Appendix A14.5 Detailed Dispersion Modelling Predictions

Element	Abbotstown Pumping Station Odour Assessment
Assessment details	Stack Height and Meteorological data Set
Data sets	Dublin Airport 2011 - 2015

Table A14.5.1 Abbotstown Pumping Station: Maximum predicted ground level concentration of odour

Air Quality Standard	Stack Height m	Predicted GLC, OU_E/m^3				
		2011	2012	2013	2014	2015
Typical normal operating conditions: APS Scenario 1						
1-hour limit not to be exceeded more than 176 hours / year (98th %ile)	7	0.71	0.71	0.71	0.71	0.71
	8	0.63	0.63	0.63	0.63	0.63
	10	0.54	0.54	0.54	0.54	0.54
1-hour limit not to be exceeded more than 44 hours / year (99.5th %ile)	7	0.77	0.77	0.77	0.77	0.77
	8	0.71	0.71	0.71	0.71	0.71
	10	0.59	0.59	0.59	0.59	0.59
Peak operating conditions: APS Scenario 2						
1-hour limit not to be exceeded more than 176 hours / year (98th %ile)	7	1.1	1.1	1.1	1.1	1.1
	8	0.95	0.95	0.95	0.95	0.95
	10	0.54	0.54	0.54	0.54	0.54
1-hour limit not to be exceeded more than 44 hours / year (99.5th %ile)	7	1.1	1.1	1.1	1.1	1.1
	8	1.1	1.1	1.1	1.1	1.1
	10	0.59	0.59	0.59	0.59	0.59

Principal findings

There is no significant difference between the predictions for the different meteorological data sets. 2015 was selected as the worst-case year.

Element	Abbotstown Pumping Station Odour Assessment
Assessment details	Stack height and Meteorological data Set
Data sets	Casement Aerodrome 2013

Table A14.5.2 Abbotstown Pumping Station: Maximum predicted ground level concentration of odour

Air Quality Standard	Stack Height m	Predicted GLC, OU_E/m^3	
		Casement Aerodrome 2013	Dublin Airport 2013
Typical normal operating conditions: APS Scenario 1			
1-hour limit not to be exceeded more than 176 hours / year 98th %ile	7 8 10	0.67 0.60 0.45	0.71 0.63 0.54
1-hour limit not to be exceeded more than 44 hours / year 99.5th %ile	7 8 10	0.77 0.68 0.54	0.77 0.71 0.59
Peak operating conditions: APS Scenario 2			
1-hour limit not to be exceeded more than 176 hours / year 98th %ile	7 8 10	1.0 0.89 0.67	1.1 0.95 0.54
1-hour limit not to be exceeded more than 44 hours / year 99.5th %ile	7 8 10	1.2 1.0 0.81	1.1 1.1 0.59

Principal findings

There is no significant difference between the predictions for the different meteorological data sets.

Element	Abbotstown Pumping Station Odour Assessment
Assessment details	Stack height and Terrain
Data sets	Dublin Airport, Casement Aerodrome 2013; digital terrain data

Table A14.5.3 Abbotstown Pumping Station: Maximum predicted ground level concentration of odour

Air Quality Standard	Stack Height m	Predicted GLC, OU_E/m^3			
		Casement Aerodrome 2013		Dublin Airport 2013	
		No Terrain	Terrain included	No terrain	Terrain included
Typical normal operating conditions: APS Scenario 1					
1-hour limit not to be exceeded more than 176 hours / year 98th %ile	7 8 10	0.67 0.60 0.45	0.61 0.54 0.40	0.71 0.63 0.54	0.70 0.63 0.52
1-hour limit not to be exceeded more than 44 hours / year 99.5th %ile	7 8 10	0.77 0.68 0.54	0.77 0.64 0.53	0.77 0.71 0.59	0.77 0.69 0.58
Peak operating conditions: APS Scenario 2					
1-hour limit not to be exceeded more than 176 hours / year 98th %ile	7 8 10	1.0 0.89 0.67	0.90 0.80 0.40	1.1 0.95 0.54	1.1 0.93 0.78
1-hour limit not to be exceeded more than 44 hours / year 99.5th %ile	7 8 10	1.2 1.0 0.81	1.1 0.95 0.53	1.1 1.1 0.59	1.1 1.0 0.86

