Aleris Recycling Ltd, Waunarlwydd Works Air Quality H1 Assessment and Dispersion Modelling of Significant Emissions

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Air Quality H1 Assessment and Dispersion Modelling of Significant Emissions – Aleris Recycling Ltd

1 Introduction

To satisfy a section of a corrective action issued by the Environment Agency, Aleris Recycling Ltd requested that an H1 Air Quality assessment was performed. Detailed dispersion modelling has been undertaken to examine the impact of the significant emissions more closely. Additionally, Aleris are proposing to submit a variation which will propose an increase in the emission limits set for VOCs and SO_2. Dispersion modelling has been used to determine the likely impact of increasing the emissions from the plant. AES has performed dispersion modelling using the USEPA ISC-AERMOD package to determine whether significant impact will occur as a consequence of the current and proposed emissions from the site.

The site has two emission points which have been considered in isolation, but the impact of the site for certain determinands has also been considered as a whole. The results are presented as tabular data and in the form of contour plots, allowing comparisons to be made against the predicted concentrations for the current site situation, and the long and short-term Air Quality Standards as quoted within The Air Quality Strategy for England, Scotland, Wales & Northern Ireland (DEFRA, 2000, as amended 2003 and 2007).

The assessment has been undertaken using emissions testing data gathered at the site previously by the AES Emissions Testing Unit and using the proposed higher limit values for VOCs and SO_2.

The assessment has been performed by Analytical and Environmental Services.

1.1 Scope of the Assessment

A H1 assessment is to be performed to determine the significance of the emissions from the plant. Dispersion modelling will be used to predict the ground level concentrations of the pollutants deemed significant from the H1 assessment that local residential areas will potentially be exposed to.

The following aspects will be considered:

- The existing air quality in the locality - to allow addition of process contribution;
- The predicted impact on the air quality at surrounding residential properties as a consequence of significant emissions for the following options:
    - Current emissions from the site since burner modifications have been made
    - The impact of increasing the ELV for SO_2 from 35mg/Nm^3 to 50 mg/Nm^3
    - The impact of increasing the ELV for VOC from 10mg/Nm^3 to 50 mg/Nm^3
- Future trends in background air quality that may effect the overall impact

2 H1 Air Quality Screening Assessment

The Air Quality Impact Section of the Environment Agency H1 Software Tool has been used to quantify the significance of the emissions from the site and to determine which substances require more detailed assessment. The criteria for the H1 assessment are detailed in Section 2.1 and 2.2 below. The H1 Input/Output sheets are provided in Appendix III. The VOC figures are estimates for the proposed higher 50mg/Nm^3 ELV based on data contained within the McLellan permit information.

2.1 Criteria - The UK Air Quality Standards and Objectives

The UK Air Quality Strategy (AQS) [DETR 2000, 2002 and 2007] states a number of air quality standards and objectives with compliance dates, for the purposes of local air quality management. A summary of the objectives and standards taken from the National Air Quality Information Archive is provided below:

UK Air Quality Objectives for protection of human health, July 2007			
Pollutant	**Air Quality Objective**		**To be achieved by**
	Concentration	**Measured as**	
Benzene			
All authorities	16.25 µg m^{-3}	Running annual mean	31 December 2003
England and Wales Only	5.00 µg m^{-3}	Annual mean	31 December 2010
Scotland and N. Ireland	3.25 µg m^{-3}	Running annual mean	31 December 2010
1,3-Butadiene	2.25 µg m^{-3}	Running annual mean	31 December 2003
Carbon Monoxide			
England, Wales and N. Ireland	10.0 mg m^{-3}	Maximum daily running 8-hour mean	31 December 2003
Scotland Only	10.0 mg m^{-3}	Running 8-hour mean	31 December 2003
Lead	0.5 µg m^{-3}	Annual mean	31 December 2004
	0.25 µg m^{-3}	Annual mean	31 December 2008
Nitrogen Dioxide	200 µg m^{-3} not to be exceeded more than 18 times a year (99.79th percentile)	1-hour mean	31 December 2005
	40 µg m^{-3}	Annual mean	31 December 2005
Particles (PM10) (gravimetric)			
All authorities	50 µg m^{-3}, not to be exceeded more than 35 times a year (90.41th percentile)	24 hour running mean	31 December 2004
	40 µg m^{-3}	Annual mean	31 December 2004
Scotland Only	50 µg m^{-3}, not to be exceeded more than 7 times a year (98.08th percentile)	24 hour running mean	31 December 2010
	18 µg m^{-3}	Annual mean	31 December 2010
Particles (PM2.5) (gravimetric) *	25 µg m^{-3} (target)	Annual mean	2020
All authorities	15% cut in urban background exposure	Annual mean	2010 - 2020
Scotland Only	12 µg m^{-3} (limit)	Annual mean	2010
Sulphur dioxide	350 µg m^{-3}, not to be exceeded more than 24 times a year (99.73th percentile)	1-hour mean	31 December 2004
	125 µg m^{-3}, not to be exceeded more than 3 times a year (99.18th percentile)	24-hour mean	31 December 2004
	266 µg m^{-3}, not to be exceeded more than 35 times a year (99.90th percentile)	15-minute mean	31 December 2005
PAH *	0.25 ng m^{-3}	Annual mean	31 December 2010
Ozone *	100 µg m^{-3} not to be exceeded more than 10 times a year	8 hourly running or hourly mean*	31 December 2005

*Not included in regulations at present

UK Air Quality Objectives for protection of vegetation and ecosystems, July 2007			
Pollutant	**Air Quality Objective**		**To be achieved by**
	Concentration	**Measured as**	
Nitrogen dioxide (for protection of vegetation & ecosystems) *	30 µg m^{-3}	Annual mean	31 December 2000
Sulphur dioxide (for protection of vegetation & ecosystems) *	30 µg m^{-3} 30 µg m^{-3}	Annual mean Winter Average (Oct - Mar)	31 December 2000
Ozone *	18 µg m^{-3}	AOT40^{+}, calculated from 1h values May-July. Mean of 5 years, starting 2010	01 January 2010

*not included in regulations at present

$^{+}$ AOT 40 is the sum of the differences between hourly concentrations greater than 80 µg m^{-3} (=40ppb) and 80 µg m^{-3}, over a given period using only the 1-hour averages measured between 0800 and 2000.

2.2 Environmental Assessment Levels (EAL)

The following long term (annual average) and short term (maximum hourly average) figures are provided in the H1 guidance document issued by the EA. The figures are particularly useful for assessing pollutants that are not included within the UK Air Quality Strategy or that do not have annual or hourly air quality standards.

Pollutant	Long term EAL (µg/m^3)	Short term EAL (µg/m^3)
Hydrogen chloride (HCl)	20	800
Hydrogen fluoride (HF) as F	No long term value	250
Benzene	16.25	208
Hexane	720	21600
Cyclohexane	3500	105000
Toluene	1910	8000

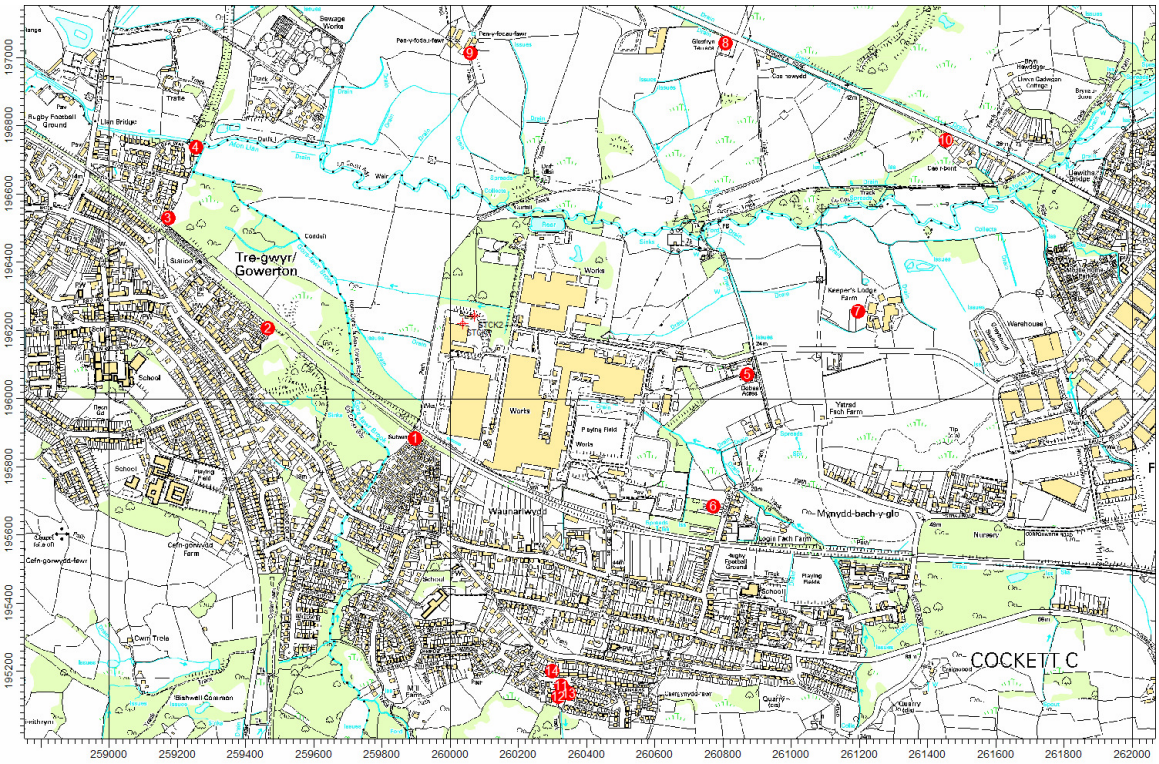
There are currently no guideline values or air quality standards for dioxins and furans. The Expert Panel on Air Quality Standards (EPAQS) is currently discussing this area, and may assign guideline values in the future.

The H1 Screening Assessment indicates that HCl, HF, Hexane, Cyclohexane and Toluene releases can be screened out as insignificant. The methodology indicates that particulate matter, nitrogen dioxide and sulphur dioxide require detailed assessment against the short term air quality standards as the predicted short term PC exceeds 20% of the headroom between the EAL and the background concentration.

Benzene has also been examined within the assessment for the proposed increased ELV value for VOCs, as the air quality standard is due to be tightened to 5µg/m^3 by the end of 2010.

3 Receptors Considered for the Dispersion Model

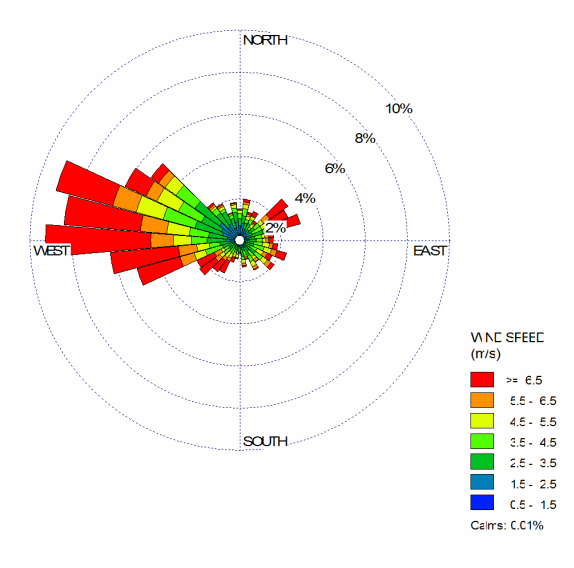
The location of the site and the position of the sensitive receptors considered are shown below.



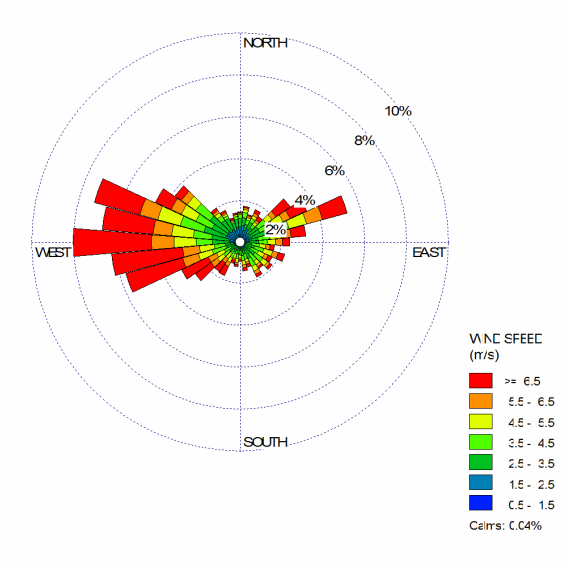
The receptors as numbered above are summarised in the following table:

Receptor Number	Receptor name	X-Coord (m)	Y-Coord (m)	Direction from Site
1	Nearest Receptor - Oak Drive	259898	195881.3	S
2	Eastern Property - Tir Y Farchnad	259466	196205.3	W
3	Residential receptor - Liiw Valley Close	259174	196527.8	W
4	Eastern Property - Alder Way	259255	196735.8	WNW
5	Residential receptor - Dobes Acres	260872	196068.8	E
6	Residential receptor - Roseland Road	260773	195684.4	SE
7	Residential Property - Keeper's Lodge Farm	261196	196256.2	E
8	Residential Property - Glasfryn Terrace	260808	197041.7	NE
9	Residential Property - Pen y Fodau Fawr	260060	197011.4	N
10	Residential Property - Cae'r Bont	261455	196757.7	NE
11	Residential Property - Heol Will George	260327	195157.7	SSE
12	Residential Property - Sardis Close	260319	195124.9	SSE
13	Residential Property - Sardis Close	260349	195134.1	SSE
14	Residential Property - Heol Will George	260300	195200.5	SSE

Meteorological data from the St Athans observation station has been used in the AERMOD dispersion model. Analysis of the worst case year for dispersion has been undertaken was deemed to be 2004 for this area. Wind roses for this year and for a five year period are provided below.



Wind rose for 2004 Data



Wind Rose for combined 2003 to 2007 data

The wind roses indicate that typically the prevailing winds are from the west to west southwest which will significantly affect the pattern of the long term concentrations of pollutants surrounding the site. Poorer dispersion usually occurs during periods of lighter winds, potentially giving rise to higher short term concentrations.

4 Existing and Future Background Air Quality

Data from the National Atmospheric Emissions Inventory [AEAT 2009a] indicates that more than 60% of the NO_x produced in the area is as a consequence of road traffic emissions.

In the absence of any local monitoring information, the background pollutant levels for the area have been derived from the National Air Quality Information Archive [AEAT 2009b] and adjusted where necessary for the year of interest using the Netcen Adjustment Calculator v2.2a. The background values for each pollutant have been calculated for the square centred on the X and Y grid coordinates detailed below for the area surrounding the plant which resides at the junction of the X259500 Y196500 and X260500 Y196500 squares.

X	Y	NO_x 2009 ugm-3 as NO_2 annual mean	NO_2 2009 ugm-3 as NO_2 annual mean	PM_{10} 2009 ugm-3 Annual mean	SO_2 ugm-3 assumed annual mean	Benzene 2010 ugm-3 annual mean
259500	195500	10.1	8.5	13.9	2.5	0.21
259500	196500	11.3	9.4	14.3	2.4	0.24
259500	197500	12.6	10.5	14.8	2.9	0.25
260500	195500	10.6	8.9	14.9	2.4	0.24
260500	196500	11.2	9.3	14.9	2.3	0.26
260500	197500	12.5	10.4	14.7	2.6	0.27
261500	195500	12.6	10.6	15.0	2.6	0.26
261500	196500	13.4	11.2	15.2	2.6	0.26
261500	197500	13.4	11.2	14.9	2.5	0.27
Average		**12.0**	**10.0**	**14.7**	**2.5**	**0.25**

The figures indicate that the predicted background NO_2 levels form 25% of the 40µg/m^3 annual mean UK Air Quality Standard in 2009 and PM_{10} levels form 37% of the 40µg/m^3 annual mean UK Air Quality Standard in 2009.

The average figures shown above have been used in Section 6 to assess the cumulative concentrations at the receptor positions.

5 Industrial Emissions and Modelling Details

5.1 Emissions Data used within the Model

The table below indicates the parameters used within the model for the assessment of long term impacts. They are based upon typical figures obtained during 2008 during the quarterly emissions testing exercises. Benzene figures are based on speciated organic figures provided within the original permit application document written by McLellan.

Emission point	Particulate matter (g/s)	NOx as NO2 (g/s)	SO2 (g/s)	Benzene (g/s)	Dioxins & Furans (ng/s I-TEQ)	Gas temperature (K)	Diameter of duct at release point (m)	Area of Duct at release point (m2)	Actual flow rate (m3/s)	Efflux velocity actual (m/s)	Emission Point Height (m)
A3 Mud Room Stack	0.01	-	-	-	-	329	1.2	1.13	12.4	11	15
A4 Main Stack	0.05	0.49	0.70	0.022	4.2	358	1.5	1.72	53.3	31	23

The table below indicates the maximum and minimum hourly average figures for NO_x and SO_2 used within the model for the assessment of short term impacts, again based upon figures obtained during 2008. The model allows variation of the input parameters to reflect process cycles. Based upon the 3 hour profiles generated for NO_x and SO_2, the process appears to cycle on a roughly hourly period. Other parameters are measured using techniques that do not allow for the analysis of the process cycle and are therefore assumed to remain roughly constant.

