Case Study No 29

Odour from WwTW

This study was for a new wastewater treatment works in a disused quarry where the process is contained within a building, treated by an odour control unit and discharged through a stack. The nearest receptors are 70m from the proposed odour control stack. Several designs were reviewed as the design of the treatment process evolved.

Dispersion was initially predicted using ADMS 3.1 with terrain mapped using a detailed topographical survey. Two smoke tests within the quarry confirmed significant re-circulating flow which was not predicted by ADMS. Steady state CFD simulations using ANSYS CFX were conducted prior to detailed wind tunnel tests.

Odour $OU_{E/m}^3$ comparing ADMS 3.3, CFD and wind tunnel

Design Assessed	ADMS 3.3	Wind Tunnel	CFD
Option 1 3m stack	5.6	5.0	2.1
Option 1 13m stack	3.5	1.4	-
Option 2 13m stack	3.5	1.1	-

The ground level concentrations at the nearest receptors provided by the wind tunnel tracer gas measurements and ADMS 3.3 predictions are similar. This has been repeated for three separate physical models.

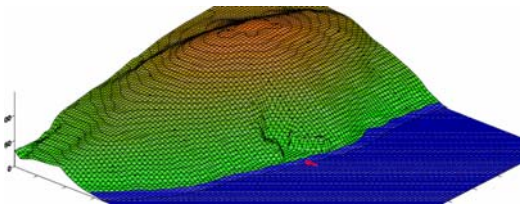
Worst Case Wind Direction for ADMS 3.3,CFD and wind tunnel

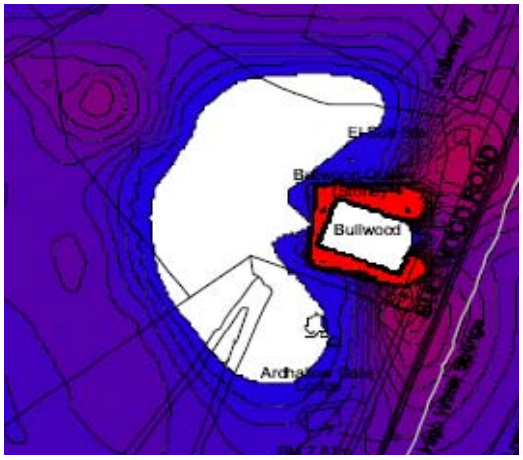
Design	ADMS 3.3	Wind Tunnel	CFD
Option 1 3m stack	210	270	180
Option 1 13m stack	240	330	-
Option 2 13m stack	240	210	-

The CFD predictions are of a similar magnitude to the dispersion estimates provided by both other models, but on this limited comparison do not provide reliable estimates of worst case wind direction.

The project design team aimed to achieve odour emission rates as low as reasonably practicable, rather than to aim for compliance with indicative benchmarks. The design solution proposes ~99% odour abatement and a stack 13m above roof level. This should ensure the odour at the nearest receptor is <0.1 OU_E/m^3 98%ile.

This provides maximum model headroom; takes account of potential model uncertainties; and the need to provide additional confidence in the process, in view of the proximity of the nearest receptors.





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