Principal findings

Element	Abbotstown Pumping Station Generator Assessment
Assessment details	Meteorological data Set
Data sets	Dublin Airport 2011 - 2015

Table A14.5.4 Abbotstown Pumping Station Generator: Dispersion Modelling Predictions

Air Quality Standard		Predicted incremental contribution, µg/m^3				
		2011	2012	2013	2014	2015
Particulate Matter, PM_{10}						
24-hour limit not to be exceeded more than 35 times/year (90.4th %ile)	50 µg/m^3	1.4	1.2	1.2	1.2	1.2
Annual limit	40 µg/m^3	0.39	0.34	0.36	0.34	0.34
Particulate Matter, $PM_{2.5}$						
Annual limit	25 µg/m^3	0.39	0.34	0.36	0.34	0.34
Carbon Monoxide, CO						
8-hour limit	10,000 µg/m^3	3.5	3.3	3.7	3.6	3.6
Sulphur dioxide, SO_2						
Hourly limit - not to be exceeded more than 24 times/year (99.7th %ile)	350 µg/m^3	3.8	3.8	3.8	3.8	3.8
Daily limit - not to be exceeded more than 3 times/year (99.2th %ile)	125 µg/m^3	2.7	2.6	2.7	2.2	2.2
Annual limit	20 µg/m^3	0.39	0.34	0.36	0.34	0.34
Nitrogen Dioxide NO_2						
Hourly limit - not to be exceeded more than 18 times/year (99.8th %ile)	200 µg/m^3	3.9	3.9	3.8	3.8	3.8
Annual limit for protection of human health	40 µg/m^3	0.39	0.34	0.36	0.34	0.34
Nitrogen oxides, NO_x						
Annual limit for protection of vegetation	30 µg/m^3	0.39	0.34	0.36	0.34	0.34

Principal findings

Element	Abbotstown Pumping Station Generator Assessment
Assessment details	Meteorological data Set
Data sets	Dublin Airport and Casement Aerodrome 2013

Table A14.5.5 Abbotstown Pumping Station Generator: Dispersion Modelling Predictions

Air Quality Standard		Predicted incremental contribution, µg/m^3	
		Dublin Airport 2013	Casement Aerodrome 2013
Particulate Matter, PM_{10}			
24-hour limit not to be exceeded more than 35 times/year (90.4th %ile)	50 µg/m^3	1.2	1.3
Annual limit	40 µg/m^3	0.36	0.36
Particulate Matter, $PM_{2.5}$			
Annual limit	25 µg/m^3	0.36	0.36
Carbon Monoxide, CO			
8-hour limit	10,000 µg/m^3	3.7	3.7
Sulphur dioxide, SO_2			
Hourly limit - not to be exceeded more than 24 times/year (99.7th %ile)	350 µg/m^3	3.8	3.8
Daily limit - not to be exceeded more than 3 times/year (99.2th %ile)	125 µg/m^3	2.7	2.7
Annual limit	20 µg/m^3	0.36	0.36
Nitrogen Dioxide NO_2			
Hourly limit - not to be exceeded more than 18 times/year (99.8th %ile)	200 µg/m^3	3.8	3.8
Annual limit for protection of human health	40 µg/m^3	0.36	0.36
Nitrogen oxides, $NO_{x0.36}$			
Annual limit for protection of vegetation	30 µg/m^3	0.36	0.36

Principal findings

Element	Clonshagh WwTP CHP Assessment
Assessment details	Meteorological data set
Data sets	Dublin Airport 2011 - 2015