Emission point	Particulate matter (g/s)	NOx as NO2 (g/s)	SO2 (g/s)	Benzene (g/s)	Dioxins & Furans (ng/s I-TEQ)	Gas temperature (K)	Diameter of duct at release point (m)	Area of Duct at release point (m2)	Actual flow rate (m3/s)	Efflux velocity actual (m/s)	Emission Point Height (m)
A3 Mud Room Stack	0.01	-	-	-	-	329	1.2	1.13	12.4	11	15
A4 Main Stack	0.05	0.56 (max) 0.39 (min)	1.41 (max) 0.39 (min)	0.022	4.2	358	1.5	1.72	53.3	31	23

The model has also been used to predict the impact of increasing the ELVs for SO_2 and VOCs to 50mg/Nm^3. The table below indicates the parameters used within the model for assessing the short and long term impacts under this scenario. It is assumed that the emissions remain constant and do not exceed 50mg/Nm^3 as an hourly average. The benzene figure is based upon the speciation of organic compounds presented in the original permit application document written by McLellan. The percentage of benzene found in the original speciation (approx. 10% of the total VOC figure) has be extrapolated to an equivalent amount that would be present within an emission of 50mg/Nm^3 total VOC.

Emission point	SO2 (g/s)	Benzene (g/s)	Gas temperature (K)	Diameter of duct at release point (m)	Area of Duct at release point (m2)	Actual flow rate (m3/s)	Efflux velocity actual (m/s)	Emission Point Height (m)
A3 Mud Room Stack	-	-	329	1.2	1.13	12.4	11	15
A4 Main Stack	1.78	0.11	358	1.5	1.72	53.3	31	23

All predictions have been performed using worst case operating times/conditions - 100% operation of the processes throughout the year.

5.2 Modelling Details

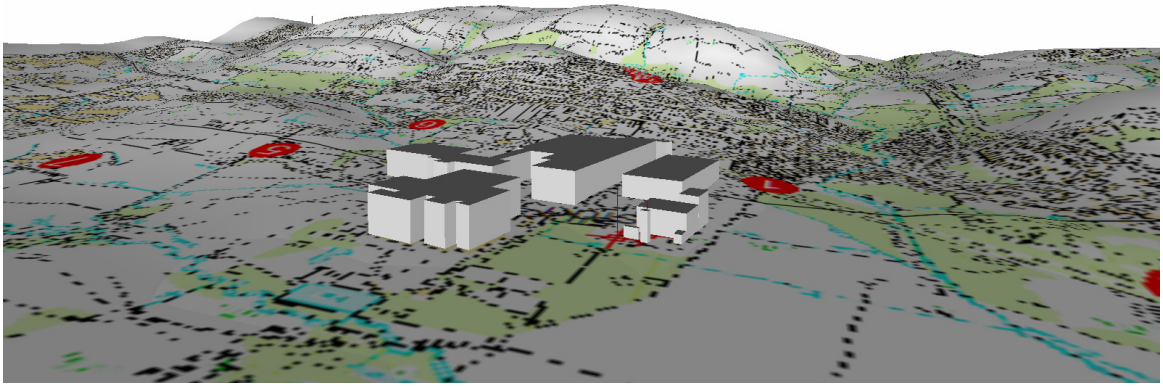
The ISC-AERMOD dispersion model has been used to perform the predictions provided in the Appraisal Section and the contour maps in Appendix I. This model has been used extensively for assessing air quality impacts from IPPC sites and is recognised as an appropriate air quality modelling tool by the EA, SEPA and local authorities. It is the regulatory model used by the USEPA.

Topographic features can have significant effect on the dispersion of pollutants, especially when the gradient exceeds 1 in 10. Terrain to the east of the site has a significant gradient and this needs to be taken into account. Terrain data provided by the Ordnance Survey has been used

within the model. The terrain pre-processing module was utilised within the model to predict topographic effects and to generate elevations of receptors, buildings and stack bases.

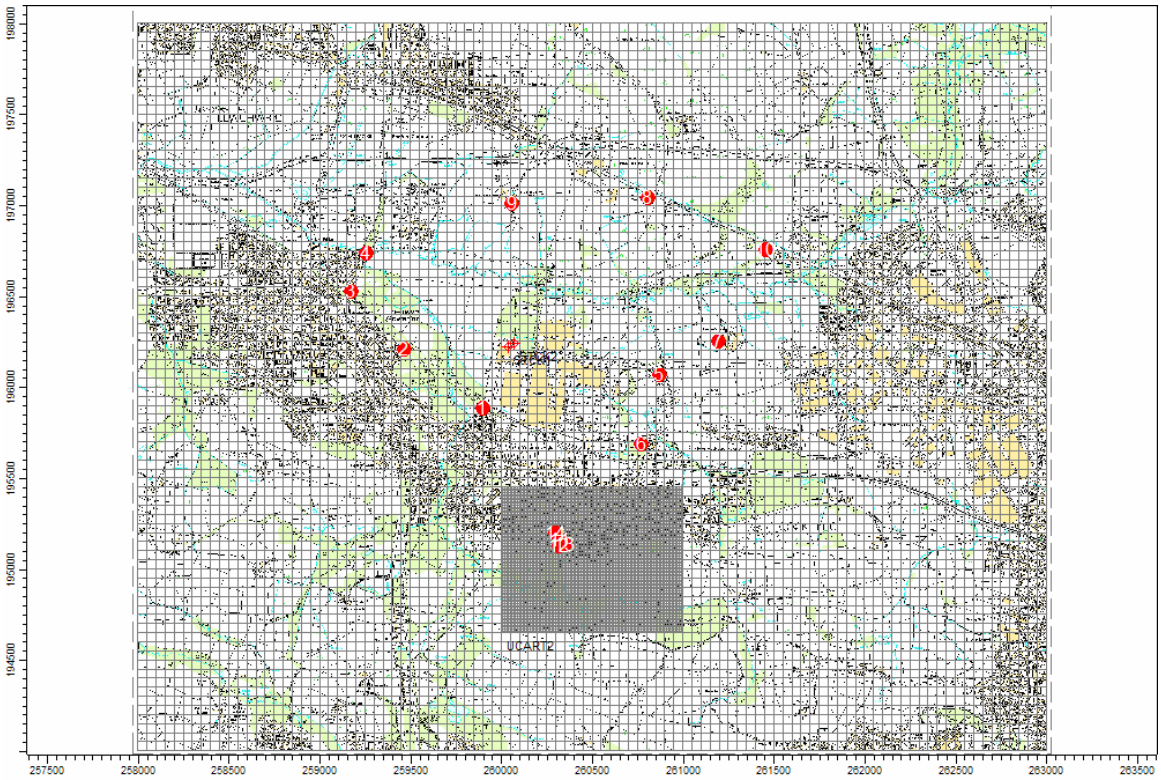
5 years of meteorological data was used from the St Athans as supplied by The Met Office. This data is thought to be representative of the met conditions experienced by the site and required no additional adjustment for local topography. The AERMET pre-processor provided the surface and profile files for the model. As the site is located in an urban area, the urban option was selected within the model to allow for any additional heating from properties. Seasonal surface roughness, Albedo figures and Bowen Ratios for each of 16 wind quadrants were used for the areas surrounding the site representing the urban landscape.

The buildings module was also utilised in each modelling run to allow for downwash. All major site buildings were input into the model using height information taken from site drawings provided by Aleris Recycling Ltd. The revised building layout is indicated by the 3D visualisation below. The vertical height is exaggerated to illustrate the buildings more clearly.



Emissions of oxides of nitrogen from combustion processes are typically 95% nitric oxide (NO) or greater. Atmospheric reactions with ozone and oxygen cause the oxidation of NO to nitrogen dioxide (NO_2). For the purposes of the modelling exercise, it has been assumed that there is 35% conversion of NO to NO_2 for the short-term concentrations and 70% conversion to NO_2 for the long term concentrations. This is in accordance with the latest guidance provided by the EA. No other specialised model treatments such as short-term (puff) releases were used in this assessment.

The area surrounding the site was modelled using a uniform grid as indicated below with a 50m spacing. The screening runs indicated hotspots to the south of the plant. A grid with a 10m spacing was used to cover the area in more detail.



The input data for this assessment has been compiled using a worst case scenario view point as described in previous sections. This will tend to provide an overestimation of ground level concentrations and the actual figures could be lower, or sometimes significantly lower in the case of NO_2.

Screening runs were performed for each year of met data to determine the worst case year for dispersion. This was determined to be 2004, and this year of met data has been used for each detailed modelling run.

The uncertainty associated with dispersion models is difficult to quantify, and short-term concentrations in particular may be subject to large uncertainties. The inclusion of terrain files and building downwash algorithms will also increase the overall uncertainty budget. In addition to the model itself, there are also uncertainties associated with background data which may be as much as ±50%. However, the AERMOD model is well validated by the USEPA, and as such, dispersion modelling is probably the most useful tool for plume visualisation and for allowing comparison of the effects of changing process parameters.

6.0 Predictions and Assessment of Impacts

The results of the dispersion modelling are presented in this section and compares predicted ground levels concentrations to the air quality standards and other guideline values applicable for the area surrounding the site.

As defined by DETR (2000) the Air Quality Standards and other limit values apply;

'*in non-occupational near ground level outdoor locations where a person might reasonably be expected to be exposed over the relevant averaging period*'.

The predicted ground level concentrations are presented alongside a combined figure taking into account the background concentrations in the area as determined in Section 4. Within the tabulated results, the background level has been left unchanged for long-term average air quality standards, but has been multiplied by 2 for the addition to short-term air quality standards. The percentage take of the air quality standard as a consequence of the process contribution is also provided.

IPPC document H1 provides criteria for assessing the significance of plant releases to be used for screening purposes within the H1 software tool, in order to decide whether more detailed modelling is required. These criteria may also be considered suitable for assessing the significance of the results obtained from the detailed modelling. Predicted ground level concentrations may be considered insignificant based on the following criteria:

- Long-term Process Contribution < 1% of the long-term environmental benchmark
- Short-term Process Contribution < 10% of the short-term environmental benchmark
- Short-term Process Contributions not exceeding 30% of the short-term benchmark "may be considered to be tolerable"

Additionally, the short-term process contribution may be considered to be significant if it forms more than 20% of the headroom between the background concentration and the short term Air Quality Standard or EAL, or if the long-term Process Contribution plus background concentration (Predicted Environmental Concentration or PEC) is greater than 70% of the long term benchmark.

The following predictions are based on the results of the ISC-AERMOD model runs under the scenario as described in each sub-section.

Concentration contour plots are also presented in Appendix I and II.

6.1 Current Situation

The following tables detail the predicted pollutant concentrations at specific receptor positions using worst case meteorological data (2004) under the current operational situation.

NO2 and NOx Impacts at Sensitive Receptors

Aleris Recycling - Typical Operations. Emissions from A4 Main Stack

Average background levels calculated for 2009 using NETCEN calculator

		Predicted Ground Level Concentrations										
		NO_2 Annual Mean (µg/m^3)				NO_x Annual Mean (µg/m^3)			NO_2 99.79 %ile of 1hr means (µg/m^3)			
	Air Quality Standard (µg/m^3)				40			30				200
	Vegetation based Air Quality Standard (µg/m^3)				-			12				-
	Calculated Background NO_x concentration (µg/m^3)				-			-				-
	Calculated Background NO_2 concentration (µg/m^3)				10							20
Receptor Number	Receptor name	Process Contribution Excluding Background	PEC Including Background	Process Contrib as % of AQS	% PEC of AQS	Process Contribution Excluding Background	PEC Including Background	Process Contrib as % of Veg AQS	Process Contribution Excluding Background	PEC Including Background	Process Contrib as % of AQS	% PC of headroom
1	Nearest Receptor - Oak Drive	0.02	10.0	0.1	25.1	0.03	12.0	0.1	0.6	20.6	0.3	0.3
2	Eastern Property - Tir Y Farchnad	0.05	10.1	0.1	25.1	0.07	12.1	0.2	0.8	20.8	0.4	0.5
3	Residential receptor - Liiw Valley Close	0.03	10.0	0.1	25.1	0.05	12.0	0.2	0.5	20.5	0.3	0.3
4	Eastern Property - Alder Way	0.03	10.0	0.1	25.1	0.04	12.0	0.1	0.5	20.5	0.2	0.3
5	Residential receptor - Dobes Acres	0.08	10.1	0.2	25.2	0.12	12.1	0.4	0.7	20.7	0.3	0.4
6	Residential receptor - Roseland Road	0.02	10.0	0.1	25.1	0.03	12.0	0.1	0.4	20.4	0.2	0.2
7	Residential Property - Keeper's Lodge Farm	0.07	10.1	0.2	25.2	0.10	12.1	0.3	0.6	20.6	0.3	0.4
8	Residential Property - Glasfryn Terrace	0.03	10.0	0.1	25.1	0.04	12.0	0.1	0.8	20.8	0.4	0.4
9	Residential Property - Pen y Fodau Fawr	0.02	10.0	0.0	25.0	0.02	12.0	0.1	0.5	20.5	0.3	0.3
10	Residential Property - Cae'r Bont	0.03	10.0	0.1	25.1	0.04	12.0	0.1	0.5	20.5	0.2	0.3
11	Residential Property - Heol Will George	0.18	10.2	0.4	25.4	0.26	12.3	0.9	10.2	30.2	5.1	5.7
12	Residential Property - Sardis Close	0.17	10.2	0.4	25.4	0.25	12.2	0.8	10.5	30.5	5.2	5.8
13	Residential Property - Sardis Close	0.18	10.2	0.4	25.4	0.26	12.3	0.9	10.2	30.2	5.1	5.7
14	Residential Property - Heol Will George	0.15	10.2	0.4	25.4	0.22	12.2	0.7	10.0	30.0	5.0	5.6

The long-term PEC figures are <70% of the long-term AQS at all locations and the process contribution is predicted to be <1% of the AQS. The short-term process contribution is predicted to be 5% or less of the short-term AQS and less than 20% of the headroom at all receptors. Therefore, the impact is predicted to be insignificant under the current situation.

SO2 Impacts at Sensitive Receptors

Aleris Recycling - Typical Operations. Emissions from A4 Main Stack

Current emissions

Typical background levels estimated from NETCEN figures

		Predicted Ground Level Concentrations																	
		SO_2 Annual Mean (µg/m^3)						SO_2 99.18 %ile of 24hr means (µg/m^3)				SO_2 99.73 %ile of 1hr means (µg/m^3)				SO_2 99.90 %ile of 15min means (µg/m^3)			
	Air Quality Standard (µg/m^3)						-				125				350				266
	EAL (µg/m3)						50				-				-				-
	Vegetation based Air Quality Standard (µg/m^3)						20				-				-				-
	Estimated Background SO_2 concentration (µg/m^3)						2.5				2.5				5				5
Receptor Number	Receptor name	Process Contribution Excluding Background	PEC Including Background	Process Contrib as % of EAL	PEC as % of EAL	Process Contrib as % of Veg AQS	PEC as % of Veg AQS	Process Contribution Excluding Background	PEC Including Background	Process Contrib as % of AQS	PC as % of Headroom	Process Contribution Excluding Background	PEC Including Background	Process Contrib as % of AQS	PC as % of Headroom	Process Contribution Excluding Background	PEC Including Background	Process Contrib as % of AQS	PC as % of Headroom
1	Nearest Receptor - Oak Drive	0.07	2.57	0.14	5.1	0.3	12.8	0.9	3.4	0.7	0.7	3.4	8.4	1.0	1.0	3.8	8.8	1.4	1.5
2	Eastern Property - Tir Y Farchnad	0.15	2.65	0.29	5.3	0.7	13.2	1.5	4.0	1.2	1.2	5.9	11	1.7	1.7	6.8	12	2.5	2.6
3	Residential receptor - Liiw Valley Close	0.09	2.59	0.18	5.2	0.4	12.9	1.0	3.5	0.8	0.8	3.7	8.7	1.0	1.1	4.5	9.5	1.7	1.7
4	Eastern Property - Alder Way	0.08	2.58	0.16	5.2	0.4	12.9	0.9	3.4	0.7	0.7	3.2	8.2	0.9	0.9	3.7	8.7	1.4	1.4
5	Residential receptor - Dobes Acres	0.23	2.73	0.47	5.5	1.2	13.7	1.5	4.0	1.2	1.2	5.0	10	1.4	1.4	6.1	11	2.3	2.3
6	Residential receptor - Roseland Road	0.07	2.57	0.13	5.1	0.3	12.8	0.7	3.2	0.6	0.6	3.0	8.0	0.9	0.9	3.7	8.7	1.4	1.4
7	Residential Property - Keeper's Lodge Farm	0.19	2.69	0.39	5.4	1.0	13.5	1.3	3.8	1.0	1.1	4.8	9.8	1.4	1.4	6.0	11	2.2	2.3
8	Residential Property - Glasfryn Terrace	0.08	2.58	0.15	5.2	0.4	12.9	1.0	3.5	0.8	0.8	5.3	10	1.5	1.5	5.7	11	2.1	2.2
9	Residential Property - Pen y Fodau Fawr	0.05	2.55	0.09	5.1	0.2	12.7	0.6	3.1	0.5	0.5	3.2	8.2	0.9	0.9	3.4	8.4	1.3	1.3
10	Residential Property - Cae'r Bont	0.09	2.59	0.17	5.2	0.4	12.9	0.7	3.2	0.6	0.6	3.4	8.4	1.0	1.0	4.2	9.2	1.6	1.6
11	Residential Property - Heol Will George	0.55	3.05	1.09	6.1	2.7	15.2	11	13	8.6	9	62	67	18	18	54	59	20	21
12	Residential Property - Sardis Close	0.54	3.04	1.08	6.1	2.7	15.2	11	13	8.7	9	56	61	16	16	52	57	19	20
13	Residential Property - Sardis Close	0.53	3.03	1.05	6.1	2.6	15.1	9.7	12	7.7	7.9	60	65	17	17.5	61	66	23	23
14	Residential Property - Heol Will George	0.50	3.00	1.01	6.0	2.5	15.0	9.2	12	7.3	7.5	48	53	14	14.0	51	56	19	20

The long-term PEC figures are <70% of the long-term EAL at all locations and the process contribution is predicted to be 1% or less of the EAL. At the majority of locations, the short-term process contributions are predicted to be less than 10% of the short-term AQS values and less than 20% of the headroom figures. However, the model predicts, for a small number of elevated receptors on the hillside to the south of Caer Gynydd Road, that the short-term process contributions are predicted to be around 20% of the 15 minute average short-term AQS and approximately 20% of the headroom. Therefore, the impact is predicted to be insignificant on a long-term basis and of low significance on a short-term basis under the current situation, with reference to the EA guideline values.

