Appendix 22: Air quality assessment

AIR QUALITY ENVIROMENT IMPACT ASSESSMENT

Prepared for: WEPA UK Limited

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BASIS OF REPORT

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1.0 INTRODUCTION

SLR Consulting Ltd (SLR) has been appointed on behalf of WEPA UK Limited to prepare an Air Quality Impact Assessment in support of plans for the extension of their existing papermill site in Bridgend (the 'Application Site').

This Air Quality Impact Assessment considers the potential for the construction and operation of the proposed papermill extension to impact upon the air quality environment in the vicinity of the development. This report describes the scope, relevant legislation, assessment methodology, and the baseline conditions existing at the site and its surroundings. It considers any potential significant environmental effects the proposed development would have on this baseline environment; the mitigation measures required to prevent, reduce or offset any significant adverse effects; and the likely residual effects after these measures have been employed.

1.1 Development Proposals

A range of site layouts had been examined before culminating in the final design of the Project. Alternative design options for the Project are limited due to the existing physical site layout as well as the confined conditions of the WEPA premises. The proposed development will include the buildings and areas as listed below and shown in Figure 1-1.

- A - Pulp Storage (south-east);
- B - Bale Handling (south-east);
- B1 - Sludge Press building (south-east);
- I - Pipe Bridge (south-east);
- C - Paper Machine Building (south);
- D - Converting Building (south-west);
- J – New Jumbo Reel Storage (south-west);
- E - Shipping Area (north-west);
- F - Finished Product Storage (north);
- G - Gate House (west); and
- T - Storage Area.

The existing site has a single point of access at the western end of the site which, through the redevelopment of this site, will be upgraded. A new secondary vehicle access is proposed to the south-eastern end of the development site.

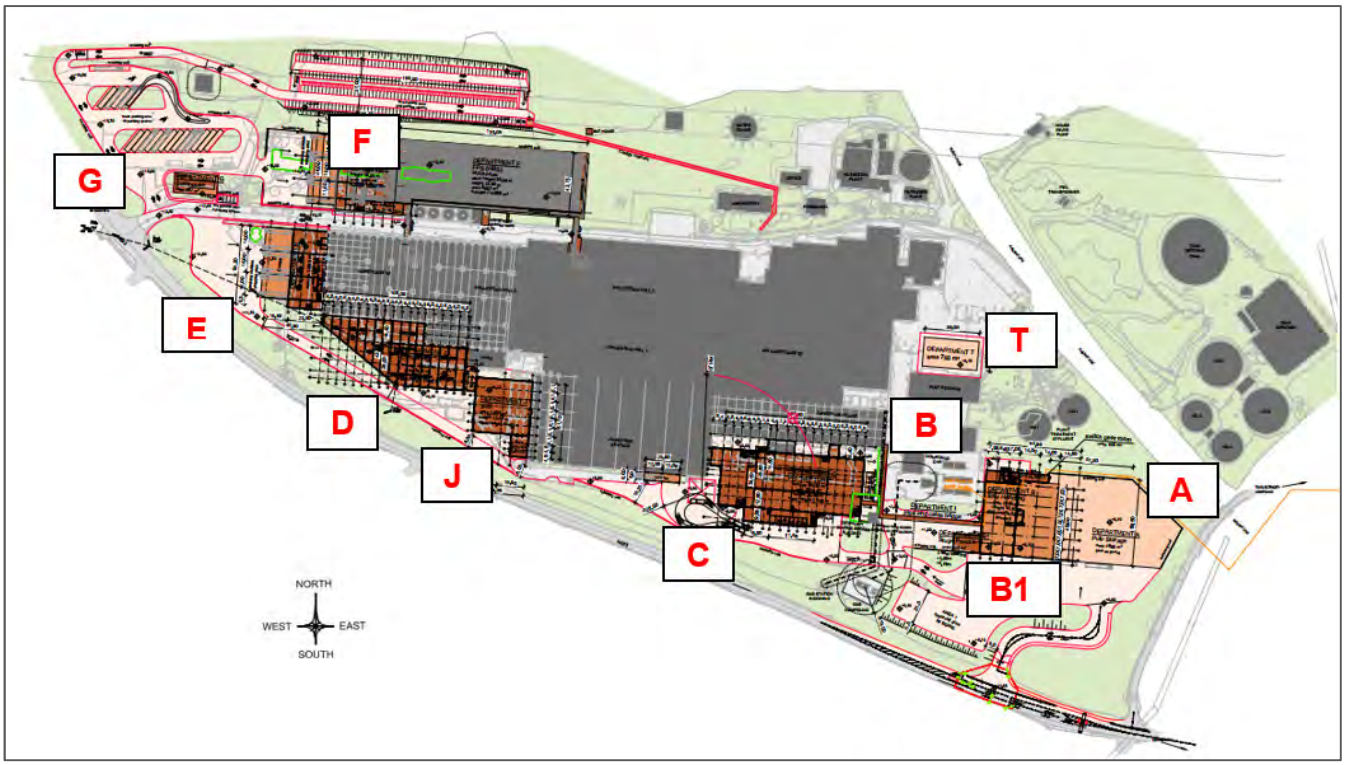


Figure 1-1
Site Overview – Existing and Proposed

2.0 RELEVANT AIR QUALITY LEGISLATION AND GUIDANCE

2.1 Air Quality Strategy

The United Kingdom Air Quality Strategy (UK AQS) 2007 for England, Scotland, Wales and Northern Ireland[1] sets out the Government's policies aimed at delivering cleaner air in the United Kingdom (UK). It sets out a comprehensive strategic framework within which air quality policy will be taken forward in the short to medium term, and the roles that Government, industry, the Environment Agency (EA), local government, business, individuals and transport have in protecting and improving air quality.

2.2 Air Quality Standards

The Air Quality Standards (Wales) Regulations 2010 (the regulations) transpose the Ambient Air Quality Directive (2008/50/EC), and transpose the Fourth Daughter Directive (2004/107/EC) within Welsh legislation. The regulations include Limit Values, Target Values, Objectives, Critical Levels and Exposure Reduction Targets for the protection of human health and the environment (collectively termed Air Quality Assessment Levels (AQAL) throughout this report). Those relevant to this Air Quality Assessment are presented within Table 2-1.

Table 2-1
Relevant Air Quality Strategy Standards and Objectives

Pollutant	Standard (µg/m^3)	Measured As	Equivalent percentile
Nitrogen Dioxide (NO_2)	40	Annual Mean	-
	200	1-hour Mean	99.79th percentile of 1-hour means (equivalent to 18 1-hour exceedences)
Particulate matter within an aerodynamic diameter of less than 10µm (PM_{10}) (gravimetric)	40	Annual Mean	-
	50	24-hour mean	90.41th percentile of 24-hour means (equivalent to 35 24-hour exceedences)
Particulate matter within an aerodynamic diameter of less than 2.5µm ($PM_{2.5}$) (gravimetric)	25	Annual Mean	-
Sulphur dioxide (SO_2)	266	15-minute mean	99.9 (equivalent to 35 15-minute mean exceedences)
	350	1-hour mean	99.18 (equivalent to 24 1-hour mean exceedences)

[1] The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, DEFRA. July 2007.

Pollutant	Standard (µg/m^3)	Measured As	Equivalent percentile
	125	24-hour mean	99.8 (equivalent to 3 24-hour mean exceedences)
Carbon monoxide (CO)	10,000	Maximum daily running 8-hour mean	-

2.2.1 Applicable Public Exposure

In accordance with Department for Environment, Food and Rural Affairs' (DEFRA) technical guidance on Local Air Quality Management (LAQM.TG(16)) which is applied by the Welsh Assembly, the AQOs should be assessed at locations where members of the public are likely to be regularly present and are likely to be exposed for a period of time appropriate to the averaging period of the objective. A summary of relevant exposure for the objectives presented in Table 2-1 are shown below in Table 2-2.

Table 2-2
Relevant Public Exposure

Objective Averaging Period	Relevant Locations	Objectives should apply at	Objectives should not apply at
Annual Mean	Where individuals are exposed for a cumulative period of 6-months in a year	Building facades of residential properties, schools, hospitals etc.	Facades of offices Hotels Gardens of residences Kerbside sites
24-hour mean	Where individuals may be exposed for eight hours or more in a day	As above together with hotels and gardens of residential properties	Kerbside sites where public exposure is expected to be short term
1-hour mean	Where individuals might reasonably be expected to spend one hour or longer	As above together with kerbside sites of regular access, car parks, bus stations etc.	Kerbside sites where public would not be expected to have regular access

2.3 Local Air Quality Management

Section 82 of the Environment Act 1995 (Part IV) requires Local Authorities (LA) to periodically review and assess the quality of air within their administrative area. The reviews have to consider the present and future air quality and whether any AQALs prescribed in regulations are being achieved or are likely to be achieved in the future.

Where any of the prescribed AQALs are not likely to be achieved the authority concerned must designate an Air Quality Management Area (AQMA). For each AQMA the LA has a duty to draw up an Air Quality Action Plan (AQAP) setting out the measures the authority intends to introduce to deliver improvements in local air quality in pursuit of the AQAL. As such, LAs, have formal powers to control air quality through a combination of LAQM and by use of their wider planning policies.

2.4 Legislation for the Protection of Nature Conservation Sites

Sites of nature conservation importance at a European, national and local level, are provided environmental protection, including from atmospheric emissions by the legislation as indicated in Table 2-3

Table 2-3
Legislation for the Protection of Nature Conservation Sites

Nature Conservation Sites	Legislation
European Sites Special Areas of Conservation (SAC) candidate Special Areas of Conservation (cSAC) Special Protection Areas (SPA) potential Special Protection Areas (pSPA) Ramsar sites Marine Protection Areas.	The Conservation of Habitats and Species Regulations (2010); known as the 'Habitats Regulations'
Sites of Special Scientific Interest (SSSI)	The Countryside and Rights of Way (CRoW) Act 2000
National Nature Reserves (NNR) Local Nature Reserves (LNR) local wildlife sites (LWS) ancient woodland (AW)	The Environment Act 1995; and the Natural Environment and Rural Communities Act (NERC) 2006.

2.5 General Nuisance Legislation

Part III of the Environmental Protection Act (EPA) 1990 (as amended) contains the main legislation on Statutory Nuisance and allows local authorities and individuals to take action to prevent a statutory nuisance. Section 79 of the EPA defines, amongst other things, smoke, fumes, dust and smells emitted from industrial, trade or business premises so as to be prejudicial to health or a nuisance, as a potential Statutory Nuisance.

Fractions of dust greater than 10µm (i.e. greater than PM_{10}) in diameter typically relate to nuisance effects as opposed to potential health effects and therefore are not covered within the UK AQS. In legislation there are currently no numerical limits in terms of what level of dust deposition constitutes a nuisance.

2.6 Planning Policy

2.6.1 National Policy

Planning Policy Wales (10th Edition)[2] sets out the land use planning policies in Wales. Section 6.7 'Air Quality and Soundscape" includes air quality specific policies, including:

Paragraph 6.7.6 – In proposing new development, planning authorities and developers must, therefore:

[2] Welsh Government (2018). Planning Policy Wales, Edition 10, December 2018

- *address any implication arising as a result of its association with, or location within, air quality management areas, noise action planning priority areas or areas where there are sensitive receptors;*
- *not create areas of poor air quality or inappropriate soundscape; and seek to incorporate measures which reduce overall exposure to air and noise pollution and create appropriate soundscape […]"*

Paragraph 6.7.10 – "It will be important to identify wider mitigation solutions to reduce air and noise pollution and to avoid exacerbating problems in existing air quality management areas or noise hotspots through the provision of green infrastructure identified as part of Green Infrastructure Assessments, by the provision of electric vehicle charging infrastructure or through promoting the need to consider effective design solutions. Planning authorities should work closely with bodies such as the Public Service Boards in the preparation of their well-being plans and seek input from their own Environmental Health departments."

Paragraph 6.7.16 – Relevant considerations in making planning decisions for potentially polluting development are likely to include:

- *location, including the reasons for selecting the chosen site itself;*
- *impact on health and amenity;*
- *effect of pollution on the natural and built environment and the enjoyment of areas of landscape and historic and cultural value; […]*
- *resilience, including where there may be cumulative impacts on air or water quality which may have adverse consequences for biodiversity and ecosystem resilience;*
- *the risk and impact of potential pollution from the development, insofar as this might lead to the creation of, or worsen the situation in, an air quality management area, a noise action planning priority area or an area where there are sensitive receptors; "*

The policies within Planning Policy Wales (10th Edition) in relation to air pollution are considered within this Air Quality Impact Assessment.

2.6.2 Local Policy

Existing Bridgend Local Development Plan (2013)

The existing Bridgend Local Development Plan (2006-2021) was adopted by Bridgend County Borough Council on 18th September 2013.

