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### **DEADLINE D5 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, provides only for a solus<sup>1</sup> assessment, and not a cumulative assessment, when differential emission quantities are taken forward for assessment (as is the case in the Application). **Without doubt**, the carbon assessment based on these quantities is 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 carbon assessment. I define the traffic model configurations required so that cumulative assessment of the carbon impacts of the scheme is possible. Although, the point of concern 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

<sup>1</sup> Solus means, here, “alone; separate” as in the first definition in the Collins on-line dictionary

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 the A47THI 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 DS models beyond the A47BNB, A47THI and NWL.
- Traffic modelling, carbon quantification and assessment based on the three EIA Regs compliance-oriented traffic models which I define at Table 2. **This is required for EIA Regs compliance.** This modelling should be provided for both the NATS 2015 base year model architecture and the NATS 2019 base year model architecture as the Applicant has indicated they have access to NATS 2019.
- An analysis of which other environmental factors, for example noise, 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 from both the Applicant, and from Norfolk County Council, to my questions in my written representation, REP1-029, 114-122 about the NATS 2015 and NATS 2019 models, the inconsistencies between them, and the marked difference in traffic volumes and changes in increases/decreases in traffic over time between the two models.

Further, I request that the ExA requests that Norfolk County Council to provide more information on the very different NATS 2015 and NATS 2019 modelling of the NWL. The different configurations (or "combinations") of road network links needs to be fully explained in detail by NCC.

**Following the demonstration without doubt that no cumulative carbon assessment has been made in the Environmental Statement, I now respectfully 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-011. 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).

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## 1 INTRODUCTION

### 1.1 *Deadline 5 (D5)*

- 1 This is my submission for Deadline 5. It follows my written representation at REP1-029 at D1.
- 2 I will comment on:
  - A. REP2-006, the Applicant's responses to ExQ1.
  - B. REP2-007, and the Applicant's response my WR within it.
  - C. REP3-019, the Applicant's Written Summary of Oral Submissions at ISH1.
  - D. PD-008, the ExQ2.
- 3 I thank the ExA for his consideration of my letters of (1) October 24<sup>th</sup> [AS-011] requesting for cumulative carbon emissions to be considered together for the A47BNB, A47NTE and A47THI examinations, and (2) October 27<sup>th</sup> [AS-012] 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 1<sup>st</sup> (including deadlines on three other PINS NSIP examinations in the last 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, nor do I cover carbon assessment in detail in this submission (this D5 submission covers carbon quantification).

All the same, the evidence in this document, demonstrates **without doubt** that the Environmental Statement is unlawful on considerations of carbon quantification alone. I will submit further evidence at Deadline D6, January 18<sup>th</sup> to cover other areas, including carbon assessment, not covered here.

**1.2 Recent changes to relevant policy**

- 5 Since the examination opened on 23<sup>rd</sup> September 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 Plan<sup>2</sup> (TDP) which requires ambitious quantifiable carbon reductions in transport at the local level was published on the 14<sup>th</sup> July 2021.
  - (b) The Government’s Net Zero Strategy<sup>3</sup> (NZS) backing the urgent need for ambitious quantifiable carbon reductions in transport, at the local level was published on 19<sup>th</sup> October 2021.
  - (c) HM Treasury Green Book supplement providing specific guidance on how analysts should quantify and value emissions of GHGs<sup>4</sup> was published in October 2021.
  - (d) Government policy paper<sup>5</sup> 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 guidance<sup>6</sup> and TAG data book, including changes to emissions factors, was published on 29<sup>th</sup> November 2021
  - (f) Highways England Carbon Reporting Tool<sup>7</sup> 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 tool<sup>8</sup>.
- 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 D6, January 18<sup>th</sup>.

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2 [REDACTED]

3 [REDACTED]

4 “Valuation of energy use and greenhouse gas: Supplementary guidance to the HM Treasury Green Book on Appraisal and Evaluation in Central Government”  
[REDACTED]

5 “Valuation of greenhouse gas emissions: for policy appraisal and evaluation”, [REDACTED]

6 [REDACTED]

7 [REDACTED]

8 [REDACTED]

**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”, 27<sup>th</sup>, October 2021, legal letter<sup>9</sup>
- Derby Climate Coalition, “Response to the Secretary of State's Consultation of 23 September 2021”, 27<sup>th</sup>, October 2021, Expert report of Dr Boswell<sup>10</sup>

**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.

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<sup>9</sup> [REDACTED]

<sup>10</sup> [REDACTED]

### 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 [REP3-006] 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 103<sup>11</sup> [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 (DS) traffic modelling output (and not from the “net” DS - 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 CARBON QUANTIFICATION AND ASSESSMENT**

16 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?