PM10 Impacts at Sensitive Receptors

Aleris Recycling - Typical Operations. Emissions from A3 Mud Room Stack and A4 Main Stack

Average background levels calculated for 2009 using NETCEN calculator

		Predicted Ground Level Concentrations							
		PM_{10} Annual Mean (µg/m^3)				PM_{10} 90.41 %ile of 24hr means (µg/m^3)			
Air Quality Standard (µg/m^3)					40				50
Calculated Background PM10 concentration (µg/m^3)					14.7				29.4
Receptor Number	Receptor name	Process Contribution Excluding Background	PEC Including Background	Process Contrib as % of AQS	% PEC of AQS	Process Contribution Excluding Background	PEC Including Background	Process Contrib as % of AQS	% PC of headroom
1	Nearest Receptor - Oak Drive	0.017	14.7	0.04	36.8	0.066	29.5	0.13	0.3
2	Eastern Property - Tir Y Farchnad	0.013	14.7	0.03	36.8	0.045	29.4	0.09	0.2
3	Residential receptor - Liiw Valley Close	0.007	14.7	0.02	36.8	0.024	29.4	0.05	0.1
4	Eastern Property - Alder Way	0.0060	14.7	0.01	36.8	0.019	29.4	0.04	0.1
5	Residential receptor - Dobes Acres	0.024	14.7	0.06	36.8	0.068	29.5	0.14	0.3
6	Residential receptor - Roseland Road	0.016	14.7	0.04	36.8	0.046	29.4	0.09	0.2
7	Residential Property - Keeper's Lodge Farm	0.016	14.7	0.04	36.8	0.045	29.4	0.09	0.2
8	Residential Property - Glasfryn Terrace	0.0063	14.7	0.02	36.8	0.022	29.4	0.04	0.1
9	Residential Property - Pen y Fodau Fawr	0.0040	14.7	0.01	36.8	0.013	29.4	0.03	0.1
10	Residential Property - Cae'r Bont	0.0073	14.7	0.02	36.8	0.022	29.4	0.04	0.1
11	Residential Property - Heol Will George	0.028	14.7	0.07	36.8	0.098	29.5	0.20	0.5
12	Residential Property - Sardis Close	0.027	14.7	0.07	36.8	0.093	29.5	0.19	0.5
13	Residential Property - Sardis Close	0.028	14.7	0.07	36.8	0.10	29.5	0.20	0.5
14	Residential Property - Heol Will George	0.026	14.7	0.06	36.8	0.085	29.5	0.17	0.4

The long-term PEC figures are <70% of the long-term AQS at all locations and the process contribution is predicted to be <1% of the AQS. The short-term process contribution is predicted to be less than 10% of the short-term AQS and less than 20% of the headroom at all receptors. Therefore, the impact is predicted to be insignificant under the current situation.

Benzene Impacts at Sensitive Receptors

Aleris Recycling - Typical Operations. Emissions from A4 Main Stack

Current emissions

Average background levels calculated for 2010 using NETCEN calculator

		Predicted Ground Level Concentrations							
		Benzene Annual Mean (µg/m^3)				Benzene Maximum 1hr Mean (µg/m^3)			
2010 Air Quality Standard/EAL (µg/m^3)					5				208
Calculated Background concentration (µg/m^3)					0.25				0.5
Receptor Number	Receptor name	Process Contribution Excluding Background	PEC Including Background	Process Contrib as % of AQS	% PEC of AQS	Process Contribution Excluding Background	PEC Including Background	Process Contrib as % of EAL	% PC of headroom
1	Nearest Receptor - Oak Drive	0.002	0.3	0.05	5.0	0.28	0.8	0.13	0.1
2	Eastern Property - Tir Y Farchnad	0.005	0.3	0.11	5.1	0.18	0.7	0.09	0.1
3	Residential receptor - Liiw Valley Close	0.003	0.3	0.07	5.1	0.12	0.6	0.06	0.1
4	Eastern Property - Alder Way	0.003	0.3	0.06	5.1	0.11	0.6	0.05	0.1
5	Residential receptor - Dobes Acres	0.009	0.3	0.17	5.2	0.17	0.7	0.08	0.1
6	Residential receptor - Roseland Road	0.002	0.3	0.05	5.0	0.14	0.6	0.07	0.1
7	Residential Property - Keeper's Lodge Farm	0.007	0.3	0.14	5.1	0.13	0.6	0.06	0.1
8	Residential Property - Glasfryn Terrace	0.003	0.3	0.06	5.1	0.55	1.0	0.26	0.3
9	Residential Property - Pen y Fodau Fawr	0.0017	0.3	0.03	5.0	0.18	0.7	0.09	0.1
10	Residential Property - Cae'r Bont	0.003	0.3	0.06	5.1	0.11	0.6	0.05	0.1
11	Residential Property - Heol Will George	0.018	0.3	0.36	5.4	3.4	3.9	1.62	1.6
12	Residential Property - Sardis Close	0.018	0.3	0.35	5.4	3.5	4.0	1.68	1.7
13	Residential Property - Sardis Close	0.018	0.3	0.36	5.4	3.6	4.1	1.73	1.7
14	Residential Property - Heol Will George	0.016	0.3	0.31	5.3	3.3	3.8	1.57	1.6

Based on the tighter 2010 Benzene AQS, the long-term PEC figures are <70% of the long-term AQS at all locations and the process contribution is predicted to be <1% of the AQS. The short-term process contribution is predicted to be less than 10% of the short-term AQS and less than 20% of the headroom at all receptors. Therefore, the impact is predicted to be insignificant under the current situation even under the tighter 2010 AQS.

Dioxin & Furan Impacts at Sensitive Receptors
Aleris Recycling - Typical Operations. Emissions from A4 Main Stack

		Predicted Ground Level Concentrations				Predicted Deposition Rate
		Annual Mean (fg/m^3 I-TEQ)			Highest 24 Hr Mean (fg/m3 I-TEQ)	Annual Mean (ng/m^2/year I-TEQ)
Long term guideline value				No value	-	
*Estimated Sub-Urban Background concentration (fg/m^3 I-TEQ)				5.9	-	
Receptor Number	Receptor name	Process Contribution Excluding Background	Including Background	Process Contrib as % of Background	Process Contribution Excluding Background	Process Contribution Excluding Background
1	Nearest Receptor - Oak Drive	0.29	6.2	5.0	9.5	0.14
2	Eastern Property - Tir Y Farchnad	0.64	6.5	11	12	0.12
3	Residential receptor - Liiw Valley Close	0.39	6.3	6.6	6.8	0.091
4	Eastern Property - Alder Way	0.36	6.3	6.0	5.1	0.086
5	Residential receptor - Dobes Acres	1.0	6.9	17	9.3	0.21
6	Residential receptor - Roseland Road	0.27	6.2	4.6	4.9	0.11
7	Residential Property - Keeper's Lodge Farm	0.83	6.7	14	7.2	0.19
8	Residential Property - Glasfryn Terrace	0.33	6.2	5.6	4.8	0.090
9	Residential Property - Pen y Fodau Fawr	0.20	6.1	3.3	2.8	0.078
10	Residential Property - Cae'r Bont	0.37	6.3	6.3	4.1	0.13
11	Residential Property - Heol Will George	2.2	8.1	38	67	0.036
12	Residential Property - Sardis Close	2.2	8.1	37	73	0.035
13	Residential Property - Sardis Close	2.2	8.1	38	53	0.035
14	Residential Property - Heol Will George	2.0	7.9	33	76	0.036

*Based on 2007 NETCEN figures for Stoke Ferry site

Dioxins and furans currently have no benchmark concentrations. The long-term concentrations are predicted to be less than 10% of the estimated background at the majority of local receptors, and no more than 38% of the current levels as measured at the Stoke Ferry monitoring site. The higher figures are predicted to occur for a small number of elevated receptors on the hillside to the south of Caer Gynydd Road. The emissions from the plant do not significantly increase the airborne concentrations or deposition rate of these pollutants in the area surrounding the plant.

Work by the Danish EPA indicates that absorption by the lungs is approximately 75% of the intake quantity. At rest an adult human has a respiratory rate of about 13 m^3/day and considerably more during exercise or whilst performing activities. Therefore, based on the annual mean figures and assuming a respiratory rate of approximately 20m^3/day, the total daily intake of dioxins and furans is estimated to be 122 fg I-TEQ/day or 0.122 pg I-TEQ/day at the worst affected receptors with the addition of the plant emissions to the existing background. This equates to 0.0017 pg I-TEQ/kg body weight/day assuming a bodyweight of 70kg, or 0.030 pg I-TEQ/kg body weight/day assuming a bodyweight of 4kg for a newly born baby.

The World Health Organisation (WHO) recommended Tolerable Daily Intake (TDI) is 1-4 pg I-TEQ/kg/body weight/day and it is generally accepted that the majority of dioxin and furan intake occurs as a consequence of the intake through food. Estimates from the AERMOD dispersion model, indicate that the

intake due to inhalation as a consequence of plant emissions plus background concentrations at the worst affected receptors is only 0.2 to 3% of the most stringent TDI figure recommended by WHO, depending upon body weight.

Typical dioxin levels in agricultural soils in rural areas can vary between 0.008 and 1.5ng I-TEQ/kg. The figures from the dispersion model indicate that the additional burden to the soil will be no greater than 0.2ng I-TEQ/m^2/year or 0.5pg I-TEQ/m^2/day at the receptors studied. These figures suggest that the potential health risk associated with eating vegetables grown in the area will be extremely small. Unfeasibly large quantities of soil or unwashed fruit and vegetables would need to be ingested daily in order to exceed the TDI figure. As dioxins are predominantly particle bound, the liquid uptake of dioxins by root crops would be extremely small.

6.2 Predictions for Emissions at Proposed Increased ELVs

The site is proposing to apply for an increase in the ELVs for SO_2 and VOCs, taking the value to 50mg/Nm^3 from the 35mg/Nm^3 and 10mg/Nm^3 values respectively. The following tables detail the predicted pollutant concentrations at specific receptor positions using worst case meteorological data (2004) under the increased ELV figures.

SO2 Impacts at Sensitive Receptors

Aleris Recycling - Typical Operations. Emissions from A4 Main Stack

Proposed increase of ELV to 50mg/Nm3

Typical background levels estimated from NETCEN figures

		Predicted Ground Level Concentrations																	
		SO_2 Annual Mean (µg/m^3)						SO_2 99.18 %ile of 24hr means (µg/m^3)				SO_2 99.73 %ile of 1hr means (µg/m^3)				SO_2 99.90 %ile of 15min means (µg/m^3)			
	Air Quality Standard (µg/m^3)						-				125				350				266
	EAL (µg/m3)						50				-				-				-
	Vegetation based Air Quality Standard (µg/m^3)						20				-				-				-
	Estimated Background SO_2 concentration (µg/m^3)						2.5				2.5				5				5
Receptor Number	Receptor name	Process Contribution Excluding Background	PEC Including Background	Process Contrib as % of EAL	PEC as % of EAL	Process Contrib as % of Veg AQS	PEC as % of Veg AQS	Process Contribution Excluding Background	PEC Including Background	Process Contrib as % of AQS	PC as % of Headroom	Process Contribution Excluding Background	PEC Including Background	Process Contrib as % of AQS	PC as % of Headroom	Process Contribution Excluding Background	PEC Including Background	Process Contrib as % of AQS	PC as % of Headroom
1	Nearest Receptor - Oak Drive	0.12	2.62	0.25	5.2	0.6	13.1	1.6	4.1	1.3	1.3	5.0	10	1.4	1.5	5.9	11	2.2	2.3
2	Eastern Property - Tir Y Farchnad	0.27	2.77	0.54	5.5	1.3	13.8	2.9	5.4	2.3	2.4	7.5	13	2.2	2.2	9.4	14	3.5	3.6
3	Residential receptor - Liiw Valley Close	0.17	2.67	0.33	5.3	0.8	13.3	2.0	4.5	1.6	1.6	5.0	10	1.4	1.4	6.4	11	2.4	2.4
4	Eastern Property - Alder Way	0.15	2.65	0.30	5.3	0.8	13.3	1.7	4.2	1.3	1.4	4.5	9.5	1.3	1.3	5.6	11	2.1	2.1
5	Residential receptor - Dobes Acres	0.43	2.93	0.85	5.9	2.1	14.6	2.5	5.0	2.0	2.1	7.7	13	2.2	2.2	9.5	15	3.6	3.6
6	Residential receptor - Roseland Road	0.11	2.61	0.23	5.2	0.6	13.1	1.3	3.8	1.0	1.1	3.8	8.8	1.1	1.1	4.9	9.9	1.8	1.9
7	Residential Property - Keeper's Lodge Farm	0.35	2.85	0.70	5.7	1.7	14.2	2.3	4.8	1.8	1.9	5.8	11	1.7	1.7	7.6	13	2.9	2.9
8	Residential Property - Glasfryn Terrace	0.14	2.64	0.28	5.3	0.7	13.2	1.6	4.1	1.3	1.3	6.8	12	1.9	2.0	8.1	13	3.0	3.1
9	Residential Property - Pen y Fodau Fawr	0.08	2.58	0.17	5.2	0.4	12.9	0.9	3.4	0.7	0.7	4.6	9.6	1.3	1.3	4.8	9.8	1.8	1.8
10	Residential Property - Cae'r Bont	0.16	2.66	0.31	5.3	0.8	13.3	1.3	3.8	1.0	1.0	4.5	9.5	1.3	1.3	5.8	11	2.2	2.2
11	Residential Property - Heol Will George	0.91	3.41	1.81	6.8	4.5	17.0	14	16	11	11	93	98	27	27	104	109	39	40
12	Residential Property - Sardis Close	0.89	3.39	1.77	6.8	4.4	16.9	13	16	11	11	93	98	27	27	93	98	35	36
13	Residential Property - Sardis Close	0.91	3.41	1.82	6.8	4.5	17.0	12	15	9.9	10.1	92	97	26	26.5	95	100	36	36.5
14	Residential Property - Heol Will George	0.78	3.28	1.56	6.6	3.9	16.4	11	13	8.5	8.6	82	87	24	23.9	75	80	28	28.9

The long-term PEC figures are <70% of the long-term EAL at all locations and the process contribution is predicted to be 2% or less of the EAL. These figures are considered insignificant on a long-term basis. At the majority of locations, the short-term process contributions are predicted to be less than 10% of the short-term AQS values and less than 20% of the headroom figures. However, the model predicts, for a small number of elevated receptors on the hillside to the south of Caer Gynydd Road, that the short-term process contributions are now predicted to be up to almost 40% of the 15 minute average short-term AQS and up to 40% of the headroom. There are no predicted exceedences of any of the air quality standards, but the impact is predicted to be of greater significance on a short-term basis under the proposed ELV. On average, a 67% increase is predicted for the 15 minute figures and a 61% increase is predicted for the hourly figures. This assumes a constant emission of 50mg/Nm^3 rather than the current fluctuating levels.

Benzene Impacts at Sensitive Receptors

Aleris Recycling - Typical Operations. Emissions from A4 Main Stack

Proposed increased ELV to 50mg/Nm3

Average background levels calculated for 2010 using NETCEN calculator

		Predicted Ground Level Concentrations							
		Benzene - Annual Mean (µg/m^3)				Benzene - Highest 1hr Mean (µg/m^3)			
2010 Air Quality Standard/EAL (µg/m^3)					5				208
Calculated Background concentration (µg/m^3)					0.25				0.5
Receptor Number	Receptor name	Process Contribution Excluding Background	PEC Including Background	Process Contrib as % of AQS	% PEC of AQS	Process Contribution Excluding Background	PEC Including Background	Process Contrib as % of EAL	% PC of headroom
1	Nearest Receptor - Oak Drive	0.012	0.3	0.25	5.2	1.38	1.9	0.66	0.7
2	Eastern Property - Tir Y Farchnad	0.027	0.3	0.54	5.5	0.92	1.4	0.44	0.4
3	Residential receptor - Liiw Valley Close	0.017	0.3	0.33	5.3	0.60	1.1	0.29	0.3
4	Eastern Property - Alder Way	0.015	0.3	0.30	5.3	0.55	1.1	0.27	0.3
5	Residential receptor - Dobes Acres	0.043	0.3	0.85	5.9	0.86	1.4	0.41	0.4
6	Residential receptor - Roseland Road	0.011	0.3	0.23	5.2	0.68	1.2	0.33	0.3
7	Residential Property - Keeper's Lodge Farm	0.035	0.3	0.70	5.7	0.67	1.2	0.32	0.3
8	Residential Property - Glasfryn Terrace	0.014	0.3	0.28	5.3	2.7	3.2	1.32	1.3
9	Residential Property - Pen y Fodau Fawr	0.0083	0.3	0.17	5.2	0.89	1.4	0.43	0.4
10	Residential Property - Cae'r Bont	0.016	0.3	0.31	5.3	0.53	1.0	0.25	0.3
11	Residential Property - Heol Will George	0.091	0.3	1.81	6.8	17	17.4	8.12	8.1
12	Residential Property - Sardis Close	0.089	0.3	1.77	6.8	17	17.9	8.38	8.4
13	Residential Property - Sardis Close	0.091	0.3	1.82	6.8	18	18.5	8.66	8.7
14	Residential Property - Heol Will George	0.078	0.3	1.56	6.6	16	16.9	7.87	7.9

Based on the proposed ELV and the tighter 2010 Benzene AQS, the long-term PEC figures are <70% of the long-term AQS at all locations and the process contribution is predicted to be <2% of the AQS. The short-term process contribution is predicted to be less than 10% of the short-term AQS and less than 20% of the headroom at all receptors. Although the concentrations are predicted to increase approximately 5 fold, the impact is still predicted to be insignificant under the proposed ELV and the tighter 2010 AQS.