A review of the Existing Bridgend Local Development Plan (2013) indicates the following policies relating to air quality:

"Strategic Policy SP2 – Design and Sustainable Place Making

All development should contribute to creating high quality, attractive, sustainable places which enhance the community in which they are located, whilst having full regard to the natural, historic and built environment by:

8) Avoiding or minimising noise, air, soil and water pollution;"

"Strategic Policy SP4 – Conservation and Enhancement of the Natural Environment

Development which will conserve and, wherever possible, enhance the natural environment of the County Borough will be favoured.

Development proposals will not be permitted where they will have an adverse impact upon:

The quality of its natural resources including water, air and soil."

"Policy ENV7 – Natural Resources Protection and Public Health

Development proposals will only be permitted where it can be demonstrated that they would not cause a new, or exacerbate an existing, unacceptable risk of harm to health, biodiversity and/or local amenity due to:

1) Air Pollution;"

The above policies stated within the Existing Bridgend Local Development Plan (2013) in relation to air quality are considered within this Air Quality Impact Assessment.

2.7 Assessment Guidance

2.7.1 DEFRA 'LAQM.TG(16)'

DEFRA Local Air Quality Management Technical Guidance[3] (LAQM.TG(16)) was published for use by local authorities in their LAQM review and assessment work. The document provides key guidance in aspects of air quality assessment, including screening, use of monitoring data, and use of background data that are applicable to all air quality assessments.

2.7.2 Environmental Protection UK and Institute of Air Quality Management Guidance

Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) have together published guidance[4] to help ensure that air quality is properly accounted for in the development control process. It clarifies when an air quality assessment should be undertaken, what it should contain, and how impacts should be described and assessed including guidelines for assessing the significance of impacts.

2.7.3 Design Manual for Roads and Bridges

The Design Manual for Roads and Bridges (DMRB) (LA 105) considers the following 'traffic scoping criterion' to determine where air quality impacts of a project require assessment:

1. annual average daily traffic (AADT) >=1,000; or
2. heavy duty vehicle (HDV) AADT >=200; or
3. a change in speed band; or
4. a change in carriageway alignment by >=5m.

The above 'traffic scoping criterion' is required to be applied to all areas covered by the extent of traffic data, termed the 'traffic reliability area'. Where the above 'traffic scoping criterion' are met, there is a requirement to identify areas that are likely to be sensitive to changes in air quality identified as:

- monitored exceedances of air quality thresholds;
- air quality management areas (AQMAs);

[3] DEFRA Local Air Quality Management Technical Guidance (2016).

[4] Environmental Protection UK and Institute of Air Quality Management, 'Land-Use Planning and Development Control: Planning for Air Quality', v1.2 2017.

- areas identified by the Department for Environment, Food and Rural Affairs (Defra) as exceeding EU limit values; and / or
- designated habitats.

The DMRB considers any of the above locations within 200m of a road source to be potentially affected by that operation and require assessment where the 'traffic scoping criterion' is met. Any roads which meet the above 'traffic scoping criteria' are defined as the 'affected road' network.

If none of the roads in the network meet any of the traffic / alignment criteria or there are no properties or relevant Designated Sites near the affected roads, then an air quality assessment can be 'scoped out'.

2.7.4 Construction and Demolition Dust Guidance

Guidance on the assessment of dust from demolition and construction has been published by the IAQM[5]. The guidance provides a series of matrices to determine the risk magnitude of potential dust sources associated with construction activities in order to identify appropriate mitigation measures that are defined within further IAQM guidance.

[5] Institute of Air Quality Management (IAQM), Guidance on the assessment dust from demolition and construction (2016).

3.0 ASSESSMENT METHODOLOGY

3.1 Scoping Opinion

A Scoping Opinion was sought from Bridgend County Borough Council (BCBC) by way of a Scoping Request Report submitted on 2nd September 2019.

Table 3-1 outlines issues relating to air quality which were included within the ES Scoping Opinion.

Table 3-1
Scoping Opinion – Air Quality Considerations

Page & Paragraph No.	Scoping Opinion	Comments	Outcome	Reference within ES
12.9	*The applicant must look to examine current AADT (Annual Average Daily Traffic) flows and projected AADT following the completion of the development. Referring to Table 6.2 of the EPUK and IAQM guidance "Land- Use Planning and Development Control: Planning for Air Quality, January 2017" if calculated AADT flows increase from the baseline traffic levels by more than the set figures outlined in Table 6.2, the applicant is required to submit an Air Quality Assessment (AQA) which would examine the potential air quality impacts associated with traffic derived emissions (nitrogen dioxide & particulate matter) at locations of relevant exposure.*	-	Road traffic emissions have been 'screened' following the stated EPUK & IAQM 'indicative criterion for assessment'. Additional development trips are predicted to be less than the screening criterion.	Section 5.2.1
13.4	*Applicant must confirm if there is an expected change to process emission outputs. If the applicant outlines that process emission outputs will vary as a result of the proposal then consideration for these changes will be necessary by conforming to the following;* *An assessment will need follow the Environment Agency online guidance (referenced by NRW) 'Air emissions risk assessment for your environmental permit' (the AERA guidance), available at*	-	Change in combustion emissions from proposed new sources have been quantitatively assessed (at both human and ecological receptors).	Section 5.2.2

Page & Paragraph No.	Scoping Opinion	Comments	Outcome	Reference within ES
	https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit The AERA guidance requires assessment of potential short-term and long-term impacts on both human and ecological receptors (such as SSSIs within 2km and SACs/SPAs within 10km). Impacts will be assessed against relevant Environmental Assessment Levels (EALs) for the protection of human health and against Critical Loads (CLo) and Critical Levels (CLe) for the protection of vegetation and ecosystems.			

3.2 Additional Consultation

Pre-application discussion was undertaken with the Shared Regulatory Services department within BCBC in order to agree upon the detailed scope of the assessment methodology (i.e. beyond that level of detail provided as part of the Scoping Report)[6]. The scope of works was agreed by BCBC on 10/09/2019 and 24/09/2019.

3.3 Construction Phase Dust Assessment

The assessment has been undertaken with reference to IAQM '*Guidance on the assessment of dust from construction and demolition*'. The assessment of risk is determined by considering the risk of dust effects arising from four activities in the absence of mitigation:

- demolition;
- earthworks;
- construction; and
- track-out.

The assessment methodology considers three separate dust impacts with account being taken of the sensitivity of the area that may experience these effects:

- annoyance due to dust soiling;
- the risk of health effects due to an increase in exposure to PM_{10}; and
- harm to ecological receptors.

The first stage of the assessment involves a screening to determine if there are sensitive receptors within threshold distances of the site activities associated with the construction phase of the scheme. No further assessment is

[6] Email correspondence between Craig Lewis, Specialist Services Officer within the Shared Regulatory Services department of Bridgend County Borough Council, and SLR Consulting Ltd, dated 10/09/2019 and 24/09/2019.

required if there are no receptors within a certain distance of the works; 350m for human receptors and 50m for designated ecological receptors.

The dust emission class (or magnitude) for each activity is determined on the basis of the guidance, indicative thresholds and expert judgement. The risk of dust effects arising is based upon the relationship between the dust emission magnitude and the sensitivity of the area. The risk of impact is then used to determine the mitigation requirements

Descriptors for magnitude of impact and impact significance used in this assessment of construction phase dust are as presented in Appendix A.

3.4 Road Traffic Emissions Screening

A screening assessment has been undertaken to identify 'significant changes' in traffic on roads with relevant receptors by reference to EPUK & IAQM 'indicative criterion for assessment', i.e.:

- a change of light duty vehicle (LDV)[7] flows of more than 500 annual average daily traffic (AADT) (outside an AQMA);
- a change of heavy duty vehicle (HDV)[8] flows of more than 100 AADT (outside an AQMA);
- a change of LDV flows of more than 100 AADT (within an AQMA); and/or
- a change of HDV flows of more than 25 AADT (within an AQMA).

3.5 Assessment of Operational Phase Combustion Emissions

Detailed atmospheric dispersion modelling of the emissions of combustion pollutants from the existing and proposed stacks serving Application Site has been undertaken. Modelling and the assessment of potetial impacts has been undertaken in accordance with Environment Agency (EA) *Air emissions risk assessment for your environmental permit*'[9] (the AERA guidance).

The following stages have been considered:

- identification of sensitive receptors;
- review of process design proposals and emission sources;
- compilation of the existing air quality baseline with due regard to Review and Assessments of local air quality; and
- calculation of process contribution to ground level concentrations for pollutants emitted from the process.

The potential effects on human health have been assessed within the detailed dispersion modelling assessment by comparison of predicted impacts against health based AQOs.

Reference should be made to Appendix B for details of the modelling treatments and details for the assessment of impacts on vegetation and ecosystems (as Critical Loads and Critical Levels).

[7] As defined by the design manual for roads and bridges (DMRB), and includes vehicles <3.5tonnes including cars and light duty vehicles.

[8] As defined by the design manual for roads and bridges (DMRB), and includes vehicles ≥3.5tonnes and includes heavy duty vehicles and buses.

[9] https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit.

3.6 Air Quality Significance Criteria

The EIA Regulations require 'a description of the likely significant effects of the development on the environment, which should cover the direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects of the development'. The approach to impact significance and judgements on effect is described below.

3.6.1 Assessment of Operational Phase Combustion Emissions, Human Receptors – Air Quality Significance Criteria

The significance of effects has been assessed on the basis of the EPUK & IAQM guidance '*Land-use planning and development control planning for air quality*' (v1.2, 2017), which presents a matrix to establish the magnitude of impact on individual receptors based upon the percentage change relative to the Air Quality Assessment Level (AQAL) / AQO.

Magnitude

Differing magnitude classifications are defined for long-term and short-term averaging periods, as presented in Table 3-2 and Table 3-3 respectively.

Table 3-2
Definition of Magnitude of Impact – Long-term Concentrations

Magnitude	Percentage Change in Long-term (Annual Mean) Concentrations (%)
High	>10
Moderate	6 – 10
Low	1 – 5
Negligible	<1

Table 3-3
Definition of Magnitude of Impact – Short-term Concentrations

Magnitude	Percentage Change in Short-term (Annual Mean) Concentrations (%)
High	>50
Moderate	20 – 50
Low	10 – 20
Negligible	<10

Sensitivity

Receptor sensitivity is defined based upon the EPUK & IAQM guidance '*Land-use planning and development control planning for air quality*' (v1.2, 2017). Representative discrete human health receptor locations of relevant exposure have been included within the assessment of operational phase impacts. Each type of human health receptor is considered to be of equal value. However existing background concentrations are taken into account for long term averaging periods (i.e. annual mean concentrations).

Reference should be made to Table 3-4 for presentation of the sensitivity classifications used within the assessment of long-term concentrations.

Table 3-4
Definition of Receptor Sensitivity – Long-term Concentrations

Sensitivity	Percentage of Long-term (Annual Mean) AQO (%)
Very High	<110% of the AQO
High	103 – 110% of the AQO
Moderate	95 – 103% of the AQO
Low	75 – 95% of the AQO
Very Low	<75% of the AQO

As referenced within EPUK & IAQM guidance '*Land-use planning and development control planning for air quality*' (v1.2, 2017), short-term concentration receptor sensitivity does not reference background concentrations as they are of a much smaller quantity in comparison to the peak process contribution concentration, such as that from a combustion emission point source. Therefore, it is the process contribution concentration that is used as a measure of the effect, not the overall concentration at a receptor.

Determination of Overall Significance

The EPUK & IAQM guidance '*Land-use planning and development control planning for air quality*' (v1.2, 2017), provide a set method for establishing the impact significance at an individual receptor identified as 'negligible', 'slight', 'moderate' or 'substantial'. The impact significance can be either 'adverse' (due to concentration increase) or 'beneficial' (due to concentration decrease).

The impact significance at individual receptors is dependent upon the long-term average pollutant concentration at the receptor in the assessment year and the percentage change relative to the AQAL / AQO.

Reference should be made to Table 3-5 for presentation of the impact significance descriptors used within the assessment of long-term concentrations.

Table 3-5
Impact Significance Descriptors – Assessment of Long-term Concentrations

Sensitivity of Receptor / Long-term Average Concentration at Receptor in Assessment Year	Percentage Change in Long-term Concentration to AQAL			
	1	2 – 5	6 – 10	>10
<75% of the AQO (Very Low)	Negligible	Negligible	Slight	Moderate
75 – 95% of the AQO (Low)	Negligible	Slight	Moderate	Moderate
95 – 103% of the AQO (Moderate)	Slight	Moderate	Moderate	Substantial
103 – 110% of the AQO (High)	Moderate	Moderate	Substantial	Substantial
>110% of the AQO (Very High)	Moderate	Substantial	Substantial	Substantial

Reference should be made to Table 3-6 for presentation of the impact significance descriptors used within the assessment of short-term concentrations.

