Agrivert Ltd

Stormy Down Anaerobic Digester

Air Quality Assessment

Rev C | 22 December 2015

Job number 238522-00

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Document Verification

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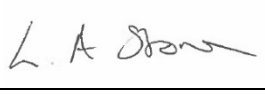
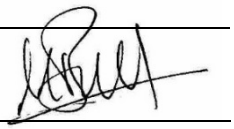
		Signature			
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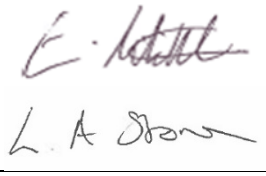
		Name	Ellie Mitchell/Lesley-Anne Stone	Max Rooksby	Michael Bull
		Signature			
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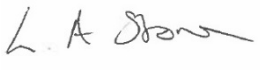
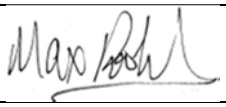
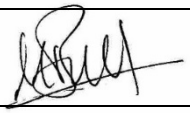
		Name	Lesley-Anne Stone	Max Rooksby	Michael Bull
		Signature			
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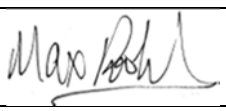
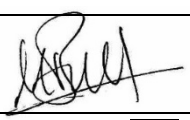
		Signature			
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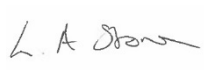
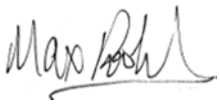
		Signature			
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Contents

Appendices

1 Introduction

Ove Arup and Partners Ltd (Arup) has been instructed by Agrivert Ltd (Agrivert) to undertake an update to the Air Quality Assessment for the proposed Stormy Down Anaerobic Digestion (AD) facility in Bridgend, South Wales which was submitted as part of a planning application for the site in October 2014. The updated proposals which were assessed include a revised site layout and a reduction in the height of flues on site.

The updated assessment focussed on emissions to air and the significance of air quality impacts only. The impact of the revised site layout on the odour assessment undertaken in October has been reviewed and it was considered unnecessary to undertake further dispersion modelling. The movement of modelled odour sources approximately 32m North West would not change the conclusions of the odour assessment submitted as part of the planning application for the site. Therefore, the proposed facility is considered to have a negligible effect on odour concentrations in areas of sensitivity and as such changes in odour are not considered to be significant as a result of the proposed facility.

The site of the proposed facility lies approximately 7 km west of the town of Bridgend within Bridgend County Borough Council (BCBC) and is a former World War II airfield. The site is currently occupied by Cenin Limited which operates a research facility for an alternative low carbon cement substitute, and a solar farm. Cenin also have planning permission to install a wind turbine to the north of the site.

The proposed facility will comprise AD processing with the capacity to treat approximately 48,500 tonnes of waste per year comprising municipal solid waste from households, commercial solid food waste from local schools, hospitals, businesses and food producers and commercial liquid waste from local producers. The site boundary of the proposed facility is shown in Figure 1.

Figure 1: Location of Proposed Facility

2 Legislation, Policies and Guidance

2.1 Air Quality

2.1.1 European Legislation

In 1996, the European Commission published the Air Quality Framework Directive on ambient air quality assessment and management (96/62/EC). This Directive defined the policy framework for 12 air pollutants known to have harmful effects on human health and the environment. Limit values (pollutant concentrations not to be exceeded by a certain date) for each specified pollutant are set through a series of Daughter Directives, including Directive 1999/30/EC (the 1st Daughter Directive) which sets limit values for sulphur dioxide (SO_2), nitrogen dioxide (NO_2) and oxides of nitrogen (NO_X), particulate matter (PM_{10}) and lead in ambient air.

In May 2008, the Directive 2008/50/EC on ambient air quality and cleaner air for Europe came into force. This Directive consolidates the above (apart from the 4th Daughter Directive, which will be brought within the new Directive at a later date) and provides a new regulatory framework for $PM_{2.5}$ and makes provision for extended compliance deadlines for NO_2 and PM_{10}.

In a parallel national process, the Environment Act was published in 1995. The objectives for specified pollutants and outlining measures to be taken by local authorities through the system of Local Air Quality Management (LAQM) and by others "to work in pursuit of achievement" of these objectives. A National Air Quality Strategy (NAQS) was published in 1997 and subsequently reviewed and revised in 2000, as the Air Quality Strategy for England, Scotland, Wales and Northern Ireland and an addendum to the Strategy was published in 2003. The current Air Quality Strategy for England, Scotland, Wales and Northern Ireland was published in July 2007.

The above European Directives, 2008/50/EC and the 4th Daughter Directive, were transposed into legislation in Wales by the Air Quality Standards Regulations (Wales) 2010. The Secretary of State for the Environment has the duty of ensuring the air quality limit values are complied with.

European Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora requires member states to introduce a range of measures for the protection of habitats and species. The Conservation of Habitats and Species Regulations 2010 No. 490 transposes the Directive into law in England and Wales.

The Habitats Directive requires the competent authority, which in this case would be the planning authority, to firstly evaluate whether the Site is likely to give rise to a significant effect on the European site. Where this is the case, it has to carry out an 'appropriate assessment' in order to determine whether the Site would adversely affect the integrity of the European site.

2.1.2 UK Legislation

Air quality limit values and objectives are quality standards for clean air, which can be used as assessment criteria to determine potential changes in local air quality resulting from a development.

Some pollutants have standards expressed as annual average concentrations owing to the chronic way in which they affect health or the natural environment (i.e. effects occur after a prolonged period of exposure to elevated concentrations) and others have standards expressed as 24-hour, one-hour or 15-minute average concentrations owing to the acute way in which they affect health or the natural environment (i.e. after a relatively short period of exposure). Some pollutants have standards expressed in terms of both long-term and short-term concentrations. Table 1 sets out these EU and UK air quality limit values for the pollutants of greatest concern for this assessment.

In the majority of cases the air quality limit values for the EU and UK have the same pollutant concentration threshold and date for compliance. The UK limit values also have the same pollutant concentrations as set out in the NAQS. The key difference is that the Secretary of State for the Environment is required under European law to ensure the air quality limit values are complied with whereas local authorities are only obliged under national legislation to undertake best efforts to comply with the air quality objectives set out in the NAQS. To assist local authorities in demonstrating best efforts, the Environment Act 1995 requires that when carrying out their local air quality management functions, local authorities shall have regard to guidance issued by the Secretary of State.

Table 1 Air Quality Limit Values

Pollutant	**Air Quality Limit Value**	
	Concentration (µg/m^3)	**Averaging Period**
NO_2 (Nitrogen Dioxide)	40	Annual mean
	200	1-hour mean; not to be exceeded more than 18 times a year
NOx[a)] (Oxides of Nitrogen)	30	Annual mean

a) The Air Quality Limit Value for NOx is for the protection of vegetation and sensitive ecosystems only

Environmental Permitting Regulations (England & Wales) 2014

The latest revision of the Environmental Permitting Regulations[1] came into force in October 2014. The premises regulated under these Regulations are required to use Best Available Techniques (BAT) in order to minimise their emissions to the environment. In order to operate, they have to apply for a permit from the Environment Agency and failure to comply would constitute a criminal offence.

1 Environmental Permitting (England and Wales) (Amendment) Regulations SI 2014/255.

2.1.3 National Planning Policy

Planning Policy Wales

Planning Policy Wales[2] (PPW) sets out land use planning policies for Wales and is supplemented by Technical Advice Notes (TAN) for a number of topics.

One of the underlying aims is the protection of the environment which includes air quality policies. Air quality specific policies 13.10 to 13.12 include the following excerpts:

> *"The planning system should determine whether a development is an acceptable use of land and should control other development in proximity to potential sources of pollution rather than seeking to control the processes or substances used in any particular development."*
>
> *"The potential for pollution affecting the use of land will be a material consideration in deciding whether to grant planning permission. Material considerations in determining applications for potentially polluting development are likely to include:*
>
> - *Location, taking into account such considerations as the reasons for selecting the chosen site itself;*
> - *Impact on health and amenity;*
> - *The risk and impact of potential pollution from the development … particularly if the development would impact on an Air Quality Management Area or a Special Area of Conservation (SAC);*
> - *Prevention of nuisance;*
> - *Impact on the road and other transport networks, and in particular on traffic generation".*

There are no TANs associated with air quality in the PPW.

2.1.4 Guidance

The Environment Agency H1 (EA H1) Annex F – Air Emissions[3] provides guidance on the assessment of industrial emissions in the UK. The guidance is part of the EA horizontal guidance for all sectors regulated under the environmental permitting regulations (EPR).

The guidance takes a risk based approach for actions which may have an effect on the environment. For air quality this involves screening the emissions from the activity against the criteria set out in the guidance.

[2] Welsh Government, Planning Policy Wales, Edition 7, July 2014.

[3] Environment Agency H1 Guidance – Annex F Air emissions – 2011.

