
WRITTEN STATEMENT

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ON BEHALF OF

GWENT WILDLIFE TRUST

In the matter of:

Public Local Inquiry into the M4 relief road around Newport: The effects of the proposed M4 extension across the Gwent Levels

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Gwent Wildlife Trust Submission: Water Treatment and Pollution Issues

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Professor Ward has been evaluating the impact of motor vehicle activities and chemical contamination of the environment since 1975 and has widely published papers on the subject of heavy metal pollution and motorways since his pioneering publication on Heavy Metal Pollution from Automotive Emissions and its Effect on Roadside Soils and Pasture Species in New Zealand (*Environ Sci Tech* 11, 917-20, 1977). He has published more than 30 papers on heavy metal pollution and motorways, including storm water treatment systems, the impact on water quality, animals and food crops. He has been responsible for the chemical analysis of the Oxted M25 motorway treatment facility since 1996 and the subsequent development of the new A34 WTAs since the opening of the Newbury bypass in 1998. This research has led to publications on sediment analysis from constructed vegetative treatment facilities (Hares & Ward, *Sci Tot. Environment*, 334-35, 473-479, 2004) and platinum emissions and levels in motorway dust samples (Ward & Dudding, *Sci Tot. Environ.*, 334-335, 457-463, 2004). He is considered to be a world authority on the chemical analysis of motorway media and the impact of motorway pollution on the near-by environment. He has also been involved in numerous motorway development enquiries and a court case about chemical contamination alongside the M25 motorway in Surrey.

As a contribution to our submissions to the M4 CaN public Inquiry, Prof Neil Ward of the University of Surrey has undertaken a review of the Welsh Government M4 Corridor around Newport December 2016 Environmental Statement Supplement Appendix SS16.1 Revised Water Treatment Area DMRB Risk Assessment.

Fundamental Concerns:

1. Cadmium

Section 2.1.4 (page 6) compares the WTA specific HAWRAT generated Event Mean Concentrations (EMC) data for Cu and Zn and 'show that with the exception of a minor deficiency at WTA1 of 3.6% and 0.1% for copper and zinc respectively, all discharges are attenuated to below the Probable No Effect Concentration (PNEC)'. The data is present in Annex 1.

However, no comments are made on cadmium which is a very toxic heavy metal and has much lower EQS Standard level. Inspection of the Annex shows that the presented HAWRAT data for Cd 0.26 µg/L is higher than the Environmental Quality Standards for Priority Substances and Certain Other Pollutants (see below) of AA-EQS MAC Inland Surface Waters of 0.2 µg/L Cd.

Moreover, the EQS Cd value quoted in Annex 1 is 0.9 µg/L Cd (which is for class 4 other surface waters classification) and no justification has been given for using this value.

EQS Report states:

N° | Name of substance | CAS number | AA-EQS [21] Inland surface waters | AA-EQS(...)21 Other surface waters | MAC- EQS [22] Inland surface waters | MAC-EQS(...)22Other surface waters |

Cadmium and its compounds (depending on water hardness classes [24]) | 7440-43-9 | ≤ 0.08 (Class 1) 0.08 (Class 2)0.09 (Class 3)0.15 (Class 4)0.25 (Class 5) | 0.2 | ≤ 0.45 (Class 1)0.45 (Class 2)0.6 (Class 3)0.9 (Class 4)1.5 (Class 5) |

2. Accumulation of Pollutants in Water Treatment areas

Section 3 Proposed Contingency Measures

Table 3-1:

I wish to draw attention to Table 3-1 second part: Routine Works: Removal of sediment (to be determined annually)

Also:

Section 3.6 Sediment Monitoring and Recovery

3.6.1 states:

'As a final resort where unacceptable sediment discharge and accumulation was considered to be occurring as a consequence of WTA discharge, sampling would be undertaken for chemical analysis. Early dredging would be considered where concentrations found to exceed HAWRAT chronic toxicity thresholds for heavy metals and PAH were assessed as contributing to unacceptable long term water quality and demonstrably adverse impacts on aquatic ecology. This could be undertaken during routine reed dredging within the Gwent Levels SSSI.'

This statement is highly inadequate and does not address the serious issue of sediment accumulation in the WTA lagoon and reed bed area. How is the sediment going to be sampled and analysed (for what and using what authorised method)?