Table 3-6
Impact Significance Descriptors – Assessment of Short-term Concentrations

Impact Significance	Percentage Change in Short-term (Annual Mean) Concentrations (%)
Substantial	>50
Moderate	20 – 50
Slight	10 – 20
Negligible	<10

The predicted impacts will be used to determine the significance of the overall effect which is dependent on a number of factors. Therefore, professional judgement will be applied to determine the likely significance of effects, with the following factors considered:

- the existing and future air quality in the absence of the development, notably whether the AQOs are likely to be met or the scale of exceedences in the long-term and short-term mean concentrations;
- the extent of current and future population exposure to the predicted impacts, notably the number of properties and/or people present and the scale of impact (e.g. whether the majority of the local population is subject to substantial or slight magnitude impacts); and
- the influence and validity of any assumptions adopted when undertaking the prediction of impacts, such as establishing a worst-case scenario for sensitive receptors.

If the overall impact is described as 'substantial', or there is a predicted exceedence of any considered AQO at a location of relevant exposure, the predicted effect on air quality is considered as "significant" in terms of the EIA Regulations.

3.6.2 Assessment of Operational Phase Combustion Emissions, Ecological Receptors – Air Quality Significance Criteria

In addition to the AERA guidance, the EA's Operational Instruction 66_12[10] details how the air quality impacts on ecological sites should be assessed. This guidance provides risk-based screening criteria to determine whether impacts will have 'no likely significant effects (alone and in-combination)' for European sites, 'no likely damage' for SSSIs.

- PC does not exceed 1% long-term CLe and/or CLo or that the PEC does not exceed 70% long-term CLe and/or CLo for European sites and SSSIs;
- PC does not exceed 10% short-term CLe for NOx for European sites and SSSIs;

Where impacts cannot be classified as resulting in 'no likely significant effect', more detailed assessment may be required depending on the sensitivity of the feature in accordance with EAs Operational Instruction 67_12 ('*Detailed assessment of the impact of aerial emissions from new or expanding IPPC regulated industry for impacts on nature conservation*'). This can require the consideration of the potential for in-combination effects, the actual distribution of sensitive features within the site, and local factors (such as the water table).

The guidance provides the following further criteria:

- if the PEC does not exceed 100% of the appropriate limit it can be assumed there will be no adverse effect;

[10] EA Working Instruction 66_12 - Simple assessment of the impact of aerial emissions from new or expanding IPPC regulated industry for impacts on nature conservation

- if the background is below the limit, but a small PC leads to an exceedance – decision based on local considerations;
- if the background is currently above the limit and the additional PC will cause a small increase – decision based on local considerations;
- if the background is below the limit, but a significant PC leads to an exceedance – cannot conclude no adverse effect; and
- if the background is currently above the limit and the additional PC is large - cannot conclude no adverse effect.

4.0 SITE SETTING AND BASELINE

4.1 Location

The Application Site is located on the site of the existing Bridgend mill site approximately 5km to the north of Bridgend town centre, in an area bound to the south and to the west by the A4063, to the east by the River Llynfi, and to the north by open farmland. The site is orientated along its long axis in an approximate west to east direction and it is accessed via the A 4063 (Bridgend Road) between Maesteg and Coytrahen, with traffic generally proceeding south towards the M4. The Application Site is centred at the approximate National Grid Reference (NGR): x287780, y187160.

4.2 Sensitive Receptors

4.2.1 Construction Dust Receptors

In terms of human receptors, the main receptors likely to be affected by the generation of construction dust are those existing receptors within approximately 350m of the development site boundary and/or within 50m of the route(s) used by vehicles on the public highway, up to 500m from the site entrance(s)[11]. However, for those receptors sited in a downwind location from the development site boundary, potential dust impacts may be witnessed at a distance of greater than 350m on occasion under worst case conditions.

Reference should be made to Drawing AQ1 for an illustration of buffer zones of all sensitive receptors with the potential to be impacted upon by construction phase dust in accordance with the stated IAQM assessment methodology.

In terms of ecological receptors, a review using the Magic web-based mapping service[12] was undertaken to identify any designated sites of ecological or nature conservation importance required for consideration within the assessment.

In relation to the construction phase dust assessment, this included consideration of any ecological designation within 50m of the Application Site boundary, or 50m of any road projected to witness construction phase road traffic movements, that could potentially be affected by dust from the construction phases of the proposed development.

A search within 50m of the development boundary / any road projected to witness construction phase road traffic movements identifies no receptors.

4.2.2 Combustion Emissions – Human Receptors

According to LAQM.TG(16), air quality standards should only apply to locations where members of the public may be reasonably likely to be exposed to air pollution for the duration of the relevant limit value. At such, receptors of relevant annual mean exposure have been considered. Furthermore, additional receptors were considered to inform the risk assessment in terms of relevant short-term (1-hour mean) exposure. Reference should be made to Figure 4-1 and Table 4-1 for presentation of modelled receptors.

The detailed dispersion modelling assessment has used a receptor grid across the study area to assess the potential impact of combustion emissions from the combustion processes / emission points on-site. This method allows the exposure at any location in the study area to be determined and presented graphically. The receptor grid spacing used was 20m and considered impacts up to 2km from the Application Site.

[11] IAQM, Guidance on the assessment dust from demolition and construction v1.1, 2016.

[12] www.magic.gov.uk, accessed January 2020.

Further, the dispersion modelling has been completed using a receptor grid to allow potential short-term exposure to be assessed at all locations surrounding the Site.

Table 4-1
Modelled Discrete Receptors – Human Receptors

ID	Description	Receptor Type	NGR (m)	
			X	Y
R1	Residential property off A4603 1 (Brynllywarch-Fach)	Residential	287469	187415.8
R2	Residential property off A4603 2 (Bryn-y-Fro Farm)	Residential	287152.3	187230.8
R3	Residential property off A4603 3 (Brynllywarch-Fawr)	Residential	287893.4	187404.1
R4	Residential property off A4603 4 (Cefn Ydfa)	Residential	287767.4	186630.6
R5	Residential property off A4603 5 (Gelli-Las Fawr)	Residential	288105.6	186585.1
R6	Residential property off A4603 6 (Llynfi Villa)	Residential	288705.6	186578.1
R7	Residential property off Green Field Terrace 1 (Ty Isaf)	Residential	288747.7	187049.4
R8	Residential property off Green Field Terrace 2 (Llwyn Brain)	Residential	288215.5	187979.1
R9	Residential property at The Brackens	Residential	288001.1	188702.1
R10	Residential property at Lletty Brongu 1	Residential	288302.5	188588.9
R11	Residential property at Lletty Brongu 2	Residential	288437.2	188541.6
R12	Residential property off Green Field Terrace 3 (Celfyddifan)	Residential	288736.7	187906.2
R13	Residential property off Green Field Terrace 4 (Tyle-Coch)	Residential	289049.7	187544.5
R14	Residential property off Green Field Terrace 5 (Nyth-Y-Cwm Farm)	Residential	289236.5	187344
R15	Residential property off Green Field Terrace 6	Residential	289125.9	186924.5
R16	Residential property at Shwt	Residential	288996.9	186819.7
R17	Residential property off A4603 7 (Nantmwth Fach Farm)	Residential	289189.3	186534.1
R18	Residential property off Nicholls Road	Residential	288990	185816.5
R19	Residential property off A4603 8 (Pen-Twyn)	Residential	288905.4	186139.1
R20	Residential property off A4603 9 (Maes-Cadlawr)	Residential	286661.7	187126.1
R21	Residential property off A4603 10	Residential	287048	187684
R22	Residential property off A4603 11 (Greenmeadow Farm)	Residential	286880.5	187713
R23	Residential property off A4603 12	Residential	286989.2	188224.9
R24	Ysgol Gyfun Gymraeg Llangynwyd - School	School	286967.5	188263.3
R25	Residential property off A4603 13 (Gelli-Siriol Farmhouse)	Residential	287647.3	188001.4

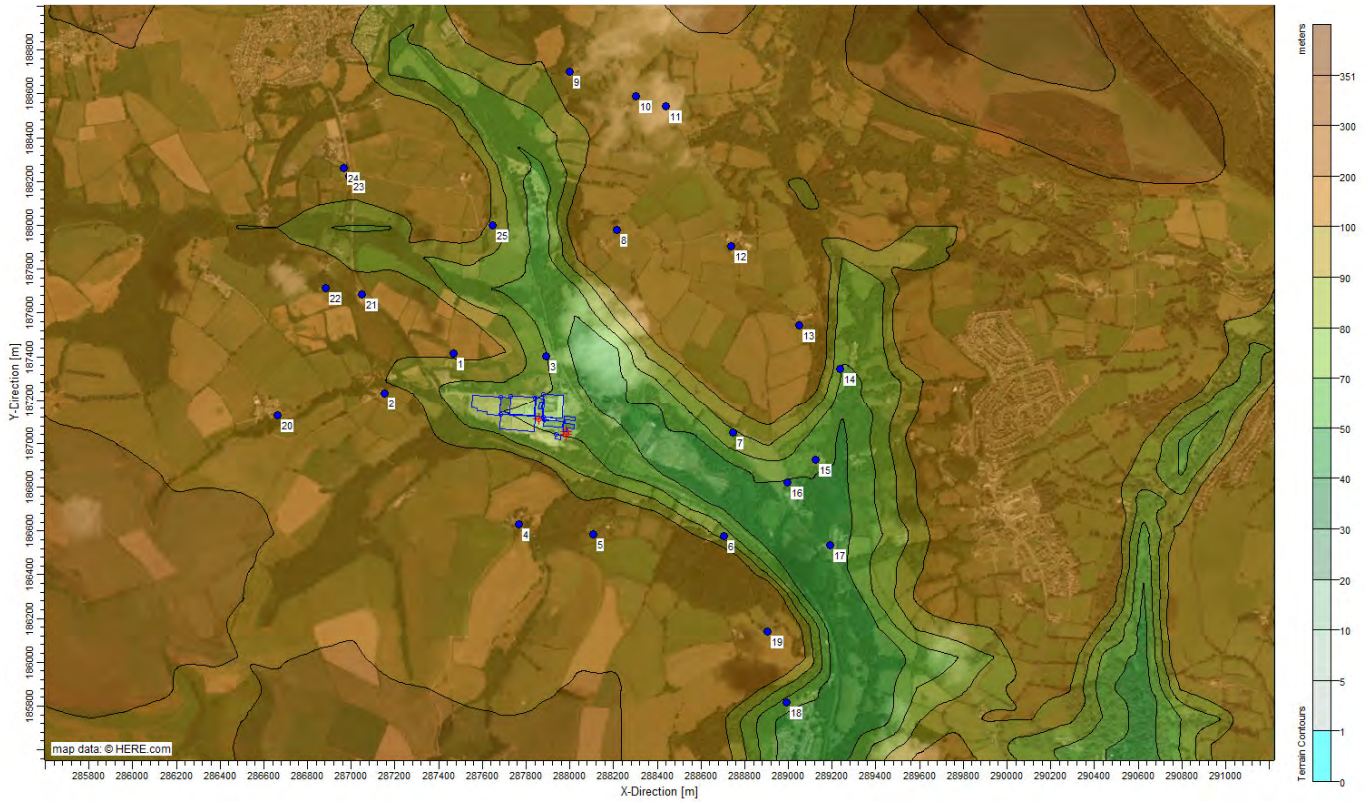


Figure 4-1
Modelled Discrete Human Receptor Locations

4.2.3 Combustion Emissions – Ecological Receptors

The AERA Guidance Note requires that designated ecological sites should be screened against relevant standards if they are located within the following set distances from the facility:

- Special Protection Areas (SPAs), Special Areas of Conservation (SACs) or Ramsar sites within 10km of the installation; and
- Sites of Special Scientific Interest (SSSIs) within 2km of the installation.

Details of the sites within these screening distances are presented in Table 4-2 and locations in Figure 4-2 based 10km site search radii. It is noted that there are no relevant designated ecological sites within a 2km site search radii.

