

Air Quality Assessment – Thermophilic Aerobic Digestion Facility, Pebble Hall Farm, Theddingworth

Introduction

A detailed air quality assessment was undertaken to support the planning application for a Thermophilic Aerobic Digestion (TAD) facility to be built on behalf of Welland Waste Management on land at Pebble Hall Farm, Theddingworth. The overall conclusion from detailed modelling of emissions from the proposed TAD facility was that the potential impact on local air quality is likely to be low, and unlikely to pose a significant threat to the health of local residents or people working nearby.

Consultation comments received from Harborough District Council's Contaminated Land and Air Quality Officer¹, raised concerns about the potential impact of process emissions from the TAD facility on background nitrogen dioxide (NO₂) concentrations at nearby residential properties in Theddingworth. Diffusion tube measurements undertaken by the Council in Theddingworth indicate that there is a risk of exceeding the annual average AQS objective value for NO₂ at properties adjacent to the A4304 which passes through Theddingworth. Measured background NO₂ concentrations at these locations are considerably higher than the general background due to vehicular emissions associated with traffic passing through the village.

Discussions were held with the Officer to agree the scope of additional information required to respond to the consultation comments. It was agreed that additional receptors should be incorporated into the ADMS model for the TAD facility to estimate annual average NO₂ process contributions, and the associated Predicted Environmental Concentrations based upon results from diffusion tube measurements at the receptor locations.

The results are presented in the following section and are based upon the Process Contribution due to emissions from the TAD facility in isolation as well as cumulatively with the Renewable Energy Generation Facility (REGF) to be built on behalf of Welland Waste Management Ltd on adjoining land at Pebble Hall Farm.

Detailed Modelling of Emissions from the TAD Facility

Reference was made to the latest air quality review and assessment document from Harborough DC², which identifies two locations in Theddingworth where NO₂ diffusion tube measurements are undertaken. The locations and most recent measured annual average NO₂ concentrations are summarised in the following table.

					2011 Annual NO ₂	2012 Annual NO ₂
28n	Spencerdene, Main Street, Theddingworth	Roadside	466535	285545	21.97	28.43
29n	Homeside, Main Street, Theddingworth	Roadside	466651	285607	30.28	37.87

The receptor locations were entered into the ADMS model and the following results were obtained based upon the use of the 2012 hourly average meteorological data file, and the measured annual average NO₂ concentration at each location in 2012.

Source	Receptor Location	Annual NO ₂ PC	% AQS	Annual NO ₂ PEC	% AQS
TAD Facility	28n	0.64	1.6%	29.07	72.7%
	29n	0.64	1.6%	38.51	96.3%
Cumulative with REGF	28n	1.06	2.7%	29.49	73.7%
	29n	1.05	2.6%	38.92	97.3%

As can be seen, the annual average NO₂ Process Contribution at the two diffusion tube monitoring locations is predicted to be ~0.6 µg m⁻³ due to emissions from the TAD facility. An increase of this magnitude corresponds to a value that is ~1.6% of the AQS objective value, which is of marginal

¹ Consultation response from Harborough DC to Northamptonshire CC regarding Application Number 13/00117/WASFUL. Gareth

² 2013 Air Quality Progress Report for Harborough District Council. June 2013

significance in relation to Environment Agency guidance for the assessment of long term impacts in Horizontal Guidance Note H1 Annex F.

When considered in relation to the 2012 background concentration measured by diffusion tubes at the two locations, the Predicted Environmental Concentrations are ~73% and ~96% of the AQS objective value at receptor locations 28n and 29n respectively. Accordingly, the results from detailed modelling indicate that emissions of NO_x from the TAD facility will not result in an exceedence of the annual average NO₂ AQS objective value at residential properties adjacent to the A4304 in Theddingworth.

When emissions from the TAD facility are considered cumulatively with those from the proposed REGF, there is a small increase in estimated Process Contribution, but the results confirm that there will not be an exceedence of the AQS objective value when the two facilities are operational.

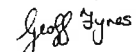
It should be noted that the assessment is based upon the roadside measurements at receptors 28n and 29n, and when the measured data are corrected to reflect the concentration at the façades of the two residential properties, the measured values fall to 20.55 µg m⁻³ and 31.90 µg m⁻³ respectively. Accordingly, Predicted Environmental Concentrations due to emissions from the TAD facility, at the building façades of receptors 28n and 29n, will be proportionately lower at ~21 µg m⁻³ (~53% of the AQS objective value) and ~33 µg m⁻³ (~81% of the AQS objective value) respectively.

Conclusions

Detailed modelling of emissions from the proposed TAD facility to be built at Pebble Hall Farm, Theddingworth has shown that increases in annual average NO₂ concentrations at diffusion tube monitoring locations in Theddingworth will be small, and will not result in an exceedence of the annual average AQS objective value.

Similar conclusions were drawn for the case when emissions from the TAD facility were considered cumulatively with those from the REGF to be built on adjoining land at Pebble Hall Farm.

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Via email

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