3 Methodology

3.1 Air Quality Assessment

The proposed facility has the potential to affect local air quality by the combustion of biogas generated by the process in either Combined Heat and Power (CHP) gas engines or through flaring. The impact of these sources has been quantified through dispersion modelling in accordance with the methodology outlined in the following sections.

The proposed facility would also result in additional vehicle movements in the local area as the waste will be imported to site in Refuse Collection Vehicles (RCVs) and digestate will be exported in tankers. The transport strategy for the proposed facility aims to ensure that the HGV trips are limited to 102 two-way movements per day. The Design Manual for Roads and Bridges[4] (DMRB) includes criteria where a change of less than 200 Heavy Duty Vehicles (HDVs) is not considered significant. As such, the effect of the change in vehicles along the local road network as a result of the proposed facility is anticipated to be negligible for local air quality and a quantitative assessment has been scoped out.

An industry standard atmospheric dispersion model, ADMS 5, was used to model releases from sources on site. The dispersion modelling procedure was as follows:

- Information on stack dimensions and position were obtained via plans provide by Agrivert;
- Appropriate meteorological data was obtained from Arup's in-house data library and agreed with BCBC;
- Potentially sensitive locations were identified in the vicinity of the installation using digital mapping and agreed with BCBC;
- Background air quality data was determined from background mapping published by Defra;
- The above information was entered into the dispersion model;
- The dispersion model was run to determine ground level pollutant concentrations at the area of maximum impact and sensitive receptors, which were added to background pollutant concentrations. The interpretation of the results was based on the highest modelled concentration at any location on the receptor grid or appropriate specified receptor locations; and,
- The study results were compared with the relevant air quality limit values to determine the significance of any air quality impacts.

Dispersion Model

ADMS 5 is a short-range dispersion modelling software package that simulates a wide range of buoyant and passive releases to atmosphere. It is a new generation model using boundary layer height and Monin-Obukhov length to describe the

[4] Highways Agency, Design Manual for Roads and Bridges, Volume 11 Section 3 Part 1 Air Quality, May 2007.

atmospheric boundary layer and a skewed Gaussian concentration distribution to calculate dispersion under convective conditions.

The model uses hourly meteorological data to define conditions for plume rise, transport and diffusion. It estimates the concentration for each source and receptor combination for each hour of input meteorology, and calculates user-selected long-term and short-term averages.

Modelling Scenarios

The scenarios considered in the modelling assessment are summarised in Table 2 and were selected so that predicted NO_2 concentrations could be compared with the relevant air quality standard. NO_x and the subsequent conversion to NO_2 has been identified as the pollutant of greatest concern with regard to the proposed facility therefore modelling scenarios consider this pollutant only. The emissions from the AD facility are not anticipated to contain significant emissions of other pollutants for which air quality limit values are in place, such as sulphur dioxide (SO_2), fine particulate matter (PM_{10} or $PM_{2.5}$), volatile organic compounds (VOC) or carbon monoxide (CO) as these are controlled through the process. An assessment of these pollutants has therefore been scoped out of the assessment and no exceedences of relevant air quality objectives or any significant effects are anticipated.

Table 2 Dispersion Modelling Scenarios

Pollutant	**Modelled As**	
	Short Term	**Long Term**
NO_2	99.8th percentile (%ile) 1-hour mean	Annual mean

Some short-term air quality standards are framed in terms of the number of occasions in a calendar year on which the concentration should not be exceeded. As such, the 99.8th percentile shown in Table 2 was selected to compare with the relevant standard.

The flare will only be operated during abnormal conditions, either as a back-up when the biogas CHP engines are out of use or in events where more biogas is generated than can be used through the CHP engines. As such, emissions from this source were only included within the short-term model scenarios. It should be noted that it is unlikely that the flare and both biogas CHP engines will be operational concurrently for long periods.

Modelled Sources

Model parameters for those sources with the potential to release emissions to air have been identified through correspondence with Agrivert Ltd. Inputs to the dispersion model are shown in Table 3. Two biogas CHP engines will be operational on site, each with a separate flue.

Input from the flare has been taken from data used for Agrivert's Basildon AD facility and waste transfer centre[5] which is primarily based on monitored data from the Cassington facility. These are both of a similar design and capacity to the proposed facility and receive similar waste feedstock and therefore the use of this data is appropriate. Locations of modelled sources are shown in Figure 2.

A sensitivity calculation for flare emissions has been undertaken using emission factors outlined in the European Emissions Inventory[6] combined with the likely volume of gas to be burned through flaring. This indicated a NO_x emission rate of approximately 0.1g/s, which is significantly lower than the emission rate calculated for monitored data. As such the emission rate included for the flare is representative of a worst case scenario.

Table 3 Dispersion Modelling Input Parameters

Condition	Unit	Biogas CHP Engine 1	Biogas CHP Engine 2	Flare
Stack location	NGR	284229, 180037	284235, 180038	284216, 180064
Stack height	m	10	10	10
Stack diameter	m	0.55	0.55	1.8
Flue gas efflux velocity	m/s	14.7	14.7	8.4
Temperature	˚C	424	424	800

Flares are generally treated in a different manner in air quality modelling as they are usually unconstrained sources (i.e. the flare burns freely) and the heat lost owing to radiation can be significant and results in a loss of buoyancy of the exhaust gases (although these are considerably hotter and hence more buoyant than emissions from a normal flue). As the flare will be enclosed and located in a flue, radiative emissions will be reduced and the emissions are likely to behave more like a normal flue. For this reason, the flare was modelled as a point source representative of a standard flue.

The AD plant is required to comply with the relevant emission limit values for exhaust gas pollutant concentrations for biogas CHP engines. These are shown in Table 4 for NOx. It should be noted that monitored data from Cassington included very small concentrations of VOCs and CO concentrations. 2.6µg/m^3 and 1.8µg/m^3 respectively, and SO_2 concentrations were below the detection limit.

Table 4 Pollutants and Emission Limit Values

Parameter	Biogas Engines Emission Limit Value (mg/m^3)	Flare Emission Concentration (mg/m3)
NO_x	500	72

[5] REC Consultants, Air Quality Assessment Basildon Anaerobic Digestion Plant and Waste Transfer Station, January 2014.
[6] European Emissions Inventory, Air Pollutant Emission Inventory Guidebook, August 2013

Figure 2: Modelled Sources for Air Quality Effects

The pollutant mass emission rates from the biogas CHP engines and flare and the operational parameters for use in the assessment were derived from the concentrations shown in Table 4 and are summarised in Table 5. This represents a conservative assessment approach with NOx emissions from the biogas CHP engines assumed to be the maximum permitted concentration.

Table 5 Pollutants and Emission Limit Values

Parameter	**Mass Emission Rate (g/s)**	
	Biogas CHP Engines	**Flare**
NO_x	0.63	1.52

Emissions were assumed to be constant, with the plant in operation 24-hours per day, 365-days per year. This is considered to be a worst-case assessment scenario as plant shut-down or periods of reduced work load are not reflected in the modelled emissions.

Assessment Extents

Ambient pollutant concentrations were predicted at selected receptor locations as well as over a cartesian grid of extent 2.5km by 2.5km with a resolution of 25m. The grid was used to identify the point of maximum impact from the proposed facility.

A desk-top study was undertaken in order to identify any sensitive receptor locations in the vicinity of the site, included designated sites for the protection of vegetation and sensitive ecosystems that required specific consideration during the assessment. These are summarised in Table 6.

Table 6 Selected Receptors

Receptor		**NGR**	
		X	**Y**
R1	Tythegston Kennels	284921	180002
R2	Commercial Property (Main Junction for site)	284539	180187
R3	Residential Property 1	284630	180266
R4	RAF Terraces 1	284501	180274
R5	RAF Terraces 2	284450	180404
R6	Stoney Barn (Heol-y-sheet)	283828	180712
R7	Mount Pleasant Farm	283336	179531
R8	Pyle Road	282531	178660
E1	Kenfig/Cynffig SAC (Kenfig)	280229	180877
E2	Penycastell SSSI	284231	181798
E3	Kenfig/Cynffig SAC (Merthyr Mawr)	285519	177672
E4	Dunraven Bay SAC	288638	172855
E5	Cefn Cribwr Grasslands SSSI	285519	181715
E6	Cefn Cribwr Grasslands SSSI	285541	183027
E7	Cefn Cribwr Grasslands SSSI	286595	182898
E8	Blackmill Woodlands SAC	292164	185371
E9	Blackmill Woodlands SAC	292186	185887
AW1	Ancient Woodland	285345	181378
AW2	Ancient Woodland	285887	181308
AW3	Ancient Woodland	283907	180630
AW4	Ancient Woodland	283717	180702
AW5	Ancient Woodland	283382	180532
AW6	Ancient Woodland	283208	180492
AW7	Ancient Woodland	283067	180545
AW8	Ancient Woodland	282843	180453
AW9	Ancient Woodland	282248	179638
AW10	Ancient Woodland	283199	179352
AW11	Ancient Woodland	284536	179264
AW12	Ancient Woodland	284838	179358
AW13	Ancient Woodland	285210	179302
AW14	Ancient Woodland	286121	179470
AW15	Ancient Woodland	283722	178613
AW16	Ancient Woodland	284158	178440
AW17	Ancient Woodland	284841	177772
AW18	Ancient Woodland	282485	180475

Receptor		NGR	
		X	Y
AW19	Ancient Woodland	285670	179362
AW20	Ancient Woodland	284299	181794
AW21	Ancient Woodland	284372	182093

The receptors identified in Table 6 represent worst-case locations for human health considerations as these are the closest to the proposed facility. However, this is not an exhaustive list and there may be other locations within the vicinity of the site that may experience air quality impacts as a result of atmospheric emissions from the facility that have not been individually identified above.

