Appendix 15. Air Quality and Climate

15.1. Rosslare Meteorological Station

Table 15.1: Rosslare monthly, annual mean and extreme meteorological values from 1961 - 1990

Temperature (oC)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Mean daily max	8.2	7.9	9.3	10.9	13.2	15.9	17.9	17.9	16.3	13.8	10.6	9.1	12.6
Mean Daily min	3.9	3.8	4.3	5.6	7.9	10.4	12.1	12.2	10.8	9	5.9	4.8	7.6
Absolute max	6.1	5.9	6.8	8.3	10.5	13.2	15	15	13.6	11.4	8.2	7	10.1
Absolute min	12.7	13	14.2	20.1	20.3	25.4	26.2	25.9	21.5	19.2	15.7	14	26.2
Mean no. of days with air frost	-4.4	-4.1	-2.5	-1	-0.3	4.7	5.2	6.2	2.6	0.7	-2.5	-3.1	-4.4
Mean no. of days with air ground frost	2.4	2	1.1	0.3	0	0	0	0	0	0	0.6	1.6	8
Relative Humidity (%)													
Mean at 0900UTC	86	85	84	82	81	82	82	84	84	86	85	86	84
Mean at 1500UTC	81	79	76	76	77	78	77	78	77	80	79	82	78
Sunshine (hours)													
Mean daily duration	1.94	2.47	3.87	5.74	6.88	6.59	6.29	5.86	4.79	3.27	2.5	1.75	4.33
Greatest daily duration	8.2	9.8	11.8	13.4	15.4	15.8	15.9	14	12.8	10.2	8.6	7.3	15.9
Mean no. of days with no sun	11	8	5	3	1	2	1	2	3	6	9	11	61
Rainfall (mm)													
Mean monthly total	94.8	69.9	67.8	55.7	55.8	50.6	50.7	68.7	73.3	94.9	97.1	97.8	877.1
Greatest daily total	44.9	33.4	48.9	27.9	31	32.6	79.1	61	63.6	54.8	56.7	44.8	79.1
Mean no. of days with >=0.22mm	18	15	16	14	14	13	11	13	14	16	16	17	176
Mean no. of days with >=1.0mm	14	11	12	10	10	8	8	9	10	12	13	13	129
Mean no. of days with >=5.0mm	7	5	5	4	4	3	3	4	5	6	6	7	59
Wind (knots)													
Mean monthly speed (m/s)	6.64	6.58	6.38	6.07	5.86	5.20	4.89	5.14	5.50	5.97	6.22	6.58	5.92
Max gust	76	76	66	75	57	51	50	56	72	87	71	80	87
Max. mean 10-minute speed	46	44	42	52	35	38	35	37	47	50	45	50	52
Mean no. of days with gales	2.5	1.5	1.1	1.3	0.3	0.2	0.1	0.2	0.5	0.9	1.3	1.9	11.7
Weather (mean no. of days with…)													
Snow or sleet	2.7	3.7	1.9	0.8	0.1	0	0	0	0	0	0.2	1.3	10.7
Snow lying at 0900UTC	0.8	0.7	0.2	0	0	0	0	0	0	0	0	0.1	1.8
Hail	1.8	1.1	2.5	2.1	1	0.3	0	0	0.1	0.4	1.2	1.2	11.8
Thunder	0.4	0.2	0.1	0.4	0.8	1	1	0.7	0.6	0.5	0.7	0.3	6.7
Fog	2	2.2	3.2	4.2	3.2	4.4	5	4.6	3.9	2.5	1.7	1.6	38.5

15.2. Stack Height Determination

15.2.1. Introduction

This appendix presents a stack height determination undertaken for the proposed plant at Great Island which includes a 430MW Combined Cycle Gas Turbine (CCGT) stack.

The underlying principle of air pollution control is to minimise the release of pollutants to the atmosphere and promote sufficient dispersion and dilution of released pollutants to ensure ground level impacts are not significant.

The first part of this principle is controlling emissions at source through abatement techniques. The second part is the determination of the optimum release conditions, including stack height determination to ensure that subsequent ground level concentrations of the released pollutants remain within acceptable limits.