17 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 typography<sup>12</sup>) [eg: REP1-029, section 2.11]
- Baseline, solus<sup>13</sup> and cumulative emissions [eg: REP1-029, section 2.4]
- Spatial scales of quantification [eg: REP1-029, section 2.7 and 2.8]
- Short-term, medium-term and long-term [eg: REP1-029, section 2.12 and 2.13]

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

- Absolute v differential (delta) emissions [eg: REP1-029, section 5.1, and see definitions above]
- Local, regional and national [eg: REP1-029, sections 2.7 and 2.8]

19 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

20 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 D6, January 18<sup>th</sup> January, although the final section of this submission makes an indicative comparison of different assessments.

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<sup>12</sup> REP1-029, Table 1 and narrative

<sup>13</sup> Solus means, here, "alone; separate" as in the first definition in the Collins on-line dictionary



### 3 CARBON QUANTIFICATION AND THE TRANSPORT ASSESSMENT

- 21 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 [REP1-029, section 2.1]. The question as to how carbon is quantified depends upon the configurations of the traffic modelling.
- 22 The Applicant has laid out how it has configured DM and DS core scenarios (ie **two** traffic model configurations) in the "**Transport Case** for the Scheme" [APP-125, 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.

#### 3.1 Core scenarios in the Traffic models (Transport Case)

- 23 This section gives a high-level description of how the traffic models are configured, and the elements of interest to us here.
- 24 Local developments listed in the uncertainty log, regarded at least 'near certain' or 'more than likely', are included in both the DM and DS configurations [APP-125, 4.3.21-4.3.28]. In total eleven identified development sites are situated in the local area, with six in Cringleford, two in Hethersett and three in Wymondham.
- 25 Major highway schemes – the A47BNB, A47THI and the NWL are also included [APP-125, 4.4.3], and this summarised at APP-125, 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.**

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.

	Performance-oriented (ie as in APP-125)	
	<i>DM (Perf, baseline)</i>	<i>DS (Perf, all)</i>
2015 Baseline Highway network	✓	✓
A47THI scheme	✗	✓
A47BNB	✓	✓
A47NTE	✓	✓
NWL	✓	✓
Additional major highway schemes, unspecified	✓	✓
11 Local developments (APP-125, 4.3.23, uncertainty log)	✓	✓
Forecast changes in trip demand (VDM)	✓	✓

**Table 1**

26 The red ellipse indicates the only change in the configuration between the DM and DS scenarios is the presence, or not, of the A47THI in the modelling.

27 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-125.

The “all” in *DS (Perf, all)* [the Applicant’s DS model in APP-125] 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.

28 The operational performance of the DM and DS configurations are described in APP-125, sections 4.5 - 4.9. I note sensitivity tests have been performed on the traffic model to test various performance issues under section 4.9 “Operational Modelling Assessment”, and growth/uncertainty assumptions:

- a. APP-125, 4.9.3/4.9.5: the effect of removing the B1172 bus lane
- b. Two sensitivity tests have therefore been undertaken, considering changes to traffic growth and uncertainty of assumptions

29 However, these are local sensitivity tests for performance: they are not sensitivity tests on the wider and larger-scale issues such as the effects of other large scale road schemes in the area.

30 I now describe how the outputs of DM and DS are translated into the carbon quantifications in REP3-006, Chapter 14, Climate.

