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DEADLINE D6 SUBMISSION

I am an independent scientist and environmental consultant, working at the intersection of science, policy, and law, particularly relating to ecology and climate change. I work as a consultancy called Climate Emergency Policy and Planning (CEPP). An updated resume is provided at Appendix A.

In so far as the facts in this statement are within my knowledge, they are true. In so far as the facts in this statement are not within my direct knowledge, they are true to the best of my knowledge and belief.

SUMMARY

This submission addresses the “carbon quantification” part of “carbon quantification and assessment”, and addresses the question how the Scheme’s emissions should be quantified. I find that the carbon quantification, based on the core scenarios in the traffic models in the Transport Case, is **without doubt** a solus quantification, and not cumulative. The carbon assessment based on these quantities is also a solus only assessment, and not a cumulative assessment. **Since an assessment of the cumulative GHG emission impacts of the Scheme is legally required under the EIA Regs, and is not provided anywhere else in the Environmental Statement, this failing alone renders the Environmental Statement unlawful.**

I analyse the traffic model configurations and show that this situation arises out of the Applicant’s very narrow range of traffic modelling, which is based, historically, on analysing and solving operational and performance issues. As well as these performance-oriented traffic models, a set of EIA Regs compliance-oriented traffic models are required to perform cumulative assessment. I define the traffic model configurations required so that cumulative assessment of the carbon impacts of the scheme is possible. Although, the issue in this submission is that cumulative carbon assessment has not been done, the issue that the traffic model configuration precludes cumulative assessment may extend to other environmental factors like noise too. The performance-oriented traffic models also produce an underestimate for the carbon emissions associated with the scheme in the Applicant’s solus assessment, because journeys which should be attributable to scheme (in isolation) are included in the Do Minimum scenario.

I request that the ExA request the following additional information from the Applicant:

- Any other roads schemes which are included in the DM and DS0 models beyond the A47BNB, A47THI and NWL.
- A carbon quantification and assessment based on the model configuration of the sensitivity test DS1 (without the NWL).
- Traffic modelling, carbon quantification and assessment based on the three EIA Regs compliance-oriented traffic models which I define at Table 2.
- An analysis of which other environmental factors have no cumulative assessment due to the error (as explained in detail) of using performance-oriented traffic models as a basis for environmental impact assessment.
- An explanation of inconsistencies between the traffic modelling uncertainty log and Cumulative Effects Assessment short and long lists.
- For algorithmic transparency, requires a fuller explanation of how the traffic models used by the Applicant for the Environmental Assessment function and link together.
- A response to my questions in REP1-023 about the NATS 2015 and NATS 2019 models.

Following the demonstration without doubt that no cumulative carbon assessment has been made in the Environmental Statement, I now ask that the ExA determines that the EIA Reg 20 process to suspend the examination, so that the Environmental Statement can be reworked, is now followed in relation to this matter.

I repeat my request that cumulative carbon emissions are considered together for the A47BNB, A47NTE and A47THI examinations. All three DCO applications have the same issues as those laid out in this submission, and in my letter AS-016. In practical terms, this would require suspension of each examination under EIA Regulation 20, and then requiring the necessary remodelling and changes to the Environmental Statements for each scheme from a common “written statement” under EIA Regulation 20 (1)(a), (b) and (c).

I regret that I find it necessary to make a complaint to the ExA about the evidence that the Applicant gave to the ISH2 hearing, which contains erroneous and misleading statements. This is at section 2. I request an acknowledgement, and an indication of how the complaint will be dealt with. I request that the ExA asks the Applicant for a full, formal retraction of the relevant sections of REP4-015.

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1 INTRODUCTION

1.1 *Deadline 6 (D6)*

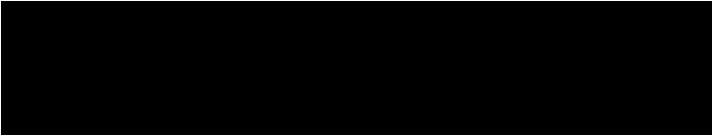
- 1 This is my submission for Deadline 6. It follows my written representation at REP1-023 at D1.
- 2 I will comment on:
 - A. REP2-014, the Applicant's responses to ExQ1
 - B. REP3-022, and the Applicant's response my WR within it.
 - C. REP4-015, the Applicant's Written Summary of Oral Submissions at ISH2
 - D. REP4-016, Applicant's Response to Examining Authority's Action List from ISH2 within it
 - E. EV-024a, recording¹ of ISH2, Part1, Session 4
 - F. PD-012, the ExQ3
- 3 I thank the ExA for his consideration of my letters of (1) October 24th [AS-016] requesting for cumulative carbon emissions to be considered together for the A47BNB, A47NTE and A47THI examinations, and (2) October 27th advising of late submissions due my complete absence from the internet for the month of November.
- 4 Due to a very high workload since December 1st (including deadlines on three other PINS NSIP examinations this week), I am concentrating in this submission on carbon quantification and how it is prepared prior to the assessment stage. Therefore my responses to the above documents are not complete yet.

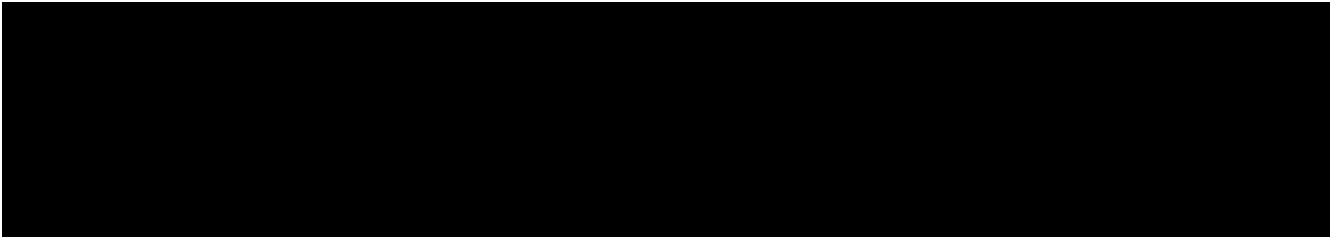
All the same, the evidence in this document, demonstrates **without doubt** that the Environmental Statement is unlawful. I will submit further evidence at Deadline D7, January 17th to cover other areas, including assessment, not covered here.



1.2 Recent changes to relevant policy

- 5 Since the examination opened on 12th August 2021 (and slightly before that date), there have been a significant number of changes to national policy and guidance.
- (a) The Government's Transport Decarbonisation Plan² (TDP) which requires ambitious quantifiable carbon reductions in transport at the local level was published on the 14th July 2021.
 - (b) The Government's Net Zero Strategy³ (NZS) backing the urgent need for ambitious quantifiable carbon reductions in transport, at the local level was published on 19th October 2021.
 - (c) HM Treasury Green Book supplement providing specific guidance on how analysts should quantify and value emissions of GHGs⁴ was published in October 2021.
 - (d) Government policy paper⁵ setting out a revised approach to valuing GHG emissions, and revised carbon prices, in policy appraisal was published on 2nd September 2021
 - (e) An updated version of the DfT's WebTAG guidance⁶ and TAG data book, including changes to emissions factors, was published on 29th November 2021
 - (f) Highways England Carbon Reporting Tool⁷ was used to assess the GHG emissions for scheme construction and maintenance was withdrawn on 21 September 2021. It was replaced with the National Highways Carbon emissions calculation tool⁸.
- 6 I raise these as an administrative notification in this submission. Again, I will follow up on the issues raised by the above with further evidence at Deadline D7, January 17th.