The objective of the stack height determination is to establish at what stack height local building wake effects are no longer a major constraint thereby ensuring the adequate dispersion of pollutants. The primary determinant of the stack height is therefore the local building heights.

The height of the stacks has been determined by advanced dispersion modelling.

15.2.2. Dispersion Modelling Methodology

On the basis of the above, the stack height determination considers:

- A unit emission rate of 1 g/s enabling the influence of meteorological conditions to be determined;
- All averaging periods relevant to the air quality assessment;
- A range of all likely meteorological conditions through the use of five years (2003-2007) of hourly sequential meteorological data from a representative measuring station (Rosslare Harbour).

Plant emissions characteristics assumed are identical to those reported in the main body of this report (Section 15.7.1.8).

The model has been run using ADMS to determine what stack height is required to overcome local building wake effects. Terrain in the vicinity of the plant is considered likely to affect plume dispersion. Particularly since there are changes in gradient within the site, and hence terrain data have been included in the model. The model was run assuming stack heights between 40m and 100m at 10m incremental spacing. Results were obtained for short term and long term NO_2 averaging periods to this assessment.

The dispersion modelling for the purposes of stack height determination assumed a grid domain of 15km by 15km from the CCGT stack with 200m receptor spacing. Results are reported for the maximum affected location. This is considered a robust and conservative approach.

15.2.3. Results

Modelled results in are ground level concentrations predicted by the model for the CCGT stack. These results illustrate that for stack heights below 50m, local building wake effects are predicted to have a significant influence over dispersion. At stack heights above 60m, local building wake effects are no longer a major constraint for the short and long term averaging period in respect to the air quality standards.

The purpose of the stack height determination is to establish at what stack height local building wake effects are no longer significant, thereby ensuring the adequate dispersion of pollutants. On that basis, a height of 60m is recommended for the proposed plant.

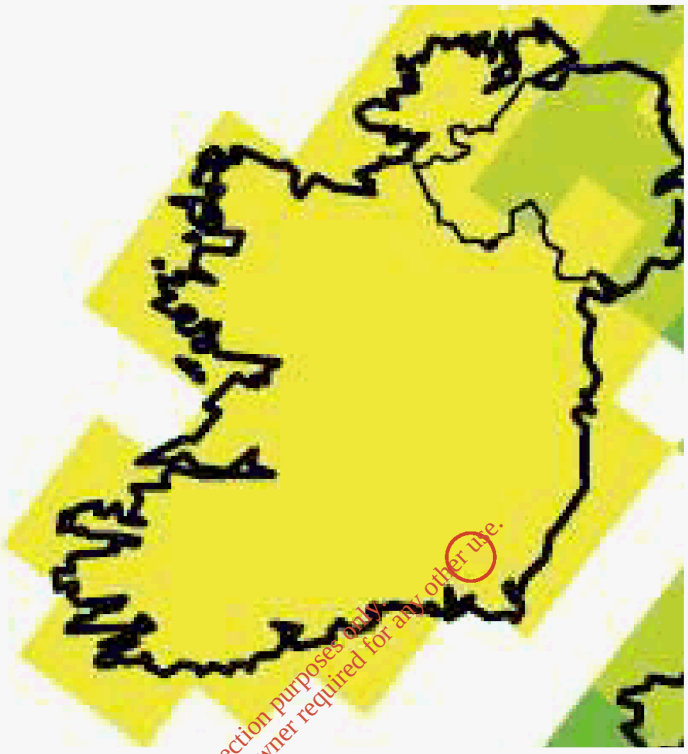
Table 15.2: Stack Height Determination Results

Stack Height (m)	Short Term	Long Term
40	62	7.8
50	27	3.9
60	18	2.2
70	10	1.3
80	9	0.9
90	6	0.8
100	5	0.6

