

RESPONSE TO BARRY&VALE FOE COMMENTS TO PLANNING INSPECTORATE MARCH 2021

DNS/3236340 – 000624

Introduction

This short document is provided in response to the comments made by Barry and Vale FOE, signed by Mr Max Wallis. Environmental Visage Limited has responded to several of the comments made.

Suitability of Meteorological Data

Mr Wallis directs several comments to Natural Resources Wales (NRW), including querying the use of differing meteorological data when considering the Permit already issued to Viridor. Mr Wallis notes that NRW have tried to apply different meteorological data, e.g. from Bristol Airport at Lulsgate Bottom, and consideration of the daily averages recorded by Cardiff Harbour Authority. Mr Wallis goes on to note that:

“The Môr Hafren applicants use the St Athan wind data in their modelling, though known to be wrong by NRW; they could have purchased the Met Office model and 5 years Met data, or gone for Cardiff Harbour Authority data.”

Response from Environmental Visage Limited

Firstly, it is important to note that Environmental Visage Limited cannot and do not intend any comments within this response to relate to the operation of the Viridor plant. It is however noted that the Môr Hafren study applied meteorological conditions recorded at Cardiff Airport, not the nearby St. Athan site. Whilst unlikely to be significantly different from the St. Athan data, should any serious concerns exist regarding the meteorological data applied, there are indeed cross checks which can be applied to the models run, even where, for example, the data cannot be used directly in the modelling methodology. This would be the case with any daily average data from Cardiff Harbour Authority, as the ADMS modelling system requires hourly sequential data rather than daily average figures.

Hence, should further works be requested by the regulator or statutory consultees, further assessment could indeed be made. However, in the absence of such a request from either the Planning Inspectorate or NRW, such further works are assumed to not be required. NRW have completed two high level reviews of the air quality modelling methodology and found it appropriate and deemed it fit to inform a planning decision.

Suitability of the Air Quality Standards

Mr Wallis also notes that *“Air Quality Standards are limits. The limits are out-of-date (2008 Directive) and recognised as not protective of health by the WHO in 2013. The Welsh Government accepted that in 2017 (LAQM Guidance) and has included it in Planning Policy Wales (PPW 11th Edn Feb. 2021).”*

“Short-term is not from the 2008-assumed 1-hour average NO₂ levels but perhaps as brief as 5-minute exposures.

2. An annual average NO₂ distribution has little relation to the far higher peak hourly values in the ADMS or Aermol model. 5-10 minute averages are still higher though their maps may be similar to 1-hour average maps. It's bad science for EVL to cite annual maps in their arguments.

3. The plume models represent ground level values from the edge of a diffusing plume. This is quite different (and lower) than from occasional short-term groundings on the main part of the plume.”

Response from Environmental Visage Limited

Mr Wallis has clear concerns regarding the suitability of the Air Quality Standards. However, the figures, descriptions and referencing periods applied in the Air Quality Assessment produced by Environmental Visage Limited are as per the existing Welsh Air Quality Standards, and as such, are the appropriate assessment levels to apply.

It is noted that the report prepared by Environmental Visage Limited includes maximum gridded values specified in the results tables, that is, the maximum Process Contribution (PC) and the Predicted Environmental Concentration (PEC) from five years' worth of meteorological data, across an area of 4 km by 4 km. This data is provided for both long and short-term averaging periods where relevant.

Additionally, Figure 8 presents the isopleth of the maximum hourly average process contribution for NO₂, in line with the averaging period specified by the Air Quality Standards. There is no 5 – 10 minute averaging period for NO₂ within the Air Quality Standards, with the shortest averaging period, against which contributions can be assessed, being the 15-minute averaging period for SO₂. It is also noted that these results do not only show the “ground level values from the edge of a diffusing plume”, but the ground level concentrations beneath the entire plume.

It is accepted that “air just barely compliant with the objectives should not be considered ‘clean’ and still carries long-term health risks. The lower the concentration of pollutants such as nitrogen dioxide and particulate matter, the lower will be the risks of adverse health effects in the exposed population. Therefore, while compliance with the national air quality objectives is essential, it is desirable to keep levels of pollution as low as reasonable practicable.” (<https://airquality.gov.wales/about-air-quality/standards-and-objectives>)

In applying the regulator’s systematic screening, whereby an increment of 1 % (or less) of the relevant long term assessment level is considered inconsequential, the assessment presented does just that. As noted by the Institute of Air Quality Management and Assessment (A guide to the assessment of air quality impacts on designated nature conservation sites. V 1.1. May 2020), the 1 % threshold has become widely used throughout the air quality assessment profession to define a reasonable quantum of long-term pollution which is not likely to be discernible from fluctuations in background / measurements.

The regulator’s risk assessment guidance goes on to state that if the (annual average) PEC is less than 70 % of the long-term criterion it can be deemed to be insignificant, and these are the assessment thresholds applied throughout the Môr Hafren study. Different assessment levels are applied to short-term reference conditions in order to ensure that a suitably stringent level is applied to confirm the insignificance or otherwise of short-term contributions. However, the assessment presented takes account of and applies guidance from the regulator at every step.