Table 4-2
Designated Ecological Sites

Receptor	Site	Designation	Most sensitive APIS Habitat classification
R1	Kenfig / Cynffig	SAC	Coastal stable dune grasslands - acid type
R2	Glaswelltiroedd Cefn Cribwr / Cefn Cribwr Grasslands	SAC	Non-Mediterranean dry acid and neutral closed grassland
R3	Blackmill Woodlands	SAC	Acidophilous Quercus-dominated woodland

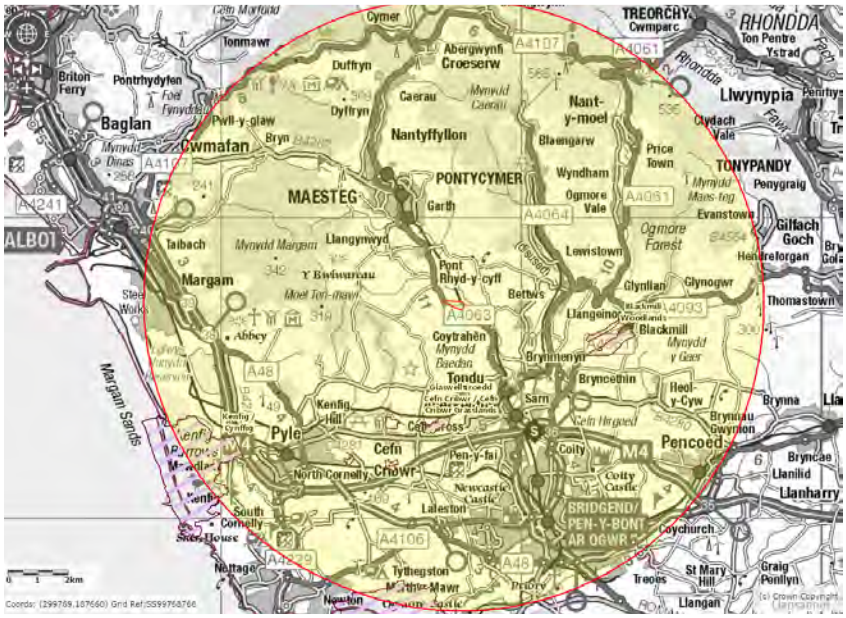


Figure 4-2
Ecological Sites – 10km Site Search

4.3 Baseline Air Quality

4.3.1 Local Authority Review and Assessment

As required under Section 82 of the Environment Act (1995) (Part IV), BCBC has conducted an on-going exercise to review and assess air quality within their administrative area.

This process has indicated that annual mean NO_2 concentrations are above, and likely to remain above the AQO at locations of relevant public exposure within BCBC's administrative area. As such, a single AQMA has been declared within the Council's area known as the 'Park Street, Bridgend AQMA'. The AQMA is defined as:

> *"The area comprising the Bridgend County Borough Council Air Quality Management Area Order No. 1, Park Street is that contained within the following boundary:- The designated area borders the green space area prior to the rear entrance of properties located on Sunnyside Road. The designated area incorporates all north facing properties, including their open space areas between 39 Park Street and 105 Park Street. The boundaries' northern side borders the open space areas that front the south facing properties encapsulating the public access pathway."*

The 'Park Street, Bridgend AQMA' is located approximately 7.6km south, south-east of the Application Site. Therefore, given the distance between the Application Site and the AQMA, the Application Site is not considered to impact upon air quality within the extent of the AQMA and no assessment is provided.

All other Air Quality Strategy pollutants were below the relevant AQOs at locations of relevant public exposure, and as such no further AQMAs have been declared within the Council's administrative area.

4.3.2 Automatic Air Quality Monitoring

The UK Automatic Urban and Rural Network (AURN) is a countrywide network of air quality monitoring stations operated on behalf of DEFRA. Monitoring data for AURN sites is available from the UK Air Information Resource (AIR) website.

The closest AURN monitor to the Application Site is the Port Talbot Margam AURN (NGR: x277406, y188719) located approximately 10.7km west of the Application Site. The Port Talbot Margam AURN is classified as an 'urban industrial' monitor, defined as: "*Site in an urban residential area downwind of specific industrial source*". Given the difference in site classification and distance between the Port Talbot Margam AURN and the Application Site, similar pollutant concentrations are not anticipated. Therefore, this source of data has not been considered as part of this assessment.

BCBC operates two automatic monitoring across its administrative area as part of their commitment to the LAQM. The closest automatic monitor to the Application Site is station 'CM1 Ewenny Cross Roundabout' (NGR: x290565, y178567) classified as a 'roadside' monitor, defined as: "*a site sampling typically within one to five metres of the kerb of a busy road"*. The 'CM1 Ewenny Cross Roundabout' monitor is located approximately 9.1km south south-east of the Application Site. Given the difference in site classification and distance between the CM1 Ewenny Cross Roundabout' automatic monitor and the Application Site, similar pollutant concentrations are not anticipated. Therefore, this source of data has not been considered as part of this assessment.

4.3.3 Passive Diffusion Tube Monitoring

BCBC Monitoring

Passive diffusion tube monitoring is currently undertaken by BCBC at numerous locations throughout the Council's area as part of their commitment to LAQM. The diffusion tubes are located in areas which are deemed to require further assessment of NO_2 concentrations.

A review of BCBC's 2018 Air Quality Annual Status Report indicates that the closest NO_2 passive diffusion tube monitoring location to the Application Site currently operating are those located at 'Commercial Road, Maesteg' (NGR: x285299, y191136) and 'School property; Cwmfelin Primary School, Maesteg' (NGR: x286290, y189590), located approximately 4.7km north-west and 2.9km north-west of the Application Site, respectively. These monitoring locations were commissioned by BCBC and began data capture at the start of 2019. As such, annual mean monitoring datasets are not yet available at the time of assessment. As such, diffusion tube monitoring datasets from the BCBC network are not considered within this assessment.

4.3.4 DEFRA Mapped Background Concentrations

Background pollutant concentration data on a 1km x 1km spatial resolution is provided by DEFRA through the UK Air Information Resource (AIR) website and is routinely used to support LAQM and Air Quality Assessments.

Mapped background concentrations of NO_2, PM_{10}, SO_2 and CO were downloaded for the grid square containing the Application Site and human receptors presented within Table 4-1. Mapped background concentrations of NO_2 and PM_{10} are based upon the 2017 base year DEFRA update (published in May 2019)[13]. Mapped background concentrations of SO_2 and CO are based upon a 2001 base year (the most up to date DEFRA mapping projections). Reference should be made to Table 4-3 for presentation of all mapped background concentrations.

Table 4-3
DEFRA Mapped Background Concentrations

Grid Square	NO_2 Background Concentration ($\mu g/m^3$)	PM_{10} Background Concentration ($\mu g/m^3$)	SO_2 Background Concentration ($\mu g/m^3$)	CO Background Concentration ($\mu g/m^3$)
x286500, y188500	6.96	9.75	2.88	199
x287500, y188500	7.34	9.77	2.91	203

[13] Background mapping data for local authorities – http://uk-air.defra.gov.uk/data/laqm-background-home, accessed January 2020.

Grid Square	NO_2 Background Concentration ($\mu g/m^3$)	PM_{10} Background Concentration ($\mu g/m^3$)	SO_2 Background Concentration ($\mu g/m^3$)	CO Background Concentration ($\mu g/m^3$)
x288500, y188500	6.96	9.65	2.64	204
x286500, y187500	6.52	9.79	2.61	194
x287500, y187500	9.46	10.0	2.69	199
x288500, y187500	7.05	9.71	2.63	203
x289500, y187500	6.60	9.75	3.04	204
x287500, y186500	6.65	10.0	2.25	200
x288500, y186500	7.21	9.77	2.26	206
x289500, y186500	6.95	10.0	2.44	210
x288500, y185500	6.70	9.77	2.29	210

4.4 Applied Background Concentration – Human Receptors

Concentrations for different averaging periods have been calculated in accordance with EA *Air Emissions Risk Assessment for Your Environmental Permit* (AERA) guidance, which indicates that annual background concentrations should be multiplied by a factor of 2 to derive 1-hour backgrounds and adjusted to other averaging periods as recommended. The conversion factors applied are illustrated in Table 4-4.

Table 4-4
AERA Conversion Factors for Environmental Standards

From ↓ To →	24-hour	8-hour	15-minute
1-hour	Multiply by 0.59 (A)	Multiply by 0.7 (B)	Multiply by 1.34 (C)

Notes:
(A) For example, to convert hourly data to 24-hour data, multiply the 1-hour value by 0.59.
(B) For example, to convert hourly data to 8-hour data, multiply the 1-hour value by 0.7.
(C) For example, to convert hourly data to 15-minute data, multiply the 1-hour value by 1.34.

The background concentrations in Table 4-5 have been applied in this Air Quality Impact Assessment, these values are based on the predicted background concentrations detailed in the previous section. In general, a conservative approach has been applied with use of high background concentrations as a worst-case scenario.

Table 4-5
Calculated and Applied Background Concentrations

Pollutant	Averaging Period	Concentration ($\mu g/m^3$)	Data Source
NO_2	Annual Mean	9.46	Maximum DEFRA Background Mapping in study area, 2017 (grid square x287500, y187500)
	1-hour Mean	18.9	As above, adjusted to 1-hour Mean (x2 factor applied)
PM_{10}	Annual Mean	10.0	Maximum DEFRA Background Mapping in study area, 2017 (grid square x287500, y187500)

Pollutant	Averaging Period	Concentration (µg/m³)	Data Source
	24-hour Mean	11.8	As above, adjusted to 24-hour Mean (x2 and x0.59 factor applied)
SO_2	1-hour Mean	6.08	Maximum DEFRA Background Mapping in study area, 2001 (grid square x289500, y185500). Adjusted to 1-hour Mean (x2 factor applied)
	24-hour Mean	3.59	As above, adjusted to 24-hour Mean (x0.59 factor applied
	15-minute Mean	8.15	As 1-hour above, adjusted to 15-minute Mean (x1.34 factor applied)
CO	8-hour Mean	294	Maximum DEFRA Background Mapping in study area, 2001 (grid square x289500, y185500). Adjusted to 8-hour Mean (x2 factor applied, then x0.7 factor applied)

4.5 Baseline Conditions at Ecological Receptors

The APIS website[14], a support tool for assessment of potential effects of air pollutants on habitats and species developed in partnership by the UK conservation agencies and regulatory agencies and the Centre for Ecology and Hydrology has been used to provide information on existing base NOx and SO_2 concentrations (Table 4-6), current deposition rates and C_{Lo} for nutrient nitrogen (Table 4-7) and C_{Lo} functions for acidity (Table 4-8).

Table 4-6
Baseline Concentrations and Levels – Ecological Receptors

ID	APIS Habitat Class (most sensitive)	NOx (µg/m³)	SO_2 (µg/m³)
ER1	Coastal stable dune grasslands - acid type	8.36	1.17
ER2	Non-Mediterranean dry acid and neutral closed grassland	14.37	1.78
ER3	Acidophilous Quercus-dominated woodland	10.72	1.64

Table 4-7
Nitrogen Critical Levels, Loads and Current Loads

ID	APIS Habitat Class (most sensitive)	Critical Load Range (kg N/ha/yr)	Critical Load Applied in Assessment (kg N/ha/yr)	Current Load (kg N/ha/yr)
ER1	Coastal stable dune grasslands - acid type	8 – 10	8	12.9
ER2	Non-Mediterranean dry acid and neutral closed grassland	10 – 15	10	13.6
ER3	Acidophilous Quercus-dominated woodland	10 – 15	10	25.1

[14] http://www.apis.ac.uk/.

Table 4-8
Acid Critical Load Functions and Current Loads

ID	APIS Critical Load Class (most sensitive)	Critical Load Function (k_{eq}/ha/yr)			Current Load (k_{eq}/ha/yr)		
		CLmaxS	CLminN	CLmaxN	N	S	Total Load
ER1	Coastal stable dune grasslands - acid type	4.08	0.223	4.303	0.9	0.4	1.3
ER2	Non-Mediterranean dry acid and neutral closed grassland	1.58	0.581	2.018	1	0.4	1.4
ER3	Acidophilous Quercus-dominated woodland	0.952	0.285	1.237	1.8	0.6	2.4

4.6 Meteorology

The generation, release and dispersion of emissions are particularly dependent upon weather conditions and the nature of the handled material. The prevailing meteorological conditions at any site would be dependent upon many factors including its location in relation to macroclimatic conditions as well as more site specific, microclimatic conditions. The most important climatic parameters governing the emission and magnitude of impact of dust are:

- wind direction which determines the broad transport of the emission and the direction in which it is dispersed; and
- wind speed will affect ground level emissions by increasing the initial dilution of pollutants in the emission; it will also affect the potential for dust entrainment.

Rainfall is also an important climatological parameter in the generation of dust; sufficient amounts of rainfall can suppress dust at the source and eliminate the pathway to the receptor. According to guidance, rainfall greater than 0.2mm per day is sufficient to suppress dust emissions.

4.6.1 Wind Speed and Direction Data

The most comparable observation station to the proposed development site is St Athan located approximately 22.5km south-east of the Application Site. Reference should be made to Appendix B for the presentation of individual wind-roses for each year of the applied 2015 – 2019 dataset.

5.0 ASSESSMENT OF EFFECTS

5.1 Construction Phase Effects

This section presents the potential air quality impacts and effects associated with the construction of the development in terms of dust and vehicle emissions.

5.1.1 Construction Dust Assessment

Construction activities will include:

- material export and import;
- temporary stockpiling of materials;
- groundwork for foundations and services;
- construction of buildings;
- landscaping works; and
- vehicle movements (with the potential to track-out material from site).

The following subsections provide a consideration of potential construction dust and conclude with a determined emission class and risk category, from each of the categories identified by the IAQM Guidance.

Assessment Screening

As shown in Drawing AQ1, there are 'human receptors' within 350m of the Application Site but no designated habitat sites within 50m of the Application Site boundary or within 50m of the Application Site entrance / 500m of the roads anticipated to witness construction traffic movements. Therefore, an assessment of construction dust on ecological receptors can be screened out from this assessment but an assessment of construction dust at human receptors is required.