7 Conclusions

An air quality assessment using the EA H1 methodology and more detailed dispersion modelling has been performed for Aleris Recycling Ltd, Waunarlwydd based upon current emission figures and the proposed increases to the ELVs. The ground level concentrations have been predicted using AERMOD, a recognised Gaussian dispersion model.

The following scenarios have been considered within the assessment:

- Current emissions from the site since burner modifications have been made
- The impact of increasing the ELV for SO_2 from 35mg/Nm^3 to 50 mg/Nm^3
- The impact of increasing the ELV for VOC from 10mg/Nm^3 to 50 mg/Nm^3

The impacts of the following pollutants on sensitive receptors were considered:

- Oxides of nitrogen (NO_x and NO_2)
- Sulphur dioxide
- Particulate matter (PM_{10})
- VOCs
- Hydrogen chloride
- Hydrogen fluoride
- Dioxins and furans

- The H1 assessment indicated that oxides of nitrogen, sulphur dioxide, particulate matter and the benzene component of the VOC emissions required more detailed assessment.
- Dioxins and furans were also modelled as the H1 methodolgy does not currently cover these components.
- Of the substances modelled, only the short-term SO_2 concentrations are predicted to exceed the significance criteria as detailed with the EA H1 guidance.
- At the majority of locations, the short-term process contributions of SO_2 are predicted to be less than 10% of the short-term AQS values and less than 20% of the headroom figures. However, the model predicts, for a small number of elevated receptors on the hillside to the south of Caer Gynydd Road, that the short-term process contributions are predicted to be around 20% of the 15 minute average short-term AQS and approximately 20% of the headroom. Therefore, the impact is predicted to be of low significance on a short-term basis under the current situation, with reference to the EA guideline values.
- There are no predicted exceedences of any of the short or long-term air quality standards even with the addition of background concentrations under any of the options presented.

Compared with the predictions made for the current emissions from the site, the findings for proposed ELV increases are as follows:

- **SO_2 -** The long-term PEC figures are predicted to be <70% of the long-term EAL at all locations and the process contribution is predicted to be 2% or less of the EAL. These figures are considered insignificant on a long-term basis. At the majority of locations, the short-term process contributions are predicted to be less than 10% of the short-term AQS values and less than 20% of the headroom figures. However, the model predicts, for a small number of elevated receptors on the hillside to the south of Caer Gynydd Road, that the short-term process contributions are now predicted to be up to almost 40% of the 15 minute average short-term AQS and up to 40% of the headroom. There are no predicted exceedences of any

of the air quality standards, but the impact is predicted to be of greater significance on a short-term basis under the proposed ELV. On average, a 67% increase is predicted for the 15 minute figures and a 61% increase is predicted for the hourly figures. This assumes a constant emission of 50mg/Nm^3 rather than the current fluctuating levels.

- **VOCs (Benzene) -** Based on the proposed ELV and the tighter 2010 Benzene AQS, the long-term PEC figures are <70% of the long-term AQS at all locations and the process contribution is predicted to be <2% of the AQS. The short-term process contribution is predicted to be less than 10% of the short-term AQS and less than 20% of the headroom at all receptors. Although the concentrations are predicted to increase approximately 5 fold, the impact is still predicted to be insignificant under the proposed ELV and the tighter 2010 AQS.

8 References

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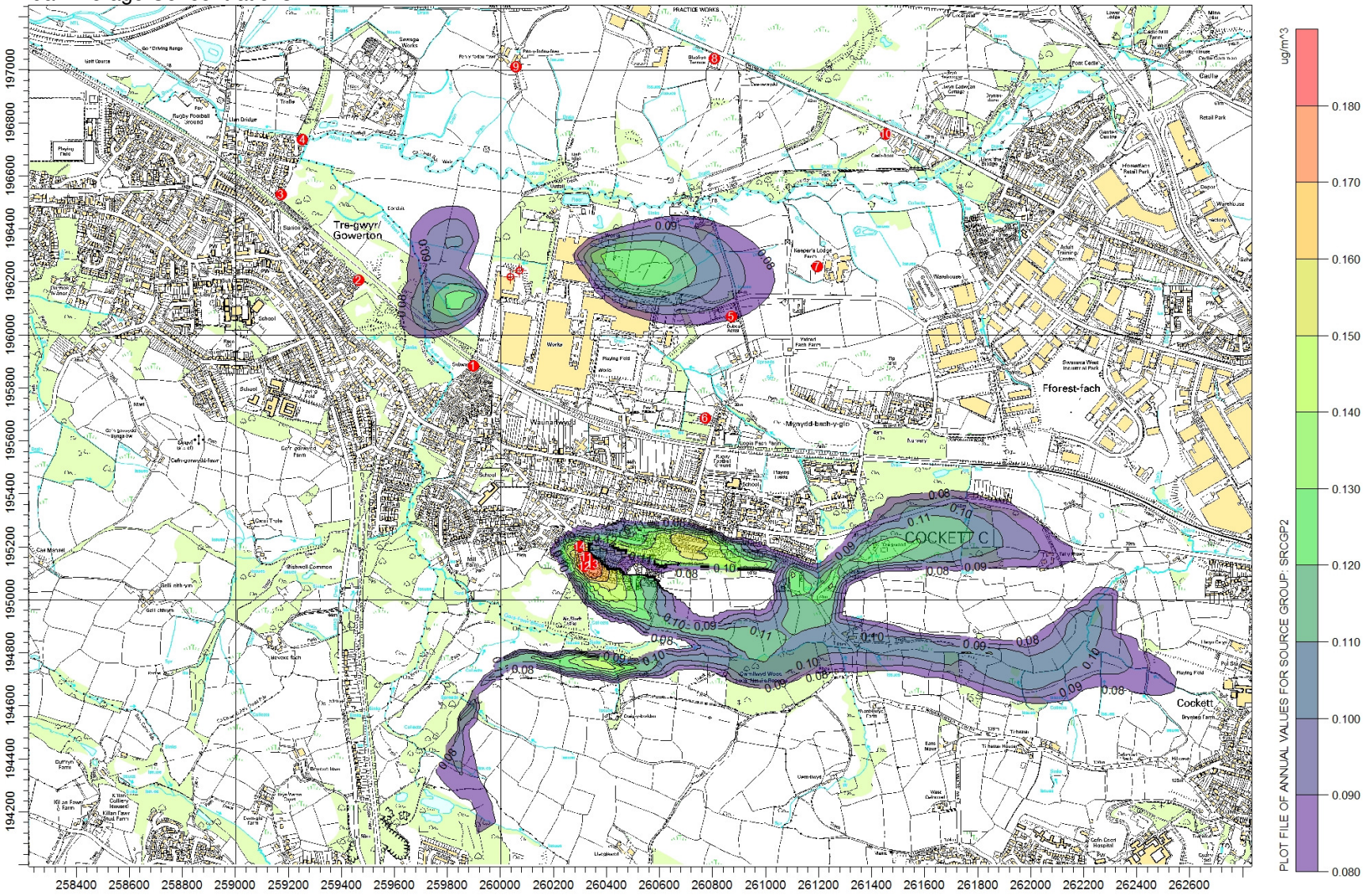
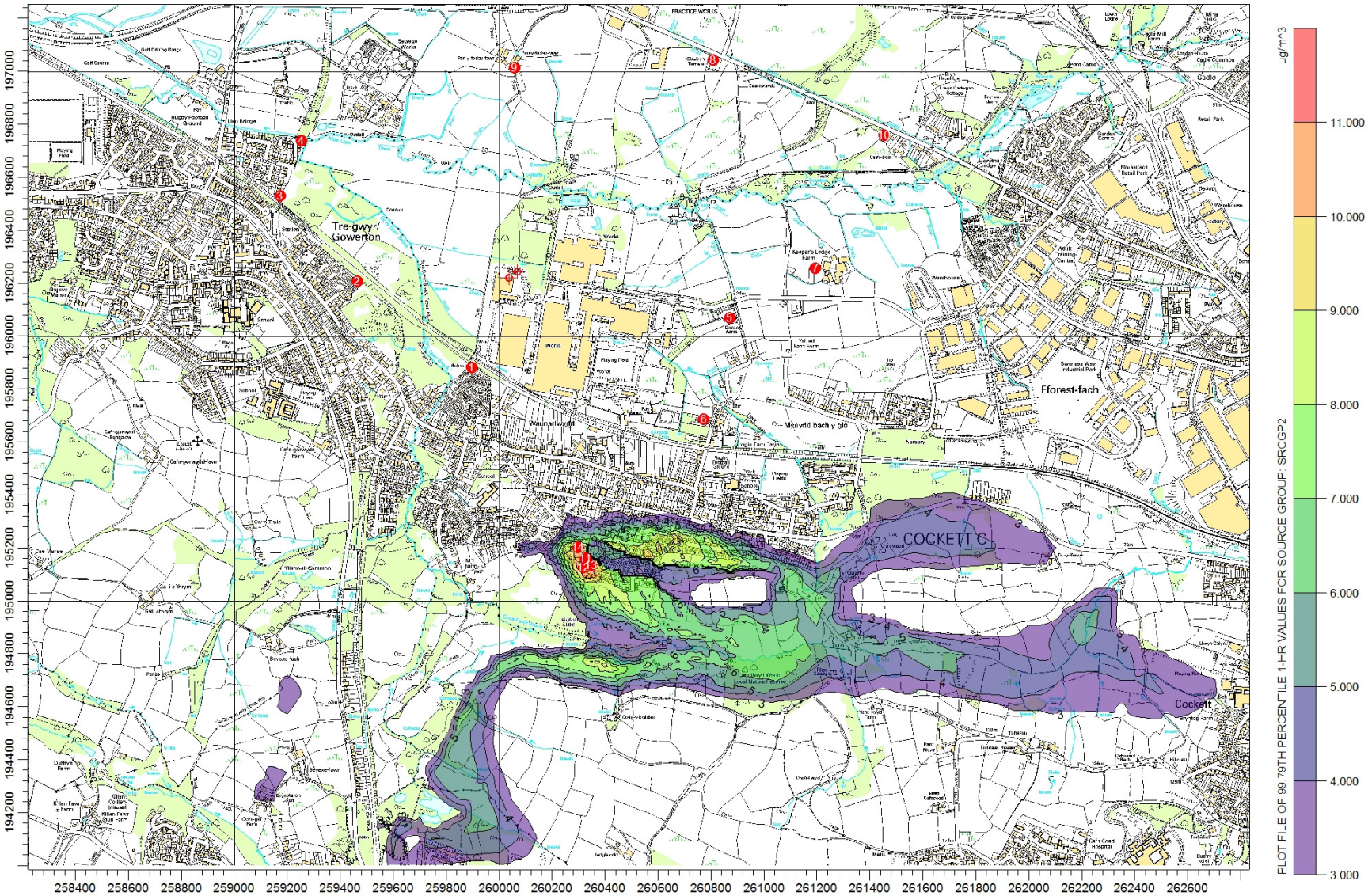
Appendix I Concentration Contour Maps – Current Situation

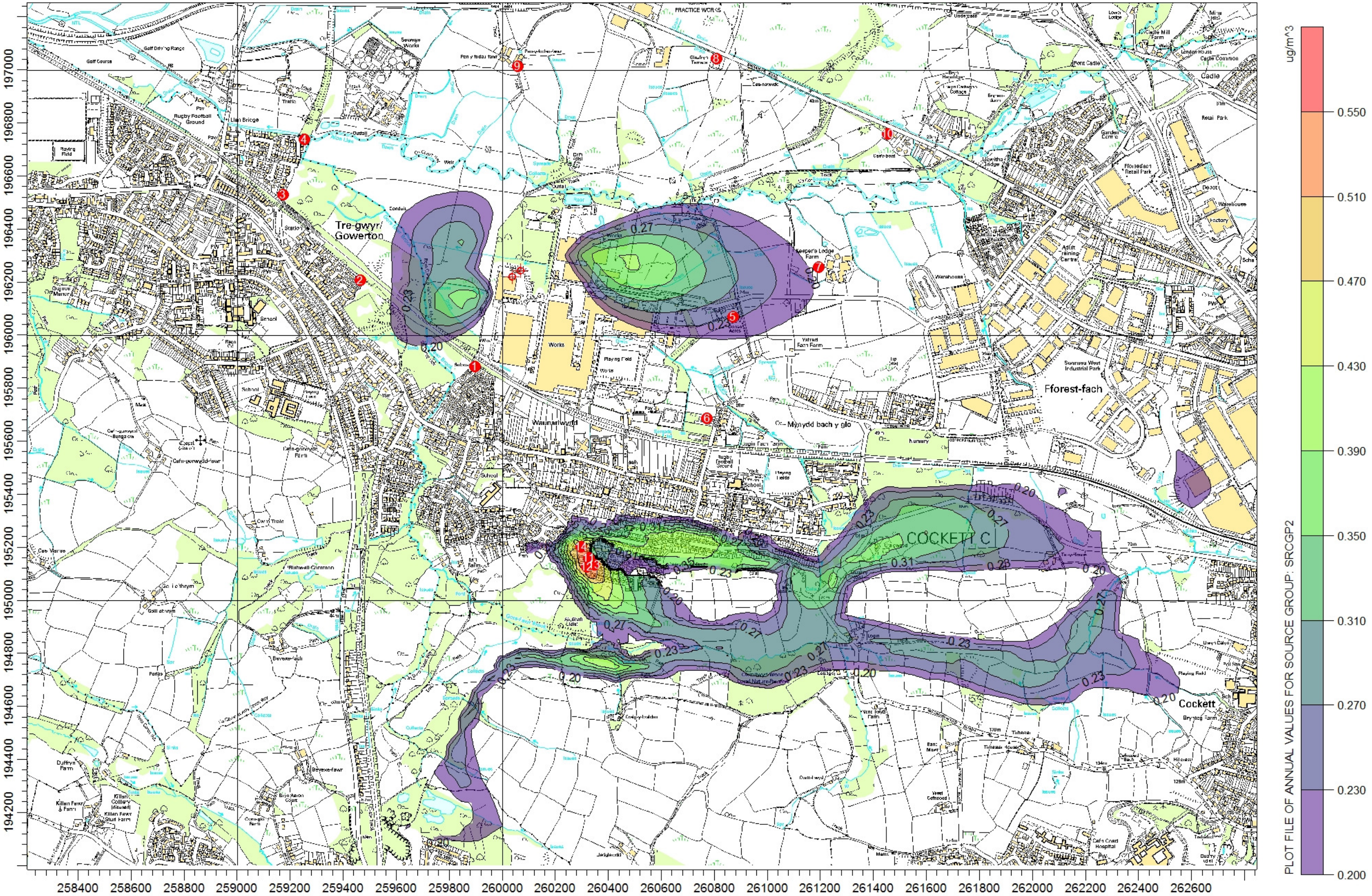
NO_2 Annual Average Concentrations



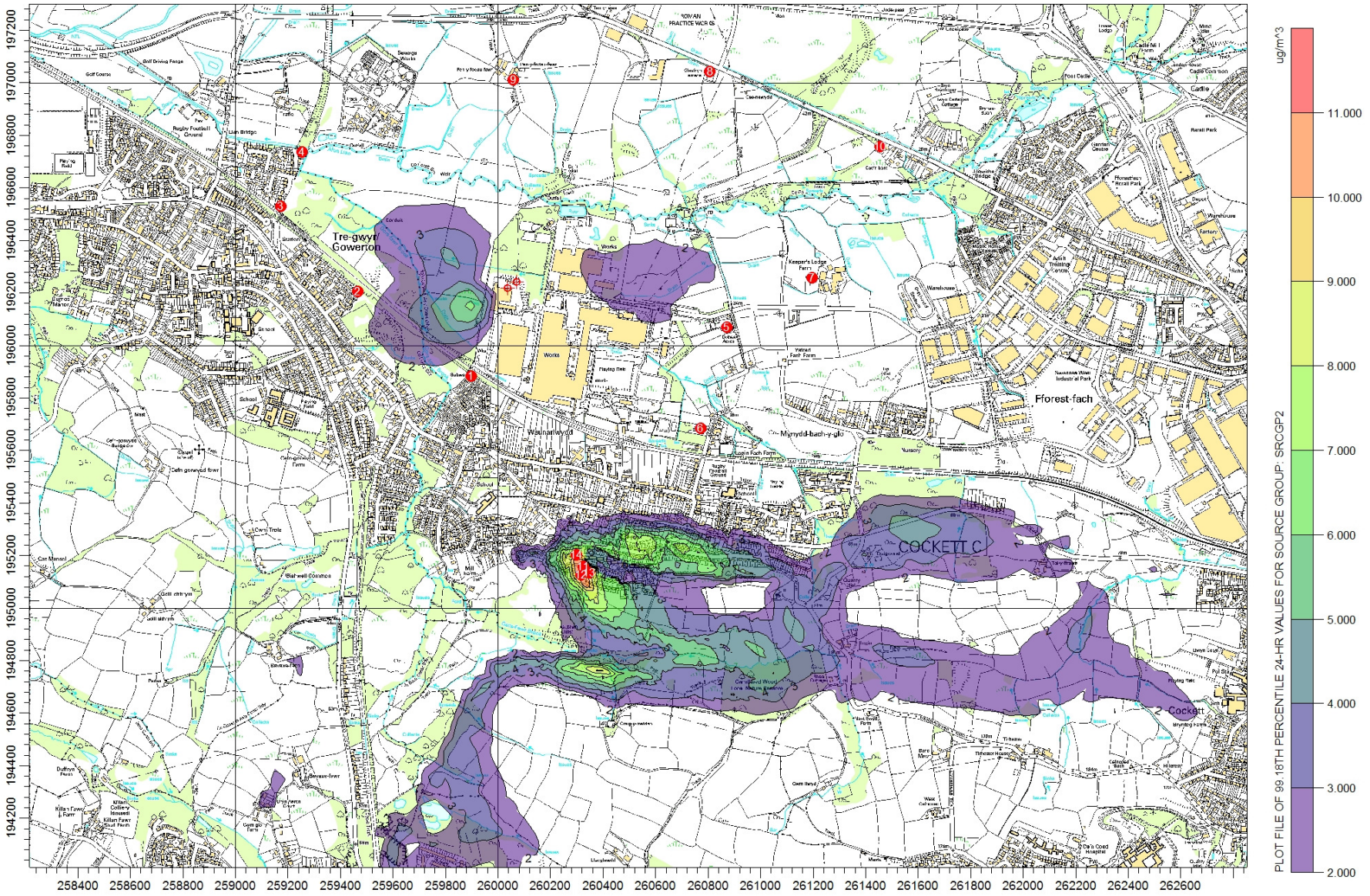
99.79%tile of Hourly Average NO_2 Concentrations