### 3.2 Carbon quantification from the core scenarios

- 31 It is clear from Table 1 that the only difference in configuration between the DM core scenario and the DS core scenario is the A47THI scheme. Therefore differentials generated from between the outputs of these two model configurations (ie: DS – DM) are attributable only the A47THI 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).
- 32 This is what happens in the Environmental Statement when the carbon assessment is performed based on the *DM (Perf, baseline)* and *DS (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 4,673,125 tCO<sub>2</sub>e as in REP3-006, Table 14-10, whilst *DS (Perf, all)* corresponds to the Applicants DS value of 4,681,042<sup>14</sup> tCO<sub>2</sub>e.
- 33 Then in REP3-006, Table 14-10, the differential eg: *DS (Perf, all) - DM (Perf, baseline)*<sup>15</sup> quantities are calculated. For example, 7,917<sup>16</sup> tCO<sub>2</sub>e is **a differential value of carbon emissions** for the vehicle emissions in the 5CB period.
- 34 Whilst the Applicant presents in REP3-006, Table 14-10, for the 4<sup>th</sup>, 5<sup>th</sup> and 6<sup>th</sup> carbon budgets (4CB, 5CB and 6CB) both the absolute carbon quantifications (ie: DS and DM), and the differential carbon quantifications (ie: DS - DM), which derive from the traffic model configurations, it **only** takes forward the differential carbon quantifications into the assessment stage.
- 35 Therefore, the solus differential (DS - DM) values are the Applicant’s key carbon quantifications as presented in REP3-006, Table 14-10, and the **only** quantities which the Applicant takes forward into the carbon assessment stage.
- 36 **Without doubt**, from the explanation above, the quantity of 7,917<sup>17</sup> tCO<sub>2</sub>e 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 A47THI 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

<sup>14</sup> The figure in Table 14-10 is 4,681,132 tCO<sub>2</sub>e, but this needs to be adjusted for non-vehicle operational emissions (eg: lighting) as shown in REP1-029, Table 4 and text narrative adjacent to the Table.

<sup>15</sup> Referred to a DS – DM in Chapter 14, Table 14-10.

<sup>16</sup> The figure in Table 14-10 is 8,008 tCO<sub>2</sub>e, but this needs to be adjusted for non-vehicle operational emissions (eg: lighting) as shown in REP1-029, Table 4 and text narrative adjacent to the Table, giving the 7,917 tCO<sub>2</sub>e figure.

<sup>17</sup> The figure in Table 14-10 is 8,008 tCO<sub>2</sub>e, but this needs to be adjusted for non-vehicle operational emissions (eg: lighting) as shown in REP1-029, Table 4 and text narrative adjacent to the Table, giving the 7,917 tCO<sub>2</sub>e figure.

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.**

37 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.**

38 The Applicant confirms that the traffic modelling which they have presented aligns with Table 1, and the above narrative. For example, at REP3-019, page 26, the Applicant states:

*“**Assessment** has been with other road projects such as the A47 Blofield to North Burlingham, A47 North Tuddenham to Easton and the Norwich Western Link. These have been put within the 'do minimum' baseline.”*

39 The first sentence is not true – the first word should read “**Quantification**”, not “Assessment”, as I will explain. The second sentence is true in confirming alignment with Table 1 and the analysis above.

### 3.3 Response to Annex A of the Applicant's oral submissions of ISH1 [REP3-019]

40 Annex A, bullets 1, 3 and 5 of the Applicant's oral submissions of ISH1 [REP3-019], presents the NNNPS as the overriding legislation, and does not acknowledge that the requirements of EIA Regulations must also be met. **Overall, the lengthy annex does not address the key truth that the Environmental Statement does not comply with the EIA Regulations.** As I have laid out above, the key step of carbon quantification has been based on traffic model configurations which in their making, and based on a differential emissions assessment, only allow for a solus assessment. No cumulative assessment has been done, and the solus assessment which has been done underestimates the quantity of carbon associated with the A47THI scheme, as I will explain later.

### 3.4 The EIA Regulations

41 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, in Common Response G of REP1-004, “Applicants Comments on Relevant Representations”, the Applicant says:

*“The Scheme is also assessed against legislated carbon budgets in Chapter 14 (APP-051), which are also **inherently cumulative** as they consider emissions across all sectors in the economy. **The assessment of climate effects has been provided in accordance with the National Networks National Policy Statement (NNNPS).**”  
(my emphasis)*

- 42 First, an aside, to note that the first sentence about nationally legislated carbon budgets being “inherently cumulative” is a spurious truism, but only in part. It is a “**part**” truism because the carbon budgets do not contain all emissions anyway: notably aviation, shipping and consumptions emissions are not accounted for in the UK 4<sup>th</sup> and 5<sup>th</sup> carbon budgets. It is **spurious**, because it states the obvious and beyond that has no relevance to the assessment of cumulative impacts of carbon emissions, and demonstrating compliance with relevant definitions of “cumulative” within the regulations and guidance. It is obvious that the sum of all possible emissions (notwithstanding the ones omitted as just noted) is cumulative, but it tells us no more than the fact that counting (or summing) the apples in one’s shopping basket is inherently cumulative.
- 43 Second, the final sentence ignores the EIA Regs requirement for cumulative assessment and suggests that the NNNPS is somehow sovereign on the matter.
- 44 However, 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).
- 45 As I have previously explained<sup>18</sup>, 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 law<sup>19</sup>, 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.”*

- 46 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]).

