The Abergelli Power Gas Fired Generating Station Order

6.2 Environmental Statement Appendices - Volume D Air Quality

Planning Act 2008
The Infrastructure Planning
(Applications: Prescribed Forms and Procedure) Regulations 2009

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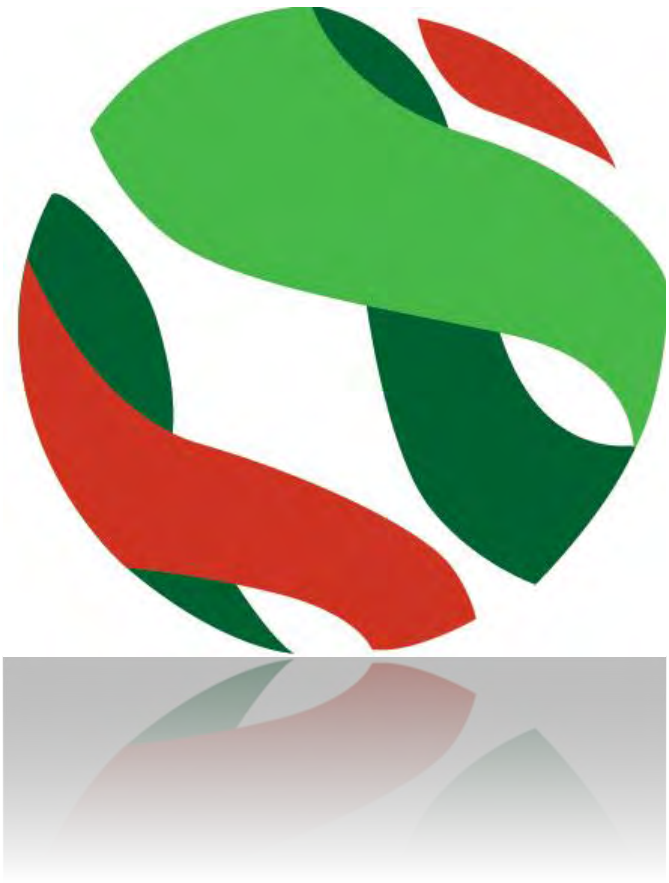

Appendix 6.1

Approach to Air Quality Dispersion Modelling

Appendix 6.1 Approach to Air Quality Dispersion Modelling

The following methodology was agreed as part of the consultation process as agreed with City and County of Swansea (CCS).

Table 6-1: Agreed Approach to the Air Quality Assessment

Point of Consultation	Agreed Approach
Stack Modelling	
Model to be used:	ADMS 5
Pollutants to be considered:	Nitrogen oxides, carbon monoxide
Meteorological Data	5 years data (2012-2016) for Cwm Level Park Data (provided by CCS) with missing data/cloud cover supplemented with Mumbles Head Data for the same time period.
Terrain Data	Included in the model based maximum resolution (64x64) allowed within ADMS5 and covering an area applicable to each modelling grid
Modelling Grid	200 m (20 km x 20 km centred on the stack) – used for contour plots and ecological impact assessment. 30 m (3 km x 3 km centred on the stack) – used for Stack Height Determination
Indicative Receptors	Ecological Designations (modelled at a height of 1.5 m): - Ramsar, SAC and SPA sites within 10 km - SSSI, SINC, Ancient Woodland, NNR and LNRs designated within 2 km Human Receptors (modelled at a height of 1.5 m) - specific receptor locations representing the closest sensitive receptors to the Project Site, i.e.: - Abergelli Farm; - Morriston; - Pant-lasau; - Llwyncelyn; - Llangyfelach; and - Receptors representative of the eastern boundary of areas 11 and 5 on the LDP Concept Plan
Background Air Quality	Human Health - Based on Mapped Defra grid square for each modelled receptor. Contour Plots - No background will be applied for contour plots which will just show contributions from the Project

Point of Consultation	Agreed Approach
	Ecology - Background for ecological receptors will be based on APIS background estimates
NO_x to NO_2 conversion	Use Environment Agency values of 70% conversion of NO_x to NO_2 for annual concentrations and 35% for hourly concentrations.
Assessment of Significance	Environment Agency Screening levels i.e. if less than 1% of AQS objective for Long-term and 10% for short-term then can be screened out as not significant.
Roads Modelling	
Is assessment required?	Screen need to assess road contributions based on the based on the IAQM Land-Use Planning & Development Control Planning For Air Quality Jan 2017 (v1.2) Table 6.2
If traffic contributions cannot be screened out based on the IAQM guidance's then:	Model Using ADMS Roads at specific receptors close to the roads that exceed the IAQM screening level at a height of 1.5 m. Use Defra mapped background data Stack contribution will be added to this to assess in combination effects. NO_x to NO_2 conversion based on Defra conversion tool. Assess significance based on the IAQM guidance's criteria