Table A14.5.7 Clonshagh WwTP CHP Unit: Dispersion Modelling Predictions

Air Quality Standard		Predicted incremental contribution, µg/m^3				
		2011	2012	2013	2014	2015
Particulate Matter, PM_{10}						
24-hour limit not to be exceeded more than 35 times/year (90.4th %ile)	50 µg/m^3	1.4	1.3	1.4	1.4	1.4
Annual limit	40 µg/m^3	0.4	0.4	0.4	0.4	0.4
Particulate Matter, $PM_{2.5}$						
Annual limit	25 µg/m^3	0.4	0.4	0.4	0.4	0.4
Carbon Monoxide, CO						
8-hour limit	10,000 µg/m^3	405	405	405	403	405
Sulphur dioxide, SO_2						
Hourly limit - not to be exceeded more than 24 times/year (99.7th %ile)	350 µg/m^3	137.6	137.7	137.6	137.6	137.6
Daily limit - not to be exceeded more than 3 times/year (99.2th %ile)	125 µg/m^3	38.7	38.7	38.8	38.7	38.7
Annual limit	20 µg/m^3	4.9	4.9	4.9	4.9	4.9
Nitrogen Dioxide NO_2						
Hourly limit - not to be exceeded more than 18 times/year (99.8th %ile)	200 µg/m^3	96	97	96	96	96
Annual limit for protection of human health	40 µg/m^3	4.9	4.9	4.8	4.9	4.9
Nitrogen oxides, NO_x						
Annual limit for protection of vegetation	30 µg/m^3	4.9	4.9	4.9	4.9	4.9

Principal findings

Element	Clonshagh WwTP CHP Assessment
Assessment details	Meteorological data set
Data sets	Dublin Airport and Casement Aerodrome 2013

Table A14.5.8 Clonshagh WwTP CHP Unit: Dispersion Modelling Predictions

Air Quality Standard		Predicted incremental contribution, µg/m³	
		Dublin Airport 2013	Casement Aerodrome 2013
Particulate Matter, PM_{10}			
24-hour limit not to be exceeded more than 35 times/year (90.4th %ile)	50 µg/m³	1.4	1.5
Annual limit	40 µg/m³	0.4	0.4
Particulate Matter, $PM_{2.5}$			
Annual limit	25 µg/m³	0.4	0.4
Carbon Monoxide, CO			
8-hour limit	10,000 µg/m³	405	406
Sulphur dioxide, SO_2			
Hourly limit - not to be exceeded more than 24 times/year (99.7th %ile)	350 µg/m³	137.6	139.7
Daily limit - not to be exceeded more than 3 times/year (99.2th %ile)	125 µg/m³	38.8	38.9
Annual limit	20 µg/m³	4.9	4.9
Nitrogen Dioxide NO_2			
Hourly limit - not to be exceeded more than 18 times/year (99.8th %ile)	200 µg/m³	96	96
Annual limit for protection of human health	40 µg/m³	4.8	4.8
Nitrogen oxides, NO_x			
Annual limit for protection of vegetation	30 µg/m³	4.9	4.9

Principal findings

Element	Clonshagh WwTP Odour Assessment
Assessment details	Meteorological data Set
Data sets	Dublin Airport 2011 - 2015

Table A14.5.9 Clonshagh WwTP: Maximum predicted ground level concentration of odour

Air Quality Standard	Predicted GLC, OU_E/m^3				
	2011	2012	2013	2014	2015
Typical normal operating conditions: WwTP Scenario 1					
1-hour limit not to be exceeded more than 176 hours / year 98th %ile	0.62	0.65	0.63	0.66	0.64
1-hour limit not to be exceeded more than 44 hours / year 99.5th %ile	0.91	0.93	0.93	0.98	0.98
Peak operating conditions: WwTP Scenario 2					
1-hour limit not to be exceeded more than 176 hours / year 98th %ile	0.62	0.65	0.63	0.66	0.64
1-hour limit not to be exceeded more than 44 hours / year 99.5th %ile	0.91	0.93	0.93	0.98	0.98