Potential Dust Emissions Magnitude

The most significant potential source of dust emissions during construction would be the earthworks and trackout activities. Dust is potentially generated by the action of heavy vehicles (bulldozer, front-end loader, hydraulic excavator, and dump trucks), as well as by the movement of the vehicles on potentially dusty surfaces. Handling and storage of construction materials (aggregates / hard core), haulage across unsurfaced areas are also potential sources of dust generation.

The potential dust emission magnitude for each activity is described in Table 5-1.

Table 5-1
Potential Dust Emission Magnitude

Activity	Comments	Dust Emission Magnitude
Demolition	Prior to construction of the new paper machine at the Application Site, some existing buildings and structures are required to be demolished. This includes buildings / structures to the north-west and south-east of the existing site layout, including an existing sludge press building, a concrete slab and asphalt / concrete areas associated with current roads and hard-standing. Concrete products to be demolished represent a high-potential for dust generation. All material generated during the demolition of these buildings / structures will be exported from site.	Small

Activity	Comments	Dust Emission Magnitude
	Demolition activities are required on a total building volume of <20,000m^3. Demolition works are currently projected to occur over a short period (<4-weeks). Demolition works are currently projected to occur in the summer of 2020. Therefore, some demolition activities will occur over 'summer' months, corresponding to lower periods of rainfall and reduced potential for natural dust suppression. Therefore, dust emission magnitude is calculated to be 'small'.	
Earthworks	The proposals comprise the development of a new paper machine and associated infrastructure / access at the Application Site. Site earthworks are required over an area greater than 10,000m^2 with assumed soil types representing a high-risk potential for suspension when dry due to small particle size. Given the size of the site, between 5 – 10 heavy earth moving vehicles are considered to be required on Application Site at once. Given the size of the site, it is estimated that construction phase activities will occur over a period of greater than one year. Therefore, some earthworks activities will occur over 'summer' months, corresponding to lower periods of rainfall and reduced potential for natural dust suppression. For the purpose of this assessment and to provide a worst-case assumption, it has been assumed that earthworks associated with site preparation and landscaping would run concurrently with construction works. Therefore, dust emission magnitude is calculated to be 'large'.	Large
Construction	The total building volume associated with the proposed new paper machine and associated infrastructure / access is predicted to be between 25,000m^3 and 100,000m^3. Foundations will be as both strip foundations and piling based upon geotechnical specifications. Construction will be as pre-cast reinforced concrete wall panels, steel columns / girders / purlins, sheet steel roofing panels and concrete slabs. The majority of concrete products used on-site will arrive as pre-cast / pre-form. Concrete will additionally arrive on site as Readymix. However, a small portion of concrete may additionally be mixed on-site. Concrete has a high potential for dust generation. It is estimated that construction phase activities will occur over a period of greater than one year. Therefore, some earthworks activities will occur over 'summer' months, corresponding to lower periods of rainfall and	Large

Activity	Comments	Dust Emission Magnitude
	reduced potential for natural dust suppression. For the purpose of this assessment and to provide a worst-case assumption, it has been assumed that earthworks associated with site preparation and landscaping would run concurrently with construction works. Therefore, dust emission magnitude is calculated to be 'large'.	
Trackout	Construction vehicles will most likely access the site via the existing highway network from the south (via A4063, ultimately in the direction of the M4). A new site access junction is to be created off the A4063. No details are available at the time of assessment on the number of additional HDV movements associated with construction works in each phase, however, given the scale and nature of works required, there is considered to be >50HDV outward movements in any worst-case day. Due to the size of the site the unpaved road length is considered to be >100m. Therefore, dust emission magnitude is calculated to be 'large'.	Large

Sensitivity of the Area

The sensitivity of the area takes account of a number of factors:

- the specific sensitivities of receptors in the area;
- the proximity and number of those receptors;
- in the case of PM_{10}, the local background concentration; and
- site-specific factors, such as whether there are natural shelters, such as trees, to reduce the risk of wind-blown dust.

The sensitivity of the area and the factors considered are presented in Table 5-2.

Table 5-2
Sensitivity of the Area

Sensitivity to:	Comments	Sensitivity
Dust Soiling Impacts	The surroundings predominantly comprise rural / agricultural land with sparsely populated associated residential dwellings. These residential dwellings are classified as of high sensitivity to dust soiling. There are between 1 – 10 high sensitivity receptors within 350m of the Application Site boundary.	Low

Sensitivity to:	Comments	Sensitivity
Human Health Impacts	The background PM_{10} concentration for the maximum 1km^2 grid square containing the Application Site and surrounding receptors is estimated to be 10.0µg/m^3, based upon 2017 mapped background estimates presented in Table 4-3 (i.e. falls into the <24µg/m^3 class) and there are between 1 – 10 high sensitivity receptors within 350m of the Application Site boundary.	Low

Risk of Impacts (Unmitigated)

The outcome of the assessment of the potential 'magnitude of dust emissions', and the 'sensitivity of the area' are combined in the table below to determine the risk of impact which is used to inform the selection of appropriate mitigation.

Table 5-3
Risk of Dust Impacts

Potential Impact	Demolition	Earthworks	Construction	Trackout
Dust Soiling Impacts	Negligible Risk	Low Risk	Low Risk	Low Risk
Human Health Impacts	Negligible Risk	Low Risk	Low Risk	Low Risk
Ecological Impacts	n/a	n/a	n/a	n/a

5.1.2 Construction Phase – Vehicular Pollutants

Road traffic emissions associated with vehicle movements, particularly HDV movements, during the construction phase of the development have the potential to result in increased concentrations of combustion related pollutants, including NO_2 and PM_{10} in the vicinity of the development site.

Guidance provided by EPUK and IAQM, states that a detailed assessment of potential air quality impacts should be undertaken if the following criteria are met on any link affected by a proposed development:

- change in 24-hour LDV flows of more than 100 AADT within or adjacent to an AQMA; or
- change in 24-hour HDV flows of more than 25 AADT within or adjacent to an AQMA.

The development quantum is not anticipated to result in a significant increase in movements or be above the EPUK and IAQM criterion. The duration of movements will be short-term in nature and are not considered further within the context of this assessment. Therefore, in accordance with the criterion presented within EPUK and IAQM guidance, additional road vehicle trips during the construction phase of the scheme *'can be considered to have insignificant effects*' on air quality.

5.2 Operational Phase Effects

5.2.1 Operational Phase – Vehicular Pollutants

Road traffic emissions associated with vehicle movements, particularly HDV movements, during the operational phase of the development have the potential to result in increased concentrations of combustion related pollutants, including NO_2 and PM_{10} in the vicinity of the development site.

All additional vehicle movements associated with the Application Site will access via the new access to be created off the A4063 (located immediately to the south-east of the existing facility).

In comparison to the existing operation and use of the Site, the new access road / junction is predicted to generate an additional 80 two-way LDV movements and an additional 48 two-way HDV movements over a 24-hour AADT period.

Additional trips would all route / distribute as follows on the surrounding highway network:

- Additional LDV movements:
    - 60% south on the A4603 towards Bridgend (i.e. 48 two-way LDV movements); and
    - 40% north on the A4603 towards Maesteg (i.e. 32 two-way LDV movements).
- Additional HDV movements:
    - 100% south on the A4603 towards Bridgend (i.e. 48 two-way LDV movements).

EPUK & IAQM guidance '*Land-use planning and development control planning for air quality*' (v1.2, 2017), states that a detailed assessment of potential air quality impacts should be undertaken if the following criteria are met on any link affected by a proposed development:

- change in 24-hour LDV flows of more than 100 AADT within or adjacent to an AQMA; or
- change in 24-hour HDV flows of more than 25 AADT within or adjacent to an AQMA.

The Application Site is not located within or adjacent to an AQMA and therefore the higher screening criterion (i.e. 500LDVs or 100 HDV) would apply.

The predicted additional development trips are lower that the above indicative criterion for assessment. Therefore, in accordance with the criterion presented within EPUK & IAQM guidance '*Land-use planning and development control planning for air quality*' (v1.2, 2017), additional road vehicle trips during the operational phase of the scheme '*can be considered to have insignificant effects*' on air quality.

Reference should be made to Highways & Transportation Chapter for further details of the predicted operational phase development trips.

5.2.2 Operational Phase – Combustion Emissions

The operation of the Site has the potential to release emissions to atmosphere. These are to be emitted from the existing and proposed stacks serving the papermill site operations. The existing papermill site includes the operation of a combined heat and power (CHP) plant and associated boiler, and the 'Jupiter' machine in the paper manufacturing process. The Proposed Development seeks the doubling of the capacity within the CHP plant, and the introduction of a new paper machine and associated emission points.

The detailed assessment of impact from the proposed additional combustion emissions at the Application Site process stack is set out in Appendix B.

It is noted that the assessment of the impact on air quality from combustion emissions at the Application Site has been undertaken based upon the incremental air pollutant / concentration change associated with the Proposed Development (i.e. the proposed changes to the Application Site layout). Where relevant, the assessment of absolute concentration against the AQO / CLo / CLe has been undertaken cumulatively considering both existing and the Proposed Development combustion emissions at Application Site.

Maximum Predicted Long-term Impacts

A summary of the predicted long-term (annual mean) Process Contributions (PC) from relevant combustion emission sources of the Proposed Development at the Application Site are presented in Table 5-4.

These predicted long-term (annual mean) impacts relate to the highest predicted level of impact at any location on the receptor grid (outside of the site boundary) and impacts at all other locations will be lower. It is noted that in

accordance with LAQM.TG(16), these locations of maximum predicted PC are not necessarily locations of relevant exposure to the annual mean AQO.

Table 5-4
Maximum Predicted Long-term Impacts: Combustion Emissions Assessment

Pollutant	Applied Standard	PC Change Max (A)	PC Max as a % of the AQAL	PEC	PEC as a % of the AQAL	Magnitude	Significance
NO_2	40	8.22	20.6	24.5	61.3	- (B)	- (B)
PM_{10}	40	0.12	0.31	10.2	25.5	- (B)	- (B)

Note:
(A) Presented PCs are based upon an average of the modelled 5-year dataset.
(B) Location not a location of relevant exposure, and therefore no corresponding magnitude / significance has been presented.

Predicted impacts (as PC and PEC) at each considered discrete receptor have been considered further for annual mean NO_2 and PM_{10} concentrations, as referenced within the following subsections.

Maximum Predicted Short-term Impacts

A summary of the predicted short-term (1-hour mean, 8-hour, 24-hour mean and 15-minute mean) PCs from relevant combustion emission sources of the Proposed Development are presented in Table 5-5.

These predicted short-term impacts relate to the highest predicted level of impact at any location on the receptor grid (outside of the site boundary) and impacts at all other locations and all other times, will be lower. It is noted that in accordance with LAQM.TG(16), these locations of maximum predicted PC are not necessarily locations of relevant exposure to the 1-hour mean, 8-hour, 24-hour mean and 15-minute mean AQOs.

The location of maximum predicted short-term NO_2 and PM_{10}, respectively, PCs is not a location of relevant exposure to the 1-hour mean and 24-hour mean, respectively, AQOs. Therefore, no associated 'magnitude' or 'significance' descriptors are presented.

Table 5-5
Maximum Predicted Short-term Impacts: Combustion Emissions Assessment

Pollutant	Applied Standard	Averaging Period	PC Max Change (A)	PC Max as a % of the AQAL	PEC	PEC as a % of the AQAL	Magnitude	Significance
NO_2	200	1-hour mean 99.79%ile	48.34	24.17	109.63	54.82	- (B)	- (B)
PM_{10}	50	24-hour 90.41 %ile	0.38	0.77	12.18	24.37	- (B)	- (B)
SO_2	266	15-minute mean 99.9%ile	42.38	15.93	91.76	34.50	Medium	Moderate, adverse
SO_2	350	1-hour mean 99.73%ile	22.85	6.53	50.89	14.54	Small	Slight, adverse
SO_2	125	24-hour mean 99.18%ile	5.73	4.58	12.19	9.75	Negligible	Negligible

Pollutant	Applied Standard	Averaging Period	PC Max Change (A)	PC Max as a % of the AQAL	PEC	PEC as a % of the AQAL	Magnitude	Significance
CO	10,000	8-hour rolling mean	29.95	0.30	352.54	3.53	Negligible	Negligible

Note:
(A) Presented PCs are based upon an average of the modelled 5-year dataset.
(B) Location not a location of relevant exposure, and therefore no corresponding magnitude / significance has been presented.

Predicted impacts (as PC) at each considered discrete receptor have been considered further and presented for short-term (1-hour mean, 8-hour, 24-hour mean and 15-minute mean) NO_2, PM_{10}, SO_2 and CO concentrations as referenced within the following subsections.

Discrete Human Receptors – Annual Mean NO_2 Impact

Predicted impacts on annual mean NO_2 concentrations at discrete receptors are presented in Table 5-6.