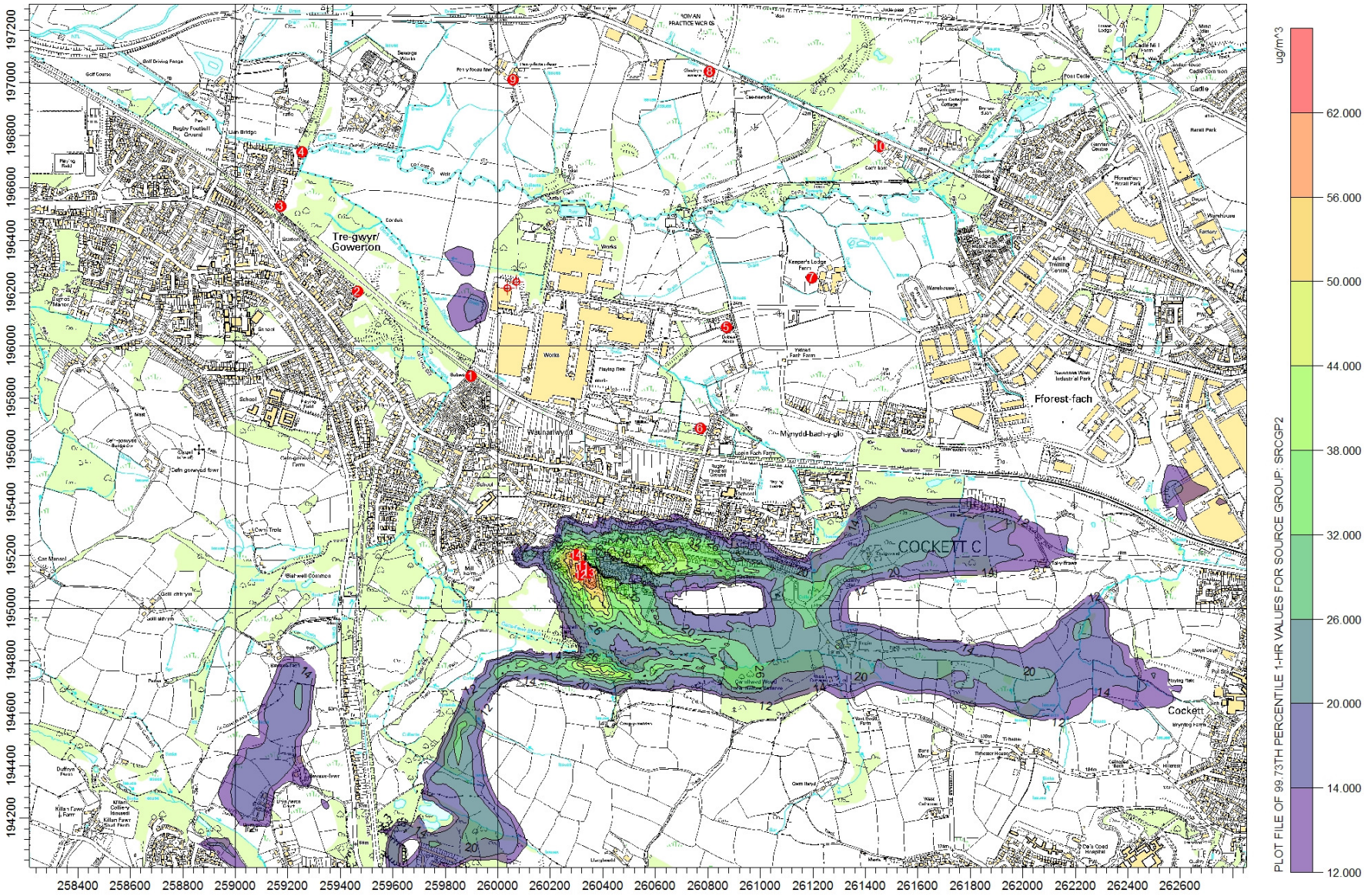
Annual Average SO_2 Concentrations



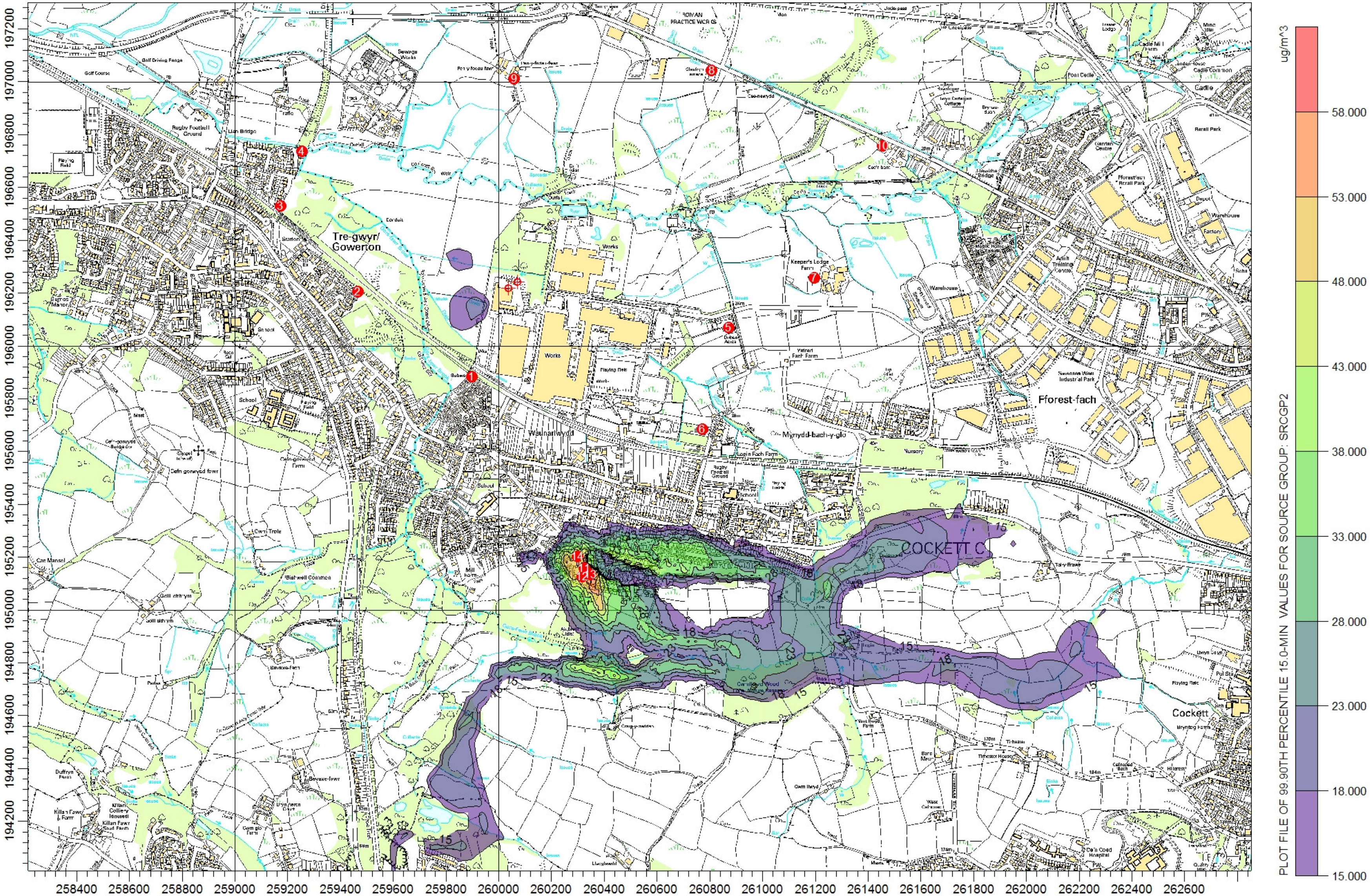
99.18%tile of 24 Hour Average SO_2 Concentrations



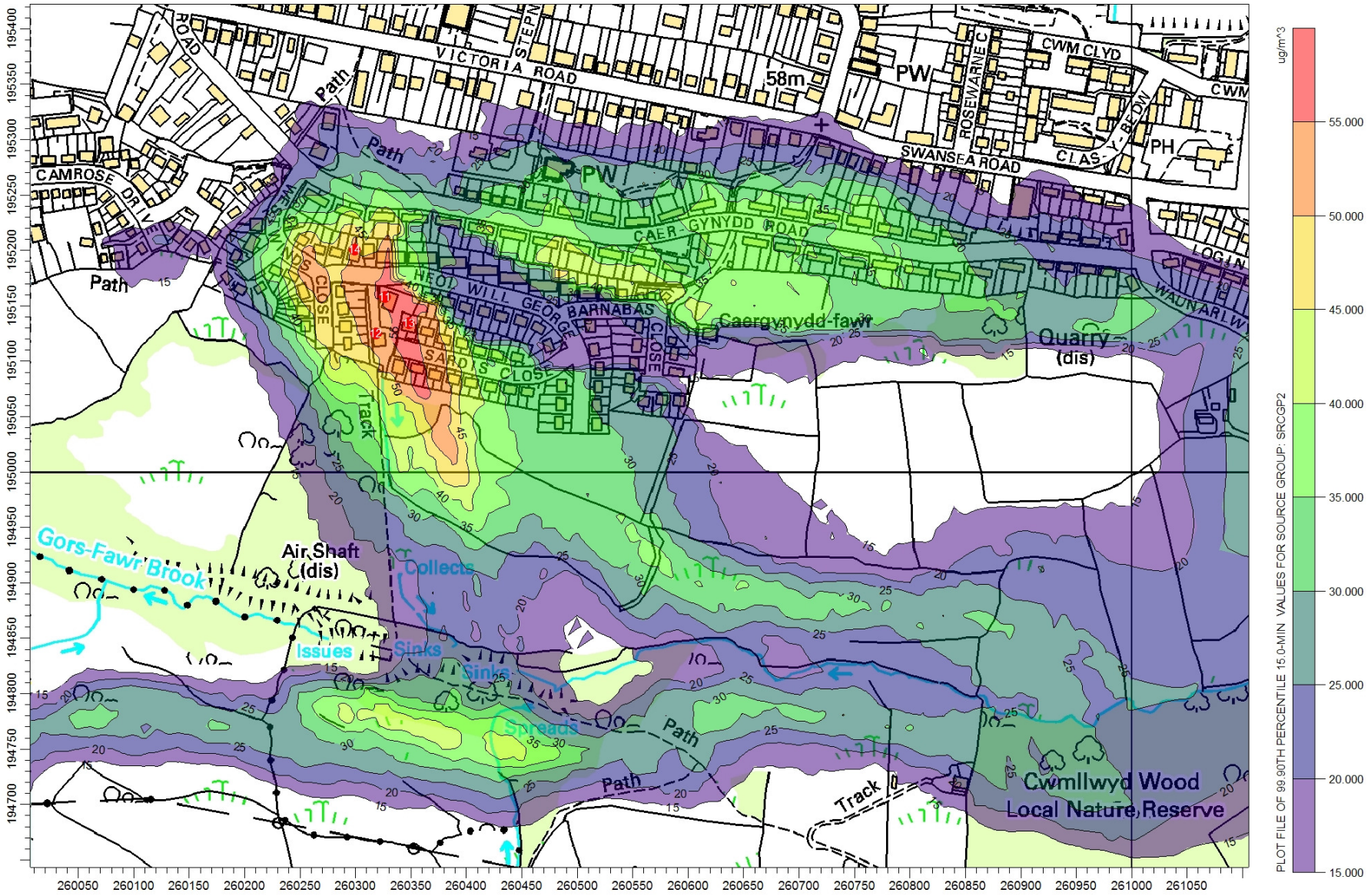
99.73%tile of 1 Hour Average SO_2 Concentrations



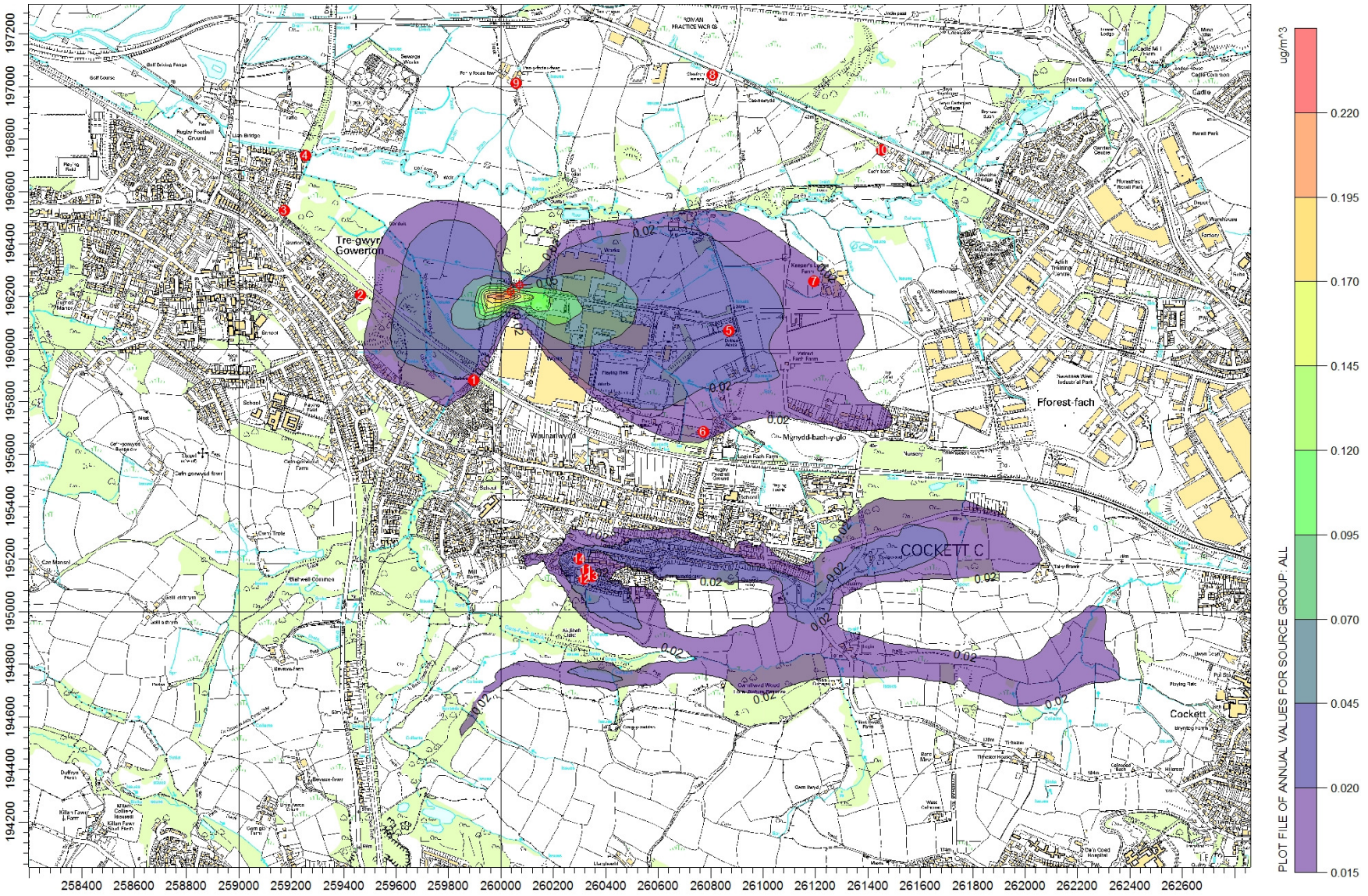
99.90%tile of 15 Minute Average SO_2 Concentrations