⁴ "Valuation of energy use and greenhouse gas: Supplementary guidance to the HM Treasury Green Book on Appraisal and Evaluation in Central Government"
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1024054/1.Valuation_of_energy_use_and_greenho



1.3 Relevant documents from other DCO schemes beyond Norfolk

8 I draw the ExA attention to these recent submissions on the A38 Derby Junctions scheme [TR010030] which also relate to carbon quantification and assessment, and cumulative carbon assessment:

- Derby Climate Coalition, “Response to the Secretary of State's Consultation of 23 September 2021”, 27th, October 2021, legal letter⁹
- Derby Climate Coalition, “Response to the Secretary of State's Consultation of 23 September 2021”, 27th, October 2021, Expert Report of Dr Boswell¹⁰

1.4 Definitions

9 The word “cumulative” is used in different senses by the Applicant in different places. This is core to the Applicant’s legal error, which I will explain later. Suffice to say here that definitions, usage and application of the word “cumulative” are a very important issue.

10 For scientific precision, I use the following additional definitions. My definitions are:

- **Absolute emissions** – *carbon emissions which are expressed in terms of an absolute quantity of emissions. The value of the absolute emissions, as released into the atmosphere, quantifies the real measure of the impact of greenhouse gases as an environmental factor (or receptor).*
- **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 scenarios, one with a transport intervention and one without. Differential values derived this way do not quantify the real impact of atmospheric greenhouse gases by the transport intervention within its transport system, and therefore do not represent the real global heating impact.*

1.5 Absolute and differential emissions

- 11 With respect to differential emissions, the applicant sometimes refers to these as “net” emissions. For example, Chapter 14, Table 14-9 [REP3-014] labels a column “Net CO2 project GHG emissions (tCO2e) (Do something – Do minimum)”. “Net” is usually used to mean the quantitative change of some physical parameter as a result of some process.
- 12 The EIA Regulations refer to environmental factors at EIA Reg 5 (2), and the Design Manual for Roads and Bridges refers to receptors at “LA 103¹¹ [Page 6, PDF 7] with respect to cumulative impacts. “Net-ness” depends upon the factor/receptor being assessed for environmental impact. For road-use emissions in a transport system, changes in carbon dioxide in the global atmosphere is the relevant factor/receptor. The net change to the atmosphere, and consequential global heating, is given by the absolute emissions emitted from the transport system. So net change to the atmosphere, and the environmental impact, arises from the total absolute emissions, given in this case by the Do Something (DS0) traffic modelling output (and not from the “net” DS0 - DM quantity).
- 13 The usage of “net” by the Applicant in Table 14-9 and other places is misleading as it used to suggest that a quantum of differential emissions is all that is of concern for assessment of the environmental factor. Differential is clearer word to use (than “net”) as it indicates that the figures being used in the Environmental Assessment is derived by a differentiation of two large absolute carbon emissions figures in the traffic model. The underlying absolute carbon emissions figures are actually the real measure of impact on the environmental factor/receptor (ie the global atmosphere and global heating), and therefore the metrics of primary concern. Table 3 towards the end of this submission presents an indicative comparison of the relevant figures.
- 14 **This is important** – is the purpose of assessment to quantify the impact on the environmental factor, or to quantify changes to the measuring system (in this case, the transport model)? It must be to quantify the impact on the environmental factor, in this case GHGs in the global atmosphere, and therefore absolute emissions are the preferable quantification.
- 15 Differential emissions data, being a small number derived from two large numbers, is also very sensitive to changes in one of the large numbers used to calculate it. For example, if assumptions in how the baseline is modelled for the DM figure increases that figure, then the DS-DM will be consequential smaller.

2 COMPLAINT

16 I regret that I find it necessary to make a complaint about the evidence given by the Applicant to the ISH2 hearing and recorded in its written summary. Evidence was given which is erroneous and extremely misleading.

17 At REP4-015, page 28, point 5 on “the High Court Judgment in the case of R (on the application of Transport Action Network) v Secretary of State for Transport [2021] EWHC 2095 (Admin)”, the Applicant states:

“... it was an application for judicial review into the road investment strategy (RIS) decision of the Secretary of State's on the 11th March 2020, pursuant to section 31 of the Infrastructure Act 2015.” [1]

“Dr Boswell thought that had the application for judicial review being allowed that the case would have implications for the DCO project, but the application for judicial review was refused.” [2]

“Dr Boswell doesn't refer to the case in relation to this Scheme other than to note that there is an appeal against the refusal of full permission for judicial review.” [3]

18 These 3 statements are erroneous and misleading.

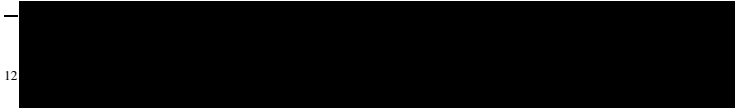
19 First, on 21 July 2020 Lieven J granted the claimant permission to apply for judicial review. This is evidenced in the Holgate J judgement of 26th July 2021 at bullet 16. In my written representation on the Blofield (A47BNB scheme), dated 20th July 2021, I referred to the case which Holgate J had already heard, and I also referred to expert witness evidence before the Court from Professor Phil Goodwin (on the types of carbon emissions that should be assessed for road schemes). **I was referring to the full case which had already been heard in the Court and, following the Hearing, was determined, 6 days later, on 26th July 2021.** I have never referred to the original application for judicial review of 11th March 2020 in any representations on the A47 schemes.

20 Later, after the July 26th 2021 judgement, in my deadline D4 submission on A47BNB, dated Sept 9th 2021, I referred to the fact that Transport Action Network had sought permission to appeal the ruling – a ruling which was on **the full judicial review** (not an application for one).

21 **Therefore statement 1 is false** in saying that I was referring to the **application** for judicial review of 11th March 2020.

22 **Statement 2 is false** in suggesting that I was considering the implications of if/whether the March 2020 application for a Judicial Review had succeeded. I only referred in my A47BNB WR to the full hearing and anticipated judgement, as of July 2021.

- 23 Further in statement 2, although the application of 11th March 2020 was turned down, the application for judicial review was granted on 21 July 2020 as above. **The phrasing of statement 2 contains implications which are misleading in the extreme.** It implies that the case never proceeded to a full hearing where in fact it did. It also implies that I was attaching weight to case which never even received permission to go a full hearing (which would be a naïve thing to do and something that I would not do).
- 24 **Further statement 3 is just erroneous.** The current appeal, and the appeal to which I referred, is the appeal to the judgement on the full judicial review, not an appeal against the refusal of full permission for judicial review.
- 25 I have watched the EV-024a recording (direct link¹² to relevant section) of ISH2, Part1, Session 4 and the same erroneous and misleading statements were made at the ISH2 by the Applicant.
- 26 **I have to say I find it remarkable that this has been so inaccurately and misleadingly presented by the Applicant.** Not least because the same agent of the Applicant (Ms Sarah Holmes) has engaged in matters on the A47BNB examination **correctly** referring to these administrative facts about the case (although we disagree about the legal interpretation of the judgement¹³): for example, Ms Holmes has quoted directly from the full judicial review judgement in the A47BNB examination. **Given that Ms Holmes knew that the case had gone to a full judicial review and judgement on July 26th, 2021, and has previously quoted from the judgement, all three statements are deeply concerning.**
- 27 I therefore make a complaint against the Applicant, and I request that the ExA asks the Applicant for a full, formal retraction of this section of REP4-015.