The A34 motorway bypass (which I have continuously monitored since the opening in 1998) has had no maintenance application regarding sediment levels in WTA reed areas. Moreover, heavy metal analysis by my laboratory (twice per year) has shown a continual elevation in many elements, especially Cadmium in the sediment material. These levels are site specific depending on reed mass, post storm event changes to the reed bed, the application of salt to the road surface and the major storm water flow through the WTA. **A serious issue is if sediment material is removed, the reed bed integrity is altered and the efficiency of the WTA is dramatically altered.** Moreover, re-constitution of the reed density is time dependent within the WTA so **post-sediment treatment/removal there will be a period of 'poor' chemical removal efficiency. This is not taken into account by HAWRAT, including the effect of salt addition which enhances the solubilisation of heavy metals, primarily as soluble chlorides leading to 'pulse' release of Cadmium especially from the sediment into the 'treated' WTA surface water outflow.**

The M25 WTA at Oxted which I have monitored since 1998, has as part of the post court case settlement had sediment removed from the pre-WTA balancing pond trap and post interceptor pond outflow interceptor every 6 months. This is removed by tanker and taken to a specific treatment facility due to the hazardous nature of the sediment material.

Finally, sediment levels of organics, including oil-based combustion products and spills, plus PAHs rapidly accumulate in WTA sediments due to the increasing organic matter levels (surrounding the areas of the reed biomass). This effectively complexes and adsorbs organic chemicals with the sediment producing a reservoir of these chemicals. Increased storm flow will increase the 'insoluble' fraction of these organics, especially PAHs, which float on the surface of the WTA outflow water, or are suspended as particulates in the water, **leading to increased levels leaving the WTA** as 'treated' storm water.

Sediment analysis, monitoring/chemical analysis and removal/treatment are therefore essential issues that must be clearly addressed in the ES (and not as stated in quotations above).

3. Fluoranthene and Chloride

Section 1.3.9 states:

*'However it was found that for both 3 and 4 treatment train WTAs, treated discharges prior to entry into a reed were below the appropriate WFD EQS for every contaminant of concern with the exception of **fluoranthene** owing to its extremely low EQS concentration and **chloride** during winter thaws following salt treatment of the carriageway. Many of the contaminants prior to discharge to a reed were below half the WFD EQS'.*

The above statement needs to be challenged. The full elemental data is not available and it is vital to inspect all PAH data. Moreover, the issue of fluoranthene has not been addressed.

'Fluoranthene is one of the U.S. Environmental Protection Agency's 16 priority pollutant PAHs. Fluoranthene has been classified by the International Agency for Research on Cancer as a group 3 carcinogen, "not classifiable as to its carcinogenicity to humans"[1], however it was found to possess carcinogenic properties in case of newborn mice according to short-term lung tumor assay (Busby et al., 1984) (Wikipedia)'.

Moreover, as stated above, increased levels of chloride ions is not considered to be a significant pollutant BUT the impact on heavy metal solubilisation and mobilisation is well recognised. Moreover, increased Cl (and Na) levels will have an impact on biota, including roadside plants and trees (see attachments).

4. Good practice based on M25 experience for maintenance of motorway WTAs

www.atkinsglobal.co.uk (article attached)

'design of the M25 drainage scheme ..incorporation of alarms (within bypass separation), CCTV and a central management system for the maintenance added value to providing a quick response to pollution incidents should they occur'.

'an important consideration for effective application of treatment systems included... provision of adequate maintenance plans...consideration of maintenance within the design and consultation process'.

The above statements need to be supported as good practice by a major environmental consultancy agency in England, WS Atkins. The design of drainage scheme features is vital as **one of the A34 WTAs has already overflowed with oil into a SSSI river (The Lambourne) due to poor maintenance follow-up and no removal of oil from the WTA oil interceptor. This completely damaged the balancing pond. Oil interceptors require good maintenance. The regular monitoring I have undertaken on my research sites along the M25 and A34 shows this is not being addressed by the authorities.**

Conclusion:

Water Treatment and Pollution statements within the ES for the M4 CaN are inadequate or open to challenge. These issues should have been addressed for the protection of the Gwent Levels SSSIs.