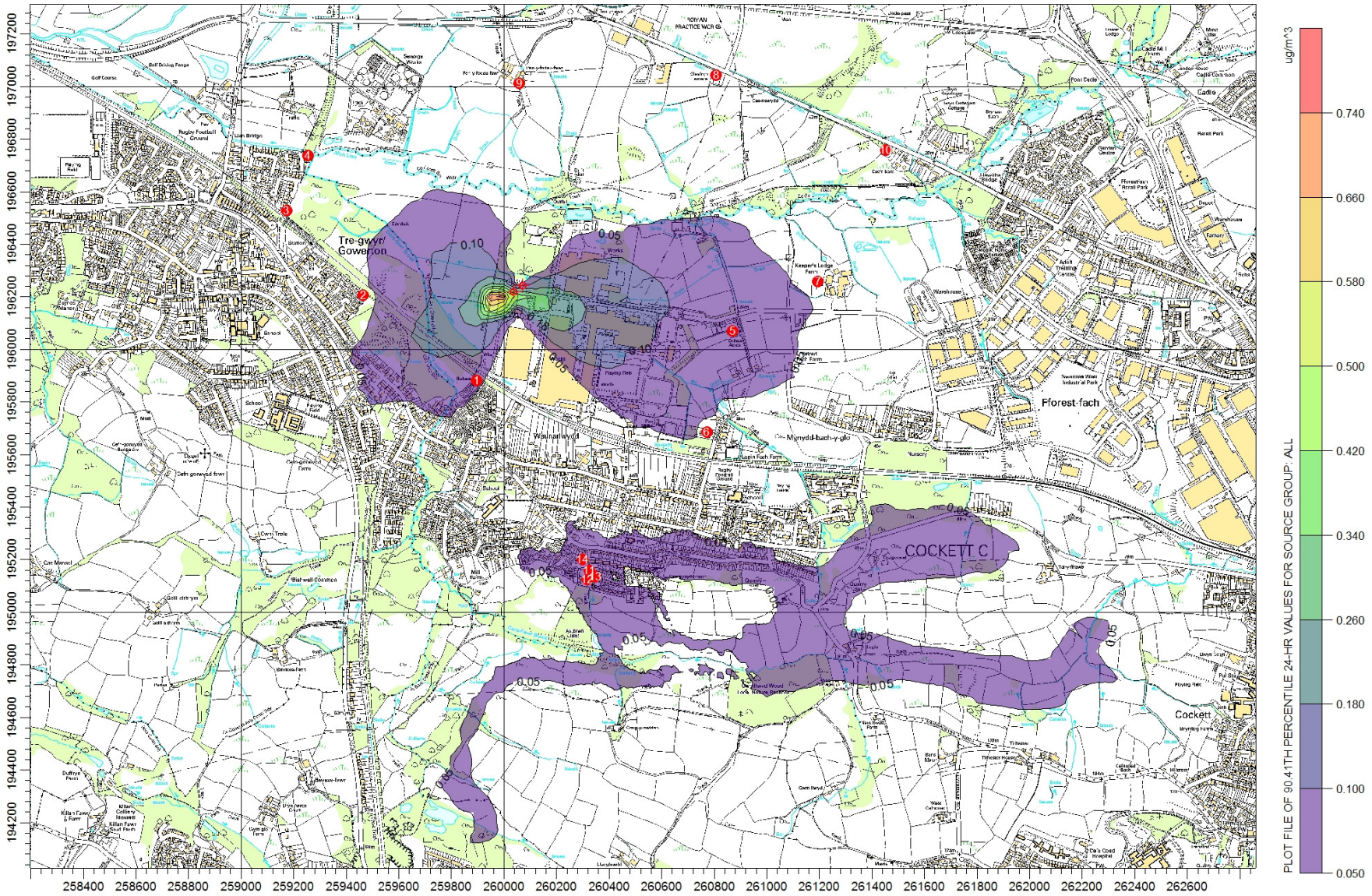
99.90%tile of 15 Minute Average SO_2 Concentrations – Detail



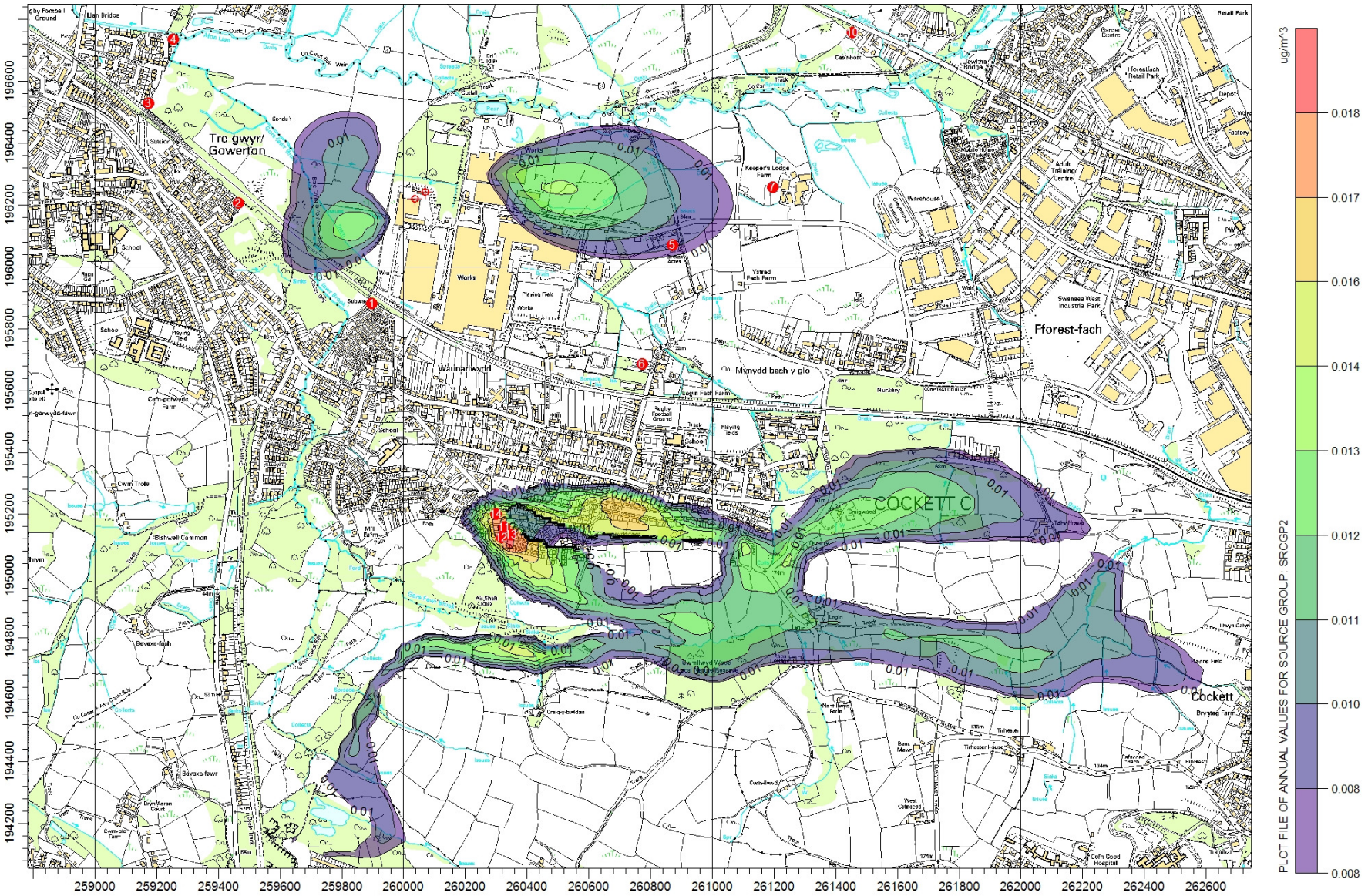
Annual Average PM_{10} Concentrations – All Sources



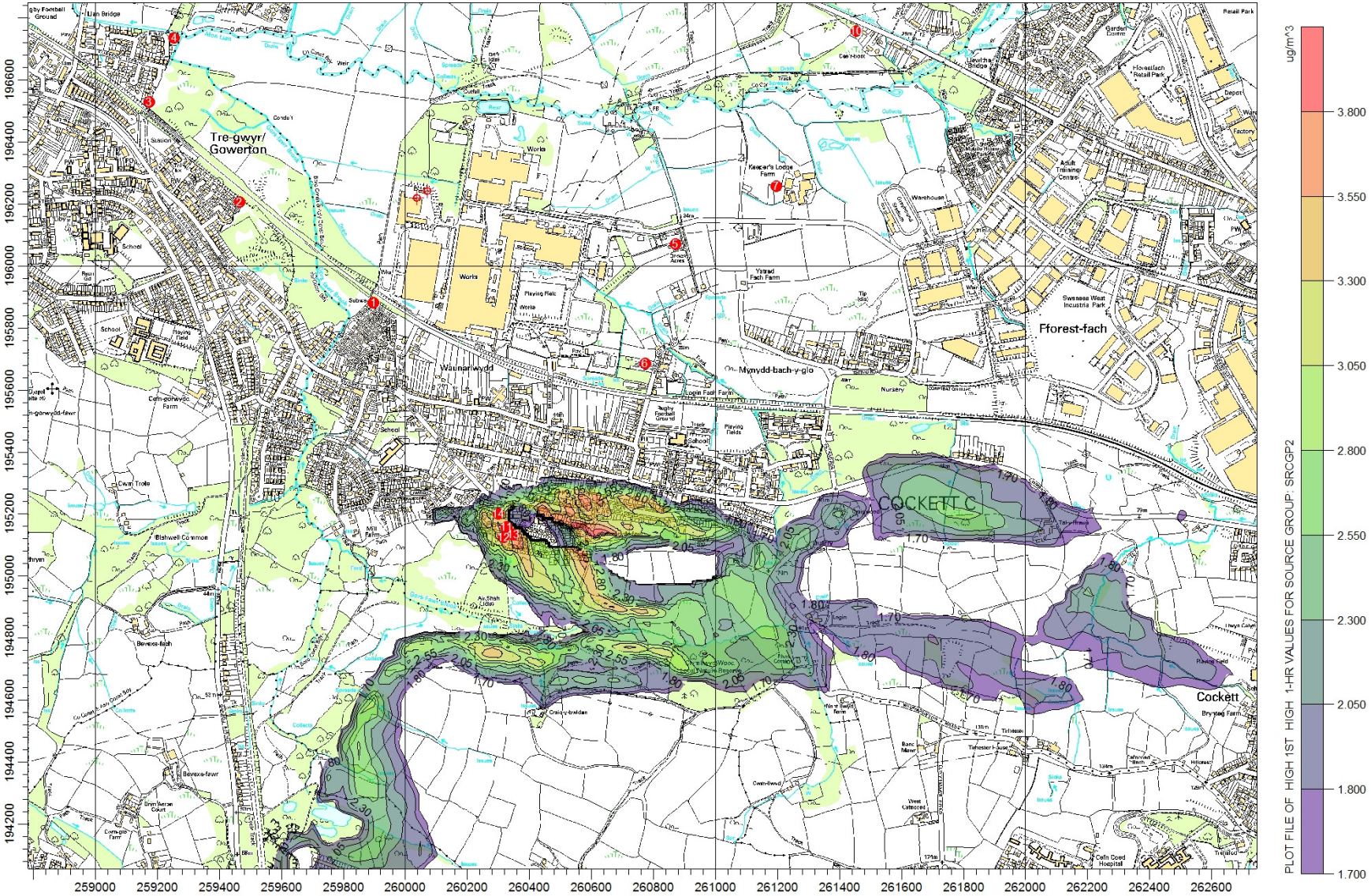
90.41%tile of 24Hour Average PM_{10} Concentrations – All Sources



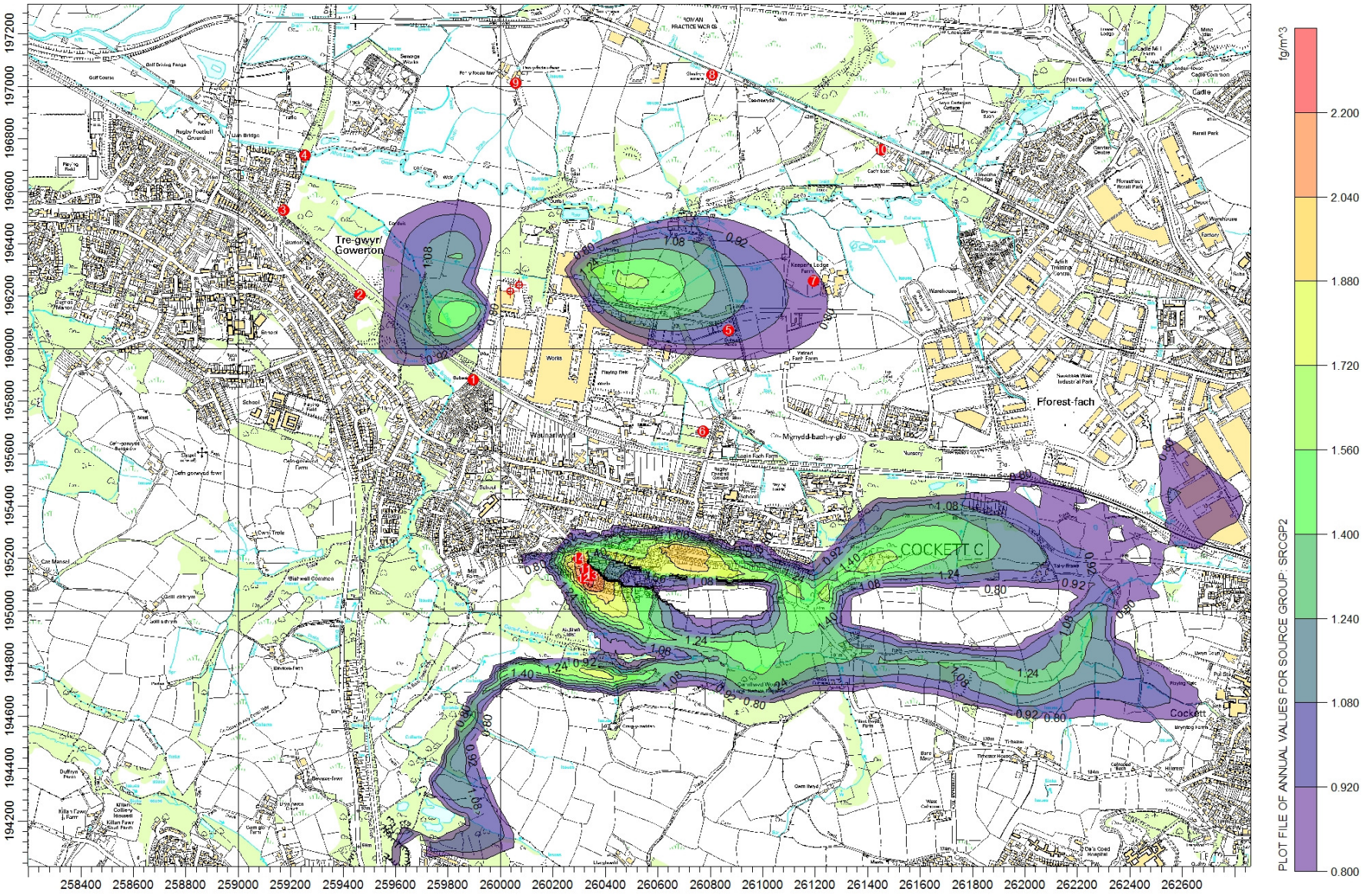
Annual Average Benzene Concentrations



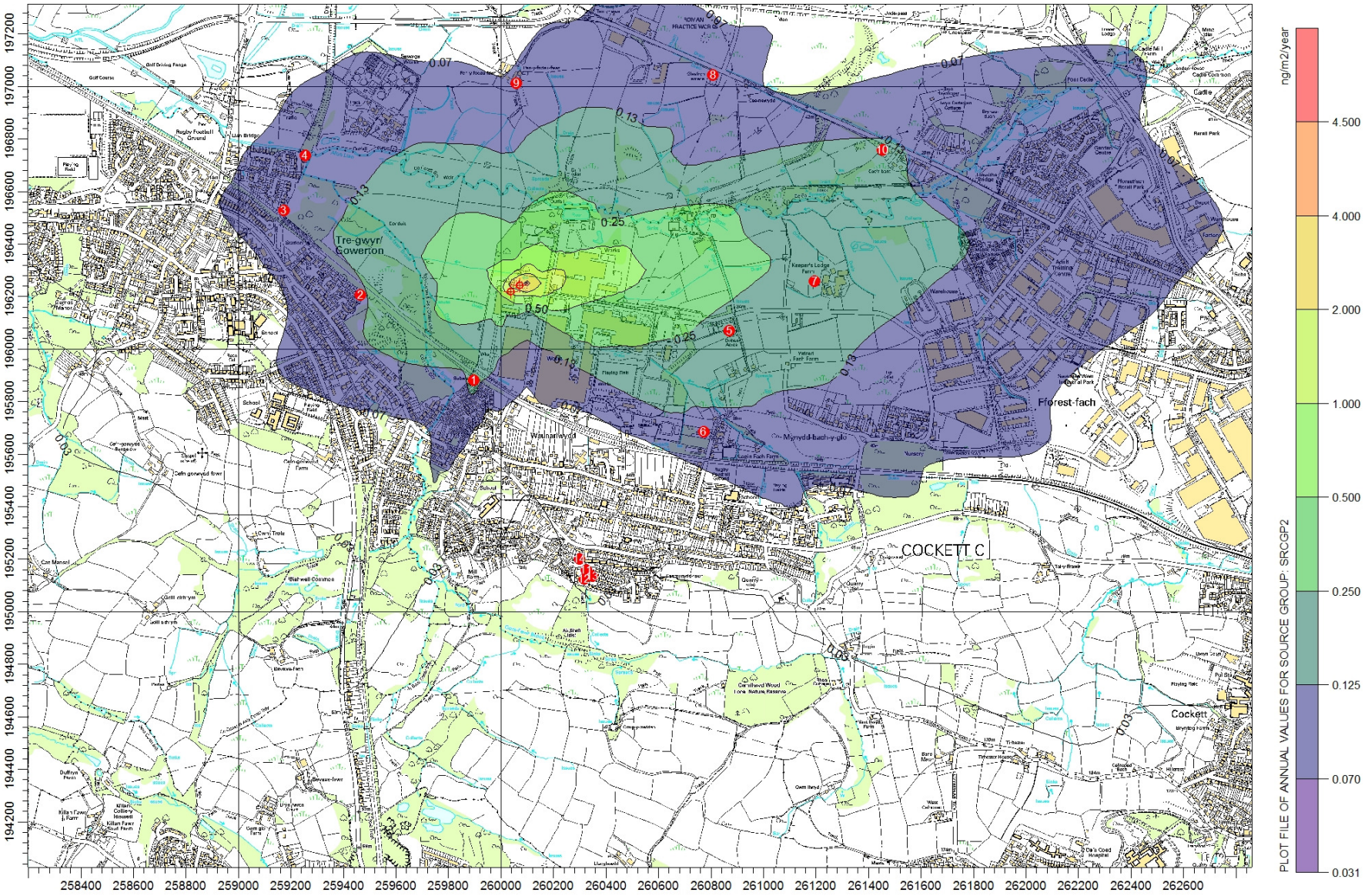
Highest Hourly Average Benzene Concentrations