¹² I have made submissions to the A47BNB examination on these disagreements

3 CARBON QUANTIFICATION AND ASSESSMENT

28 There are two key questions (KQ-1 and KQ-2) that the ExA, and SoS, need to consider on carbon assessment:

(KQ-1) How will the Scheme’s emissions be quantified?

(KQ-2) Against which “target(s)” or “budget(s)” should the Scheme’s emissions be contextualised for assessment?

29 My previous submissions have described the key parameters on carbon quantification (KQ-1) as:

- Carbon emission types (eg: construction and operations, the PAS2080 types, and my simplified seven-type typography¹⁴) [eg: REP1-023, section 2.9]
- Baseline, solus¹⁵ and cumulative emissions [eg: REP1-023, section 2.3]
- Spatial scales of quantification [eg: REP1-023, section 2.5 and 2.6]
- Short-term, medium-term and long-term [eg: REP1-023, section 2.10]

30 My previous submissions have described the key parameters on targets and budgets (KQ-2) as:

- Absolute v differential (delta) emissions [eg: REP1-023, section 4.1, and see definitions above]
- Local, regional and national [eg: REP1-023, sections 2.5 and 2.6]

31 From these questions and parameters, important questions arise within the legal framework which includes the EIA Regulations:

- “Should both the Scheme’s construction and operational emissions be considered?”
- “Should the Scheme be considered in isolation, or in the context of other cumulative developments, or both?” etc

32 This submission will concentrate on KQ-1 – carbon quantification and cumulative carbon quantification. A further submission will be submitted which will cover KQ-2 – assessment - for deadline D7, January 17th January, although the final section of this submission makes an indicative comparison of different assessments.

¹⁴ REP1-023, Table 1 and narrative

¹⁵ Solus means, here, “alone; separate” as in the first definition in the Collins on-line dictionary

4 CARBON QUANTIFICATION AND THE TRANSPORT ASSESSMENT

- 33 I return to the first fundamental question (KQ-1) which the ExA and SoS need to consider of how the scheme’s emissions should be quantified and prior to the assessment stage. A pre-requisite of the EIA regulations is that carbon is quantified in the correct way, so that both solus and cumulative assessment can be later carried out, and the NPS NN also requires this through its invocation of the EIA Regs [REP1-023, section 2.1]. The question as to how carbon is quantified depends upon the configurations of the traffic modelling.
- 34 The Applicant has laid out how it has configured DM and DS0 core scenarios (ie **two** traffic model configurations) in the “**Transport Case** for the Scheme” [APP-140, Chapter 4 in “Case for the Scheme”]. The Applicant says that it has followed the Transport Appraisal Guidance (TAG). It is more accurate to say that the Applicant has followed its own particular interpretation of TAG, which is appropriate for operational/performance evaluation of the network, but which is not fit for purpose for cumulative carbon assessment, as I will discuss further below.

4.1 Core scenarios in the Traffic models (Transport Case)

- 35 This section gives a high-level description of how the traffic models are configured, and the elements of interest to us here.
- 36 Local developments listed in the uncertainty log, regarded at least ‘near certain’ or ‘more than likely’, are included in both the DM and DS0 configurations [APP-140, 4.3.21]. Two further planned local developments are also included [APP-140, 4.3.23]. Underlined words are Applicant’s terminology.

Major highway schemes – the A47BNB, A47THI and the NWL are also included [APP-140, 4.4.2], and this summarised at APP-140, Table 4.3. I note on Table 4.3 that there is a scheme category called “Other DM Schemes including NWL”: however, what the additional schemes to the NWL does not appear to have been specified anywhere in the Environmental Statement. **It would be helpful for the Applicant to clarify for all parties what these schemes are.**

The Applicant has also run a sensitivity test DS1 which is DS0 without the NWL [APP-140, 4.4.9 and Table 4.4]. I lay out this information below in Table 1.

The open/closed status of Honingham Lane is explained at APP-140, 4.4.1.

A ✓ in Table 1 means that a feature (eg: a road) is included in the traffic model configuration whilst a ✗ means it is not included.

Model configuration name	Performance-oriented (ie as in APP-140)		
	<i>DM</i> (Perf, baseline)	<i>DS0</i> (Perf, all)	<i>DS1</i> (Perf, all')
2015 Baseline Highway network	✓	✓	✓
A47NTE scheme	✗	✓	✓
A47BNB	✓	✓	✓
A47THI	✓	✓	✓
NWL	✓	✓	✗
Additional major highway schemes, unspecified	✓	✓	✓
Local developments (APP-140, 4.3.21, uncertainty log)	✓	✓	✓
Planned local developments (APP-140, 4.3.23)	✓	✓	✓
Honingham Lane	Closed	Closed	Open
Forecast changes in trip demand (VDM)	✓	✓	✓

Table 1

37 The red ellipse indicates the only change in the configuration between the DM and DS0 scenarios is the presence, or not, of the A47NTE in the modelling.

38 I refer to this set of traffic model configurations as “Performance-oriented”, for reasons which will become clearer later. I also give each configuration a further unique name to distinguish it from other configurations which I will introduce later eg: *DM (Perf, baseline)* is the Applicant’s DM model as described in APP-140.

The “all” in *DS0 (Perf, all)* [the Applicant’s DS0 model in APP-140] indicates that all the possible elements are included in the traffic model configuration. The Applicant has introduced the notion of “inherently cumulative” to describe this situation which as I will explain later is confusing, and leads to a misunderstanding about what is “cumulative”, and leads to the Applicant’s legal error. I have used the term “all” to minimise possible confusion as explained in more detail later.

39 The operational performance of the DM and DS0 configurations are described in APP-140, sections 4.5 - 4.9. With respect to the sensitivity test DS1, in which the NWL has been removed from the traffic modelling, the operational performance impacts are described at APP-140, section 4.9.

40 I note that despite running the DS1 sensitivity test, that the outputs from have not been taken forward into the carbon quantification and carbon assessment phases by the Applicant. This is a disappointing omission by the Applicant. It would be very valuable to know the effects of the carbon quantification of the A47NTE scheme with and without

the NWL. **It would increase the sensitivity of the carbon assessment, and the Applicant's should provide this information.**

- 41 I now describe how the outputs of DM and DS0 are translated into the carbon quantifications in REP3-014, Chapter 14, Climate.

4.2 Carbon quantification from the core scenarios

- 42 It is clear from Table 1 that the only difference in configuration between the DM core scenario and the DS0 core scenario is the A47NTE scheme. Therefore differentials generated from between the outputs of these two model configurations (ie: DS0 – DM) are attributable only the A47NTE scheme itself in isolation. Any environmental assessment based on such a differential **can only be a solus assessment**. This applies to carbon emissions and all other environmental factors too (eg: noise).
- 43 This is what happens in the Environmental Statement when the carbon assessment is performed based on the *DM (Perf, baseline)* and *DS0 (Perf, all)* traffic model configurations in Chapter 14. The outputs of the traffic modelling are taken forwarded and **absolute quantities of carbon emissions** are calculated for different carbon budget periods. For example, for the fifth carbon budget (5CB), the *DM (Perf, baseline)* traffic model output corresponds to the Applicants DM value of 4,640,659 tCO₂e as in REP3-014, Table 14-10, whilst *DS0 (Perf, all)* corresponds to the Applicants DS0¹⁶ value of 4,681,289¹⁷ tCO₂e.
- 44 Then in REP3-014, Table 14-10, the differential eg: *DS0 (Perf, all) - DM (Perf, baseline)*¹⁸ quantities are calculated. For example, 40,630¹⁹ tCO₂e is **a differential value of carbon emissions** for the vehicle emissions in the 5CB period.
- 45 Whilst the Applicant presents in REP3-014, Table 14-10, for the 4th, 5th and 6th carbon budgets (4CB, 5CB and 6CB) both the absolute carbon quantifications (ie: DS0 and DM), and the differential carbon quantifications (ie: DS0 - DM), which derive from the traffic model configurations, it **only** takes forward the differential carbon quantifications into the assessment stage.