Note: Concentration in $\mu g/m^3$

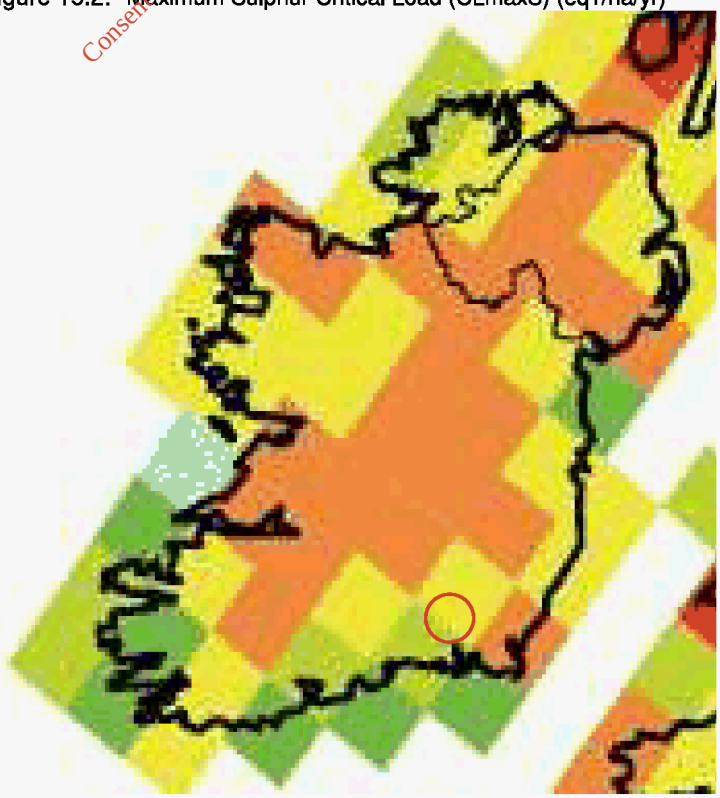
15.3. Critical Load / Deposition Maps

Figure 15.1: Nutrient Nitrogen Critical Load (CLnutN) (eq/ha/yr)



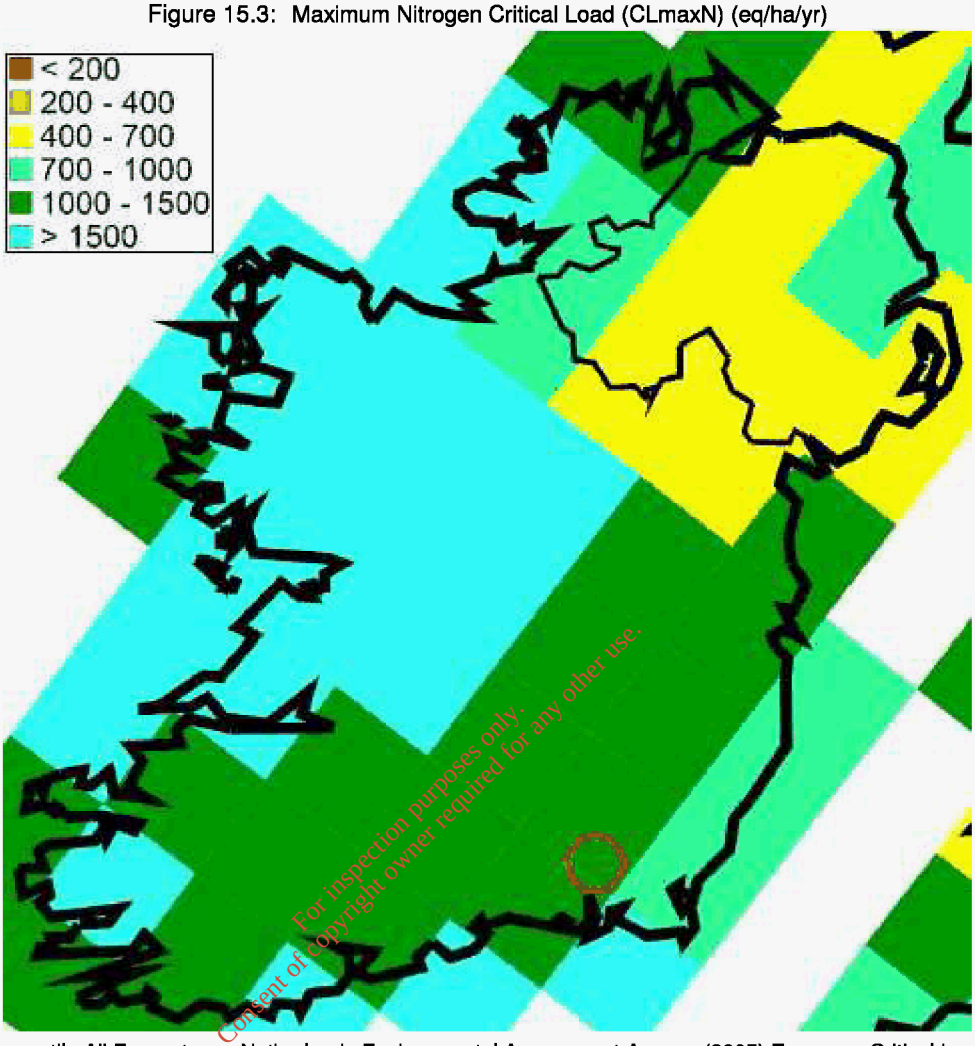
5th Percentile All Ecosystems. Netherlands Environmental Assessment Agency (2005) European Critical Loads and Dynamic Modelling: CCE Status Report 2005