Table 5-6
Predicted Annual Mean NO_2 Impacts at Discrete Receptors: Combustion Emissions Assessment

Receptor	PC (A)	PC as a % of the AQAL	PEC	PEC as a % of the AQAL	Magnitude	Significance
R1	0.43	1.06	10.2	25.6	Small	Negligible
R2	0.42	1.05	10.2	25.5	Small	Negligible
R3	0.63	1.58	10.6	26.6	Small	Negligible
R4	0.42	1.05	10.4	26.0	Small	Negligible
R5	0.58	1.45	10.7	26.6	Small	Negligible
R6	0.55	1.38	10.5	26.2	Small	Negligible
R7	0.71	1.76	10.9	27.4	Small	Negligible
R8	0.15	0.37	9.8	24.4	Negligible	Negligible
R9	0.06	0.16	9.6	24.0	Negligible	Negligible
R10	0.07	0.18	9.6	24.0	Negligible	Negligible
R11	0.07	0.18	9.6	24.0	Negligible	Negligible
R12	0.15	0.38	9.8	24.4	Negligible	Negligible
R13	0.26	0.64	10.0	24.9	Negligible	Negligible
R14	0.28	0.70	10.0	25.0	Negligible	Negligible
R15	0.44	1.10	10.4	25.9	Negligible	Negligible
R16	0.53	1.33	10.5	26.3	Negligible	Negligible
R17	0.35	0.88	10.1	25.4	Negligible	Negligible
R18	0.17	0.43	9.7	24.4	Negligible	Negligible
R19	0.33	0.82	10.1	25.3	Negligible	Negligible
R20	0.20	0.51	9.9	24.6	Negligible	Negligible
R21	0.17	0.43	9.8	24.5	Negligible	Negligible

Receptor	PC (A)	PC as a % of the AQAL	PEC	PEC as a % of the AQAL	Magnitude	Significance
R22	0.16	0.40	9.8	24.4	Negligible	Negligible
R23	0.09	0.23	9.6	24.1	Negligible	Negligible
R24	0.09	0.22	9.6	24.1	Negligible	Negligible
R25	0.19	0.47	9.8	24.5	Negligible	Negligible

Note:
(A) Presented PCs are based upon an average of the modelled 5-year dataset.

Table 5-6 indicates that there is predicted to be a 'negligible' impact on annual mean NO_2 concentrations at all considered receptors. There are no predicted exceedences of the annual mean NO_2 AQO as a result of the operation of combustion emission point sources associated with the Proposed Development at the Application Site.

Discrete Human Receptors – Annual Mean PM_{10} Impact

Predicted impacts on annual mean PM_{10} concentrations at discrete receptors are presented in Table 5-7.

Table 5-7
Predicted Annual Mean PM_{10} Impacts at Discrete Receptors: Combustion Emissions Assessment

Receptor	PC (A)	PC as a % of the AQAL	PEC	PEC as a % of the AQAL	Magnitude	Significance
R1	0.01	0.03	10.0	25.1	Negligible	Negligible
R2	0.01	0.03	10.0	25.1	Negligible	Negligible
R3	0.02	0.06	10.0	25.1	Negligible	Negligible
R4	0.01	0.01	10.0	25.0	Negligible	Negligible
R5	0.03	0.07	10.0	25.1	Negligible	Negligible
R6	0.01	0.03	10.0	25.1	Negligible	Negligible
R7	0.04	0.10	10.1	25.1	Negligible	Negligible
R8	<0.01	<0.01	10.0	25.0	Negligible	Negligible
R9	0.01	0.02	10.0	25.0	Negligible	Negligible
R10	0.01	0.02	10.0	25.0	Negligible	Negligible
R11	0.01	0.02	10.0	25.0	Negligible	Negligible
R12	<0.01	<0.01	10.0	25.0	Negligible	Negligible
R13	0.01	0.02	10.0	25.0	Negligible	Negligible
R14	0.01	0.03	10.0	25.1	Negligible	Negligible
R15	0.02	0.05	10.0	25.1	Negligible	Negligible
R16	0.02	0.05	10.0	25.1	Negligible	Negligible
R17	0.01	0.02	10.0	25.0	Negligible	Negligible
R18	<0.01	0.01	10.0	25.0	Negligible	Negligible
R19	0.01	0.02	10.0	25.0	Negligible	Negligible
R20	<0.01	<0.01	10.0	25.0	Negligible	Negligible
R21	<0.01	<0.01	10.0	25.0	Negligible	Negligible
R22	<0.01	<0.01	10.0	25.0	Negligible	Negligible
R23	<0.01	0.01	10.0	25.0	Negligible	Negligible

Receptor	PC (A)	PC as a % of the AQAL	PEC	PEC as a % of the AQAL	Magnitude	Significance
R24	<0.01	0.01	10.0	25.0	Negligible	Negligible
R25	<0.01	<0.01	10.0	25.0	Negligible	Negligible
Note: (A) Presented PCs are based upon an average of the modelled 5-year dataset.						

Table 5-7 indicates that there is predicted to be a 'negligible' impact on annual mean PM_{10} concentrations at all considered receptors. There are no predicted exceedences of the annual mean PM_{10} AQO as a result of the operation of combustion emission point sources associated with the Proposed Development at the Application Site.

Discrete Human Receptors – 1-hour Mean NO_2 Impact

Predicted impacts on 1-hour mean 99.79 percentile NO_2 concentrations at discrete receptors are presented in Table 5-8.

Table 5-8
Predicted 1-hour Mean NO_2 Impacts at Discrete Receptors: Combustion Emissions Assessment

Receptor	PC (A)	PC as a % of the AQAL	Magnitude	Significance
R1	12.2	6.10	Negligible	Negligible
R2	15.7	7.83	Negligible	Negligible
R3	14.6	7.28	Negligible	Negligible
R4	21.9	10.9	Small	Slight, adverse
R5	32.2	16.1	Small	Slight, adverse
R6	15.2	7.61	Negligible	Negligible
R7	6.87	3.44	Negligible	Negligible
R8	5.53	2.76	Negligible	Negligible
R9	2.83	1.41	Negligible	Negligible
R10	3.12	1.56	Negligible	Negligible
R11	3.14	1.57	Negligible	Negligible
R12	4.73	2.36	Negligible	Negligible
R13	4.02	2.01	Negligible	Negligible
R14	3.31	1.66	Negligible	Negligible
R15	7.88	3.94	Negligible	Negligible
R16	8.39	4.19	Negligible	Negligible
R17	8.43	4.21	Negligible	Negligible
R18	11.1	5.56	Negligible	Negligible
R19	19.4	9.71	Negligible	Negligible
R20	13.0	6.48	Negligible	Negligible
R21	6.00	3.00	Negligible	Negligible
R22	6.33	3.16	Negligible	Negligible
R23	3.94	1.97	Negligible	Negligible
R24	3.73	1.86	Negligible	Negligible

Receptor	PC (A)	PC as a % of the AQAL	Magnitude	Significance
R25	8.31	4.16	Negligible	Negligible

Note:
(A) Presented PCs are based upon an average of the modelled 5-year dataset.

Table 5-8 indicates that there is predicted to be a 'slight, adverse' impact on 1-hour mean 99.79 percentile NO_2 concentrations at 2 considered receptors (R4 and R5). At all other considered receptors, there is predicted to be a 'negligible' impact on 1-hour mean 99.79 percentile NO_2 concentrations. There are no predicted exceedences of the 1-hour mean 99.79 percentile NO_2 AQO as a result of the PCs from the operation of combustion emission point sources associated with the Proposed Development at the Application Site.

Discrete Human Receptors – 24-hour Mean PM_{10} Impact

Predicted impacts on 24-hour mean 90.41 percentile PM_{10} concentrations at discrete receptors are presented in Table 5-9.

Table 5-9
Predicted 24-hour Mean PM_{10} Impacts at Discrete Receptors: Combustion Emissions Assessment

Receptor	PC (A)	PC as a % of the AQAL	Magnitude	Significance
R1	0.08	0.15	Negligible	Negligible
R2	0.07	0.15	Negligible	Negligible
R3	0.10	0.20	Negligible	Negligible
R4	0.05	0.11	Negligible	Negligible
R5	0.14	0.28	Negligible	Negligible
R6	0.07	0.14	Negligible	Negligible
R7	0.14	0.27	Negligible	Negligible
R8	0.03	0.05	Negligible	Negligible
R9	0.01	0.02	Negligible	Negligible
R10	0.01	0.03	Negligible	Negligible
R11	0.01	0.03	Negligible	Negligible
R12	0.04	0.07	Negligible	Negligible
R13	0.05	0.11	Negligible	Negligible
R14	0.06	0.11	Negligible	Negligible
R15	0.08	0.15	Negligible	Negligible
R16	0.08	0.17	Negligible	Negligible
R17	0.05	0.09	Negligible	Negligible
R18	0.02	0.04	Negligible	Negligible
R19	0.07	0.15	Negligible	Negligible
R20	0.04	0.09	Negligible	Negligible
R21	0.03	0.07	Negligible	Negligible
R22	0.03	0.07	Negligible	Negligible
R23	0.02	0.04	Negligible	Negligible

Receptor	PC (A)	PC as a % of the AQAL	Magnitude	Significance
R24	0.02	0.04	Negligible	Negligible
R25	0.04	0.07	Negligible	Negligible
Note: (A) Presented PCs are based upon an average of the modelled 5-year dataset.				

Table 5-9 indicates that there is predicted to be a 'negligible' impact on 24-hour mean 90.41 percentile PM_{10} concentrations at all considered receptors. There are no predicted exceedences of the 24-hour mean 90.41 percentile PM_{10} AQO as a result of the PCs from the operation of combustion emission point sources associated with the Proposed Development at the Application Site.

Discrete Human Receptors – 24-hour Mean SO_2 Impact

Predicted impacts on 24-hour mean 99.18 percentile SO_2 concentrations at discrete receptors are presented in Table 5-10.

Table 5-10
Predicted 24-hour Mean SO_2 Impacts at Discrete Receptors: Combustion Emissions Assessment

Receptor	PC (A)	PC as a % of the AQAL	Magnitude	Significance
R1	1.17	0.94	Negligible	Negligible
R2	1.44	1.15	Negligible	Negligible
R3	1.91	1.53	Negligible	Negligible
R4	0.86	0.69	Negligible	Negligible
R5	2.07	1.65	Negligible	Negligible
R6	0.96	0.77	Negligible	Negligible
R7	1.21	0.96	Negligible	Negligible
R8	0.52	0.42	Negligible	Negligible
R9	0.29	0.23	Negligible	Negligible
R10	0.28	0.23	Negligible	Negligible
R11	0.29	0.23	Negligible	Negligible
R12	0.45	0.36	Negligible	Negligible
R13	0.61	0.49	Negligible	Negligible
R14	0.52	0.42	Negligible	Negligible
R15	0.69	0.55	Negligible	Negligible
R16	0.78	0.62	Negligible	Negligible
R17	0.71	0.57	Negligible	Negligible
R18	0.31	0.25	Negligible	Negligible
R19	0.88	0.70	Negligible	Negligible
R20	0.69	0.55	Negligible	Negligible
R21	0.54	0.43	Negligible	Negligible
R22	0.58	0.47	Negligible	Negligible
R23	0.30	0.24	Negligible	Negligible

Receptor	PC (A)	PC as a % of the AQAL	Magnitude	Significance
R24	0.28	0.23	Negligible	Negligible
R25	0.56	0.44	Negligible	Negligible
Note: (A) Presented PCs are based upon an average of the modelled 5-year dataset.				

Table 5-10 indicates that there is predicted to be a 'negligible' impact on 24-hour mean 99.18 percentile SO_2 concentrations at all considered receptors. There are no predicted exceedences of the 24-hour mean 99.18 percentile SO_2 AQO as a result of the PCs from the operation of combustion emission point sources associated with the Proposed Development at the Application Site.

Discrete Human Receptors – 1-hour Mean SO_2 Impact

Predicted impacts on 1-hour mean 99.73 percentile SO_2 concentrations at discrete receptors are presented in Table 5-11.

Table 5-11
Predicted 1-hour Mean SO_2 Impacts at Discrete Receptors: Combustion Emissions Assessment

Receptor	PC (A)	PC as a % of the AQAL	Magnitude	Significance
R1	3.64	1.04	Negligible	Negligible
R2	4.77	1.36	Negligible	Negligible
R3	6.38	1.82	Negligible	Negligible
R4	4.81	1.37	Negligible	Negligible
R5	14.6	4.18	Negligible	Negligible
R6	2.61	0.74	Negligible	Negligible
R7	2.36	0.68	Negligible	Negligible
R8	1.89	0.54	Negligible	Negligible
R9	1.02	0.29	Negligible	Negligible
R10	1.12	0.32	Negligible	Negligible
R11	1.09	0.31	Negligible	Negligible
R12	1.67	0.48	Negligible	Negligible
R13	1.53	0.44	Negligible	Negligible
R14	1.29	0.37	Negligible	Negligible
R15	1.61	0.46	Negligible	Negligible
R16	1.73	0.49	Negligible	Negligible
R17	1.53	0.44	Negligible	Negligible
R18	2.26	0.65	Negligible	Negligible
R19	6.68	1.91	Negligible	Negligible
R20	3.69	1.05	Negligible	Negligible
R21	1.93	0.55	Negligible	Negligible
R22	1.86	0.53	Negligible	Negligible
R23	1.39	0.40	Negligible	Negligible

Receptor	PC (A)	PC as a % of the AQAL	Magnitude	Significance
R24	1.31	0.37	Negligible	Negligible
R25	2.67	0.76	Negligible	Negligible
Note: (A) Presented PCs are based upon an average of the modelled 5-year dataset.				