Appendix 6.2

Stack Height Determination

Appendix 6.2 Stack Height Determination

6.1.1 Stack height sensitivity testing was undertaken using Cwm Level Park meteorological data from 2012 to 2016 with the maximum ground-level concentrations predicted across a grid of receptors with a model resolution of 30 m.

6.1.2 Dispersion model runs were undertaken for various stack heights between 20 m and 50 m with the stack height models in 2 metre incremental heights within this range. Table and the associated Figure A6-1 to Figure A6.3 show the results of the stack height sensitivity testing. The appropriate stack height was determined as the point at which the change in maximum predicted annual and 99.79th percentile NO_2 concentrations with each stack increase ceased to be significant. When plotted as a graph this is the point at which the curve flattens of after an initial rapid decrease with each increase in stack height.

Table A6-1: Maximum NO_2 Concentrations Predicted over the 30 m Resolution Models Receptor Grid for each Stack Height

Stack Height	Maximum Annual NO_2		Maximum Hourly 99.79th %ile NO_2		Maximum Rolling 8 Hour CO	
	Predicted Contribution ($\mu g/m^3$)	As a % of the AQS objective	Predicted Contribution ($\mu g/m^3$)	As a % of the AQS objective	Predicted Contribution ($\mu g/m^3$)	As a % of the AQS objective
20	3.44	8.6%	260.8	130.4%	1381	13.8%
22	2.10	5.3%	194.2	97.1%	993	9.9%
24	1.22	3.1%	131.7	65.8%	658	6.6%
26	0.67	1.7%	81.9	40.9%	399	4.0%
28	0.34	0.9%	46.0	23.0%	220	2.2%
30	0.16	0.4%	23.3	11.6%	110	1.1%
32	0.09	0.2%	10.5	5.3%	63	0.6%
34	0.08	0.2%	6.2	3.1%	52	0.5%
36	0.08	0.2%	5.8	2.9%	45	0.4%
38	0.07	0.2%	5.5	2.7%	39	0.4%
40	0.07	0.2%	5.1	2.6%	34	0.3%
42	0.06	0.2%	4.8	2.4%	32	0.3%
44	0.06	0.2%	4.4	2.2%	30	0.3%
46	0.06	0.1%	4.2	2.1%	29	0.3%
48	0.05	0.1%	4.0	2.0%	27	0.3%
50	0.05	0.1%	3.8	1.9%	25	0.3%

Note: Annual mean NO_2 AQS objective 40 $\mu g/m^3$, daily 99.79th percentile NO_2 AQS objective 200 $\mu g/m^3$, CO 8 hour running 10,000 $\mu g/m^3$.

6.1.3 Significant benefits are seen as the stack height increases from 20 m to 32 m, in terms of maximum ground level concentrations of NO_2 (both annual and 99.79th percentile hourly concentrations) and CO, as the impacts of building downwash reduce. Beyond this height, there is only a slight benefit seen, in terms of maximum ground level concentrations, with increasing stack height further, though there is a further decrease between 32 and 34 m when looking at 99.79th percentile hourly NO_2 concentrations though this also flattens out after 34 m. The continuing small decrease in maximum concentrations above 32/34 m is driven by the fact that with each stack increase the plume disperses slightly more before reaching ground-level, however, as thee changes above 34 m are so small this indicates that the dispersion is no longer influenced by building downwash. When the stack height is increased to 34 m, the maximum impact on ground level concentrations of nitrogen dioxide is less than 1% of the annual mean objective and both NO_2 and CO are well below 10% of their relevant short-term AQS objectives.

6.1.4 A minimum stack height of 35 m has been proposed by APL for the Power Generation Plant and a maximum height of 45 m. The assessment of impacts at both human health and ecological receptors has, therefore, used a stack height of 35 m as this represents the worst-case in terms of dispersion. For other disciplines the maximum stack height of 45 m has been assumed as this represents a worst-case e.g. in terms of landscape and visual impacts etc.