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<sup>18</sup> For example, REP1-029, section 2.1

<sup>19</sup> I am grateful to the recent legal submission to A38 Derby Junctions scheme [TR010022], of 27<sup>th</sup> October 2021, here,

47 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?

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 DS) has demonstrated **without doubt** that **only a solus quantification and, therefore, only a solus assessment has been made by the applicant.**

### 3.5 The overall picture – solus and cumulative assessment

48 From the above, it is clear that the restricted configurations of the traffic model in the Transport Case in APP-125 allows only a solus carbon assessment to be made. I now show how cumulative assessment may be performed.

49 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: DS 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 engineering<sup>20</sup>, 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-125.

50 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: DS - DM) are extracted). **Put simply, and as explained below,**

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<sup>20</sup> As an aside, it is concerning to read at APP-125, 4.14.4, that it is assumed that traffic growth will continue into the future, and should be supported:

*"This encourages growth in the local area from the Wymondham and Hethersett residential developments, as well as providing capacity for future regional traffic growth up to 2040."*

The assumption is peppered throughout APP-125 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.

an additional complementary approach to the modelling is needed to properly assess carbon impacts, both solus and cumulative, when differential emissions are being used.

- 51 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 DS - 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 the wrong solus assessment, and which are therefore 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.**
- 52 Table 2 builds on Table 1 above, and shows the additional 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-125)		EIA Regs compliance-oriented (eg: for impact assessment of GHGs)			Example sensitivity test
	DM (Perf, baseline)	DS (Perf, all)	DM (GHG, baseline)	DS (GHG, scheme)	DS (GHG, all)	DS (ST1)
2015 Baseline Highway network	✓	✓	✓	✓	✓	✓
A47THI scheme	✗	✓	✗	✓	✓	✓
A47BNB	✓	✓	✗	✗	✓	✗
A47NTE	✓	✓	✗	✗	✓	✗
NWL	✓	✓	✗	✗	✓	✗
Additional major highway schemes, unspecified	✓	✓	✗	✗	✓	✗
11 Local developments (APP-125, 4.3.23, uncertainty log)	✓	✓	✗	✗	✓	✓
Forecast changes in trip demand (VDM)	✓	✓	✓	✓	✓	✓

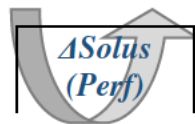


Table 1

- 53 In Table 2, I identify six *Traffic Model configurations* and give each a name eg: *DM (Perf, baseline)*. *DM (Perf, baseline)* and *DS (Perf, all)* are the two presented by the Applicant as in APP-125, as discussed above.
- 54 I have introduced three EIA Regs compliance-oriented configurations. There are many potential configurations. For example, I bundle the three road schemes (A47BNB, A47NTE 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 A47THI scheme *DS (GHG, scheme)*, against planned land-use developments (but with no other new road schemes introduced).
- 55 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.
- 56 Each of the six 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 *DS (Perf, all) - DM (Perf, baseline)*, and its associated Chapter 14, Table 14-10 5CB value of 7,917<sup>21</sup> tCO<sub>2e</sub>, are a further derivation of the data, and are expressions of differential quantities of carbon emissions for the vehicle emissions.

### 3.6 *Differential emissions and the semantics of increments*

- 57 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 7,917<sup>22</sup> tCO<sub>2e</sub> (for 5CB) which takes all the possible developments (three A47 schemes, NWL, other roads, land-use planning developments) for the DS and removes the A47THI for the DM. By contrast,  $\Delta Solus (GHG)$  introduces the A47THI 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  $\Delta Cumulative (GHG)$ .
- 58  $\Delta Solus (GHG)$  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

<sup>21</sup> The figure in Table 14-10 is 8,008 tCO<sub>2e</sub>, but this needs to be adjusted for non-vehicle operational emissions (eg: lighting) as shown in REP1-029, Table 4 and text narrative adjacent to the Table, giving the 7,917 tCO<sub>2e</sub> figure.