Figure 15.2: Maximum Sulphur Critical Load (CLmaxS) (eq1/ha/yr)



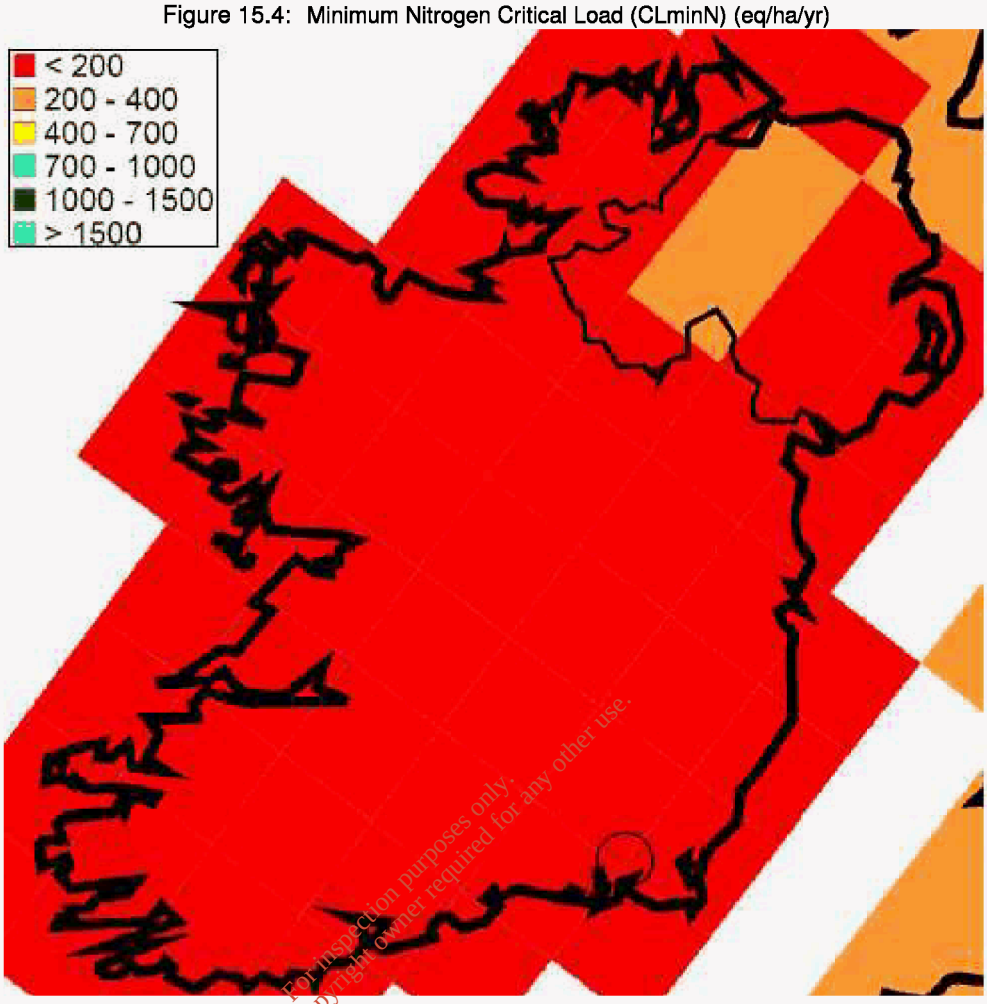
5th Percentile All Ecosystems. Netherlands Environmental Assessment Agency (2005) European Critical Loads and Dynamic Modelling: CCE Status Report 2005