Suitability of Modelling Methodology

Mr Wallis notes that:

“5. The coastal fumigation effect depicted in my objection, where the plume grounds due to wind shear, is recognised in the USA as a situation to plan against. The stack must be high enough to discharge above the boundary layer, not determined by the UK/NRW’s stack-height formula.

6. The ADMS V5.2 cited by EVL does not include wind shear with coastal fumigation. The ADMS “Coastal module” allows only for a different roughness parameter over sea and land, always finding little difference. This commercial module has not been subject to international peer review; NRW accepts it for convenience and because it sounds good.

7. EVL say they have used “available tools”. Wrong. Calpuff is “available”, has been verified for use by US-EPA (unlike ADMS) and is specifically developed for coastal locations where the winds deviate strongly from straight-line flow, diverting around hills and circulating in semi-basins.”

Response from Environmental Visage Limited

The ADMS model (Version 5.2 currently) is one of a range of models available for assessing the impact on local air quality of pollutant emissions to atmosphere. Those used routinely in the UK for this sort of application include United States Environmental Protection Agency (US-EPA) models such as AERMOD, and the ADMS models developed in the UK by Cambridge Environmental Research Consultants (CERC).

The report identifies that atmospheric dispersion modelling is not a precise science and results can be impacted by a variety of factors such as:

- Model uncertainty;
- Data uncertainty; and
- Variability.

However, the report also confirms that CERC models are continually validated against available measured data obtained from real world situations, field campaigns and wind tunnel experiments. Fundamentally, the only way to confirm the level of pollutants in the environment is to measure them once they are present. However, in the absence of a source or prior to any proposed changes to an existing source, dispersion modelling provides a detailed, scientific based assessment of the likely impact of emissions from industrial processes.

Discussion with CERC, the ADMS model developers, has confirmed that:

The ADMS model is steady state in the sense that it is assumed that average meteorological conditions are steady over each hour. However, the turbulence, and hence the spreading and mixing of the plume, during each hour depends on a statistical representation of turbulence during each hour. This depends on atmospheric stability, wind shear which in turn depends on the wind speed and surface drag caused by the surface roughness, surface heating (if present) and complex effects such as changes in terrain elevation and surface roughness. Kelvin-Helmholtz instability is a particular shear-induced effect which is represented within the turbulence parameterisation. Vortex shedding is accounted for in the ADMS buildings module, which was applied in this case, and is relevant near buildings where it may bring the plume down towards the ground. Vortices may sometimes be present downstream of very steep hills but would act to dilute any plume, reducing plume concentrations.

ADMS is used for regulatory and research studies across the world. Its algorithms are public and have been subject to scrutiny in many papers in the international scientific literature. CERC has worked closely with many regulators including the UK Environment Agencies, US-EPA, and the Chinese Ministry of Environment. Regarding peer review and validation, there is a large amount of detailed information, readily-available to all, on the CERC website. Examples include:

Validation documentation:

<https://www.cerc.co.uk/environmental-software/model-validation.html>

Technical Specifications:

<https://www.cerc.co.uk/environmental-software/technical-specifications.html>

Peer-reviewed publications:

<https://www.cerc.co.uk/environmental-software/CERC-coauthor-publications.html> and

<https://www.cerc.co.uk/environmental-software/CERC-software-publications.html>

CERC goes on to note that the potential use of CALPUFF rather than ADMS would not be an improvement in the consideration of unstable conditions, as its turbulence parameterisations are, if anything, less sophisticated than those of ADMS. This is recognised in Mr Wallis' own comment that "*The Calpuff lagrangian model does better in following flow deviated by headlands and hills, though not the unstable flow arising via wind-shear as seen in the Cardiff coastal area.*". CALPUFF was recommended by the US-EPA for modelling distances of over 50 km from a source, but has recently been de-listed by them.

Suitability of Location

Mr Wallis notes that

“Location of Commercial, Industrial and other Potentially Polluting Development

6.7.15 For the purposes of this section, potentially polluting development includes commercial, industrial, energy and agricultural or transport infrastructure. Such development should be located in areas where there is low potential for public exposure, or where its impact can be minimised.”

“6.7.17 The location of potentially polluting development adjacent to sensitive receptors will be unacceptable where health and amenity impacts cannot be minimised through appropriate design and mitigation measures. It is the overall expectation that levels of pollution should be reduced as far as possible...”

Response from Environmental Visage Limited

The overall conclusion from detailed modelling of emissions from the proposed Môr Hafren Bio Power ERF is that the potential impact on local air quality is likely to be small and is unlikely to result in a significant threat to the health of people living and working nearby. The model predicted that Process Contributions for all pollutants prescribed for control by the Industrial Emissions Directive (IED), and based on the daily average Achievable Emission Levels specified in the BREF Note for Waste Incineration, would be well below objective limits defined within the Air Quality Standards Regulations, or the relevant Environmental Assessment Levels recommended by NRW.