Designated sites for the protection of vegetation and habitat have also been included within the assessment. European designated sites such as Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Ramsar sites have been included within 10km of the site. Sites of Special Scientific Interest (SSSI) and ancient woodland sites have been included within 2km of the site as per EA H1 guidance. Receptor locations included in the assessment of air quality effects are shown in Figure 3 to Figure 5.

It is noted that there are SSSIs within 2km that have not been included in the assessment such as Stormy Down SSSI, however this is due to the designated features being geological as such not sensitive to changes in nitrogen deposition. For all sites identified in Table 6 and Figure 4 and Figure 5, an assessment of nitrogen deposition and acidification has been undertaken to ensure the proposed facility does not result in significant air quality effects. Information regarding critical loads[7] for nitrogen and acid deposition which should not be exceeded as well as existing deposition rates at each of the designated sites and ancient woodlands are provided in Table 7. As ancient woodlands are non-statutory designated sites, critical loads for nitrogen and acid deposition as well as background deposition are not available on a site by site basis. Discussions have been undertaken with the ecologists for the project to determine the most appropriate critical load to apply, it has been determined that the ancient woodland within 2km of the proposed facility are predominantly broadleaved woodland, therefore the critical load for Broadleaved, mixed and yew woodland habitats has been used. Background deposition has been calculated by location and is provided as an average across a 5km x 5km grid square.

[7] Air Pollution Information System, http://www.apis.ac.uk/, Accessed September 2014.

Figure 3: Location of Human Health Receptors

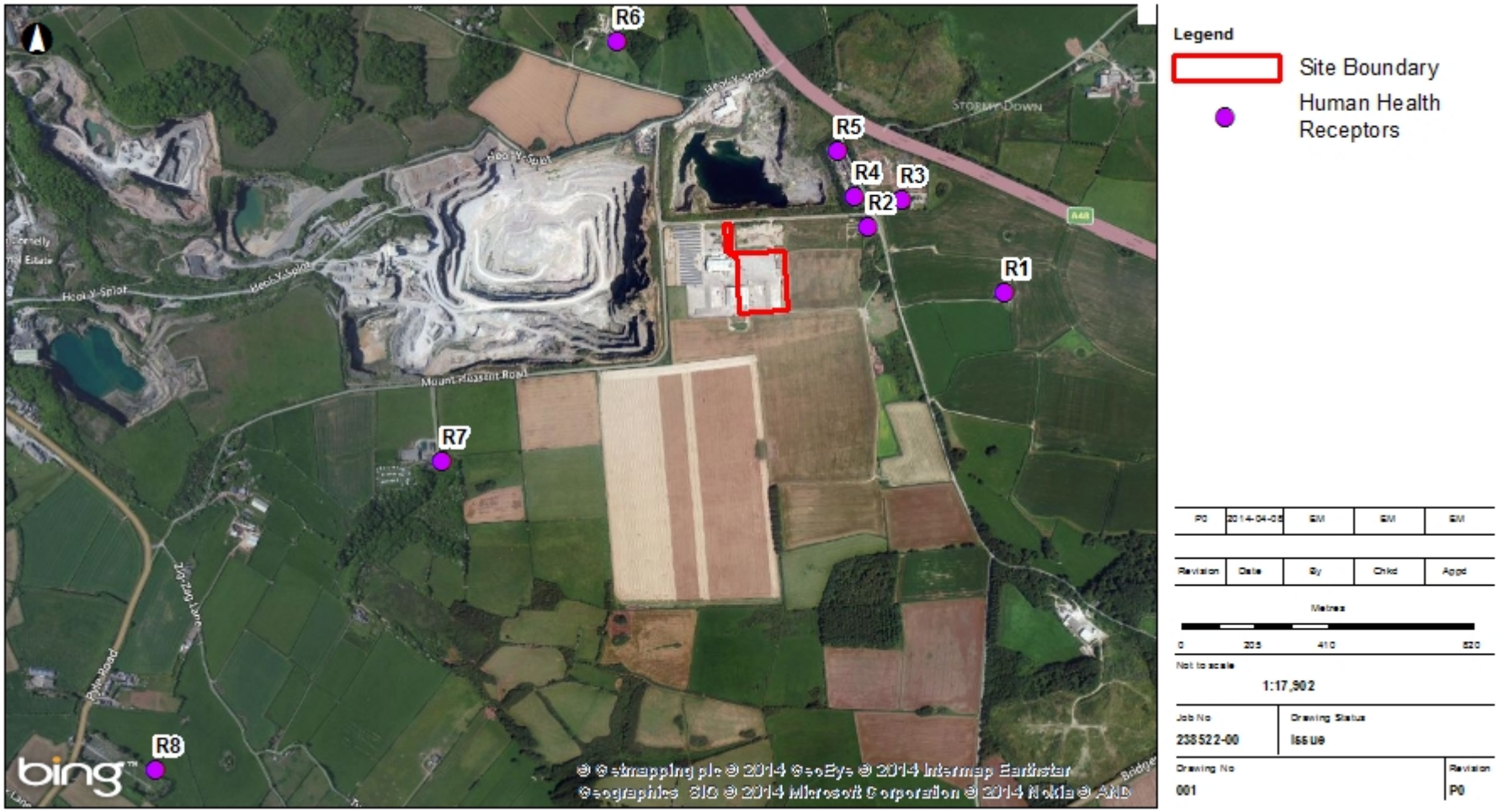

Figure 4: Location of Designated Sites

Legend

- Designated Sites
- Site Boundary
- Sites of Special Scientific Interest (SSSI)
- Special Areas of Conservation (SAC)