Table 5-11 indicates that there is predicted to be a 'negligible' impact on 1-hour mean 99.73 percentile SO_2 concentrations at all considered receptors. There are no predicted exceedences of the on 1-hour mean 99.73 percentile SO_2 AQO as a result of the PCs from the operation of combustion emission point sources associated with the Proposed Development at the Application Site.

Discrete Human Receptors – 15-minute Mean SO_2 Impact

Predicted impacts on 15-minute mean 99.9 percentile SO_2 concentrations at discrete receptors are presented in Table 5-12.

Table 5-12
Predicted 15-minute Mean SO_2 Impacts at Discrete Receptors: Combustion Emissions Assessment

Receptor	PC (A)	PC as a % of the AQAL	Magnitude	Significance
R1	5.45	4.36	Negligible	Negligible
R2	8.14	6.51	Negligible	Negligible
R3	9.34	7.47	Negligible	Negligible
R4	7.30	5.84	Negligible	Negligible
R5	22.3	17.8	Small	Slight, adverse
R6	4.34	3.47	Negligible	Negligible
R7	3.25	2.60	Negligible	Negligible
R8	3.03	2.42	Negligible	Negligible
R9	1.51	1.21	Negligible	Negligible
R10	1.67	1.34	Negligible	Negligible
R11	1.68	1.34	Negligible	Negligible
R12	3.22	2.58	Negligible	Negligible
R13	2.19	1.75	Negligible	Negligible
R14	1.86	1.49	Negligible	Negligible
R15	2.34	1.87	Negligible	Negligible
R16	2.49	1.99	Negligible	Negligible
R17	2.17	1.73	Negligible	Negligible
R18	4.04	3.23	Negligible	Negligible
R19	10.8	8.68	Negligible	Negligible
R20	7.94	6.35	Negligible	Negligible
R21	2.92	2.33	Negligible	Negligible
R22	4.02	3.22	Negligible	Negligible
R23	2.79	2.23	Negligible	Negligible

Receptor	PC (A)	PC as a % of the AQAL	Magnitude	Significance
R24	2.75	2.20	Negligible	Negligible
R25	4.42	3.54	Negligible	Negligible

Note:
(A) Presented PCs are based upon an average of the modelled 5-year dataset.

Table 5-12 indicates that there is predicted to be a 'slight, adverse' impact on 15-minute mean 99.9 percentile SO_2 concentrations at all considered receptors. There are no predicted exceedences of the 15-minute mean 99.9 percentile SO_2 AQO as a result of the PCs from the operation of combustion emission point sources associated with the Proposed Development at the Application Site.

Discrete Human Receptors – 8-hour Mean CO Impact

Predicted impacts on 8-hour rolling mean CO concentrations at discrete receptors are presented in Table 5-13.

Table 5-13
Predicted 8-hour Rolling Mean Impacts at Discrete Receptors: Combustion Emissions Assessment

Receptor	PC (A)	PC as a % of the AQAL	Magnitude	Significance
R1	8.10	0.08	Negligible	Negligible
R2	8.83	0.09	Negligible	Negligible
R3	11.7	0.12	Negligible	Negligible
R4	6.81	0.07	Negligible	Negligible
R5	20.9	0.21	Negligible	Negligible
R6	5.40	0.05	Negligible	Negligible
R7	5.32	0.05	Negligible	Negligible
R8	4.21	0.04	Negligible	Negligible
R9	1.95	0.02	Negligible	Negligible
R10	2.41	0.02	Negligible	Negligible
R11	2.33	0.02	Negligible	Negligible
R12	3.39	0.03	Negligible	Negligible
R13	3.47	0.03	Negligible	Negligible
R14	3.09	0.03	Negligible	Negligible
R15	3.37	0.03	Negligible	Negligible
R16	4.49	0.04	Negligible	Negligible
R17	4.17	0.04	Negligible	Negligible
R18	2.70	0.03	Negligible	Negligible
R19	8.42	0.08	Negligible	Negligible
R20	5.50	0.06	Negligible	Negligible
R21	3.87	0.04	Negligible	Negligible
R22	3.90	0.04	Negligible	Negligible
R23	2.90	0.03	Negligible	Negligible
R24	2.84	0.03	Negligible	Negligible

Receptor	PC (A)	PC as a % of the AQAL	Magnitude	Significance
R25	4.80	0.05	Negligible	Negligible

Note:
(A) Presented PCs are based upon an average of the modelled 5-year dataset.

Table 5-13 indicates that there is predicted to be a 'negligible' impact on 8-hour rolling mean concentrations at all considered receptors. There are no predicted exceedences of the 8-hour rolling mean CO AQO as a result of the PCs from the operation of combustion emission point sources associated with the Proposed Development at the Application Site.

Combustion Emissions – Summary of Predicted Impacts at Human Receptors,

The EPUK & IAQM guidance '*Land-use planning and development control planning for air quality*' (v1.2, 2017), considers a number of factors for the determination of significance of predicted air quality impacts. Such factors include:

- the existing and future air quality in the absence of the development;
- the extent of current and future population exposure to the impacts; and
- the worst-case assumptions adopted when undertaking the prediction of impacts.

In relation to combustion emission point sources associated with the Proposed Development, the unmitigated impact significance has been predicted in accordance with the stated assessment methodology. The following factors have been taken into account:

- there are predicted to be a 'negligible' impact on annual mean NO_2 and PM_{10} concentrations at all considered receptor locations of relevant exposure. There are no predicted exceedences of the annual mean NO_2 or PM_{10} AQOs at any location within the study domain;
- there are predicted to be 'slight, adverse' impacts on 1-hour mean 99.79 percentile NO_2 concentrations at 2 considered receptor locations. At all other receptor locations, impacts on 1-hour mean 99.79 percentile NO_2 concentrations are predicted to be 'negligible'. There are no predicted exceedences of the 1-hour mean 99.79 percentile NO_2 AQO at any location within the study area;
- there is predicted to be 'slight, adverse' impacts on 15-minute mean 99.9 percentile SO_2 concentrations at 1 considered receptor location. At all other receptor locations, impacts on 15-minute mean 99. 9 percentile SO_2 concentrations are predicted to be 'negligible'. There are no predicted exceedences of the 15-minute mean 99.9 percentile SO_2 AQO at any location within the study area;
- there is predicted to be a 'negligible' impact on 24-hour mean 90.41 percentile PM_{10} concentrations at all considered receptors. There are no predicted exceedences of the 24-hour mean 90.41 percentile PM_{10} AQO at any location within the study area;
- there is predicted to be a 'negligible' impact on 24-hour mean 99.18 percentile SO_2 concentrations at all considered receptors. There are no predicted exceedences of the 24-hour mean 90.18 percentile SO_2 AQO at any location within the study area;
- there is predicted to be a 'negligible' impact on 1-hour mean 99.73 percentile SO_2 concentrations at all considered receptors. There are no predicted exceedences of the 1-hour mean 99.73 percentile SO_2 AQO at any location within the study area; and
- there is predicted to be a 'negligible' impact on 8-hour rolling mean CO concentrations at all considered receptors. There are no predicted exceedences of the 8-hour rolling mean CO AQO at any location within the study area.

As such, the overall effect of the operation of combustion emission point sources associated with the Proposed Development at the Application Site is considered to be 'not significant'.

Impacts on Ecological Receptors – Critical Levels

The results of the assessment of impacts on CLe are presented in Table 5-14 below.

Table 5-14
Impact on Critical Levels

Receptor ID	NOx Annual PC (µg/m^3)	PC as % of C_{Le}	NOx 24-hour PC (µg/m^3)	PC as % of C_{Le}	SO_2 Annual PC (µg/m^3	PC as % of C_{Le}
ER1	0.11	0.38	1.78	2.37	0.02	0.17
ER2	0.02	0.07	0.35	0.47	<0.01	0.02
ER3	0.04	0.12	1.23	1.63	<0.01	0.01

Table 5-14 illustrates that the additional annual mean NOx and SO_2 PC does not exceed 1% of the annual mean NOx or SO_2 CLes at any considered ecological receptor.

Table 5-14 further illustrates that the additional 24-hour mean NOx PC does not exceed 10% of the 24-hour mean NOx CLe at any considered ecological receptor.

Following the stated 'EA's Operational Instruction 66_12', impacts on the annual mean NOx, 24-hour mean NOx and annual mean SO_2 CLes are all considered to result in 'no likely significant effects (alone and in-combination)' at all considered ecological receptors.

Impacts on Ecological Receptors – Critical Loads, Nutrient Nitrogen

The results of the assessment of impacts on the nutrient nitrogen CLo are presented in Table 5-15 below.

Table 5-15
Impact on Nitrogen Critical Load

Site	Applied C_{Lo} (kg N/ha/yr)	PC (kg N/ha/yr)	PC as % of C_{Lo}
R1	8	0.02	0.20
R2	10	<0.01	0.03
R3	10	0.01	0.10

Table 5-15 illustrates that the additional PC to nutrient nitrogen does not exceed 1% of the applied nutrient nitrogen CLo at any considered ecological receptor.

Following the stated 'EA's Operational Instruction 66_12', impacts on nutrient nitrogen CLos are all considered to result in 'no likely significant effects (alone and in-combination)' at all considered ecological receptors.

Impacts on Ecological Receptors – Critical Loads, Acidification

The results of the assessment of impacts on the acid CLo are presented in Table 5-16 below.

It is noted that, as presented in Table 4-8, the total current N load is greater than the CLminN at all considered ecological receptors. Therefore, the assessment of additional NO_2 and SO_2 contributions to acid deposition has been undertaken against the CLmaxN CLo.

Table 5-16
Impact on Acid Critical Load

Site	Applied C_{Lo} (kg $_{eq}$/ha/yr)	PC (kg $_{eq}$/ha/yr)	PC as % of C_{Lo}
R1	4.303	<0.01	0.07
R2	2.018	<0.01	0.02
R3	1.237	<0.01	0.08

Table 5-16 illustrates that the additional PC to acidification does not exceed 1% of the applied acid CLo at any considered ecological receptor.

Following the stated 'EA's Operational Instruction 66_12', impacts on acid CLos are all considered to result in 'no likely significant effects (alone and in-combination)' at all considered ecological receptors.

6.0 MITIGATION

6.1 Construction Phase Dust

An assessment of the significance of impacts associated with construction phase dust has been undertaken in accordance with the IAQM methodology. A summary of the risk category associated with each identified source of construction phase dust is presented within Table 13-19, for the purposes of identifying mitigation requirements.

Potential dust effects during the construction phase considered to be temporary in nature. The impacts are determined to be temporary as they will only potentially occur throughout the construction phase and short-term because these will only arise at particular times when certain activities and meteorological conditions for creating the level of magnitude predicted combine.

The risk of dust soiling effects is assessed as 'negligible risk' from demolition, and 'low risk' from earthworks, construction and trackout activities. The risk of human health effects from PM_{10} is assessed as 'negligible risk' from demolition, and 'low risk' from earthworks, construction activities and trackout activities.

In order to control potential impacts, the mitigation measures presented within Table 6-1 are proposed for the scheme. These mitigation measures should be secured by planning condition.