¹⁶ In another confusing use of labels/variables, suggesting a lack of join-up between project teams, the Applicant refers to this traffic model configuration as DS0 in the Transport Case, and as DS in Chapter 14, Climate – despite the different nomenclature in different places, I understand them to be the same model configuration.

¹⁷ The figure in Table 14-10 is 4,681,354 tCO₂e, but this needs to be adjusted for non-vehicle operational emissions (eg: lighting) as shown in REP1-023, Table 4 and text narrative adjacent to the Table.

¹⁸ Referred to a DS – DM in Chapter 14, Table 14-10.

¹⁹ The figure in Table 14-10 is 40,695 tCO₂e, but this needs to be adjusted for non-vehicle operational emissions (eg: lighting) as shown in REP1-023, Table 4 and text narrative adjacent to the Table, giving the 40,630 tCO₂e figure.

- 46 Therefore, the solus differential (DS0 - DM) values are the Applicant’s key carbon quantifications as presented in REP3-014, Table 14-10, and the **only** quantities which the Applicant takes forward into the carbon assessment stage.
- 47 **Without doubt**, from the explanation above, the quantity of 40,630²⁰ tCO₂e in the 5CB example results from the differential outputs of two traffic model configurations in which the only difference is the existence or not of the A47NTE scheme (the same applies across the other carbon budgets in Table 14-10). The key point at this stage is that the DM scenario includes the three other major road schemes, and land-use developments, and the DS scenario includes **only** the scheme “in addition”. The differential carbon quantification is therefore an expression of the scheme in solus. **Therefore any carbon assessment based on it is also a solus only assessment, and not a cumulative assessment.**
- 48 Since an assessment of the cumulative GHG emission impacts of the Scheme is legally required under the EIA Regs and is not provided anywhere else in the Environmental Statement, **this failing alone renders the Environmental Statement unlawful.**

4.3 The EIA Regulations

- 49 In considering compliance with the EIA Regulations, the Applicant’s standard response is to pitch the NPS NN as somehow legally eclipsing the EIA Regulations. For example, when asked at the ISH2 specifically about the “**cumulative** effects with other projects” at REP4-015, page 26, point 4, the Applicant says:

*“The EIA Regulations do not require government to determine significance by reference to specific levels, whether local, regional or national, those are matters for Government to determine and the Government, as approved by Parliament in the NPS, has determined that the effects of national network infrastructure shall be determined in the context of carbon budgets. This is the approach that the Applicant has taken and DMRB LA 114 requires us to. **The EIA Regulations do not place any obligation on the Secretary of State to require or to find that the environmental assessment is defective because other levels of assessment of carbon emissions have not been undertaken.**”*
(my emphasis)

- 50 Notwithstanding, the fact that the Applicant was asked specifically about cumulative effects at point 4 but framed this part of their response on the local, regional or national assessment issue, the Applicant is ignoring in this response the very clear requirement **in the EIA Regulations** for cumulative assessment, and that the NPS NN cannot remove this requirement.

²⁰ The figure in Table 14-10 is 40,695 tCO₂e, but this needs to be adjusted for non-vehicle operational emissions (eg: lighting) as shown in REP1-023, Table 4 and text narrative adjacent to the Table, giving the 40,630 tCO₂e figure.

- 51 The matter here is not about **either** the EIA Regulations “winning over” the NPS NN, **or** the reverse of the NPS NN winning over the EIA Regulations. The ExA and SoS are required to take account of, and apply, both pieces of legislation (ie it is an **and-and** situation).
- 52 As I have previously explained²¹, the NPS NN **directly invokes** the EIA Regulations at NPS NN 4.15 and 4.16: the NPSNN, therefore, fully accepts that the EIA process must be followed in full. The NPSNN cannot, as a matter of law²², in any way limit or constrain what is required by the EIA process; a full assessment of a proposed DCO’s environmental effects and their significance must be undertaken through the EIA process. This point is, in fact, recognised in the NPSNN at para 4.15 et seq. That section of the NPSNN even states, in relation to cumulative assessments that (at 4.17):

“The Examining Authority should consider how significant cumulative effects and the interrelationship between effects might as a whole affect the environment, even though they may be acceptable when considered on an individual basis with mitigation measures in place.”

- 53 Moreover, irrespective of what NPSNN policy might say as to how certain environmental effects should be considered, or weighed, in the decision-making process, the independent application of the EIA regime to the DCO process is designed to ensure that all significant environmental effects are both identified and assessed. Following this process, it is entirely permissible for the SoS to weigh a project’s significant environmental effects (as part of the adverse impact of the project) into his assessment of the balancing exercise required under section 104(7) of the Planning Act 2008 (see **R (oao ClientEarth) v SSBEIS [2021] EWCA Civ 43** at [95]).
- 54 We have already described the two fundamental questions (KQ-1 and KQ-2) which the ExA and SoS need to consider, through the lenses of both the EIA Regulations and the NPS NN:

(KQ-1) How will the Scheme’s emissions be quantified?

(KQ-2) Against which “target(s)” or “budget(s)” should the Scheme’s emissions be contextualised for assessment?

²¹ For example, REP1-023, section 2.1

²² I am grateful to the recent legal submission to A38 Derby Junctions scheme [TR010022], of 27th October 2021, here, <https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR010022/TR010022-001491-Lewis%20Hadler%20-%20Derby%20Climate%20Coalition.pdf>

The EIA Regulations are clear that two types of assessments (KQ-2), are required: solus and cumulative. A pre-requisite of this is that two types of quantifications (KQ-1), solus and cumulative, are also required. As above, analysis of the Applicant’s traffic model configurations (DM and DS0) has demonstrated **without doubt** that **only a solus quantification and, therefore, only a solus assessment has been made by the applicant.**

4.4 The overall picture – solus and cumulative assessment

55 From the above, it is clear that the restricted configurations of the traffic model in the Transport Case in APP-140 only allows a solus carbon assessment to be made. I now show how cumulative assessment may be performed.

56 First, it is necessary to understand that the TAG approach, and the knowledge and skills developed by traffic modellers, pre-date the current time when assessment of carbon emissions has become an important factor in planning policy and law. The **two** traffic model configurations (ie: DS0 and DM) which are deployed are geared to assessing operational performance. I accept that performance is an important design issue, and is necessary to test aspects of the transport network of interest to highways engineering²³, and therefore that these configurations have a value for that purpose. My submission does not seek to address the success, or not, of this aspect of the transport case. The performance issues that this approach to the modelling is designed to answer are described in APP-140.