Revision	Date	By	Chkd	Appd
P0	2014-04-08	EM	EM	EM

Metres

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Not to scale

1:115,000

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238522-00	ISSUE

Drawing No	Revision
001	P0

Figure 5: Location of Ancient Woodlands

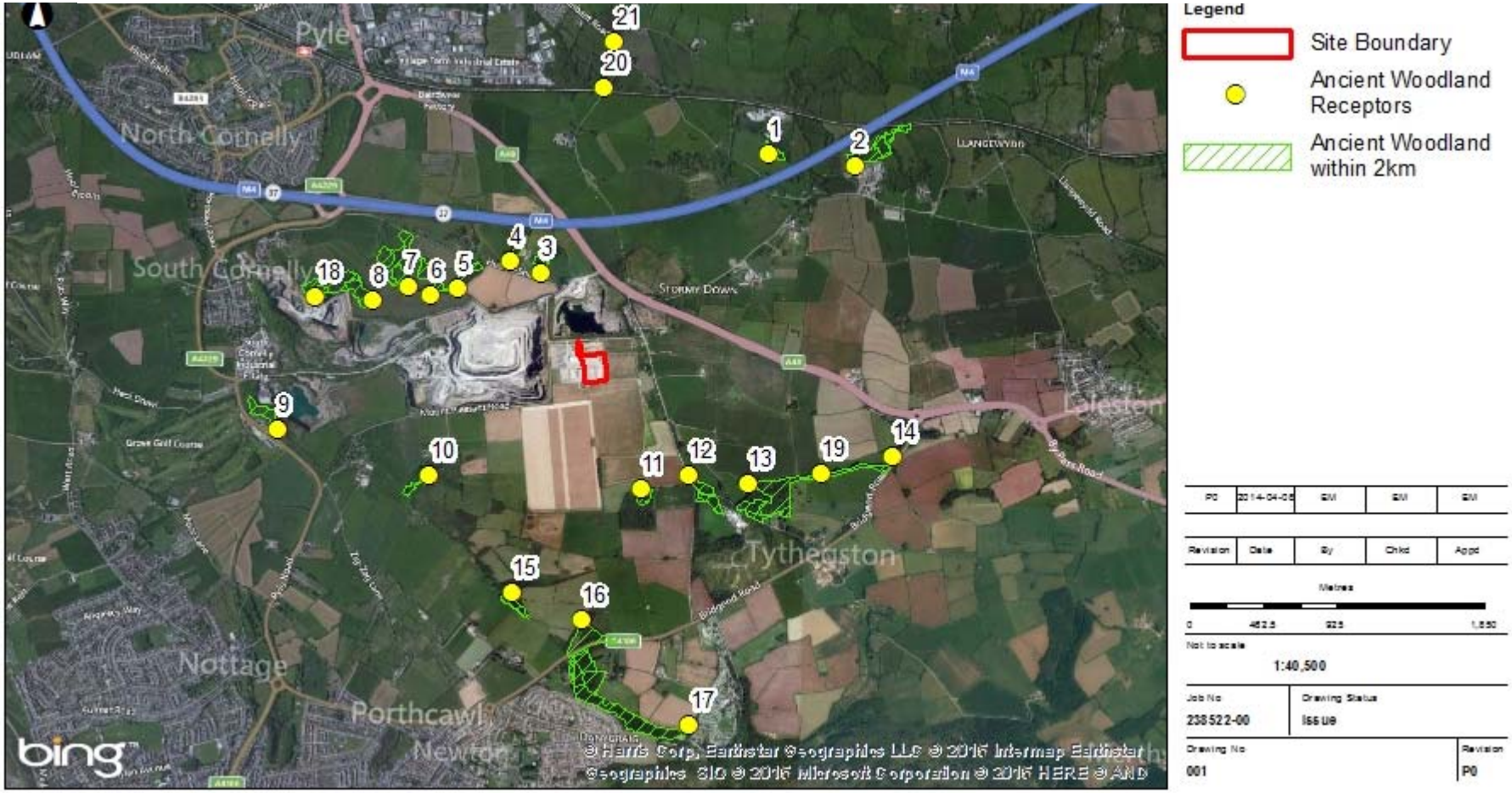


Table 7 Critical Loads for Designated Sites

Designated Site	Habitat	Nitrogen deposition Critical Load	Background Average N Deposition	Acidification Critical Loads				Background Acid Nitrogen Deposition
				MaxCLminN	MaxCLMaxN	MinCLminN	MinCLMaxN	
Units		**K N/ha/yr**		**Keq N**				
Penycastell SSSI	Upland Hay Meadows	10 – 20	13.44	-	-	-	-	-
Kenfig/Cynffig SAC	Fixed Dunes with Herbaceous Vegetation	8 – 10	9.99	0.2	4.3	0.2	1.1	0.71
Dunraven Bay SAC	Shore Dock	10 - 20	9.38	-	-	-	-	-
Cefn Cribwr Grasslands SSSI	Molinia Meadows	15 -25	13.8	0.6	2.0	0.4	1.0	0.99
Blackmill Woodlands SAC	Old Sessile Oak Woods	10 – 15	28.3	0.3	1.2	0.3	1.2	2.02
Ancient Woodland	Broadleaved, Mixed and Yew Woodlands	10 - 20	21.8	0.36	3.01	-	-	1.73
		10 - 20	21.0	0.14	11.15	-	-	1.7
		10 - 20	17.4	0.14	11.09	-	-	1.38
		10 - 20	19.9	0.14	11.09	-	-	1.57

Note: Penycastell SSSI and Dunraven Bay are not sensitive to acidification therefore no critical loads for acidification are applied to these sites. A NO_2 deposition velocity of 1.5mm/s has been applied to all sites with the exception of Blackmill Woodlands SAC and ancient woodland sites, where a NO_2 deposition velocity of 3mm/s has been applied for tall vegetation.

Building and Turbine Effects

The dispersion of substances released from elevated sources can be influenced by the presence of buildings close to the emission point. Structures can interrupt the wind flows and cause significantly higher ground-level concentrations close to the source than would arise in the absence of the buildings.

Analysis of the site layout indicated that a number of buildings should be included within the model in order to take account of effects on pollutant dispersion. Building input geometries are shown in Table 8. Width and angle parameters are not required for the tanks as these have been modelled as circular structures. Modelled buildings are shown in Figure 2 above.

The reception building has been included in the model at a height of 14.9m based on information provided by Agrivert.

Table 8 Building Geometries

Building	NGR		Height (m)	Diameter/ Length (m)	Width (m)	Angle (°)
	X	Y				
Reception Building	284209	180014	14.9	28	42	75
Tank 1	284247	179990	16.7	32	-	-
Tank 2	284277	180011	16.7	32	-	-
Tank 3	284272	180048	16.7	32	-	-
Tank 4	284272	180086	16.7	32	-	-
Tank 5	284235	180092	16.7	32	-	-

In addition to the structures to be constructed as part of the proposed facility, Cenin Ltd have planning permission to install a wind turbine to the north of the site, approximately 170m north west of the biogas CHP engines (see Figure 2). This is located within close enough proximity to emission sources that turbulence from the wind turbine could be considered to have an effect on dispersion, as such the wind turbine has been included in the dispersion model. Data for the wind turbine model proposed, Enercon E-70 E4, was provided by Cenin Ltd (see Appendix A), which provided the following parameters for input to the model:

- Hub height (m);
- Rotor diameter (m);
- Power coefficient at varying wind speeds for which the turbine would be operational; and
- Thrust coefficient at varying wind speeds for which the turbine would be operational.

Surface Roughness

Surface roughness is a parameter that describes the nature of the local terrain and is important in the modelling as it defines how turbulence resulting from the air flow

over the ground is handled in the model. In relatively flat areas the surface roughness is low and turbulence from this source is lower than a built-up urban area. Therefore, a low surface roughness was used with a value of 0.3m (defined as "Agricultural areas (max)" in the model). No terrain height information was required for input to the model as the immediate surrounding area is flat with no steep gradients.

Minimum Monin-Obukhov Length

The minimum Monin-Obukhov length provides a measure of the minimum stability of the atmosphere. A minimum Monin-Obukhov length of 30m was used in this dispersion modelling study.

NO_x to NO_2 Conversion

Emissions of NOx from combustion processes are predominantly in the form of NO. Excess oxygen in the combustion gases and further atmospheric reactions cause the oxidation of NO to NO_2.

Ground level NO_x concentrations predicted through dispersion modelling have been converted to NO_2 concentrations for comparison with the air quality limit values. NO_2 concentrations reported in the results section assume 70% conversion from NO_x to NO_2 for annual means and 35% conversion for 1-hour concentrations, based upon EA guidance[8] for a 'worse case' scenario.

Meteorological Data

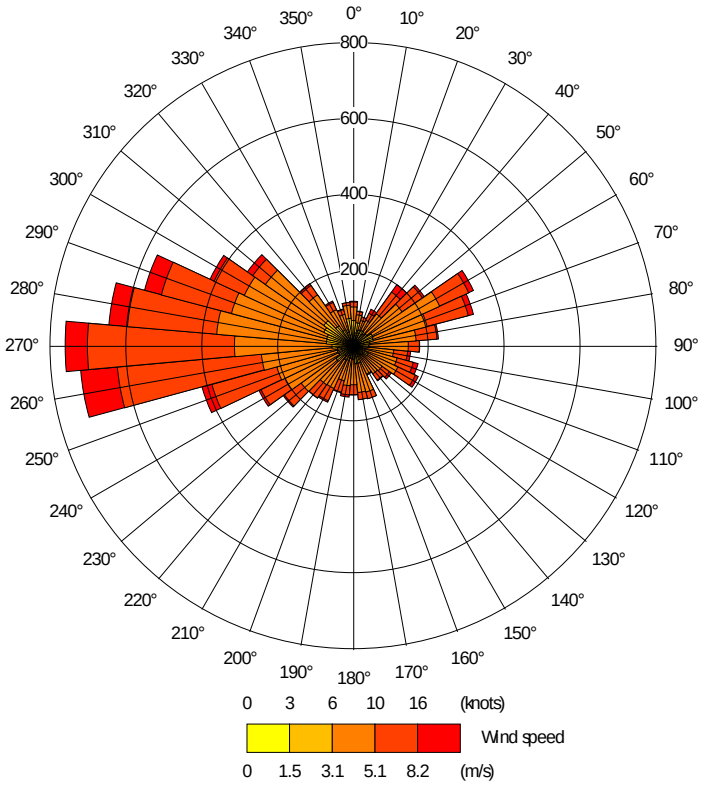
Meteorological data used in this assessment was taken from Cardiff Airport meteorological station, which is located approximately 24km south east of the proposed facility. LAQM.TG(09) recommends meteorological stations within 30km of an assessment area as being suitable for detailed modelling. Four years of meteorological data were used in order to ensure inter-year variability could be considered within the modelling results.

All meteorological data used in the assessment was provided by Atmospheric Dispersion Modelling (ADM) Ltd, which is an established distributor of meteorological data within the UK.

Figure 6 shows a wind rose of the used meteorological data from 2012, which indicates a predominantly westerly wind direction. Other years considered (2008, 2009 and 2010) show similar distribution of wind speed and direction.

