Dispersion in Quarry

The Airshed was appointed to conduct a technical review of a proposed large scale waste treatment plant processing more than 200,000 tonnes of municipal solid wastes (MSW).

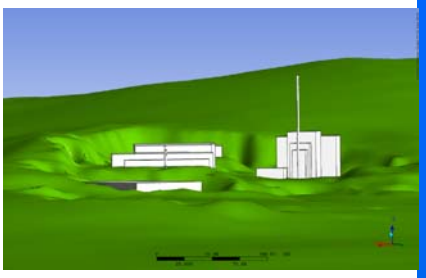
The air quality chapter published in the Environmental Statement (ES) for the project relied on dispersion modelling which used two recognised computer based prediction models: ADMS and AERMOD. Both these models include algorithms to predict how a released plume will be affected by local topography and buildings. The terrain algorithms are suitable for predicting dispersion over sloping ground. The models are less suitable for predicting dispersion where flow is likely to be affected by vertical rock faces close to the proposed releases. Model uncertainty was further increased due to the combined effects of terrain and the large buildings proposed by the scheme. The dispersion models used in the ES may therefore not have reliably described how pollutants released within the quarry would be dispersed.

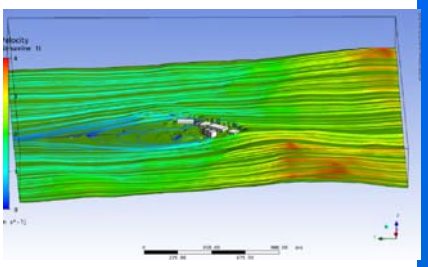
In these circumstances it would be reasonable to anticipate that the air quality impact assessment within the ES should have included some additional modelling using alternative, more fundamental models which are capable of considering these complex site specific conditions e.g. either by using computational fluid dynamics (CFD) or wind tunnel tests.

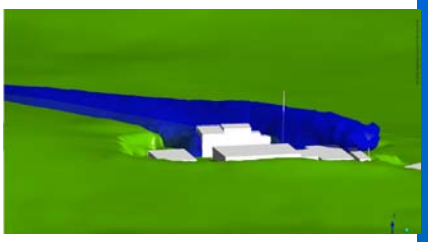
The Airshed therefore conducted a limited study using an alternative CFD dispersion model to predict how NO_x and odour would be dispersed, taking account of the combined effects of the proposed buildings, the complex terrain within the quarry, and the sloping ground elsewhere.

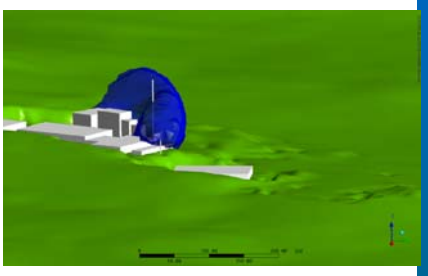
The results from the CFD model indicated that the combined effects of local topography, steep terrain within the quarry and the proposed buildings significantly affected the dispersion of pollutants released from the proposed stacks and that the ES may have significantly underestimated impacts. The CFD model predicted NO_x plume grounding >100 ug/m^3 within 1km of the EfW stack for several wind directions, which was not predicted by the dispersion models in the ES. On the basis of this limited comparison, the short-term CFD model predictions from the EfW stack were approximately twice the levels reported in the ES.

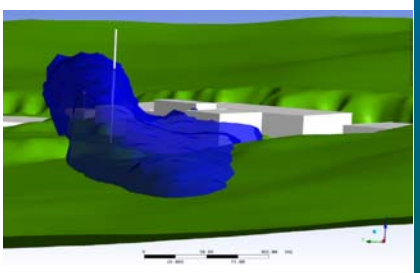
The results from the CFD modelling indicated that the odour plume would ground very close to the point of release, due to the combined effects of the local topography within the quarry and the EfW building. This local plume grounding did not appear to be predicted by either ADMS or AERMOD. Significant effects on the odour plume were predicted by the CFD model for several wind directions, with pronounced recirculating flows. The predictions within the air quality chapter of the ES may therefore have significantly underestimated exposure to air pollution.

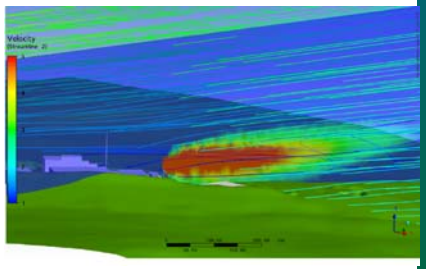


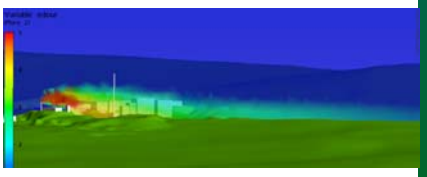












The Airshed

The Airshed Ltd 5 Lauder Place, East Linton EH40 3DB. Tel. 01620 860 529
email mail@theairshed.com