57 However, the concern for cumulative carbon assessment is that this performance-oriented transport modelling configuration, derived from the historical context explained above, does not even allow the assessment of cumulative impacts of GHGs of the Scheme (when differential emissions (ie: DS0 - DM) are extracted). **Put simply, and as explained below, an additional complementary approach to the modelling is needed to properly assess carbon impacts, both solus and cumulative, when differential emissions are being used.**

58 Although, it is not the direct concern of this submission, this failure of the performance-oriented transport modelling to assess cumulative carbon impacts, may well extend to other environmental factors, such as noise, especially where a differential quantification of environmental factors based on DS0 - DM assessment is fed into assessment process. **I request that the ExA seeks to determine whether there are other situations, with different environmental factors, where only a solus assessment has been made, and**

²³ As an aside, it is concerning to read at APP-140, 3.5.1, that it is assumed that traffic growth will continue into the future, and should be supported:

*“Supporting economic growth: reduce congestion related delay, improve journey time reliability and **increase the overall capacity for future traffic growth** to help enable regional development and growth in Norwich and its surrounding area”*

The assumption is peppered throughout APP-140 and is in contradiction to the SoS’s own department policies of modal shift to public transport, cycling and walking, and of freight from road to more sustainable alternatives, such as rail, cargo bikes and inland waterways, as in the Transport Decarbonisation Plan (TDP) and the Government’s Net Zero Strategy.

the wrong solus assessment, and which are therefore are in breach of the EIA Regulations. The Applicant should be required to provide evidence that it has carried out both solus and cumulative assessment on all environmental factors scoped-in in the EIA scoping report.

59 Table 2 builds on Table 1 above, and shows the different complementary approaches which are needed to derive both differential solus and cumulative carbon quantities which may then be fed forward into the carbon (GHG) impact assessment.

Model configuration name	Performance-oriented (ie as in APP-140)			EIA Regs compliance-oriented (eg: for impact assessment of GHGs)			Example sensitivity test
	<i>DM (Perf, baseline)</i>	<i>DS0 (Perf, all)</i>	<i>DS1 (Perf, all')</i>	<i>DM (GHG, baseline)</i>	<i>DS (GHG, scheme)</i>	<i>DS (GHG, all)</i>	<i>DS (ST1)</i>
2015 Baseline Highway network	✓	✓	✓	✓	✓	✓	✓
A47NTE scheme	×	✓	✓	×	✓	✓	✓
A47BNB	✓	✓	✓	×	×	✓	×
A47THI	✓	✓	✓	×	×	✓	×
NWL	✓	✓	×	×	×	✓	×
Additional major highway schemes, unspecified	✓	✓	✓	×	×	✓	×
Local developments (APP-140, 4.3.21, uncertainty log)	✓	✓	✓	×	×	✓	✓
Planned local developments (APP-140, 4.3.23)	✓	✓	✓	×	×	✓	✓
Honingham Lane	Closed	Closed	Open	Open	Open	Closed	Open
Forecast changes in trip demand (VDM)	✓	✓	✓	✓	✓	✓	✓



Table 1

60 In Table 2, I identify **seven** Traffic Model configurations and give each a name eg: *DM (Perf, baseline)*. *DM (Perf, baseline)* and *DS0 (Perf, all)* are the two presented by the Applicant as in APP-140, as discussed above.

61 I have introduced **three** EIA Regs compliance-oriented configurations. There are many potential configurations. For example, I bundle the three road schemes (A47BNB, A47THI and NWL), and any other road schemes [blue highlight] and land-use developments [brown highlight] together between *DS (GHG, scheme)* and *DS (GHG, all)*.

Sensitivity tests could be done with any combinations of these included, and as an example I give configuration *DS (STI)* which would test the existing road network and the A47NTE scheme *DS (GHG, scheme)*, against planned land-use developments (but with no other new road schemes introduced).

- 62 The crucial point here is that for EIA Regs compliance-oriented assessment, the bundling of road and land-use developments as shown in Table 2 would be the logical configuration to generate the correct carbon quantification for solus and cumulative assessment. Each of the models would be run at 2025 Opening Year, and 2040 Design Year, as in the Applicant's Traffic modelling.
- 63 Each of the **seven** models in Table 2 will produce a carbon quantification output for the different carbon budget periods which is expressed as **an absolute value of carbon emissions**, as I have described above for the 5CB data in Chapter 14, Table 14-10. I emphasise again that differences such as *DS0 (Perf, all) - DM (Perf, baseline)*, and its associated Chapter 14, Table 14-10 5CB value of 40,630²⁴ tCO₂e, are a further derivation of the data, and are expressions of **differential quantities of carbon emissions** for the vehicle emissions.

4.5 Differential emissions and the semantics of increments

- 64 The arrows underneath the Table 2 show the different differential carbon emissions which can be derived. It is clear straightaway that two different solus values can be calculated. $\Delta Solus (Perf)$ corresponds to the Applicant's 40,630²⁵ tCO₂e (for 5CB) which takes all the possible developments (three A47 schemes, NWL, other roads, land-use planning developments) for the DS0 and removes the A47NTE for the DM. By contrast, $\Delta Solus (GHG)$ introduces the A47BNB on top the baseline network (**ie the current environmental situation**), with the cumulative impacts of the other road schemes and land-use developments being calculated as a further step, indicated by $\Delta Cumulative (GHG)$.
- 65 $\Delta Solus (GHG)$ and $\Delta Solus (Perf)$ will calculate different quantities of carbon. $\Delta Solus (GHG)$ will be a larger value than $\Delta Solus (Perf)$ because there will be a significant number of journeys which will exist in *DM (Perf, baseline)* and attributed in that configuration to the A47BNB, A47THI, NWL and land-use developments where these journeys would be assigned to the A47NTE itself in *DM (GHG, scheme)*. **In other words, the $\Delta Solus (Perf)$ carbon quantification used by the Applicant for its solus carbon assessment is an underestimate of the real carbon impact of the scheme.**

²⁴ The figure in Table 14-10 is 40,695 tCO₂e, but this needs to be adjusted for non-vehicle operational emissions (eg: lighting) as shown in REP1-023, Table 4 and text narrative adjacent to the Table.

²⁵ The figure in Table 14-10 is 40,695 tCO₂e, but this needs to be adjusted for non-vehicle operational emissions (eg: lighting) as shown in REP1-023, Table 4 and text narrative adjacent to the Table.

- 66 $\Delta Solus$ (GHG) and $\Delta Cumulative$ (GHG) are the carbon quantifications, are more accurate, and are the quantities which should be carried forwarded into the EIA compliant assessment.
- 67 My position is consistent – and just to link the expanded narrative above, for continuity, back to the variables in my Written Representation REP1-023, Table 4, DS^{A47NTE} corresponds to $DS0$ (Perf, all). As stated above, whereas the EIA Regs compliant **solus** assessment should be based on DS (GHG, scheme) - DM (GHG, baseline). The EIA Regs compliant cumulative assessment is provided by DS^{ACCU} in REP1-023, Table 4 and corresponds to DS (GHG, all) - DM (GHG, baseline) and as REP1-023, Table 4 says requires calculation as the traffic model configurations for this have yet to be provided by the Applicant.
- 68 Therefore from the above, and Table 2, more than one possible quantity can be calculated as an “increment due to the scheme”. $\Delta Solus$ (GHG) and $\Delta Solus$ (Perf) are each increments, where the only difference is the introduction of the A47NTE scheme, but which will each have different carbon quantifications. Therefore I prefer the term differential emissions, as it is neutral in meaning, and defined purely by the difference of two quantities. It avoids risking the error that one quantity which is an increment being considered the only possible increment. **For it is the nature of the model configurations fed into the differentiation which gives the semantics of the differential quantity.**
- 69 In summary, **for carbon assessment**, the wrong solus differential quantity has been used by the Applicant [$\Delta Solus$ (Perf) instead of $\Delta Solus$ (GHG)], and the cumulative differential [$\Delta Cumulative$ (GHG)], has not been calculated, or used, at all. **This error also requires that the transport models are run in the EIA Regs compliant configurations, and that the carbon assessment and Environmental statement is reworked.**
- 70 It is, however, preferable to compare carbon budgets, which express absolute values of carbon emissions, with absolute carbon emission quantifications of the scheme, as provided by DS (GHG, scheme) and DS (GHG, all). Absolute carbon emissions quantities are more directly comparable, and they also provide greater sensitivity in assessing solus and cumulative impacts.