[8] Environment Agency, Conversion ratios for NOx and NO_2, Air Quality Modelling and Assessment Unit

Figure 6: Wind rose for Cardiff Airport Meteorological Station, 2012



Assessment Criteria

Human Health

The EA H1 Guidance, requires the following outcomes of the assessment to be reported in order to determine if air quality impacts can be considered to be insignificant and screened out of further assessment.

- Process contribution (PC) - Predicted pollutant concentration as a result of emissions from the facility only; and,
- Predicted environmental concentration (PEC) - Total predicted pollutant concentration as a result of emissions from the facility and existing baseline levels.

The PC and PEC are therefore reported in section 5.1 for each assessed receptor. The EA H1 guidance states that are quality impacts can be considered to be insignificant and screened out for further assessment when:

- The annual mean PC is less than 1% of the long term environmental standard; and
- The short term (1 hour mean) PC is less than 10% of the short term environmental standard.

In the case of nitrogen dioxide, where the long and short term standards are 40 and 200µg/m^3 respectively, this means that the predicted annual mean concentrations

below 0.4µg/m^3 and hourly average concentrations below 20µg/m^3 are considered insignificant. These guidelines do not imply that any increase in concentration above this level would be significant, further consideration of significance is required that examines the total pollutant concentration (i.e. the process contribution plus the background levels) and compare these with relevant air quality standards.

The criteria set out for assessing long term process contributions is to check if the PEC is greater than 70% of the long term standard.

PEC > 70% standard

For assessing short term contributions the process contribution is assessed to determine if it is above 20% of the short term standard minus twice the background.

PC $_{\text{short term}}$ >20% (standard $_{\text{short term}}$ – 2x background $_{\text{long term}}$)

Where the long term PEC is below the 70% criteria and the short term PC is below the 20% criteria it is not anticipated that the impacts will be significant.

Ecological Receptors

NOx and NO_2 are the main pollutants of concern of ecological receptors, in the context of habitat regulations the critical level is 30µg/m^3 for annual mean NOx concentrations which is also the air quality limit value for sites designated for the protection of vegetation and sensitive ecosystems. Therefore concentrations below 0.3µg/m^3 (1% of the air quality limit value) would be considered insignificant. For assessment of European designated sites EA guidance recommends that if the predicted contribution of the installation under investigation exceeds 1% of the critical level, then the contribution of the installation in conjunction with the prevailing background airborne concentration must be assessed against the critical level. If the total PEC is less than 70% of the critical level, the installation is not likely to have a significant effect on the sensitive ecosystem.[9]

Nitrogen (N) deposition poses a significant threat to sensitive semi-natural habitats in the UK, e.g. heathland. Changes in both species occurrence and ecosystem function indices often occur at low levels of nitrogen deposition (less than 10 kgN/ha/yr), which is sometimes lower than the established critical loads, suggesting that the critical loads are not set at a level which prevents an impact to all species or ecosystem functions. Changes in species occurrence and indices of ecosystem function also progressively continue as nitrogen deposition levels continue rising above the current critical loads values. This suggests that there are some benefits from reduction in deposition even if it remains above the critical load.

EA guidance recommends that if the predicted contribution of the proposed facility under investigation exceeds 1% of the critical level, then the contribution of the proposed facility to deposition, in conjunction with the prevailing background level of deposition must be assessed against the critical load for the qualifying feature. If the total PEC is less than 70% of the critical load, the installation is not likely to have a significant effect on the qualifying feature.

[9] Environment Agency Stage 1 and 2 Assessment of New PIR Permissions under the Habitats Regulations, Doc No251_06, 2010.

Environment Agency Dispersion Modelling Requirements

Table 9 provides the checklist of EA dispersion modelling report requirements.

Table 9 Dispersion Modelling Report Requirements

Item	Location within Report
Location map	Figure 1
Site plan	Figure 2
List of pollutants modelled and relevant air quality guidelines	Table 1
Details of modelled scenarios	Table 2
Details of relevant ambient concentrations used	Table 11
Model description and justification	Section 3.1
Table of emission parameters used	Table 3 and Table 5
Details of modelled domain and receptors	Section 3.1
Details of meteorological data used (including origin) and justification	Section 3.1
Details of terrain treatment	Section 3.1
Details of building treatment	Section 3.1
Sensitivity analysis	Section 3.1

4 Baseline

Existing air quality conditions in the vicinity of the proposed development site were identified in order to provide a baseline for assessment. These are detailed in the following Sections.

4.1 Local Air Quality Management

As required by the Environment Act (1995), BCBC has undertaken Review and Assessment of air quality within their area of jurisdiction. This process is informed by monitoring of NO_2 undertaken using passive diffusion tubes throughout the borough. There are no monitoring locations within close proximity to the proposed facility however monitoring has been undertaken in Porthcawl and Kenfig Hill which is within 4km of the proposed facility. Monitoring undertaken by BCBC has indicated that concentrations of all pollutants contained within the NAQS are below the relevant air quality limit values across the borough. As such, no Air Quality Management Area (AQMA) have been declared for any pollutant.

4.2 Background Pollutant Concentrations

The Defra website includes estimated background air pollution data based from 2010 with projections for future years for NOx, NO_2, PM_{10} and $PM_{2.5}$ for each 1km by 1km OS grid square. The proposed development site is located in grid square NGR: 284500, 180500. Data for this location was downloaded from the Defra website for the purpose of this assessment and is summarised in Table 10.

Table 10 Predicted Background Pollutant Concentrations

Pollutant	**Predicted Background Concentration (µg/m^3)**
NO_2	13.3
NOx	17.4

It should be noted that the background concentration of NO_2 for 2014 was used to consider the earliest possible opening year of the AD plant as a worst case assumption, as background concentrations are expected to reduce in the future.

Background pollutant concentrations were also obtained for the grid squares in which the assessed human health receptors are located. This has then been added to the process contribution from the biogas CHP engines to determine the predicted environmental concentration. Annual mean background NO_2 concentrations have been doubled to derive hourly mean background NO_2 concentrations to allow the PEC for hourly mean NO_2 to be calculated. This follows guidance published by the EA.

Table 11 Predicted Background Pollutant Concentrations at Assessed Receptors

Receptor		**NGR**		**Background Annual Mean NO_2 (µg/m^3)**	**Background Annual Mean NOx (µg/m^3)**
		X	**Y**		
R1	Tythegston Kennels	284921	180002	13.3	-
R2	Commercial Property (Main Junction for site)	284539	180187	13.3	-
R3	Residential Property 1	284630	180266	13.3	-
R4	RAF Terraces 1	284501	180274	13.3	-
R5	RAF Terraces 2	284450	180404	13.3	-
R6	Stoney Barn (Heol-y-sheet)	283828	180712	12.5	-
R7	Mount Pleasant Farm	283336	179531	9.0	-
R8	Pyle Road	282531	178660	10.2	-
E1	Kenfig/Cynffig SAC (Kenfig)	280229	180877	-	10.1
E2	Penycastell SSSI	284231	181798	-	21.2
E3	Kenfig/Cynffig SAC (Merthyr Mawr)	285519	177672	-	9.6
E4	Dunraven Bay SAC	288638	172855	-	7.8
E5	Cefn Cribwr Grasslands SSSI	285519	181715	-	24.0
E6	Cefn Cribwr Grasslands SSSI	285541	183027	-	13.0
E7	Cefn Cribwr Grasslands SSSI	286595	182898	-	17.2
E8	Blackmill Woodlands SAC	292164	185371	-	13.4
E9	Blackmill Woodlands SAC	292186	185887	-	13.4

Receptor		NGR		Background Annual Mean NO_2 (µg/m^3)	Background Annual Mean NOx (µg/m^3)
		X	Y		
AW1	Ancient Woodland	285345	181378	-	24.0
AW2	Ancient Woodland	285887	181308	-	24.0
AW3	Ancient Woodland	283907	180630	-	16.2
AW4	Ancient Woodland	283717	180702	-	16.2
AW5	Ancient Woodland	283382	180532	-	16.2
AW6	Ancient Woodland	283208	180492	-	16.2
AW7	Ancient Woodland	283067	180545	-	16.2
AW8	Ancient Woodland	282843	180453	-	14.3
AW9	Ancient Woodland	282248	179638	-	12.5
AW10	Ancient Woodland	283199	179352	-	11.5
AW11	Ancient Woodland	284536	179264	-	11.1
AW12	Ancient Woodland	284838	179358	-	11.1
AW13	Ancient Woodland	285210	179302	-	11.7
AW14	Ancient Woodland	286121	179470	-	12.9
AW15	Ancient Woodland	283722	178613	-	11.4
AW16	Ancient Woodland	284158	178440	-	11.2
AW17	Ancient Woodland	284841	177772	-	10.6
AW18	Ancient Woodland	282485	180475	-	14.3
AW19	Ancient Woodland	285670	179362	-	11.7
AW20	Ancient Woodland	284299	181794	-	21.2
AW21	Ancient Woodland	284372	182093	-	15.6

5 Assessment

5.1 Air Quality Assessment

5.1.1 Maximum Pollutant Concentrations

The area of maximum impact occurs on site. Figure 7 and Figure 8 show contoured annual mean and hourly mean NO_2 concentrations for the area surrounding the proposed facility. It should be noted that the data shown in the figures are predictions from the meteorological data set which resulted in the maximum pollutant concentration for NO_2, in this case 2008. Predicted pollutant concentrations at human health and ecological receptors which are areas of sensitivity are shown in sections 5.1.2 and 5.1.3.

