Carbon Budget (6CB), and other carbon budgets and policy within that
- the Governments recent Transport Decarbonisation Plan (TDP)

- NPPF 148 planning requirement to "radical reductions of greenhouse gas emissions",
- the statutory duty on Highways England under the Infrastructure Act 2015 section 5(2) to have regard for the environment

185Finally, EIA Reg 20 allows for an Examining Authority to suspend consideration of an application if the Environmental Statement is found to be inadequate:

a. "Reg 20(2)
This paragraph applies if—
(a)the applicant has submitted a statement that the applicant refers to as an Environmental Statement; and
(b)the Examining authority is of the view that it is necessary for the statement to contain further information.

b. Reg 20(1)
Where an Examining authority is examining an application for an order granting development consent and paragraph (2) applies, the Examining authority must—
(a)issue a written statement giving clearly and precisely the reasons for its conclusion;
(b)send a copy of that written statement to the applicant; and
(c)suspend consideration of the application until the requirements of paragraph (3) and, where appropriate, paragraph (4) are satisfied." *(our emphasis)*

10 APPENDIX C: Highways England Licence

186The Highways England licence requires at 5.23

> *"5.23 … the Licence holder should:*
> *…*
> *c.* ***Consider the cumulative environmental impact of its activities across its network*** *and identify holistic approaches to mitigate such impacts and improve environmental performance;"*

11 APPENDIX D: LETTER FROM DFT, 2nd AUGUST 2021, A38 DERBY JUNCTIONS

<Provided as a separate file:
CEPP_BOSWELL_WR__APP_D___TR010022-001467-210802 A38 DerbyJunctions DfT S.pdf>

12 APPENDIX E: SCIENCE BASED CARBON BUDGET FOR PARIS COMPLIANCE FOR BRECKLAND, BROADLAND, NORWICH, SOUTH NORFOLK (BBSNN)

187 As generated at https://carbonbudget.manchester.ac.uk/reports/.

188 Tyndall Carbon Budget Reports present recommended climate change commitments for UK local authority areas that are aligned with the commitments in the United Nations Paris Agreement, informed by the latest science on climate change and defined by science-based carbon budget setting.

Setting City Area Targets and Trajectories for Emissions Reduction (SCATTER)

189 This work was developed as part of the Setting City Area Targets and Trajectories for Emissions Reduction (SCATTER) project. The SCATTER project, funded by the Department for Business Energy and Industrial Strategy (BEIS), developed a methodology for Local Authorities to set carbon emissions targets that are consistent with United Nations Paris Climate Agreement. The SCATTER project was a collaboration between Tyndall Manchester, Anthesis Group and Greater Manchester Combined Authority. The further development of the carbon budget methodology into a widely applicable free online resource for local authorities UK-wide was supported through funding from the University of Manchester EPSRC Impact Support Fund. A SCATTER online tool by Anthesis Group is also available to local authority users online.

Date:	August 2021
Prepared By:	Dr Jaise Kuriakose, Dr Chris Jones, Prof Kevin Anderson, Dr John Broderick & Prof Carly McLachlan

<Provided as a separate file:
CEPP_BOSWELL_WR__APP_E___SCATTER_CarbonBudget_BBSNN_short.pdf>

13 APPENDIX F: GUIDANCE ON THE PREPARATION OF THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT

<Provided as a separate file:
CEPP_BOSWELL_WR__APP_F___2017_EIA_guidance_EIA_report_final.pdf >

14 APPENDIX G: GUIDANCE ON INTEGRATING CLIMATE CHANGE AND BIODIVERSITY INTO ENVIRONMENTAL IMPACT ASSESSMENT

<Provided as a separate file:
CEPP_BOSWELL_WR__APP_G___2013_Integrating_Biod+CC_EIA Guidance.pdf>