4.6 “Inherently cumulative” and the nub of the applicant’s error

- 71 I now introduce a subtle issue which gets to the nub of **the error** in the Applicant’s oft stated notion that their **assessment** is “inherently cumulative”. This error results from the fact that “solus” and “cumulative” are terms which the Applicant has applied to quantifications of both **absolute emissions** and **differential emissions**.
- 72 The issue is apparent from Table 2 above. The applicant’s argument is that its $DS0$ model (ie $DS0$ (Perf, all) in Table 2) contains everything (ie: the A47NTE itself, the land-use changes, and the A47BNB, A47THI and NWL), and therefore it is “cumulative”. I accept this although I have referred to this as the “**all**” scenario. In unravelling the Applicant’s

confusion, here, I developed a nomenclature for Table 2 in which **only** differential emissions quantities are referred to as either solus or cumulative. This is because it is by referring to both absolute emissions (and the traffic models from which they are derived) and differential emissions as being solus or cumulative that the Applicant has confused the issue. DS0 is a carbon quantification expressed in **absolute emissions**, derived from a traffic model configuration contain **all** possible elements.

73 Similarly, the applicant's DM model (ie $DM (Perf, \underline{baseline})$ in Table 2) contains everything except the A47NTE, and the applicant refers to it as "cumulative". Again, output of $DM (Perf, \underline{baseline})$ is a carbon quantification expressed in **absolute emissions**, derived from a traffic model configuration containing **all** possible elements except the A47NTE.

74 However, it is the differential $\Delta Solus (Perf)$ which the applicant takes forward into its carbon assessment. As we have shown above, **without doubt**, this differential carbon quantification [$\Delta Solus (Perf)$] **results in a solus assessment** as it is derived from two absolute quantities [$DS (Perf, \underline{all}) - DM (Perf, \underline{baseline})$] whose only difference is the existence or not of the A47NTE.

75 The Applicant confuses the configurations of the traffic models which, when computed, express absolute vehicle kilometres, and absolute emissions, with the differential emissions which feed into its carbon assessment. In the case of the DS0 and DM traffic model configurations, they are both "all" (or "cumulative, or even "inherently cumulative") traffic model configurations, but the differential between them produces a solus carbon quantification, and therefore a solus carbon assessment.

76 This is the nub of the Applicant's error. They have taken traffic model configurations which may be reasonably to described as "inherently cumulative", but through a process of differentiation have produced from them a solus carbon quantification, and therefore a solus assessment of carbon emissions.

4.7 Remedy for the Applicant's error

77 First, for clarity, I should emphasise again that I am not saying that the performance-oriented models should not be run. I am aware of the importance of them for understanding the wider transport issues, and operational performance.

78 However, I am saying that, if differential emissions that are derived from different model runs, are to be used for carbon assessment, then the three additional models, which I identify in Table 2 as EIA Regs compliance oriented, need to be run to capture both the true solus impacts and the cumulative impacts of the scheme.

79 Overall as I stress elsewhere assessment of absolute carbon emissions is a far more reliable and sensitive approach. Some indicative numbers are shown in Table 3 later.

80 The remedy for this is that the additional transport modelling (EIA Regs compliance-oriented), as specified in Table 2, namely configurations *DM (GHG, baseline)*, *DS (GHG, scheme)* and *DS (GHG, all)* should be done. **As only a solus assessment (and as we describe above the wrong solus assessment) has been attempted in the Environmental Statement, it is unlawful and does not comply with the requirements of the NPS NN and the EIA Regs.**

81 Reg 20 of the EIA Regs provides for a set procedure²⁶ to be followed in cases where an “applicant has submitted a statement that the applicant refers to as an environmental statement” (reg 20(2)(a)) and “the Examining authority is of the view that it is necessary for the statement to contain further information” (reg 20(2)(b)).

82 “Further information” is defined in reg 3 as meaning:

“... additional information which, in the view of the Examining authority, the Secretary of State or the relevant authority, is directly relevant to reaching a reasoned conclusion on the significant effects of the development on the environment and which it is necessary to include in an environmental statement or updated environmental statement in order for it to satisfy the requirements of regulation 14(2);”

83 Reg 20(1) and (3) essentially require that – where further information is considered necessary (under Reg 20(2)) - the Applicant must provide that “further information”.

84 It is clear that the Environmental Statement does not comply with the requirements of the NPS NN and the EIA Regs. I have requested previously that the ExA consider this under EIA Reg 20 (at REP01-023, SUMMARY, non-compliance issue N_C-1; and in AS-016, my joint letter to A47BNB, A47NTE and A47THI ExA’s). **Following the demonstration without doubt that no cumulative carbon assessment has been made in the Environmental Statement, as described above, I now ask that the ExA now determines that the Reg 20 process needs to be followed in relation to this matter.** I respectfully suggest that it would be preferable, for all parties, to do this now rather than to delay until a later consultation process as in the case of A38 Derby Junctions application.

4.8 *Uncertainty Log v Cumulative Effects Assessment (CEA) screening*

85 The Uncertainty Log is not published in the Environmental Statement, although it is referenced indirectly in the Transport Case for example, the map at APP-140, Figure 4.10 shows the NATS DM (land use) Development locations and sections 4.4.7 indicate the three major highway schemes are in the uncertainty log.

²⁶ I am grateful to the recent legal submission to A38 Derby Junctions scheme, here and in subsequent paragraphs <https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/TR010022/TR010022-001491-Lewis%20Hadler%20-%20Derby%20Climate%20Coalition.pdf>

- 86 However, the Uncertainty Log is inconsistent with the CEA screening (“Appendix 15.1 – Cumulative Effects Assessment Long List” [APP-132] and “Appendix 15.2 – Cumulative Effects Assessment Shortlist” [APP-133]) produced for the Cumulative Effects Assessment in Chapter 15 [APP-054]. The key difference is that whilst the A47NTE, A47THI and NWL are quoted as being in the Uncertainty Log, only the NWL is listed in either APP-113 or APP-114.
- 87 The Applicant has frequently used the term “inherently cumulative” to refer to the DM and DS traffic model core scenarios. It is therefore astounding that the traffic modelling has not used the Cumulative Effects Assessment lists which are published as appendices, and which relate to cumulative assessment. I strongly suspect that the authors of the Traffic Assessment and the Cumulative Effects Assessment have worked in silos, and not communicated, which has resulted in two completely different sets of data being generated which purport to serve the same purpose. **The Applicant must provide an explanation of this.**