Figure 7: Predicted Process Contribution Annual Mean NO_2 concentrations (µg/m^3)

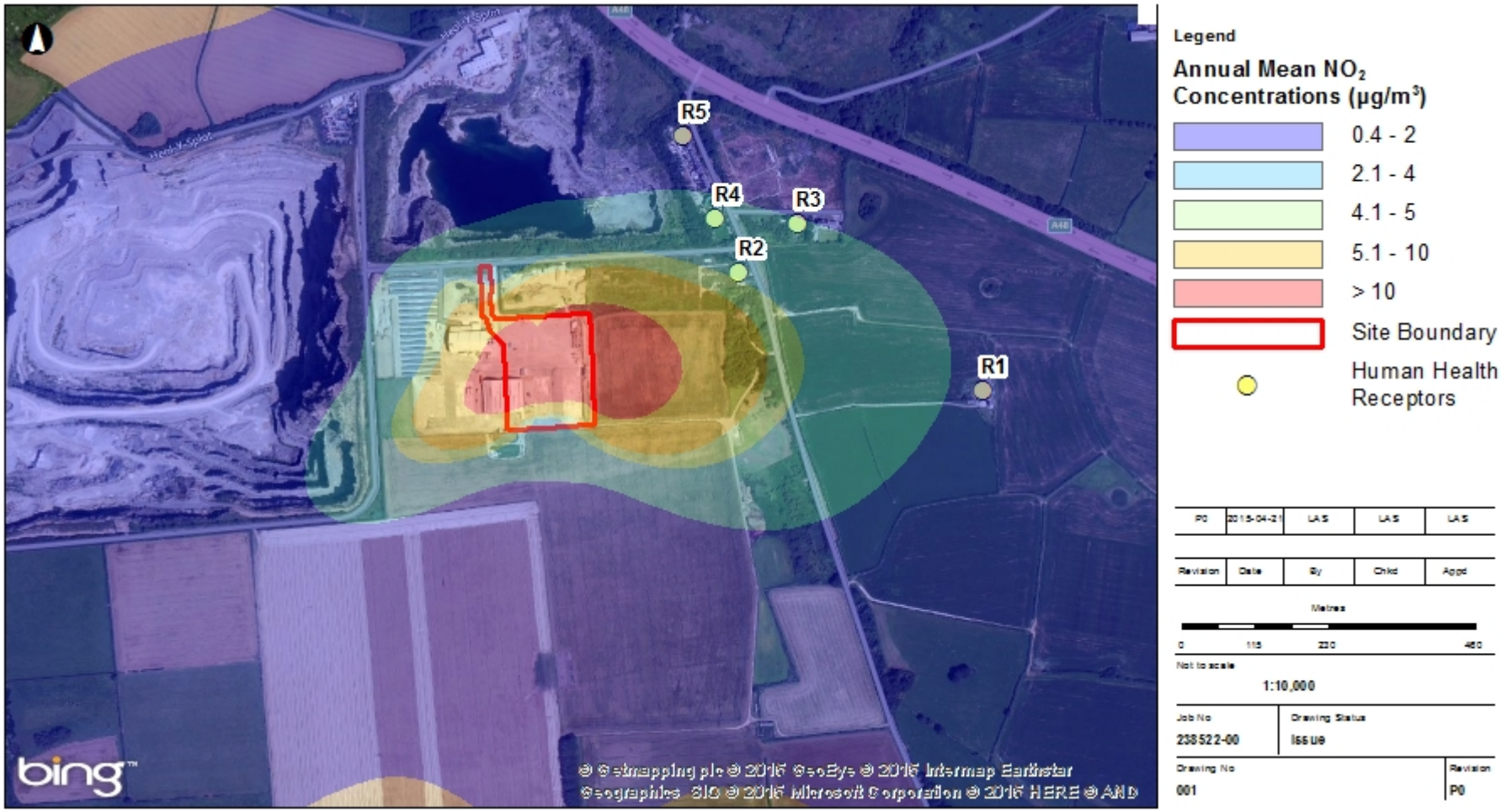
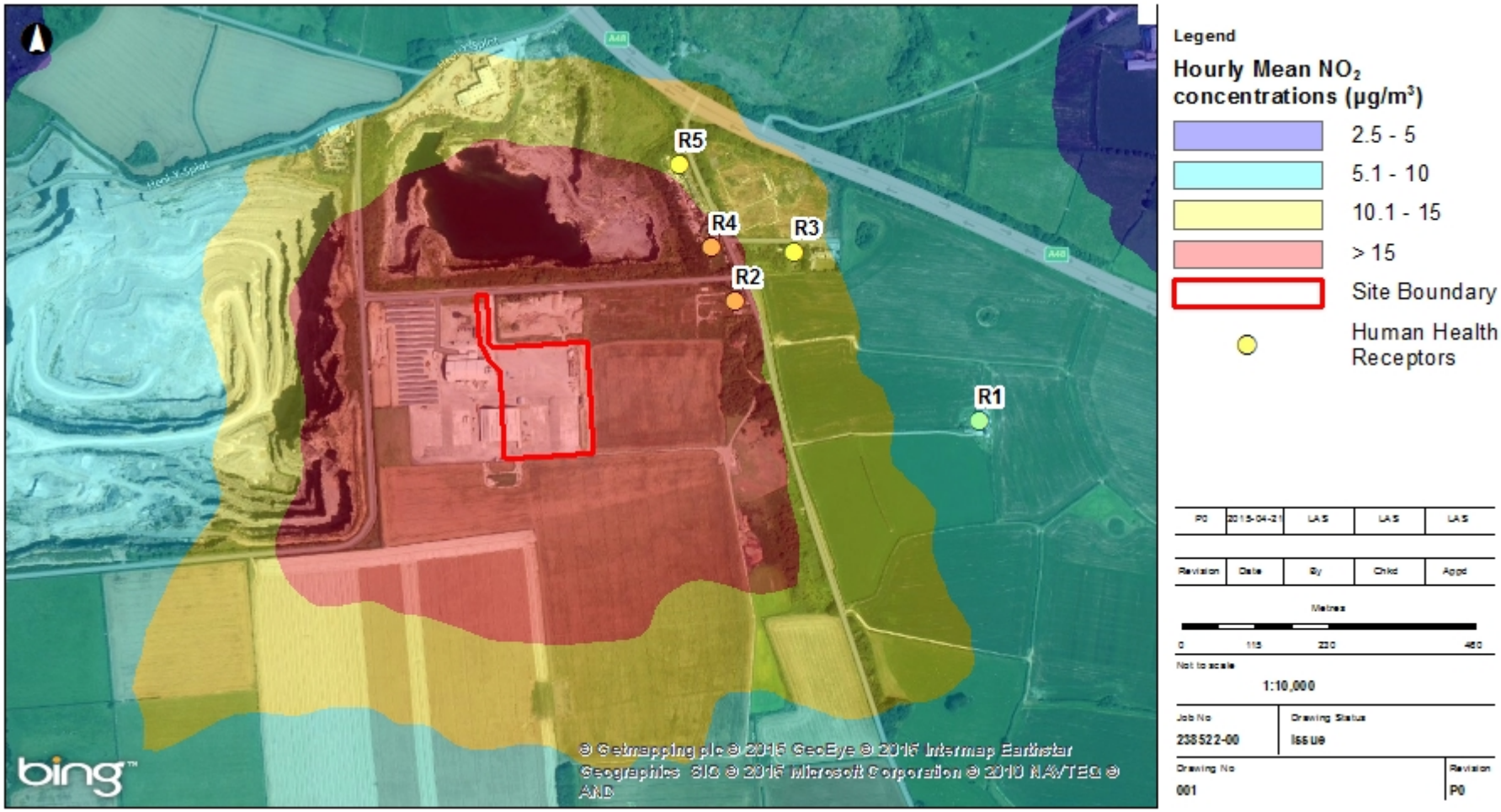


Figure 8: Predicted Process Contribution Hourly Mean NO_2 concentrations (99.79th Percentile - µg/m^3)



5.1.2 Assessed Human Health Receptors

Predicted concentrations of each pollutant at the sensitive human health receptor locations identified in Table 6 are summarised in the following Sections. The predicted PC and PEC for annual mean NO_2 concentrations are summarised in Table 12.