Figure 15.3: Maximum Nitrogen Critical Load (CLmaxN) (eq/ha/yr)



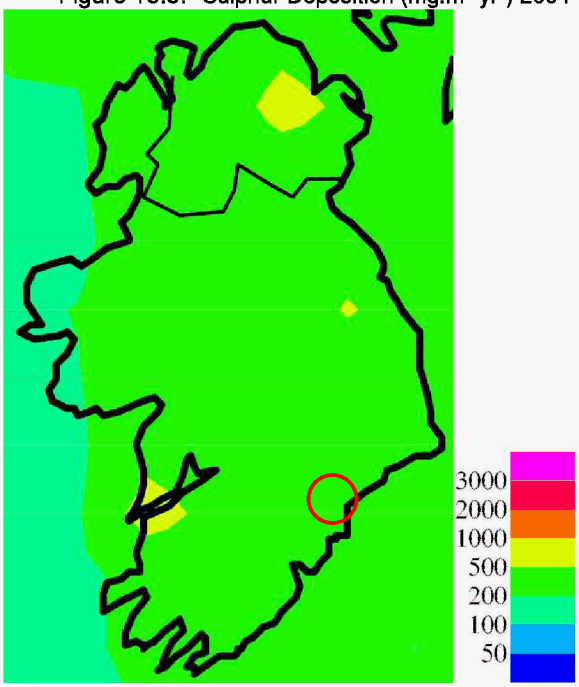
5th Percentile All Ecosystems, Netherlands Environmental Assessment Agency (2005) European Critical Loads and Dynamic Modelling: CCE Status Report 2005

Figure 15.4: Minimum Nitrogen Critical Load (CLminN) (eq/ha/yr)



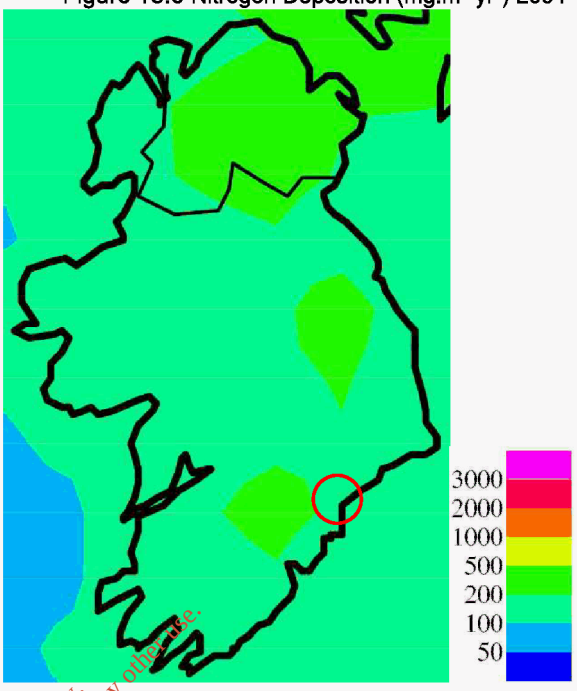
5th Percentile All Ecosystems Netherlands Environmental Assessment Agency (2005) European Critical Loads and Dynamic Modelling: CCE Status Report 2005

Figure 15.5: Sulphur Deposition (mg.m^2 yr^1) 2004



Source: Netherlands Environmental Assessment Agency (2005) European Critical Loads and Dynamic Modelling: CCE Status Report 2005.

Figure 15.6 Nitrogen Deposition (mg.m^2 yr^1) 2004



Source: Netherlands Environmental Assessment Agency (2005) European Critical Loads and Dynamic Modelling: CCE Status Report 2005.