Annual Average Dioxin Concentrations

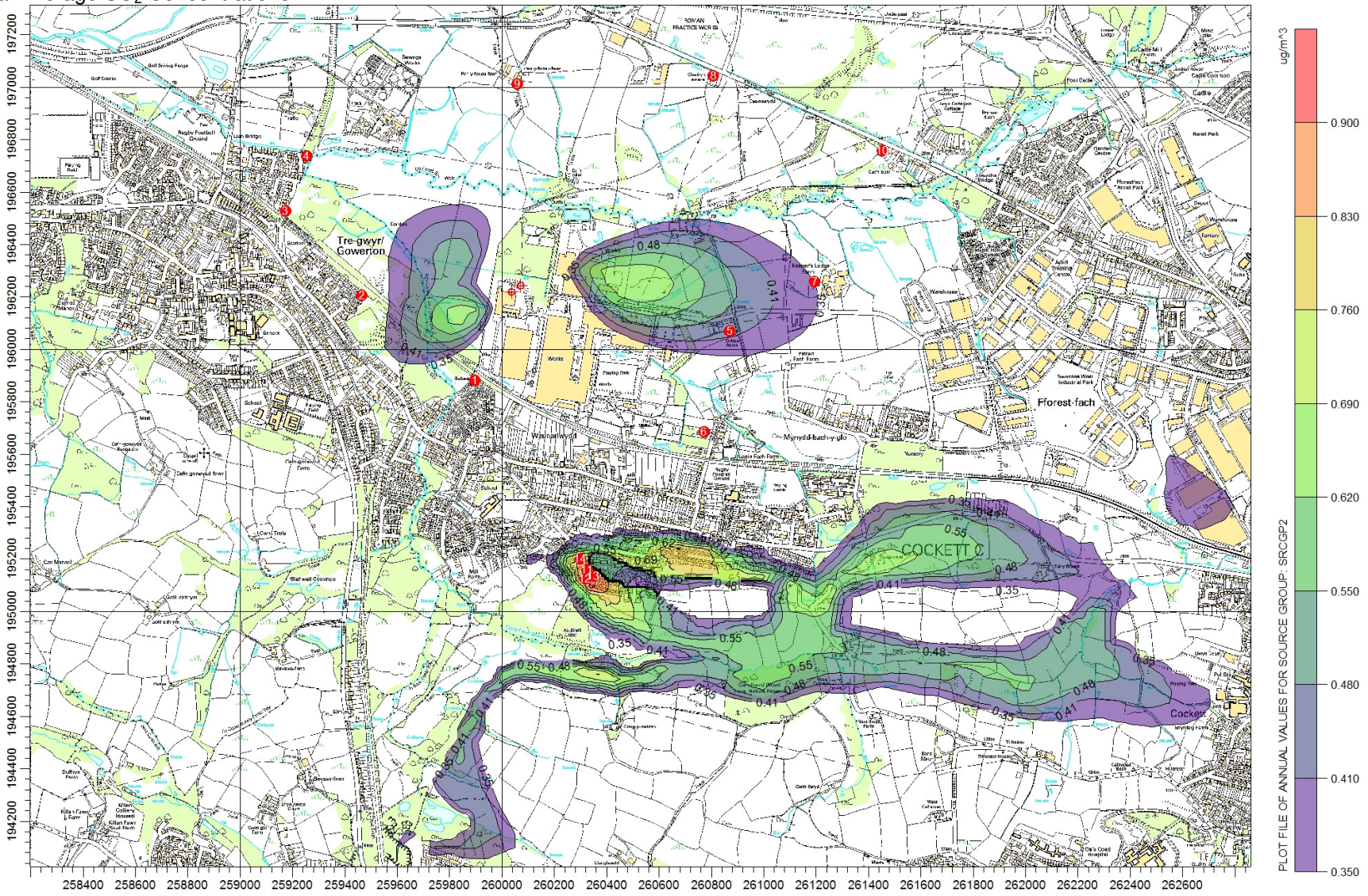


Annual Dioxin Deposition

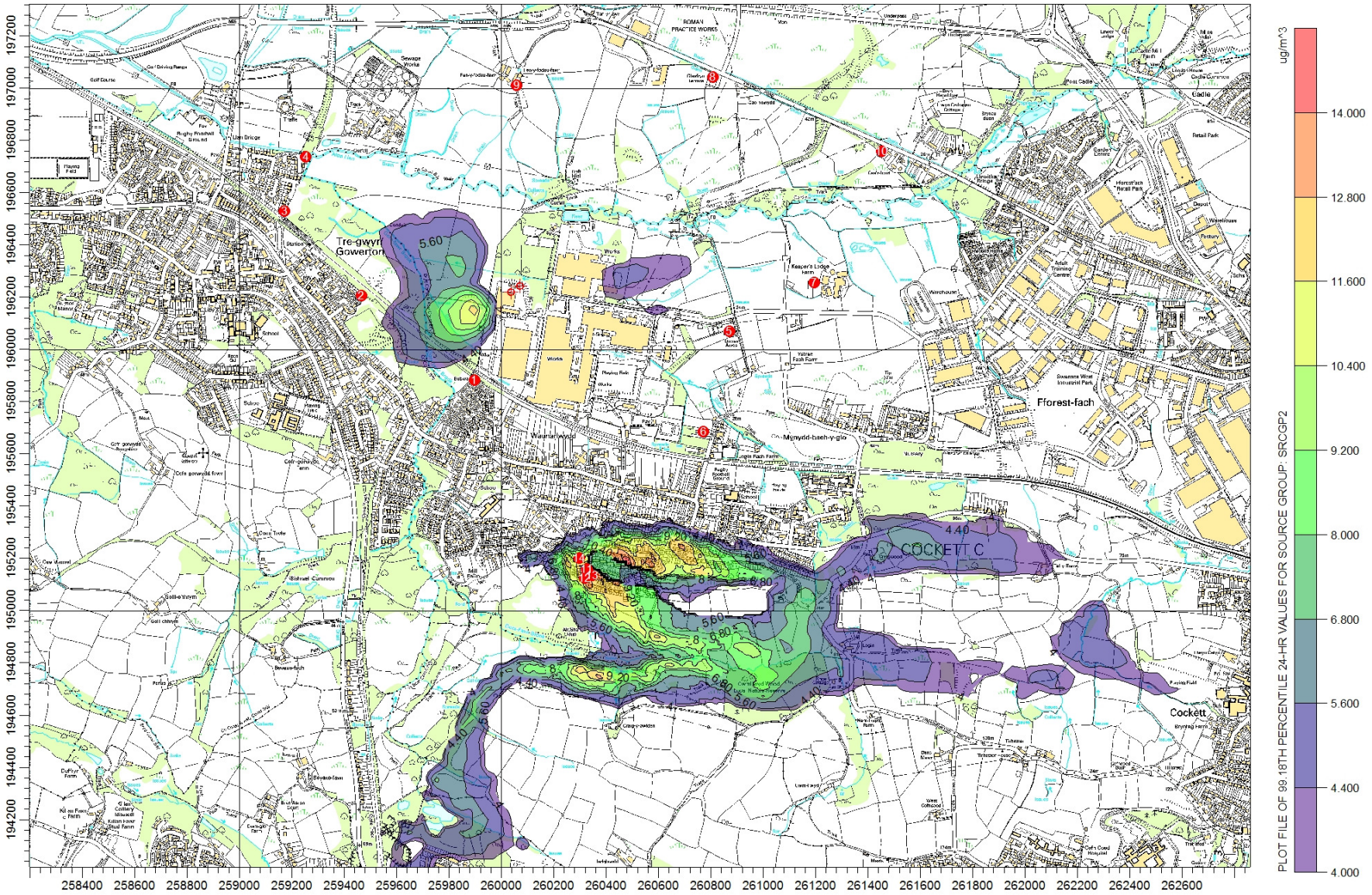


Appendix II Concentration Contour Maps – Proposed Increased ELVs

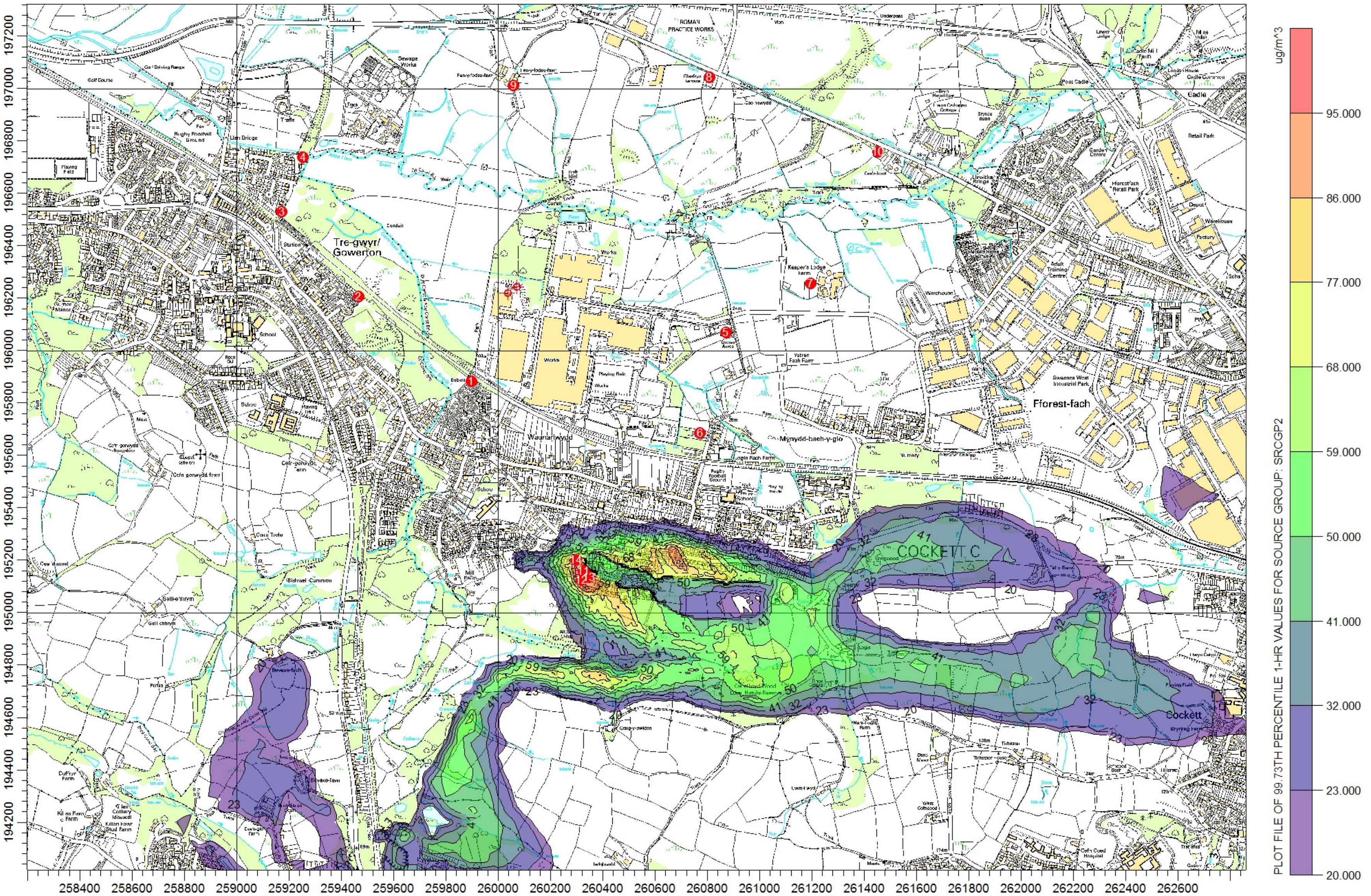
Annual Average SO_2 Concentrations



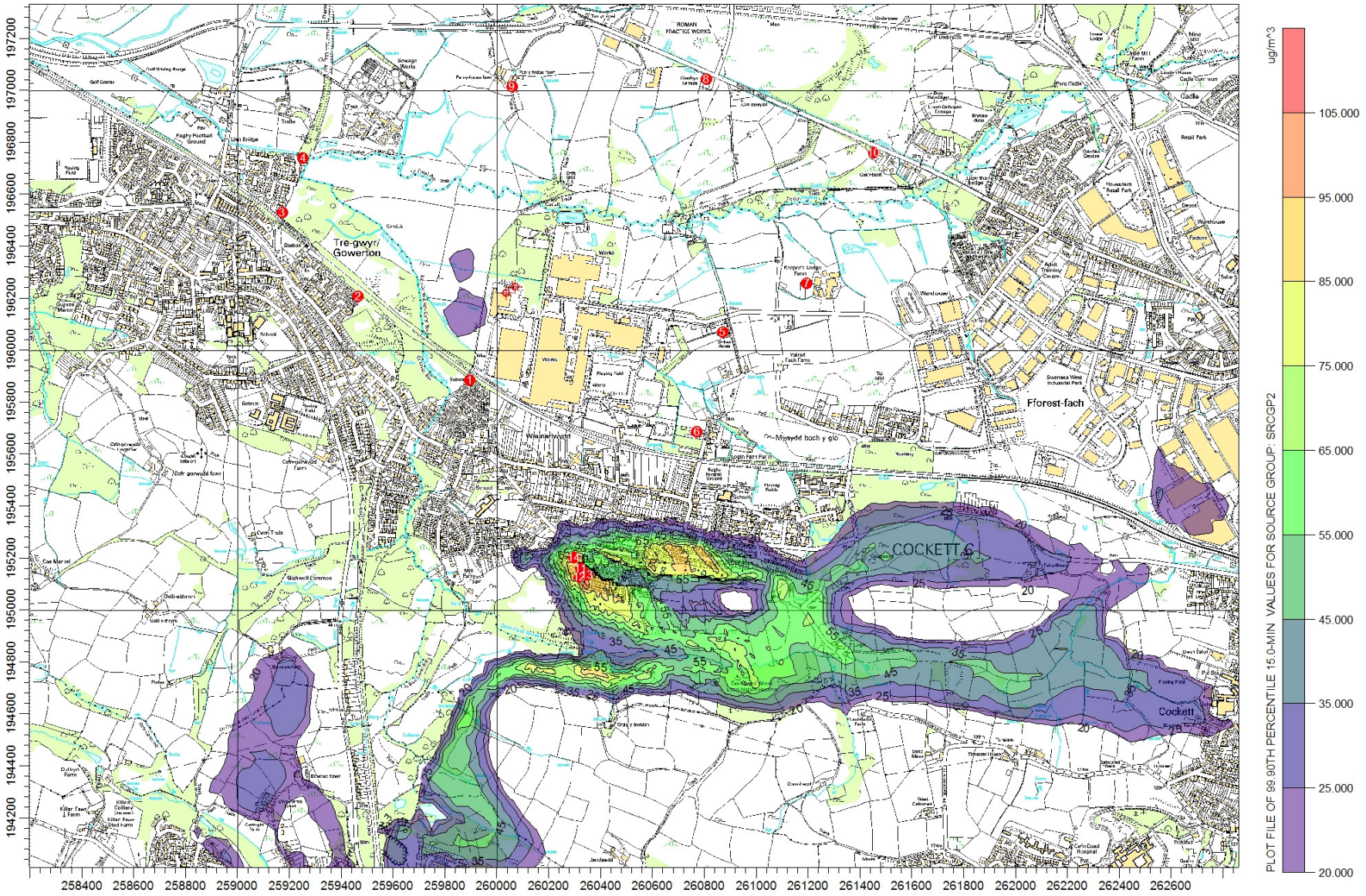
99.18%tile of 24 Hour Average SO_2 Concentrations