Table 12 Predicted Annual Mean NO_2 Concentrations, Exceedences of the 1% criteria ($0.4\mu g/m^3$) are highlighted as bold

Predicted Annual Mean NO_2 Concentrations						
Receptor		**Air Quality Limit Value**	**Predicted PC**	**Proportion of Air Quality Limit Value (%)**	**Predicted PEC**	**Proportion of Air Quality Limit Value (%)**
R1	Tythegston Kennels	$40\mu g/m^3$	1.9	**4.7%**	15.2	38.0%
R2	Commercial Property (Main Junction for site)		3.7	**9.3%**	17.1	42.6%
R3	Residential Property 1		2.1	**5.2%**	15.4	38.5%
R4	RAF Terraces 1		2.4	**5.9%**	15.7	39.2%
R5	RAF Terraces 2		1.3	**3.1%**	14.6	36.4%
R6	Stoney Barn (Heol-y-sheet)		0.4	1.0%	12.9	32.2%
R7	Mount Pleasant Farm		0.6	**1.4%**	9.5	23.9%
R8	Pyle Road		0.2	0.5%	10.4	25.9%

Table 13 Predicted Hourly Mean NO_2 Concentrations

Predicted Hourly Mean NO_2 Concentrations						
Receptor		**Air Quality Limit Value**	**Predicted PC**	**Proportion of Air Quality Limit Value (%)**	**Predicted PEC**	**Proportion of Air Quality Limit Value (%)**
R1	Tythegston Kennels	200µg/m^3	8.4	4.2%	35.0	17.5%
R2	Commercial Property (Main Junction for site)		16.8	8.4%	43.5	21.7%
R3	Residential Property 1		12.2	6.1%	38.8	19.4%
R4	RAF Terraces 1		17.2	8.6%	43.8	21.9%
R5	RAF Terraces 2		14.1	7.1%	40.7	20.4%
R6	Stoney Barn (Heol-y-sheet)		6.5	3.3%	31.4	15.7%
R7	Mount Pleasant Farm		7.0	3.5%	25.0	12.5%
R8	Pyle Road		3.5	1.8%	23.9	11.9%

The initial screening test for significance set by the EA of 1% of the relevant standard for long term emissions and 10% for short term emissions has been undertaken. The screening test of 1% against the annual mean limit value (40µg/m^3) is exceeded at six receptors. The screening test of 10% against the hourly mean limit value (200µg/m^3) is met at all assessed receptors.

As the screening has shown the results are above the initial screening criteria for the annual mean concentrations at a number of assessed receptor locations, further analysis of the results is required to determine significance. The results of this further analysis are provided below.

For long term concentrations, impacts are not considered to be significant where the PEC is less than 70% of the long term standard. For NO_2 this would be 28µg/m^3. Table 12 shows none of the assessed receptors result in a PEC greater than 70% of the annual mean limit value.

Based on the results of the assessment compared against the EA criteria, it is considered that the predicted changes in concentrations of NO_2 will not be significant at receptors assessed for human health effects.

5.1.3 Assessed Ecological Receptors

Predicted annual mean NOx concentrations at each of the assessed designated sites are shown in Table 14. The PC at all designated sites is predicted to be 0.2µg/m^3 or less which is below the 1% significance criteria for the air quality limit value (30µg/m^3). Total predicted annual mean NOx concentrations are also within the air quality limit value at all designated sites. Therefore, the proposed facility is not likely to have a significant effect on annual mean NOx concentrations at designated sites.

At ancient woodland locations, the maximum PC to annual mean NOx concentrations is 0.8 µg/m^3 (2.5% of the relevant assessment level), which occurs at ancient woodland site 3 to the north of proposed facility. At a number of ancient woodland sites the PC from the proposed facility is less than 1% of the relevant assessment level and at these locations no significant effect is anticipated. At locations where the PC is more than 1% of the relevant assessment level, the predicted PEC is less than 70% of the relevant assessment level and as such the proposed facility is not likely to have a significant effect on annual mean NOx concentrations at ancient woodland locations.

Table 14 Predicted Annual mean NOx Concentrations

Receptor		Air Quality Limit Value	Predicted PC	Proportion of Air Quality Limit Value (%)	Predicted PEC	Proportion of Air Quality Limit Value (%)
E1	Kenfig/Cynffig SAC (Kenfig)	30 µg/m^3	0.1	0.2%	10.2	33.9%
E2	Penycastell SSSI		0.2	0.6%	21.4	71.4%
E3	Kenfig/Cynffig SAC (Merthyr Mawr)		0.1	0.4%	9.7	32.3%
E4	Dunraven Bay SAC		0.0	0.1%	7.8	26.2%
E5	Cefn Cribwr Grasslands SSSI		0.2	0.6%	24.2	80.5%
E6	Cefn Cribwr Grasslands SSSI		0.1	0.3%	13.1	43.6%
E7	Cefn Cribwr Grasslands SSSI		0.1	0.2%	17.2	57.4%
E8	Blackmill Woodlands SAC		0.0	0.1%	13.4	44.7%
E9	Blackmill Woodlands SAC		0.0	0.1%	13.4	44.7%
AW1	Ancient Woodland		0.2	0.8%	24.2	80.8%
AW2	Ancient Woodland		0.2	0.7%	24.2	80.7%
AW3	Ancient Woodland		0.8	2.5%	17.0	56.6%
AW4	Ancient Woodland		0.5	1.6%	16.7	55.6%
AW5	Ancient Woodland		0.4	1.4%	16.6	55.5%
AW6	Ancient Woodland		0.4	1.2%	16.6	55.3%
AW7	Ancient Woodland		0.3	1.0%	16.5	55.1%
AW8	Ancient Woodland		0.2	0.8%	14.5	48.4%

Receptor		Air Quality Limit Value	Predicted PC	Proportion of Air Quality Limit Value (%)	Predicted PEC	Proportion of Air Quality Limit Value (%)
AW9	Ancient Woodland	30 µg/m^3	0.2	0.6%	12.7	42.5%
AW10	Ancient Woodland		0.6	2.1%	12.1	40.3%
AW11	Ancient Woodland		0.6	1.9%	11.7	39.0%
AW12	Ancient Woodland		0.7	2.4%	11.8	39.4%
AW13	Ancient Woodland		0.7	2.3%	12.4	41.2%
AW14	Ancient Woodland		0.5	1.6%	13.4	44.5%
AW15	Ancient Woodland		0.3	1.1%	11.8	39.2%
AW16	Ancient Woodland		0.4	1.2%	11.6	38.5%
AW17	Ancient Woodland		0.2	0.7%	10.8	36.0%
AW18	Ancient Woodland		0.2	0.6%	14.4	48.2%
AW19	Ancient Woodland		0.6	2.0%	12.3	40.9%
AW20	Ancient Woodland		0.2	0.6%	21.4	71.4%
AW21	Ancient Woodland		0.1	0.5%	15.7	52.4%

The predicted PC from the proposed facility to nitrogen deposition as well as total nitrogen deposition is shown in Table 15. The PC to nitrogen deposition is 0.02 kg N/ha/yr or less at each of the designated sites, which is below the 1% significance criteria for the relevant assessment level, in this case the lower critical load. Total deposition is within the critical load at all designated sites with the exception of Blackmill Woods SAC which already exceeds the critical load without the proposed facility. Therefore, the proposed facility is not likely to have a significant effect on nitrogen deposition at designated sites.

At ancient woodland locations, the maximum PC to nitrogen deposition is 0.22 kg N/ha/yr at AW3 (2.2% of the relevant assessment level, in this case the lower critical load). At a number of ancient woodland locations assessed, the PC to nitrogen deposition is less than 1% of the relevant assessment level. The total deposition at Locations AW 1-8, AW13 and AW18-21 exceeds the higher critical load (20 kgN/ha/yr), however this is predominantly due to background deposition rather than the PC from the proposed facility. The total deposition at all other assessed locations is within the higher critical load and therefore no exceedences are predicted. Regarding locations where the critical load is exceeded and the PC to nitrogen deposition is greater than 1% of the relevant assessment level, discussion has been undertaken with the ecologists for the project to determine whether the increase in nitrogen deposition as a result of the proposed facility at these locations would be significant. Following advice from an ecologist the PC has been considered in relation to the background deposition, at each of these locations, the PC increases background levels by 1% or less and as result no significant effects are predicted at these locations. It is therefore unlikely that the proposed facility would have a significant effect on nitrogen deposition at any of the ancient woodland locations assessed.