<sup>22</sup> The figure in Table 14-10 is 8,008 tCO<sub>2e</sub>, but this needs to be adjusted for non-vehicle operational emissions (eg: lighting) as shown in REP1-029, Table 4 and text narrative adjacent to the Table, giving the 7,917 tCO<sub>2e</sub> figure.



number of journeys which will exist in *DM (Perf, baseline)* and attributed in that configuration to the A47BNB, A47NTE, NWL and land-use developments where these journeys would be assigned to the A47THI itself in *DM (GHG, scheme)*. **In other words, the *ΔSolus (Perf)* carbon quantification used by the Applicant for its solus carbon assessment is an underestimate of the real carbon impact of the scheme.**

59 *ΔSolus (GHG)* and *ΔCumulative (GHG)* are the carbon quantifications, are more accurate, and are the quantities which should be carried forwarded into the EIA compliant assessment.

60 My position is consistent – and just to link the expanded narrative above, for continuity, back to the variables in my Written representation REP1-029, Table 4,  $DS^{A47THI}$  corresponds to *DS (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 REP1-029, Table 4 and corresponds to *DS (GHG, all) - DM (GHG, baseline)* and as REP1-029, Table 4 says requires calculation as the traffic model configurations for this have yet to be provided by the Applicant.

61 Therefore from the above, and Table 2, more than one possible quantity can be calculated as an “increment due to the scheme”. *ΔSolus (GHG)* and *ΔSolus (Perf)* are each increments, where the only difference is the introduction of the A47THI 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.**

62 In summary, **for carbon assessment**, the wrong solus differential quantity has been used by the Applicant [*ΔSolus (Perf)* instead of *ΔSolus (GHG)*], and the cumulative differential [*ΔCumulative (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.**

63 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.

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

64 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**.

- 65 The issue is apparent from Table 2 above. The applicant’s argument is that its DS model (ie *DS (Perf, all)* in Table 2) contains everything (ie: the A47THI itself, the land-use changes, and the A47BNB, A47NTE 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. DS is a carbon quantification expressed in **absolute emissions**, derived from a traffic model configuration contain **all** possible elements.
- 66 Similarly, the applicant’s DM model (ie *DM (Perf, baseline)* in Table 2) contains everything except the A47THI, and the applicant refers to it as “cumulative”. Again, output of *DM (Perf, baseline)* is a carbon quantification expressed in **absolute emissions**, derived from a traffic model configuration containing **all** possible elements except the A47THI.
- 67 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, all)* - *DM (Perf, baseline)*] whose only difference is the existence or not of the A47THI.
- 68 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 DS 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.
- 69 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.

### 3.8 Remedy for the Applicant’s error

- 70 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.
- 71 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.

- 72 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.
- 73 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.**
- 74 Reg 20 of the EIA Regs provides for a set procedure<sup>23</sup> 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)).
- 75 “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);”*
- 76 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”.
- 77 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 REP1-029, SUMMARY, non-compliance issue N\_C-1; and in AS-011, 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.

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<sup>23</sup> I am grateful to the recent legal submission to A38 Derby Junctions scheme, here and in subsequent paragraphs

### 3.9 *Uncertainty Log v Cumulative Effects Assessment (CEA) screening*

- 78 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-125, Figure 4.10 and Table 4.2 show the NATS DM (land use) Development locations.
- 79 However, the Uncertainty Log is inconsistent with the CEA screening (“Appendix 15.1 – Cumulative Effects Assessment Stage 2 Screening (long list)” [REP4-016] and “Appendix 15.2 Cumulative Effects Development Type (Short List)” [APP-118]) produced for the Cumulative Effects Assessment in Chapter 15 [APP-054]. The key difference is that whilst the A47BNB, A47THI and NWL are quoted as being in the Uncertainty Log, none are listed in either REP4-016 or APP-118.
- 80 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.**

### 3.10 *Transport Appraisal Guidance (TAG)*

- 81 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<sub>2</sub>e) emission levels for each year, the change between the ‘with scheme’ and ‘without scheme’ cases for each year can be calculated.*”
- 82 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.
- 83 Sensitivity testing is encouraged by TAG to test alternatives, and the Applicant themselves have provided sensitivity tests of the A47THI scheme. However, I have noted that these are local sensitivity tests for performance: they are not sensitivity tests on the

wider and larger-scale issues such as the effects of other large scale road schemes in the area.