4.9 Transport Appraisal Guidance (TAG)

- 88 The Applicant frequently refers to the requirement in TAG to generate “with scheme” and “without scheme” scheme scenarios. For example, TAG UNIT A3 on Environmental Impact Assessment, 4.2.14 states “*Having calculated the carbon dioxide equivalent (CO_{2e}) emission levels for each year, the change between the ‘with scheme’ and ‘without scheme’ cases for each year can be calculated.*”
- 89 The process we have described is entirely consistent with this. There are in fact two possible solus calculations of the change between “with scheme” and “without scheme” in Table 2 - *DS (Perf, all) - DM (Perf, baseline) AND DS (GHG, scheme) - DM (GHG, baseline)*. As we have said, the former performance-oriented differential underestimates the true carbon impact of the scheme, and the latter EIA Regs compliance-oriented differential should be used. Then there is the cumulative calculation *DS (GHG, all) - DM (GHG, baseline)* – in this case, one is “with scheme” and the other is “without scheme”, with *DM (GHG, baseline)* also without other road scheme and land-use developments, enabling an EIA Regs compliant cumulative assessment of the “scheme with other developments” to be made.
- 90 Sensitivity testing is encouraged by TAG to test alternatives, and the Applicant themselves have provided the DS1 sensitivity test of the A48NTE scheme with and without the NWL. The EIA Regs compliance-oriented configurations introduced at Table 2 are just further variations of sensitivity tests. Apart from being unlawful as they do not provide for cumulative carbon assessment, the performance-oriented model configurations are part of a paradigm which has evolved for historic reasons, as explained above. And it is entirely reasonable to continue to approach operational performance of a road scheme by this traffic model configuration, and paradigm. However, the range of traffic model configuration needs to be extended with the EIA Reg compliance-oriented configurations

as described in Table 2, and narrative above, to meet the new paradigm of both solus and cumulative carbon assessment.

5 INDICATIVE ASSESSMENT COMPARISON BETWEEN THE DIFFERENT MODEL CONFIGURATIONS

91 Whilst this submission is focussed on carbon quantification (and KQ-1), Table 3 below shows the different carbon quantifications which have been discussed, and the different carbon assessments possible, all compared against the entire national carbon budget. (A further submission will be made for deadline D7, January 17th of carbon assessment).

	tCO₂e	4CB (2023-2027)	5CB (2028-2032)	6CB (2032-2037)
	UK CCC budget	1,950,000,000	1,725,000,000	965,000,000
A	Absolute Emissions / DS0 (Perf, all) / Cumulative	2,959,658	4,681,354	4,549,858
B	A as % of UK carbon CCC budget	0.15%	0.27%	0.47%
C	True cumulative differential against environmental baseline. <i>DS (GHG, all) - DM (GHG, baseline)</i>	>>G ²⁷	>>G	>>G
D	C as % of UK carbon CCC budget	?	?	?
E	True solus differential against environmental baseline. <i>DS (GHG, scheme) - DM (GHG, baseline)</i>	> G ²⁸	> G	>G
F	E as % of UK carbon CCC budget	?	?	?
G	Differential DS0 (Perf, all) - DM (Perf, baseline) - NB: DM model is overestimate, carbon quantification is an underestimate	111,626	40,695	41,774
H	H as % of UK carbon CCC budget	0.0057%	0.0024%	0.0043%
J	Sensitivity factor absolute emissions cf differential DS-DM emissions (B/H)	27	115	109

Table 3

92 Note for simplicity here I have just used the figures directly out of REP3-014, Chapter 14, Table 14-10, although I have noted above that they need to be adjusted for non-vehicle operation emissions. I also include construction and operation emissions together for 4CB as the Applicant does in their assessment.

²⁷ Due to the cumulative effects of a number of developments, row C figures will be much greater than row G figures.

²⁸ Due to the underestimate of carbon quantities in the row G figures, row E figures will be greater than row G figures.

93 This shows that when the absolute emissions DS0 (Perf, all) are assessed, very significant carbon impacts are found (see row B), and the impact of the scheme, cumulated with the other developments and schemes, and other elements in the traffic model is 0.47% of the national 6th carbon budget (6CB). Half a percent for a relatively small scheme in a small area of Norfolk (ie Broadland) is very significant - this comparison shows that, very limited emission space is left for any other sectors such as industry, domestic, agriculture and land-use, and very considerable amounts of carbon would need to be offset somewhere else in the economy if this road were to be built.

6 Interpretation of the NPS NN

94 I note that the term “*material impact*” is not defined in the NPS NN. It must, therefore, be a matter of (rational) judgment as to what having a “*material impact on the ability of Government to meet its carbon reduction targets*” means at NPS NN 5.18.

95 I submit²⁹ that “*material*” means anything that is non-negligible ie: if a project’s carbon impacts will have a non-negligible impact on the ability of Government to meet its carbon reduction targets, then this can – according to the NPSNN – be a reason to refuse development consent.

96 There is a very spectrum of sensitivity of carbon assessment depending on the variables used – both (i) how carbon is quantified (KQ-1) and (ii) against what budget/target the emissions is compared to (KQ-2). I have only used the entire UK national carbon budget in Table 3 which dilutes the effects of the carbon emissions associated with the A47NTE into the entire economy in Table 3.

97 The single assessment that the Applicant has carried out corresponding to row H which as I show above is, anyway, **the wrong solus quantification** and overestimates the DM case, **so that the DS0 – DM calculation underestimates the incremental effect of the A47NTE presents only the result at the most extreme (lowest) end of this spectrum.** Table 3 shows that in the 6CB period, the value is over 100 times smaller than the assessment based on the absolute carbon figure.

98 The ExA and SoS should appreciate that a full range of assessment values is required to properly assess whether the Scheme will have a material impact on the Government’s ability to meet its carbon reduction targets.

99 The ExA and SoS need to consider all relevant carbon reduction targets that apply to the Scheme’s operation. This will require a consideration of the Net Zero target and the impact that the Scheme’s non-negligible emissions contribution will have on achieving that target. The SoS can only sensibly conclude that a Scheme of this size and impact *will*

²⁹ I am grateful to the recent legal submission to A38 Derby Junctions scheme, here and in subsequent paragraphs <https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/TR010022/TR010022-001491-Lewis%20Hadler%20-%20Derby%20Climate%20Coalition.pdf>

have a material impact on the Government's ability to meet the Net Zero target (because it will make that target substantially harder to meet) even if the target can still technically be met (through compensatory action taken elsewhere).

100The ExA and SoS must also consider any assessment of carbon impacts within the context of the parliamentary declared Climate Emergency, particularly in which a considerable amount of the Scheme's expected emissions (including all its construction emissions) will take place within the next 10 years – a period which the scientific community now accepts will be crucial in addressing climate change.

101Notwithstanding the need to rework the Environmental Statement for the modelling configurations at Table 2 above so that EIA Regs compliance may be demonstrated, the ExA and SoS cannot rely on the limited information provided by the Applicant in its Environmental Statement to conclude that the Scheme will not materially impact on the Government's ability to achieve its carbon reduction targets.

102In light of all of the above, and notwithstanding the need to rework the Environmental Statement by the Applicant, the Scheme clearly will, on even the indicative information in Table 3, have a material impact on the Government's ability to achieve its carbon reduction targets and **this impact represents a clear reason for refusal.**

7 TRANSPARENCY OF COMPUTER MODELLING

7.1 *The Algorithmic Transparency Standard*

103The Government recently announced an "Algorithmic Transparency Standard" at [REDACTED] under the Central Digital and Data Office in the Cabinet Office. Under the new approach, government departments and public sector bodies will be required to explain where an algorithm was used, why it was used and whether it achieved its aim. There will also be an obligation to reveal the architecture behind the algorithm.

104This follows from the debate on computing, AI and data in public bodies where decision may be made by computer or based on computer outputs. It also applies to decision making and one of the scopes is software that "has a potential legal, economic, or similar impact on individuals or populations" which includes transport models used for decision making of carbon in planning.

