



**This document is an update to the 'Proof of Evidence – Ecology and Nature Conservation' document WG 1.18.1. It contains a scheme evidence update regarding the ecological implications of predicted air quality changes following the recent Department for Transport announcement that tolls on the Severn Crossings will be removed by the 31<sup>st</sup> December 2018.**

**Scheme Evidence Update**

**Jonathan Davies BSc MSc MCIEEM CEnv**

**Welsh Government, Ecology and Nature Conservation**

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**1. AUTHOR**

- 1.1 I am Jonathan George Davies. I am Head of Ecology at Arcadis Consulting (UK) Ltd.
- 1.2 I am the author of the Ecology: Dormice and Water Voles evidence (WG 1.19.1) for the M4 Corridor around Newport Local Public Inquiry. I have also been deputising for Dr Keith Jones with regard to the general Ecology and Nature Conservation evidence, and have prepared this update in that capacity.
- 1.3 The evidence which I provide in this proof of evidence is given in accordance with the guidance of my professional institution, and I confirm that the opinions expressed are my true and professional opinions. My professional qualifications are set out in my main Proof of Evidence (WG 1.19.1) and are not repeated here.

## **2. SCOPE AND PURPOSE OF THIS SCHEME EVIDENCE UPDATE**

- 2.1 This document provides an update to the previous evidence given by Dr Keith Jones in relation to the predicted air quality effects of the Scheme (WG 1.18.1). The purpose is to provide an update of the assessment of air quality impacts upon designated habitats in light of the recent announcement from the DfT that the Severn Crossing Tolls will be removed by 31<sup>st</sup> December 2018.
- 2.2 My evidence should be read in conjunction with Environmental Statement Supplement 6 published in October 2017 (ESS6), which provided a qualitative assessment of the likely changes in air quality as a result of the removal of the tolls, and the Air Quality evidence update provided by Dr Michael Bull (WG 1.12.4), which include details of the quantitative assessment of the predicted changes.
- 2.3 My Scheme Evidence Update is presented in the following structure.
1. Author
  2. Scope and Purpose of this Scheme Evidence Update
  3. Scheme Evidence Update
  4. Conclusion

### 3. SCHEME EVIDENCE UPDATE

- 3.1 The March 2016 Environmental Statement (ES) included an assessment of the likely impacts on designated sites associated with predicted changes in air quality as a result of the Scheme. This was subsequently summarised in Dr Jones' main evidence on Ecology and Nature Conservation (WG 1.18.1). Since this was prepared, an air quality update was provided in the March 2017 Environmental Statement Supplement (ESS3) as Appendix TS7.1, and there has been an announcement that the tolls on the Severn Crossing will be removed. This announcement has resulted in a change in the predicted traffic flows on both the existing M4 corridor and the proposed new section of motorway in both the Do-Minimum and Do-Something scenarios for the opening year (2022).
- 3.2 A qualitative assessment of the implications of the likely changes in air quality as a result of this removal of the tolls was provided in ESS6. Dr Bull has since updated the air quality modelling and has thus undertaken a quantitative assessment of how these changes in predicted flows would affect NO<sub>2</sub> and PM<sub>10</sub> concentrations in proximity to both the existing and new M4 motorways. This assessment is summarised in Dr Bull's evidence update (WG 1.12.4).
- 3.3 In his evidence update, Dr Bull explains that two ecological sites were identified (in the ES and subsequent supplements) as having an exceedance of the air quality standard (also known as the 'limit value' or 'critical level') for the protection of vegetation. Critical levels are defined by the UN as '*concentrations of pollutants in the atmosphere above which direct adverse effects on receptors, such as human beings, plants, ecosystems or materials, may occur according to current knowledge*'. They are thus important as indicators of potential adverse effects on ecological receptors, and are useful tools for assessing the ecological implications of changes in air quality.

- 3.4 The two sites where exceedances of the critical levels were predicted are Langstone-Llanmartin Meadows SSSI and Severn Estuary SAC/SSSI/SPA/Ramsar. One further site, the Gwent Levels - St Brides SSSI (hereafter St Brides SSSI) was also identified as being close to an exceedance.
- 3.5 With regards to the first two sites, Dr Bull explains in his evidence update that there would be up to a major beneficial impact on air quality at Langstone-Llanmartin Meadows SSSI as a result of the removal of the tolls, and that because the Severn Estuary SAC/SSSI/SPA/ Ramsar is not sensitive to changes in nitrogen levels it would therefore not be subject to any significant impacts. These two sites do not therefore need to be considered further.
- 3.6 In contrast, however, at St Brides SSSI the predicted 9.5% increase in traffic levels on the new M4 by 2022 (with the tolls removed) would increase NO<sub>x</sub> (oxides of nitrogen – nitric oxide (NO) and nitrogen dioxide (NO<sub>2</sub>)) concentrations so that the critical level of 30µg/m<sup>3</sup> would be exceeded. In ESS6 it was predicted that this would result in NO<sub>x</sub> concentrations in the range of 31-32µg/m<sup>3</sup>, and this has since been confirmed by the updated modelling. For the two locations where NO<sub>x</sub> concentrations would now be predicted to exceed the critical levels, the predicted NO<sub>x</sub> concentrations have increased from 29.6 to 32.8µg/m<sup>3</sup> (location Eco3) and from 28.7 to 30.5µg/m<sup>3</sup> (Eco7).
- 3.7 It should be noted, however, that both of these locations are less than 20m from the centreline of the road – beyond this, the critical level would not be exceeded. Furthermore, the habitats within much of the SSSI through which the road would be built comprise arable land, improved grassland, species-poor semi-improved grassland and eutrophic reens and ditches, none of which would be sensitive to these relatively small increases in NO<sub>x</sub> concentrations (as they are already high nutrient-status habitats).