- 84 The EIA Regs compliance-oriented configurations introduced at Table 2 are just further variations of sensitivity tests. Apart from being unlawful when used solely by themselves 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 configurations 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.

#### 4 INDICATIVE ASSESSMENT COMPARISON BETWEEN THE DIFFERENT MODEL CONFIGURATIONS

85 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 D6, January 18<sup>th</sup> on carbon assessment).

	<b>tCO<sub>2</sub>e</b>	<b>4CB (2023-2027)</b>	<b>5CB (2028-2032)</b>	<b>6CB (2032-2037)</b>
	<b>UK CCC budget</b>	<b>1,950,000,000</b>	<b>1,725,000,000</b>	<b>965,000,000</b>
<b>A</b>	<b>Absolute Emissions / DS (Perf, all) / Cumulative</b>	<b>2,897,914</b>	<b>4,681,132</b>	<b>4,549,279</b>
<b>B</b>	A as % of UK carbon CCC budget	0.15%	0.27%	0.47%
<b>C</b>	True cumulative differential against environmental baseline. <i>DS (GHG, all) - DM (GHG, baseline)</i>	>>G <sup>24</sup>	>>G	>>G
<b>D</b>	C as % of UK carbon CCC budget	?	?	?
<b>E</b>	True solus differential against environmental baseline. <i>DS (GHG, scheme) - DM (GHG, baseline)</i>	> G <sup>25</sup>	> G	>G
<b>F</b>	E as % of UK carbon CCC budget	?	?	?
<b>G</b>	<b>Differential DS (Perf, all) - DM (Perf, baseline) - NB: DM model is overestimate, carbon quantification is an underestimate</b>	<b>29,707</b>	<b>8,008</b>	<b>10,180</b>
<b>H</b>	H as % of UK carbon CCC budget	0.0015%	0.0005%	0.0011%
<b>J</b>	Sensitivity factor absolute emissions of differential DS-DM emissions (B/H)	98	585	447

**Table 3**

86 Note for simplicity here I have just used the figures directly out of REP3-006, 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.

87 This shows that when the absolute emissions *DS (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

<sup>24</sup> Due to the cumulative effects of a number of developments, row C figures will be much greater than row G figures.

<sup>25</sup> Due to the underestimate of carbon quantities in the row G figures, row E figures will be greater than row G figures.

national 6<sup>th</sup> carbon budget (6CB). Half a percent for a relatively small scheme in a small area of Norfolk (ie South Norfolk) 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.

## 5 INTERPRETATION OF THE NPS NN

- 88 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.
- 89 I submit<sup>26</sup> 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.
- 90 There is a very wide 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 A47THI into the entire economy in Table 3.
- 91 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 DS – DM calculation underestimates the incremental effect of the A47THI presents only the result at the most extreme (lowest) end of this spectrum.** Table 3, row J, shows that in the 5CB and 6CB periods, the value is over 446 times smaller than the assessment based on the absolute carbon figure.
- 92 The differential solus emissions reported for the Scheme in the 6th carbon budget are 10,180 tCO<sub>2</sub>e, corresponding to 0.0011% at Table 3 above. However, this carbon quantification **is wrong and an underestimate** as I have reported above (it results from the performance-orientated traffic models, rather than EIA Regulation compliance-orientated traffic models).
- 93 In any case, even if it were correct and it is not, the figure is at the most extreme (lowest) end of the possible spectrum of carbon quantification. An assessment should be made using absolute carbon quantities to show the real impact of the road system including the A47THI against the relevant carbon budgets.

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<sup>26</sup> I am grateful to the recent legal submission to A38 Derby Junctions scheme, here and in subsequent paragraphs