105The need for such transparency was foreseen by Supreme Court judge Lord Sales in a 2019 speech³⁰ "Algorithms, Artificial Intelligence and the Law" which includes the key paragraph:

■ [REDACTED]

“The question then arises, how should we provide for ex ante review of code in the public interest? If, say, a government department is going to deploy an algorithmic program, it should conduct an impact assessment, much as it does now in relation to the environmental impacts and equality impacts in relation to the introduction of policy. ...

Therefore, there seems to be a strong argument that a new agency for scrutiny of programs in light of the public interest should be established, which would constitute a public resource for government, Parliament, the courts and the public generally. It would be an expert commission staffed by coding technicians, with lawyers and ethicists to assist them.”

106I have previously noted that the Applicant is in breach of the Aarhus Convention in providing very limited description of the traffic models and how they are configured, meaning that limited scrutiny of this aspect of the Environmental Statement is possible. For example, in my WR at REP1-023, I noted this non-compliance:

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.

107I have made best endeavours to disentangle the information in the Environmental Statement, working in good faith, and following my statement of truth on page 1 of this document “**In so far as the facts in this statement are within my knowledge, they are true. In so far as the facts in this statement are not within my direct knowledge, they are true to the best of my knowledge and belief**”. However, the current presentation of the material is largely opaque and hides much about the operation of the traffic models.

108The issues raised here on compliance with the EIA Regulations could be understood and better presented to the ExA and SoS if further information on the traffic models were released.

109The Algorithmic Transparency Standard is at a pilot stage and being tested by several government departments and public sector bodies in the coming months before being reviewed again and formally launched next year. Notwithstanding this, it is a standard that the Applicant as a public body, or publicly owned company, will be required to comply with in the future. It would be valuable to the examination if the Applicant were to provide more information of the architecture, and the configuration of, their traffic models. **For algorithmic transparency, I respectfully request that the ExA requires a fuller explanation of how the traffic models used by the Applicant for the Environmental Assessment function and link together.**

7.2 NATS-2015 model

110 Not unrelated to the previous section, my WR REP1-023 presented concerns to the ExA about different versions of the NATS model being used for the A47NTE scheme and NWL: the A47NTE using the older NATS-2015 architecture, and the NWL using the NATS-2019 architecture. I also presented data that shows there is a major inconsistency between the modelling of the NWL between the NATS-2015 and NAT-2019 models, and presented questions that need answered before any of the traffic modelling (on A47NTE or on NWL) can be trusted. The relevant section of REP1-023 is section 4.2 (bullets 81 – 88). I also noted as a non-compliance:

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.

111 I am not aware that the Applicant has provided any answer on this point yet, and respectfully ask the ExA to request an explanation and response to the questions raised in REP1-023.

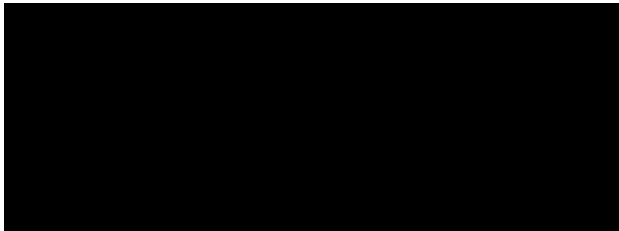
8 CONCLUSIONS

112The evidence is compelling that the Environmental Statement breaches the EIA Regulations in its assessment of carbon emissions. It is **without doubt** that only a solus carbon assessment has been made, and then on the wrong solus calculation which underestimates the impact.

I 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.

113**Further, I repeat my request that cumulative carbon emissions are considered together for the A47BNB, A47NTE and A47THI examinations.** All three DCO applications have the same issues as those laid out in this submission, and in my letter AS-016. In practical terms, this would require suspension of each examination under EIA Regulation 20, and then requiring the necessary remodelling and changes to the Environmental Statements for each scheme from a common “written statement” under EIA Regulation 20 (1)(a), (b) and (c).

I note that Mr David Pett, lawyer for the Stop the Wensum link campaign, has also submitted a Deadline D1 WR which has identified further information that is required in the Environmental Statement for ecological assessment, especially of barbastelle bats, and has requested that this is also considered under EIA Regulation 20. Taken together, the examinations(s) should be suspended so that the Environment Statement(s) can be made compliant with the EIA Regs.



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

9 APPENDIX A: Updated resume, Dr Andrew Boswell

I am an independent scientist and environmental consultant, working at the intersection of science, policy, and law, particularly relating to ecology and climate change. I work at a consultancy called Climate Emergency Policy and Planning (CEPP).

I realised recently that my life-scientific goes back over 50 years to when aged 14 I became passionate by the mystery of quantum mechanics. As an undergraduate, I studied for BSc 1977, 1st class honours in Chemistry at Imperial College London. My doctoral work³¹, at Oxford University was supervised by Professor R J P Williams, FRS, and was in structural biology, protein binding sites and dynamics (DPhil³², 1981). I later did an MSc in the then emerging area of “Parallel Computing Systems” at the University of the West of England (1994).

Most of my career has been in scientific computation and modelling. Between 1985 and 1993, I engaged in the software engineering, and testing, of modelling and simulation systems for the high-level design and logic synthesis of Very Large Scale Integrated (VLSI) circuits. These simulation systems were state of the art UK software³³, and in the 1980s and 1990s were at the forefront of formal, mathematical based, methods in the verification of computer systems, both hardware and software, used in applications such as fly-by-wire commercial aircraft. Commercial customers of our products were running software models of microprocessors and Application Specific Integrated Circuits (ASICs), at that time³⁴, of up to one million transistors.

Between 1995 and 2006, I ran the high-performance computer service at the University of East Anglia (UEA), and I supported the university’s scientific research community in running models, across a range of sciences, on a small supercomputer which I developed and manged. I have a wide understanding of the principles and practice of modelling complex systems which I bring to my current work.

I provided consultancy across the science faculties at UEA on computer modelling. This ranged from advising several generations of PhD and post-doctoral research students on modelling issues including detailed program coding issues; advising professors and research leaders on system and architectural issues of modelling, and in many cases programming solutions for them; testing and debugging extremely complex modelling systems for scientists who did not have the relevant IT skills in forensic fault finding; systems administration of servers and several iterations of high-performance computers; and running training courses of parallel computing and scientific

³¹ My doctoral supervisor was the prolific, much loved and highly missed, British chemist, Napier Royal Society Research Professor R J P Williams, FRS, MBE, see [REDACTED]

³² DPhil title: “Nuclear Magnetic Resonance Studies of Modified Eukaryotic Cytochrome c”

³³ See references to Electronic Logic Language (ELLA), one of the systems on which I worked, in “The development and deployment of formal methods in the UK”, (2020)

[REDACTED], Cliff Jones and Martyn Thomas, Professor at Gresham College. Professor Thomas was one of my mentors in computing and a superior colleague of mine from 1985-1992 when we both worked at Praxis Systems plc where he was a founding Director.

³⁴ One million was cutting edge at the time! Transistor counts now exceed two trillion on a single chip

computing languages across the campus. Supporting scientists running climate models in UEA's esteemed Environmental Science department was a significant part of my work too.

Due to the climate crisis, from 2005 I have been involved in campaigning and politics, and have also been a Green Party Councillor on Norfolk County Council 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 Bill³⁵, drafted by scientists, legal experts, ecological economists, and environmentalists, and designed specifically to reverse the climate and ecological breakdown that we are facing. The Bill recently had a second reading in the House of Commons.