- 3.8 It is also important to note that under the EU Ambient Air Quality Directive the assessment of compliance with the limit value is only required at locations more than 20km from towns with more than 250,000 inhabitants or more than 5km from other built-up areas, industrial installations or motorways. Using these critical levels for a road scheme is therefore precautionary. Nevertheless, in practice, assessment against critical levels for vegetation is frequently undertaken to inform planning, regardless of this definition.
- 3.9 Even if we do adopt the precautionary approach and use these critical levels, it is clear that only a very small proportion of the SSSI could be affected, and in most cases the habitats adjacent to the Scheme are not sensitive to such changes. In ecological terms, this would have little effect other than to slightly change the vegetation composition immediately adjacent to the road. Given that the habitat here is already nutrient-rich, and that such changes would not affect the nature conservation status, this would not be considered significant.
- 3.10 In addition to the predicted increase in airborne NO<sub>x</sub> pollutants, there would also be an increase in nitrogen deposition. In contrast to the 'critical levels' applied to NO<sub>x</sub> concentrations, 'critical loads' are used to determine exceedances of nitrogen deposition. A critical load is defined by the UN as '*a quantitative estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge*'.
- 3.11 As detailed in Table 7.2 of the main ES, the critical load for St Brides SSSI is 10-20 kgN/ha/yr. Table 7.3.7 in Appendix A to Dr Bull's updated evidence (Document WG 1.12.4) gives the predicted nitrogen deposition rates with the revised traffic data. Predicted nitrogen deposition at the eight receptors within the St Brides SSSI (Eco3 - Eco10) ranges from 8.1 to 8.7 kg N/ha/yr and, looking at the same two locations described above, nitrogen deposition at Eco3 would

only increase from 8.5 to 8.7 kg N/ha/yr, whilst at Eco7 it would increase from 8.5 to 8.6 kg N/ha/yr. Therefore, the critical load for nitrogen deposition within the SSSI would clearly not be exceeded, even with the tolls removed.

- 3.12 Finally, it should be noted that the qualifying features of the St Brides SSSI are the reed and ditch habitat, the insects and other invertebrates inhabiting the reeds and ditches, and the shrill carder bee. Because freshwater habitats are typically phosphorus limited, nitrogen deposition is usually less important than in terrestrial environments. The majority of the key features of the SSSI would thus not be adversely affected by the slight increases that would arise as a result of the tolls being removed. Whilst there is a slight risk that the increased nutrient deposition could have an effect upon the nutrient-poor species-rich grassland that is due to be created for shrill carder bee along the southern verge of the new M4 embankment, the nutrient status of the soil used to create these slopes will have a much more significant effect upon the likely success of this habitat creation.

## 4. CONCLUSION

- 4.1 I have examined the ecological implications of the predicted changes in air quality that would result from the predicted traffic flows arising from the removal of tolls from the Severn Crossing.
- 4.2 Neither the Langstone-Llanmartin Meadows SSSI nor the Severn Estuary SAC/SSSI/SPA/ Ramsar would be significantly adversely affected by the changes in airborne pollutants. Indeed, the beneficial effects of the Scheme on the Langstone-Llanmartin Meadows SSSI would be slightly increased, since the amount of traffic that would be diverted away from this SSSI in the Do Something scenario would be higher.
- 4.3 With regards to the St Brides SSSI, the removal of the tolls would result in a small increase in the predicted NO<sub>x</sub> concentrations, which would lead to an exceedance of the critical level in two of the air quality monitoring locations. However, this effect would be restricted to 20m from the centre-line of the carriageway, and would therefore only be experienced over a very small proportion of the designated site (accepting that critical levels have only been applied on a precautionary basis since the use of critical levels does not apply to motorways).
- 4.4 With regards to nitrogen deposition within the St Brides SSSI, the removal of the tolls would again lead to an increase compared with the previously-modelled scenario, but this increase would not be sufficient to lead to an exceedance in the critical load. No significant effects upon the qualifying features of the SSSI are therefore predicted.