Table 15 Predicted Annual Mean Nitrogen Deposition kg N/ha/yr

Receptor		Lower Critical Load kg N/ha/yr	Higher Critical Load kg N/ha/yr	Predicted PC	Proportion of Lower Critical Load (%)	Total Deposition kg N/ha/yr
E1	Kenfig/Cynffig SAC (Kenfig)	8	10	0.01	0.1%	10.0
E2	Penycastell SSSI	10	20	0.03	0.3%	13.5
E3	Kenfig/Cynffig SAC (Merthyr Mawr)	8	10	0.02	0.2%	10.0
E4	Dunraven Bay SAC	10	20	0.00	0.0%	9.4
E5	Cefn Cribwr Grasslands SSSI	15	25	0.02	0.2%	13.8
E6	Cefn Cribwr Grasslands SSSI	15	25	0.01	0.1%	13.8
E7	Cefn Cribwr Grasslands SSSI	15	25	0.01	0.1%	13.8
E8	Blackmill Woodlands SAC	10	15	0.01	0.1%	28.3
E9	Blackmill Woodlands SAC	10	15	0.01	0.1%	28.3
AW1	Ancient Woodland	10	20	0.07	0.7%	21.9
AW2	Ancient Woodland	10	20	0.06	0.6%	21.9
AW3	Ancient Woodland	10	20	0.22	2.2%	21.2
AW4	Ancient Woodland	10	20	0.14	1.4%	21.1
AW5	Ancient Woodland	10	20	0.12	1.2%	21.1
AW6	Ancient Woodland	10	20	0.11	1.1%	21.1
AW7	Ancient Woodland	10	20	0.09	0.9%	21.1
AW8	Ancient Woodland	10	20	0.07	0.7%	21.1
AW9	Ancient Woodland	10	20	0.06	0.6%	17.4
AW10	Ancient Woodland	10	20	0.18	1.8%	17.5
AW11	Ancient Woodland	10	20	0.17	1.7%	17.5
AW12	Ancient Woodland	10	20	0.20	2.0%	17.6
AW13	Ancient Woodland	10	20	0.20	2.0%	20.1
AW14	Ancient Woodland	10	20	0.14	1.4%	20.0
AW15	Ancient Woodland	10	20	0.09	0.9%	17.5
AW16	Ancient Woodland	10	20	0.11	1.1%	17.5
AW17	Ancient Woodland	10	20	0.06	0.6%	17.4
AW18	Ancient Woodland	10	20	0.05	0.5%	21.1
AW19	Ancient Woodland	10	20	0.17	1.7%	20.1
AW20	Ancient Woodland	10	20	0.05	0.5%	21.1
AW21	Ancient Woodland	10	20	0.04	0.4%	21.0

The predicted PC from the proposed facility to acid deposition from NOx emissions as well as total nitrogen deposition is shown in Table 16. As was the case for ambient pollutant concentrations and nutrient nitrogen deposition, the maximum process contribution is less than 1% of the relevant assessment level, where we have assessed nitrogen against the lower critical load. Total deposition is also shown to be equal or less than the higher critical load. Therefore, the proposed facility is not likely to have a significant effect on acid deposition at designated sites.

At ancient woodland receptor locations, the PC to acid deposition is greater than 1% of the minimum critical load at all ancient woodland locations assessed with the exception of AW21. However, the increase in acid deposition at ancient woodland sites assessed does not result in any exceedence of the higher critical load and total deposition is less than 70% of the higher critical load at all ancient woodland locations assessed. Therefore, the proposed facility is unlikely to have a significant effect on acid deposition at ancient woodland locations.

Table 16 Predicted Annual Mean Nitrogen Deposition keq/ha/yr

Receptor		Lower Critical Load Keq	Higher Critical Load Keq	Predicted PC	Proportion of Lower Critical Load (%)	Total Deposition Keq/ha/yr
E1	Kenfig/Cynffig SAC (Kenfig)	0.2	1.1	0.0005	0.3%	0.7
E2	Penycastell SSSI	-	-	-	-	-
E3	Kenfig/Cynffig SAC (Merthyr Mawr)	0.2	1.1	0.0011	0.6%	0.7
E4	Dunraven Bay SAC	-	-	-	-	-
E5	Cefn Cribwr Grasslands SSSI	0.4	1	0.0017	0.4%	1.0
E6	Cefn Cribwr Grasslands SSSI	0.4	1	0.0008	0.2%	1.0
E7	Cefn Cribwr Grasslands SSSI	0.4	1	0.0008	0.2%	1.0
E8	Blackmill Woodlands SAC	0.3	1.2	0.0005	0.2%	2.0
E9	Blackmill Woodlands SAC	0.3	1.2	0.0005	0.2%	2.0
AW1	Ancient Woodland	0.4	3.0	0.0048	1.3%	1.6
AW2	Ancient Woodland	0.4	3.0	0.0043	1.2%	1.6
AW3	Ancient Woodland	0.1	11.2	0.0155	10.2%	1.5
AW4	Ancient Woodland	0.1	11.2	0.0097	6.3%	1.5
AW5	Ancient Woodland	0.1	11.2	0.0089	6.4%	1.5
AW6	Ancient Woodland	0.1	11.2	0.0077	5.5%	1.5
AW7	Ancient Woodland	0.1	11.2	0.0063	4.5%	1.5
AW8	Ancient Woodland	0.1	11.1	0.0050	3.6%	1.5
AW9	Ancient Woodland	0.1	11.1	0.0039	2.8%	1.2
AW10	Ancient Woodland	0.1	11.1	0.0131	9.3%	1.3
AW11	Ancient Woodland	0.1	11.1	0.0120	8.6%	1.3

Receptor		Lower Critical Load Keq	Higher Critical Load Keq	Predicted PC	Proportion of Lower Critical Load (%)	Total Deposition Keq/ha/yr
AW12	Ancient Woodland	0.1	11.1	0.0146	10.4%	1.3
AW13	Ancient Woodland	0.1	11.2	0.0144	10.3%	1.4
AW14	Ancient Woodland	0.1	11.2	0.0097	6.9%	1.4
AW15	Ancient Woodland	0.1	11.1	0.0067	4.8%	1.2
AW16	Ancient Woodland	0.1	11.1	0.0076	5.5%	1.2
AW17	Ancient Woodland	0.1	11.0	0.0041	3.0%	1.2
AW18	Ancient Woodland	0.1	11.1	0.0036	2.6%	1.5
AW19	Ancient Woodland	0.1	11.2	0.0123	8.8%	1.4
AW20	Ancient Woodland	0.4	3.0	0.0038	1.1%	1.5
AW21	Ancient Woodland	0.4	3.0	0.0030	0.8%	1.5

5.1.4 Summary

An assessment of significance has been undertaken based on criteria set out by the EA for industrial facilities. The results of dispersion modelling have shown that the criteria set by the EA are met and that the proposed facility would not have a significant effect on ambient pollutant concentrations, nitrogen deposition or acid deposition at each of the assessed statutorily designated receptors. In addition, no exceedences of air quality limit values or critical loads are predicted as a result of the proposed facility. The EA criteria are not met at all ancient woodland sites assessed, however discussions with the ecologists who undertook the planning application and review of the PC from the proposed facility in relation to background levels have indicated that the proposed facility would be unlikely to have a significant effect on ambient pollutant concentrations, nitrogen deposition and acid deposition at ancient woodland sites within 2km of the proposed facility.

6 Conclusion

Arup has been instructed by Agrivert to undertake an update to the Air Quality assessment for the proposed Stormy Down Anaerobic Digestion (AD) facility at Bridgend, South Wales, submitted as part of the planning application for the site in October 2014. The updated assessment includes a revised site layout and a reduction to the flues proposed for the site.

Atmospheric emissions from the combustion of biogas through either CHP engines of through flaring have the potential to cause local air quality impacts in the vicinity of the site. An Air Quality Assessment was therefore undertaken to consider impacts in the vicinity of the proposed facility.

Dispersion modelling of emissions of NOx from the proposed facility was undertaken using ADMS 5. It is not anticipated that the biogas would generate significant emissions of other pollutants contained within the NAQS. Maximum ground level concentrations and PEC at sensitive receptors were quantified and the results compared with relevant air quality limit values. Predicted changes to pollutant concentrations and changes to nitrogen and acid deposition as a result of the proposed facility were determined to be insignificant at all locations assessed.

Given the nature of the AD processes and the above conclusions, it is considered that the proposed development is not likely to cause any significant air quality effects to the surrounding residential properties during its operation.

Appendix A

Wind Turbine Data

A1 Enercon E-70 E4

Table A1: Model Input Parameters

Hub height	64 m	
Tip Height	100 m	
Wind speed at hub height (m/s)	**Power coefficient (Cp)**	**Thrust Coefficient (Ct)**
3	0.27	0.76
4	0.36	1.01
5	0.42	0.84
6	0.46	0.81
7	0.48	0.82
8	0.50	0.85
9	0.50	0.84
10	0.50	0.81
11	0.49	0.78
12	0.45	0.67
13	0.39	0.53
14	0.34	0.44
15	0.28	0.36
16	0.23	0.28
17	0.19	0.24
18	0.16	0.19
19	0.14	0.17
20	0.12	0.15
21	0.10	0.13
22	0.09	0.12
23	0.08	0.11
24	0.07	0.09
25	0.06	0.07