- 94 I have provided an indicative version of such an assessment at Table 3 above. For the 6CB, the absolute DS emissions corresponding to the A47THI, the other roads, and the existing traffic system across the traffic modelling area is 4,549,279 tCO<sub>2</sub>e and this corresponds to 0.47% of the entire UK 6<sup>th</sup> carbon budget. The percentage is 447 (Table 3, Row J) times greater than that the (**wrong, underestimated**) solus percentage above.
- 95 **It is important to understand that there is a triple whammy operating with the Applicant's presentation of the carbon quantities which acts to suppress the carbon signal so it is "lost in the noise"**. The three "whammy's are (1) differential (delta) v absolute carbon quantification ; (2) national area v local area ; (3) whole economy v road transport sector. The 447 factor above derives just from Whammy (1). Whammy (2) will introduce another approximately another two orders of magnitude of dilution (ie around 100) depending on the study area size, and Whammy (3) will introduce a further 2 – 3 times dilution depending upon the percentage of transport emissions against the total economy (eg: at REP1-029, Table 5, I calculate that transport emissions are 40.13% of whole economy emissions, based on latest BEIS data, of the Broadland, Breckland, South Norfolk and Norwich area in which the 3 A47 schemes and NWL are promoted). Taking all three whammy's into account, the sensitivity difference is around an indicative value of the order of 100000 ( [447\*100\*(1/0.4013)] = 111,388 ).
- 96 In other words, if the A47THI scheme was assessed for the **absolute** carbon emissions which it generates within the **transport** sector in its **local** area, then the percentage impact on the 6<sup>th</sup> carbon budget would be of the order of 100,000 times greater than that reported by the Applicant in its assessment.
- 97 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.
- 98 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* 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).
- 99 The 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.
- 100 Notwithstanding 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.

101 In 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.**

## 6 TRANSPARENCY OF COMPUTER MODELLING

### 6.1 *The Algorithmic Transparency Standard*

102 The Government recently announced an "Algorithmic Transparency Standard" at the [REDACTED] 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.

103 This 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.

104 The need for such transparency was foreseen by Supreme Court judge Lord Sales in a 2019 speech<sup>27</sup> "Algorithms, Artificial Intelligence and the Law" which includes the key paragraph:

*"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."*

105 I 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,

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<sup>27</sup> [REDACTED]

meaning that limited scrutiny of this aspect of the Environmental Statement is possible. For example, in my WR at REP1-029, 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.**

106I 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 Applicant’s current presentation of the material is largely opaque and hides much about the operation of the traffic models.

107The 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.

108The 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.**

## 6.2 NATS-2015 model

109Not unrelated to the previous section, my WR REP1-029 presented concerns to the ExA about different versions of the NATS model being used for the A47THI scheme and NWL: the A47THI 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 A47THI or on NWL) can be trusted. The relevant section of REP1-029 is section 4.2 (bullets 114 – 122). 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.**

110The Applicant has provided a minimal response to this at Common Response E in REP1-004. The Applicant says that it will present the results of a modelling exercise using the NATS-2019 on the A47THI at Deadline D2. I have not been able to find this, so I would appreciate a pointer to where it is the document hierarchy. **I request that ExA requires the Applicant also provide solus and cumulative carbon assessments based on the model configurations in Table 2 using NATS 2019 (in additional to NATS 2015 which is required to meet the EIA Regs).**

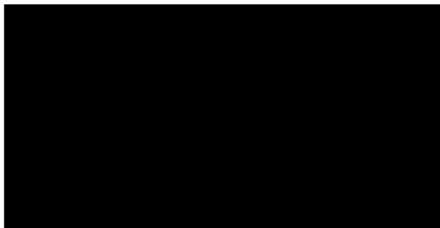
111Further, the Applicant says on the 30% difference in traffic (or traffic loss) between the NATS 2015 and NATS 2019 modelling in the NWL is because the two “*model[s] use[s] a different combination of road network links and will therefore give a different result.*” This, of course, is a truism, but one which tells the ExA and SoS nothing useful. **I request that the ExA requires Norfolk County Council to provide more information on this issue. The different configurations (or “combinations”) of road network links needs to be fully explained in detail by NCC.**

## 7 CONCLUSIONS

112 The 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 it is 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).



Dr Andrew Boswell,  
Climate Emergency Policy and Planning, December 20th, 2021

## **8 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, 1<sup>st</sup> class honours in Chemistry at Imperial College London. My doctoral work<sup>28</sup>, at Oxford University was supervised by Professor R J P Williams, FRS, and was in structural biology, protein binding sites and dynamics (DPhil<sup>29</sup>, 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 software<sup>30</sup>, 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 time<sup>31</sup>, 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 managed. 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

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<sup>28</sup> 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]

<sup>29</sup> DPhil title: “Nuclear Magnetic Resonance Studies of Modified Eukaryotic Cytochrome c”

<sup>30</sup> 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.

<sup>31</sup> 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 Bill<sup>32</sup>, 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.

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