Principal findings

Element	Clonshagh WwTP Odour Assessment
Assessment details	Meteorological data Set
Data sets	Casement Aerodrome

Table A14.5.10 Clonshagh WwTP: Maximum predicted ground level concentration of odour

Air Quality Standard	Predicted GLC, OU_E/m^3				
	2011	2012	2013	2014	2015
Typical normal operating conditions: WwTP Scenario 1 (Phase 1)					
1-hour limit not to be exceeded more than 176 hours / year 98th %ile	0.51	0.60	0.63	0.58	0.54
1-hour limit not to be exceeded more than 44 hours / year 99.5th %ile	0.86	0.81	0.93	0.86	0.94
Peak operating conditions: WwTP Scenario 2 (Phase 1)					
1-hour limit not to be exceeded more than 176 hours / year 98th %ile	0.51	0.60	0.63	0.58	0.54
1-hour limit not to be exceeded more than 44 hours / year 99.5th %ile	0.86	0.81	0.93	0.86	0.94

Principal findings

Element	Clonshagh WwTP Odour Assessment
Assessment details	Terrain
Data sets	Dublin Airport 2013; digital terrain data

Table A14.5.11 Clonshagh WwTP: Maximum predicted ground level concentration of odour

Air Quality Standard	Predicted GLC, OU_E/m^3			
	Casement Aerodrome 2013		Dublin Airport 2013	
	No terrain	Terrain included	No terrain	Terrain included
Typical normal operating conditions: WwTP Scenario 1				
1-hour limit not to be exceeded more than 176 hours / year 98^{th} %ile	0.63	0.69	0.63	0.69
1-hour limit not to be exceeded more than 44 hours / year 99.5^{th} %ile	0.93	0.98	0.93	0.98
Peak operating conditions: WwTP Scenario 2				
1-hour limit not to be exceeded more than 176 hours / year 98^{th} %ile	0.63	0.69	0.63	0.69
1-hour limit not to be exceeded more than 44 hours / year 99.5^{th} %ile	0.93	0.98	0.93	0.98

Principal findings

Element	Clonshagh WwTP Odour Assessment
Assessment details	Stack height of Odour Control Units and terrain
Data sets	Dublin Airport and Casement Aerodrome 2013

Table A14.5.12 Clonshagh WwTP: Maximum predicted ground level concentration of odour

Air Quality Standard	Stack height m								Predicted GLC, OU_E/m^3			
									Casement Aerodrome 2013		Dublin Airport 2013	
	CHP	CHP	OCU1	OCU2	OCU3	OCU4	OCU5	OCU6	No terrain	Terrain included	No terrain	Terrain included
Typical normal operating conditions: WwTP Scenario 1												
1-hour 98th percentile	24	24	9	9	22	21	21	24	0.63	0.69	0.63	0.69
1-hour 99.5th percentile									0.93	0.98	0.75	0.76
1-hour 98th percentile	24	24	6	9	22	21	21	24	0.63	0.69	0.63	0.69
1-hour 99.5th percentile									0.93	0.98	0.75	0.76
1-hour 98th percentile	18	18	9	9	22	21	21	24	0.63	0.69	0.63	0.69
1-hour 99.5th percentile									0.93	0.98	0.76	0.76
1-hour 98th percentile	21	21	9	9	22	21	21	24	0.63	0.69	0.63	0.69
1-hour 99.5th percentile									0.93	0.98	0.75	0.76
1-hour 98th percentile	21	21	6	6	18	18	18	21	0.77	0.83	0.77	0.83
1-hour 99.5th percentile									1.1	1.2	1.0	1.1
1-hour 98th percentile	18	18	6	6	15	15	15	18	0.93	0.98	0.93	0.99
1-hour 99.5th percentile									1.3	1.5	1.3	1.3
1-hour 98th percentile	10	10	6	6	10	10	10	10	1.3	1.4	1.3	1.4
1-hour 99.5th percentile									1.8	2.1	1.8	1.9