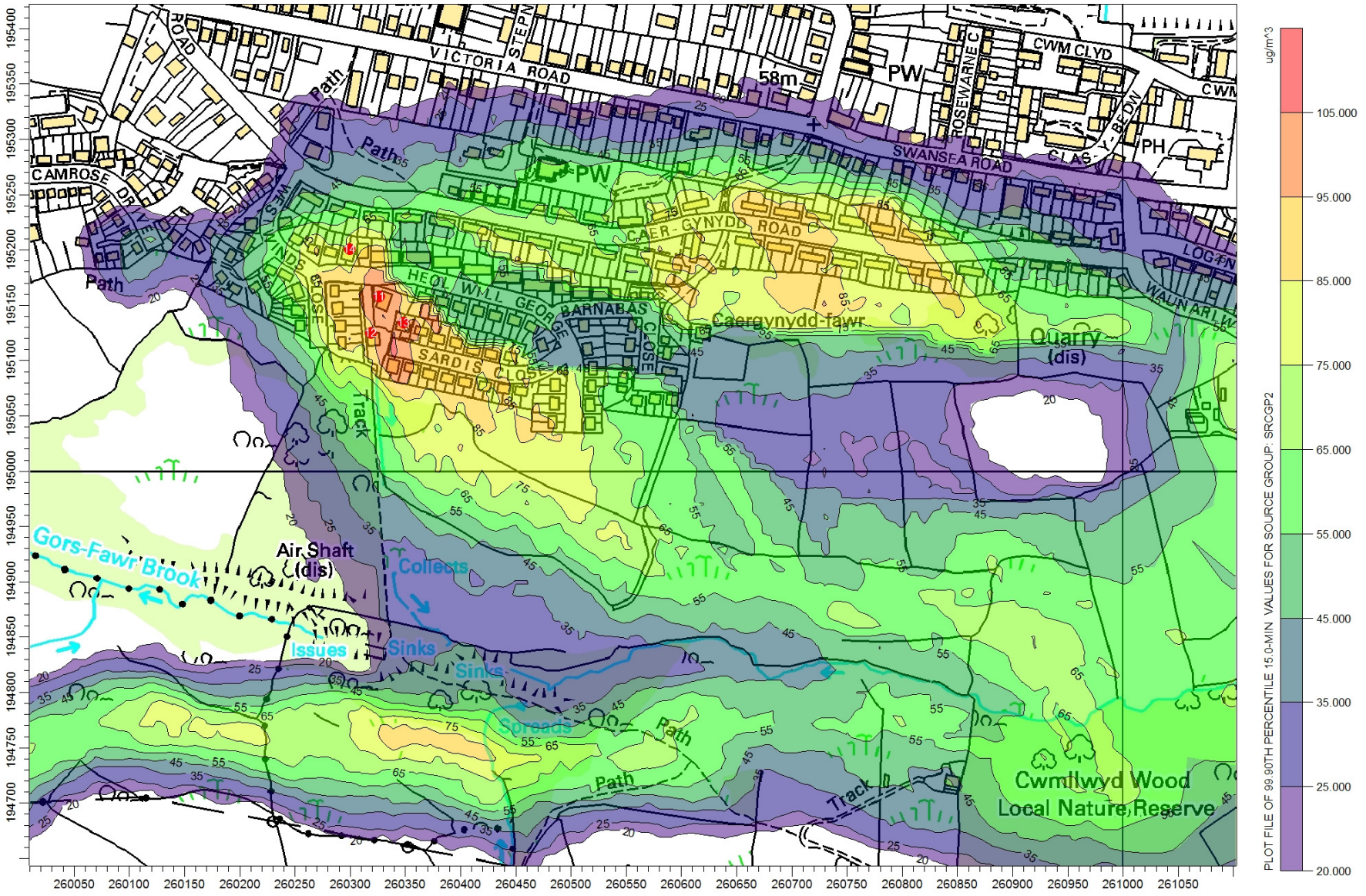
99.73%tile of 1 Hour Average SO_2 Concentrations



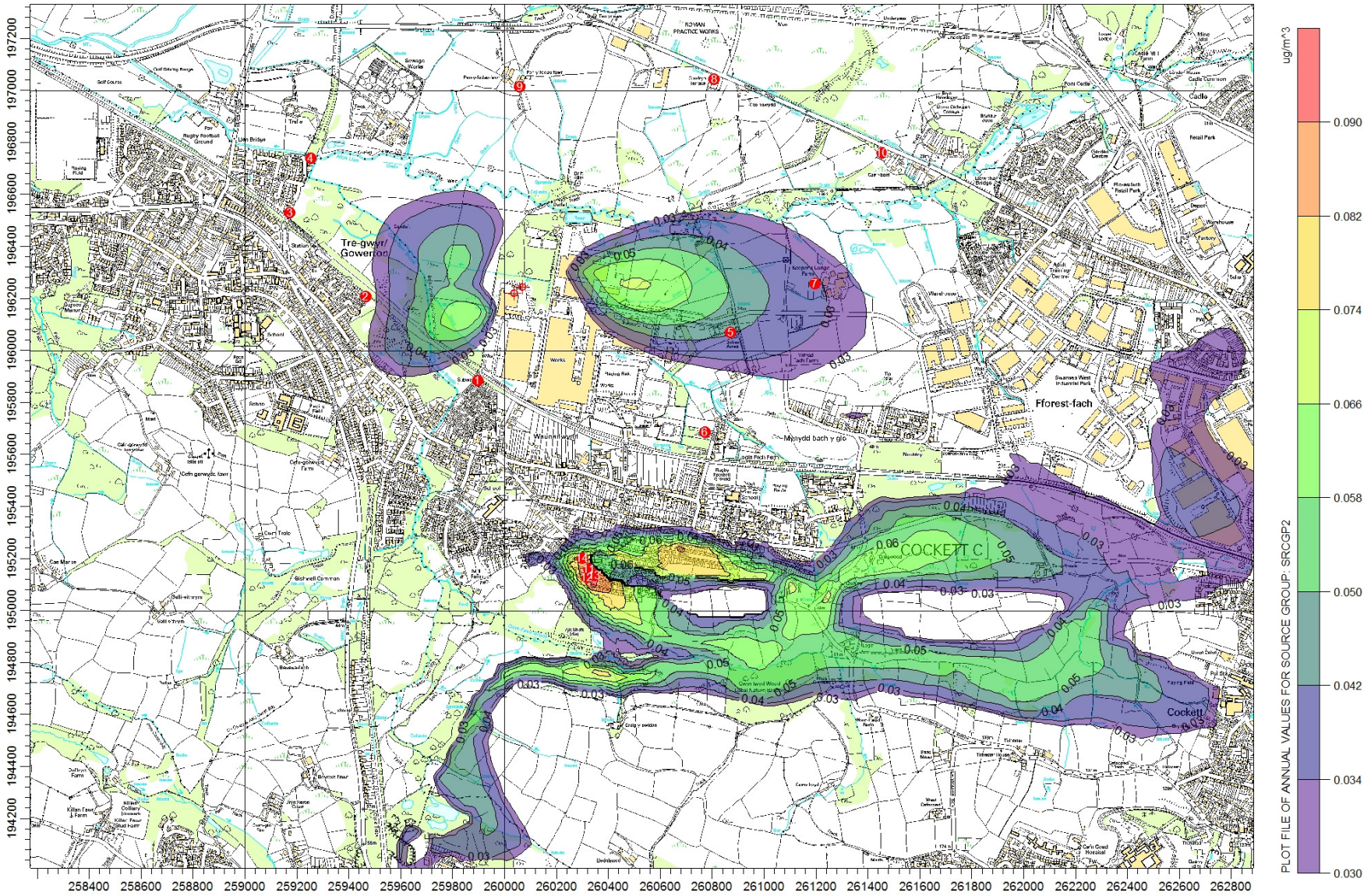
99.90%tile of 15 Minute Average SO_2 Concentrations



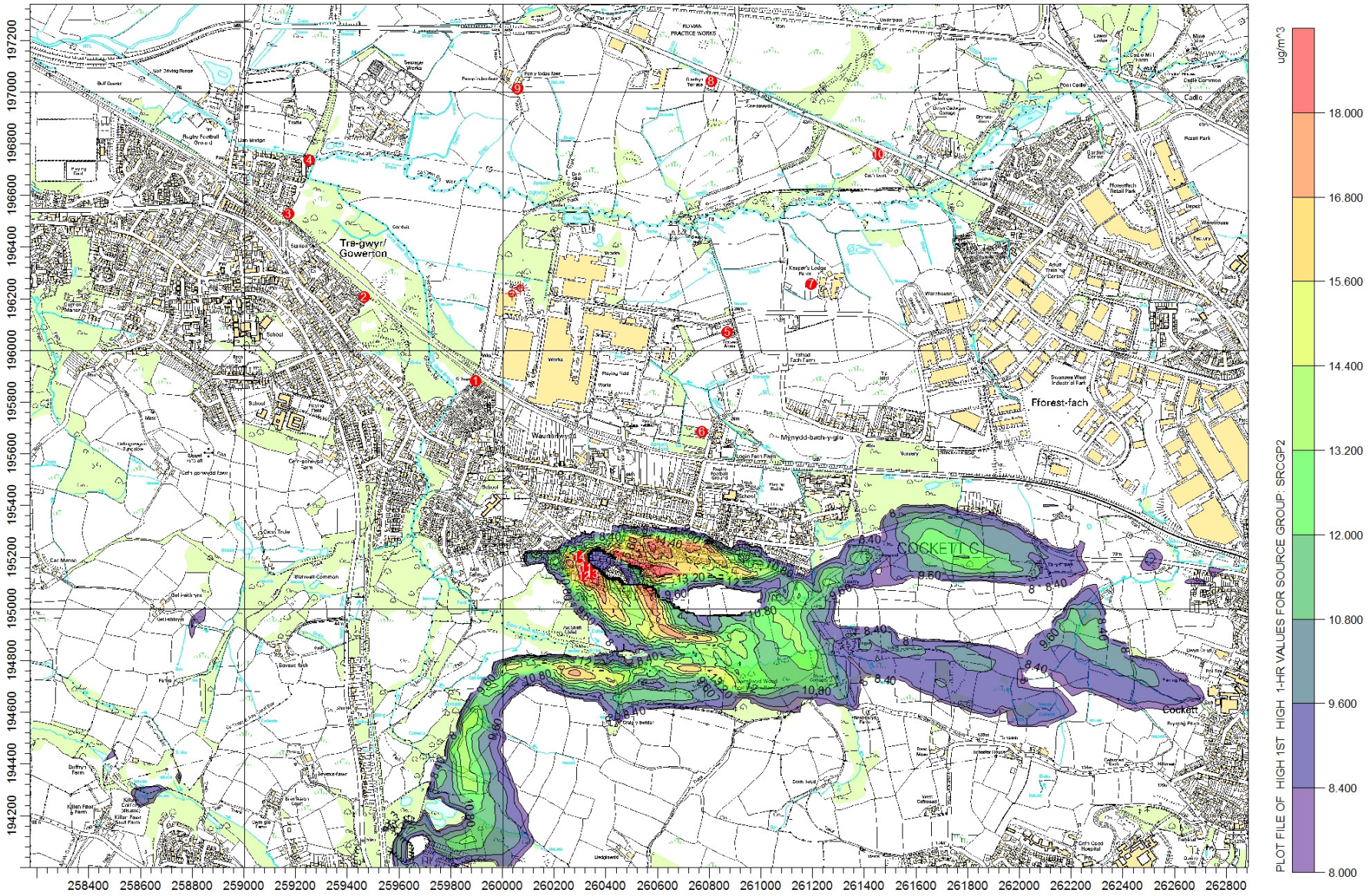
99.90%tile of 15 Minute Average SO_2 Concentrations – Detail



Annual Average Benzene Concentrations



Highest Hourly Average Benzene Concentrations



Appendix III H1 Assessment Input and Output Data

module 2

Air Release Points

Please define your Release Points for Releases to Air

Are there any Air emissions? Yes

Number	Description	Location or Grid Reference	Activity or Activities	Effective Height metres	Efflux Velocity m/s	Total Flow m3/hr
1	A3	Mud Room Stack		15	8.9	44784
2	A4	Main Stack		23	31	191988

Comments:

Air Emissions Inventory Base Option, Release Point: 1 'A3'

module 2

Air Emissions Inventory

Please list all Substances released to Air for each Release Point identified in the previous page.

Number	Substance	Meas'ment Method	Operating Mode (if relevant)	Data relating to Long Term effects			Data relating to Short Term effects			Annual Rate	ELV Conc.
				Conc. mg/m3	Release Rate g/s	Meas'ment Basis	Conc. mg/m3	Release Rate g/s	Meas'ment Basis	tonne/yr	mg/m3
1	Particulates	Periodic*		1	0.01	Ass. Ann Av	1	0.01	Hourly Av	0.315	5

Measurement method: * provide detail in comments box Comments:

module 2

Air Emissions Inventory

Please list all Substances released to Air for each Release Point identified in the previous page.

Number	Substance	Meas'ment Method	Operating Mode (if relevant)	Data relating to Long Term effects			Data relating to Short Term effects			Annual Rate	ELV Conc.
				Conc. mg/m3	Release Rate g/s	Meas'ment Basis	Conc. mg/m3	Release Rate g/s	Meas'ment Basis	tonne/yr	mg/m3
1	Nitrogen dioxide (human health receptor)	Periodic*		13.7	0.49	Ass An Av	15.7	0.56	Hourly Av	15.45	60
2	Nitrogen dioxide (ecological receptor)	Periodic*		13.7	0.49	Ass An Av	15.7	0.56	Hourly Av	15.45	60
3	Sulphur dioxide (human health receptor)	Periodic*		19.6	0.7	Ass An Av	39.5	1.41	Hourly Av	22.1	35
4	Sulphur dioxide (ecological receptor)	Periodic*		19.6	0.7	Ass An Av	39.5	1.41	Hourly Av	22.1	35
5	Hydrogen chloride	Periodic*		0.5	0.018	Ass An Av	0.5	0.018	Hourly Av	0.56	10
6	Hydrogen fluoride (as F)	Periodic*		0.003	0.0011	Ass An Av	0.03	0.0011	Hourly Av	0.034	2
7	n-Hexane	Periodic*		5.3	0.19	Ass An Av	5.3	0.19	Hourly Av	5.99	
8	Cyclohexane	Periodic*		6.1	0.22	Ass An Av	6.1	0.22	Hourly Av	6.94	
9	Benzene	Periodic*		3	0.11	Ass An Av	3	0.11	Hourly Av	3.47	
10	Toluene	Periodic*		11.4	0.41	Ass An Av	11.4	0.41	Hourly Av	12.9	
11	Particulates	Periodic*		1.4	0.05	Ass An Av	1.4	0.05	Hourly Av	1.58	5

Measurement method: * provide detail in comments box Comments:

module 3

3.3.1 Air Impacts

Calculate Process Contributions of Emissions to Air

This table estimates the Process Contribution (PC), calculated as the maximum ground level concentration for each emission listed in the inventory, according to the release point parameters input earlier. If you have more accurate data obtained through dispersion modelling, this may be entered as indicated and will be used instead of the estimated PC.

Number	Substance	Long Term EAL µg/m3	Long Term PC µg/m3	Long Term * Modelled PC µg/m3	Short Term EAL µg/m3	Short Term PC µg/m3	Short Term Modelled PC µg/m3
1	Particulates	40	0.370		50	10.5	
1	Nitrogen dioxide (human health receptor)	40	1.83		200	76.0	
2	Nitrogen dioxide (ecological receptor)	30	1.83			76.0	
3	Sulphur dioxide (human health receptor)	50	2.62		267	191	
4	Sulphur dioxide (ecological receptor)	20	2.62			191	
5	Hydrogen chloride	20	0.0672		800	2.45	
6	Hydrogen fluoride (as F)		0.00411		250	0.150	
7	n-Hexane	720	0.709		21600	25.9	
8	Cyclohexane	3500	0.821		105000	29.9	
9	Benzene	16.25	0.411		208	15.0	
10	Toluene	1910	1.53		8000	55.7	

Note that the Process Contribution shown for each substance is the sum of the individual process contributions of each point from which the substance is emitted. Process Contributions obtained from modelling data should incorporate all relevant release points and flow conditions.

* State the location of any detailed air dispersion modelling and also the main assumptions:

Comments:

module 3

3.3.2 Air Impact Screening

Screen out Insignificant Emissions to Air

This page displays the Process Contribution as a proportion of the EAL or EQS. Emissions with PCs that are less than the criteria indicated may be screened from further assessment as they are likely to have an insignificant impact.

Number	Substance	Long Term EAL	Short Term EAL	Long Term			Short Term		
				PC	% PC of EAL	> 1% of EAL?	PC	% PC of EAL	> 10% of EAL?
		µg/m3	µg/m3	µg/m3	%		µg/m3	%	
1	Particulates	40.0	50.0	0.370	0.924	**No**	10.5	21.0	**Yes**
1	Nitrogen dioxide (human health receptor)	40.0	200	1.83	4.57	**Yes**	76.0	38.0	**Yes**
2	Nitrogen dioxide (ecological receptor)	30.0	-	1.83	6.10	**Yes**	76.0	-	
3	Sulphur dioxide (human health receptor)	50.0	267	2.62	5.23	**Yes**	191	71.8	**Yes**
4	Sulphur dioxide (ecological receptor)	20.0	-	2.62	13.1	**Yes**	191	-	
5	Hydrogen chloride	20.0	800	0.0672	0.336	**No**	2.45	0.306	**No**
6	Hydrogen fluoride (as F)	-	250	0.00411	-		0.150	0.0598	**No**
7	n-Hexane	720	21,600	0.709	0.0985	**No**	25.9	0.120	**No**
8	Cyclohexane	3,500	105,000	0.821	0.0235	**No**	29.9	0.0285	**No**
9	Benzene	16.3	208	0.411	2.53	**Yes**	15.0	7.19	**No**
10	Toluene	1,910	8,000	1.53	0.0801	**No**	55.7	0.696	**No**

module 3

3.3.3 Air Impact Modelling

Identify need for Detailed Modelling of Emissions to Air

This page displays the Process Contributions in relation to the backgound pollutant levels and the EAL or EQS. You should use this information to decide whether to conduct detailed modelling. Note that releases that are insignificant are not shown as they are screened from further assessment. Also complete this page if you have already done detailed modelling.

			Long Term				Short Term	
Number	Substance	Air Bkgrnd Conc. µg/m3	PC µg/m3	% PC of headroom (EAL -	PEC µg/m3	% PEC of EAL %	PC µg/m3	% PC of headroom (EAL - Bkgrnd)
1	Particulates	14.7	0.370	1.47	15.1	37.7	10.5	51.0
1	Nitrogen dioxide (human health receptor)	10	1.83	6.10	11.9	29.6	76.0	42.3
2	Nitrogen dioxide (ecological receptor)	12	1.83	10.2	13.9	46.1	76.0	-
3	Sulphur dioxide (human health receptor)	2.46	2.62	5.50	5.08	10.2	191	73.1
4	Sulphur dioxide (ecological receptor)	2.46	2.62	14.9	5.08	25.4	191	-
5	Hydrogen chloride		1.35	-	-	-	48.9	-
9	Benzene	0.21	0.411	2.56	0.621	3.82	15.0	7.20