Table 6-1
Construction Dust Mitigation Measures

Site Application	Mitigation Measures
General Dust Management	Record all dust and air quality complaints and take appropriate measures to reduce emissions
	Record any exceptional; incidents that cause dust off site.
	Undertake daily visual inspection of dust soiling and dust generation and record in site log (available for the local authority if requested)
	Ensure an adequate supply of water is available onsite for effective dust suppression. The site manager will be present during all working hours to manage the activity of dust suppression
	Use enclosed chutes and conveyors and cover skips
	Minimise drop heights from conveyors, loading shovels and other material handling equipment
	Impose a site speed limit of 10mph on unpaved haul roads
	Ensure all vehicles engines are switched off when stationary
	Plan site layout so machinery is located away from receptors as far as possible
	Enclose specific operations where there is a high potential for dust production
	Avoid site runoff of water or mud
	Keep site fencing, barriers and scaffolding clean using wet methods
	Remove material that have the potential to produce dust from the site as soon as possible

Site Application	Mitigation Measures
	Install construction warning signage either side of the site entrance warning of 'mud on the road'
	Safety, Health & Environmental Briefings (SHEB's) will be provided to site operatives at least monthly and will reflect the actual work being undertaken on site. Records must be maintained of the briefings
	All operatives/visitors on site receive an Induction prior to commencing work on site
	Environmental Incidents and complaints will be recorded in the incident book on site and records forwarded to the divisional office and Group SHE department as required. Complaints will be dealt with locally by the Division and confirmation of action provided on or attached to the incident report form
	A power washing area will be installed behind the main compound alongside the delivery access road so that any vehicles leaving the site that require it can clean their tyres and undercarriage to wash off mud and debris before they exit
	All site managers attend the Site Management Safety Training Scheme (SMSTS) course on site safety. Part of this course covers protection against fugitive dust
Demolition	Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust)
	Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.
	Avoid explosive blasting, using appropriate manual or mechanical alternatives
	Bag and remove any biological debris or damp down such material before demolition.
Earthworks	Re-vegetate earthworks and soil stockpiles to stabilise surfaces as soon as practicable
	Cover stockpiles if not vegetated and only remove in small areas during work
	Avoid Double Handling of material
	Cease operations during high winds in the direction of sensitive receptors
Construction	Avoid scabbling (roughing of concrete surfaces) if possible
	Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out

Site Application	Mitigation Measures
Trackout	Use water assisted dust sweepers on the access and local roads to removed tracked out material is necessary. A road sweeper vehicle will be employed to visit site and clean the site roads each day to prevent a build-up of mud, grit and dirt. This will take place every afternoon prior to the close of site and will also be on call as necessary through each day should there be a need for its services
	Avoid dry sweeping large areas
	Ensure vehicles entering and leaving sire are covered to prevent escape of materials during transport
	A power washing area will be installed on the main site road near the site entrance so that other construction vehicles exiting can also be cleaned down before entering the public highway
	Access gates to be located at least 10m from receptors where possible
	All vehicles will be inspected prior to leaving site to ensure limited mud will be placed on the carriage way

6.1.1 Cumulative Impacts

There is the potential for cumulative construction phase dust impacts to occur, arising during the construction of both the proposed Application Site and any other surrounding developments which occur within a combined 350m site buffer radii.

For a potential cumulative construction phase dust impact to occur, the Application Site and any adjacent developments would need to be demolished / constructed either concurrently or sequentially. However, it is noted that both the Application Site and any adjacent developments to be demolished / constructed would be required to implement construction phase dust mitigation measures as stated within the IAQM guidance and as detailed above in Table 6-1. Therefore, the application of the above mitigation measures would produce a negligible effect and be considered to be 'not significant'.

Cumulative effects are therefore considered to be 'not significant'.

6.2 Construction Phase Road Traffic Emissions

Potential air quality impacts associated with construction phase road traffic emissions (principally HDV movements) have been screened out for further assessment with associated impacts on air quality predicted to result in an 'insignificant' effect. Therefore, mitigation measures are not considered to be required.

6.3 Construction Phase NRMM Emissions

LAQM.TG(16) guidance states that with the application of suitable control measures and site management, exhaust emissions from on-site NRMM are "*unlikely to make a significant impact on local air quality. In the vast majority of cases they will not need to be quantitatively assessed*".

The following controls would apply to NRMM:

- all NRMM should use fuel equivalent to ultralow sulphur diesel;
- all NRMM should comply with either the current or previous EU Directive Staged Emission Standards;

- all NRMM should be fitted with Diesel Particulate Filters (DPF) conforming to defined and demonstrated filtration efficiency (load/duty cycle permitting);
- the on-going conformity of plant retrofitted with DPF, to a defined performance standard; and
- implementation of fuel conservation measures including instructions to throttle down or switch off idle construction equipment; switch off the engines of trucks while they are waiting to access the site and while they are being loaded or unloaded, ensure equipment is properly maintained to ensure efficient fuel consumption.

Successful implementation of the above mitigation measures, which should be secured by planning condition, would ensure that emissions from the construction phase and NRMM used during construction are 'not significant'.

6.4 Operational Phase Road Traffic Emissions

Potential air quality impacts associated with construction phase road traffic emissions (principally HDV movements) have been screened out for further assessment with associated impacts on air quality predicted to result in an ‘insignificant’ effect. Therefore, mitigation measures are not considered to be required.

6.5 Operational Phase Combustion Emissions

In accordance with the stated EPUK & IAQM assessment methodology, the impact on air quality associated with the operational phase combustion emission assessment is considered to be ‘not significant’. There are no predicted exceedences of any considered AQO at any location of relevant exposure. Therefore, no supplementary mitigation is considered to be required.

7.0 RESIDUAL EFFECTS

7.1 Construction Phase Dust

On the basis that the mitigation measures outlined in Table 6-1 are implemented, the residual effects from activities generating construction phase dust are predicted to be 'not significant' in accordance with the stated IAQM guidance.

7.2 Construction Phase NRMM Emissions

On the basis that the mitigation measures outlined in Section 6.3 are implemented, the residual effects from activities generating construction phase dust are predicted to be 'not significant' in accordance with the stated LAQM.TG(16) guidance.

7.3 Construction Phase Road Traffic Emissions

The predicted residual effects of road traffic emissions arising from the construction phase of the scheme on existing sensitive receptors are predicted to be 'not significant' without the inclusion of mitigation measures.

7.4 Operational Phase Road Traffic Emissions

The predicted residual effects of road traffic emissions arising from the operational phase of the scheme on existing sensitive receptors are predicted to be 'not significant' without the inclusion of mitigation measures.

7.5 Operational Phase Combustion Emissions

The residual impact on air quality from combustion emission point sources associated with the Proposed Development is considered to be 'not significant' for all considered receptors without the inclusion of mitigation measures.

8.0 SUMMARY OF EFFECTS

The overall effects of the Proposed Development on air quality are summarised in Table 8-1

Table 8-1
Construction Dust Mitigation Measures

Description of Significant Effects	Receptor	Significance of Effects				Mitigation	Significance of Residual Effect s			
		Risk	Po/N	T/Pe	I/D		Risk	Po/N	T/Pe	I/D
Construction Phase										
Dust Soiling	Human	Low Risk	N	T	D	Dust Control Measures	Negligible	N	T	D
Human Health	Human	Low Risk	N	T	D	Dust Control Measures	Negligible	N	T	D
Construction Traffic Emissions	Human	Negligible	N	T	D	Construction Environmental Management Plan / Construction Logistics Plan	Negligible	N	T	D
Construction Plant (NRMM) Emissions	Human	Negligible	N	T	D	Construction Environmental Management Plan	Negligible	N	T	D
Operational Phase										
Traffic Emissions	Human Receptors	Negligible	N	Pe	D	Travel Plan	Negligible	N	Pe	D
Combustion Emissions	Human Receptors	Negligible	N	Pe	D	-	Negligible	N	Pe	D
	Ecological Receptors	Negligible	N	Pe	D	-	Negligible	N	Pe	D

Note:
Po = Positive
N= Negative
T = Temporary
Pe = Permeant
I = Indirect
D = Direct

9.0 CONCLUSIONS

The assessment has considered the significance of potential effects on the local air quality and amenity as a result of the proposed development of the Application Site. The proposed development incorporates an extension to the existing papermill, including an expansion to the existing energy centre.

A qualitative assessment of the potential dust impacts during the construction of the development has been undertaken. Through good practice and implementation of appropriate mitigation measures, it is expected that the release of dust would be effectively controlled and mitigated, with resulting impacts considered to be 'not significant'. All dust impacts are considered to be temporary and short-term in nature.

Due to the low additional number of HDV trips anticipated during the construction phase of the development, these are predicted to result in an 'insignificant' effect on air quality from road vehicle emissions. Furthermore, emissions from plant / NRMM on-site is predicted to result in a 'not significant' impact on air quality.

Due to the low additional number of HDV and LDVs trips predicted to be generated during the operational phase of the development, there is predicted to be an 'insignificant' effect on air quality from road vehicle emissions.

A dispersion modelling assessment has been undertaken to quantify potential impacts on air quality, at both human and ecological receptors, arising from increased combustion emissions generated during the operational phase of the Proposed Development. In accordance with the stated EPUK & IAQM assessment methodology, the operational phase impact on air quality arising from combustion plant emissions is considered to be 'not significant' at all considered human receptor locations.

Impacts on Critical Levels at considered ecological designations are less than 1% of the annual mean NOx and SO_2 Critical Levels and less than 10% of the 24-hour mean NOx level. Furthermore, impacts on Critical Loads at considered ecological designations are less than 1% of the relevant nutrient nitrogen and acidification Critical Loads. Therefore, impacts on are predicted to result in 'no likely significant effects (alone and in-combination)' at all considered ecological receptors.

As such, it is not considered that air quality represents a material constraint to the development proposals, which conform to the principles of Planning Policy Wales, and the Bridgend County Borough Council Local Plan.

DRAWINGS

286700 287400 288100 288800

188000

187300

350m

100m

50m

20m

N

0 100 200 300 400

Metres

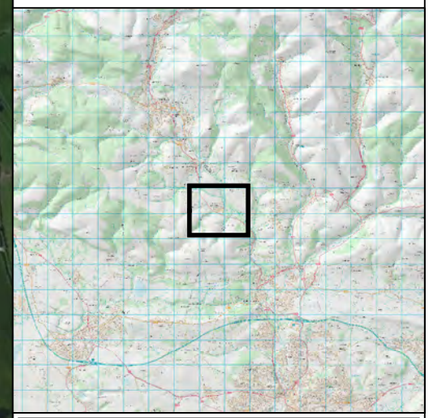
LEGEND

SITE BOUNDARY

BUFFERS FROM SITE BOUNDARY (20/50/100/350m)

TRACKOUT

TRACKOUT 50m BUFFER



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BRIDGEND PAPER MILL

AIR QUALITY ASSESSMENT

SITE SETTING AND CONSTRUCTION PHASE RECEPTORS

AQ1

Scale 1:7,000 @ A3

Date FEBRUARY 2020

09898.00001.23.001.0 Site Setting and Construction Phase Receptors

Appendix A

Construction Dust Assessment Methodology

Predicting Risk

The assessment of risk is determined by considering the predicted change in conditions as a result of the development. The risk category for potential dust effects arising from site works is defined into 4No. potential activities:

- demolition;
- earthworks;
- construction; and
- trackout.

The determination of risk categories presented above are based upon the descriptors presented within IAQM: Guidance on the assessment of dust from demolition and construction.

Sensitivity of Receptor

To determine the significance of dust effects associated with the construction phase of the development, an evaluation of the sensitivity of the surrounding area is required. Receptors can demonstrate different sensitivities to changes in their environment, and are classified as detailed within Table A-1.

Quoted distances to the nearest receptor are from the dust emission sources. Where this is not known, receptor distances are determined from the site boundary. The risk category is based upon the distance of site works to the nearest receptor.

Table A-1
Methodology for Defining Sensitivity to Dust Effects

Sensitivity of Area	Examples		
	Human Receptors		Ecological Receptors [A]
	Dust Soiling Effects	Health Effects of PM_{10}	
High	• users can reasonably expect an enjoyment of a high level of amenity; or • the appearance, aesthetics or value of their property would be diminished by soiling; and the people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. • indicative examples include dwellings, museums and other culturally important collections, medium and long term car parks and car showrooms.	• locations where members of the public are exposed over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day). • Indicative examples include residential properties. Hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment.	• locations with an international or national designation and the designated features may be affected by dust soiling; or • locations where there is a community of a particularly dust sensitive species such as vascular species included in the Red Data List For Great Britain. • indicative examples include a Special Area of Conservation (SAC) designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings.
Medium	• users would expect to enjoy a reasonable level of amenity,	• locations where the people exposed are workers, and	• locations where there is a particularly important plant

Sensitivity of Area	Examples		
	Human Receptors		Ecological Receptors [A]
	Dust Soiling Effects	Health Effects of PM_{10}	
	but would not reasonably expect to enjoy the same level of amenity as in their home; or • the appearance, aesthetics or value of their property could be diminished by soiling; or • the people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land. • indicative examples include parks and places of work.	exposure is over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day). • indicative examples include office and shop workers, but will generally not include workers occupationally exposed to PM_{10}, as protection is covered by Health • and Safety at Work legislation.	species, where its dust sensitivity is uncertain or unknown; or • locations with a national designation where the features may be affected by dust deposition. • indicative example is a Site of Special Scientific Interest (SSSI) with dust sensitive features.
Low	• the enjoyment of amenity would not reasonably be expected; or • property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or	• locations where human exposure is transient. • indicative examples include public footpaths, playing fields, parks and shopping streets.	• locations with a local designation where the features may be affected by dust deposition. • indicative example is a local Nature Reserve with dust sensitive features.

Sensitivity of Area	Examples		
	Human Receptors		Ecological Receptors (A)
	Dust Soiling Effects	Health Effects of PM_{10}	
	• there is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal • pattern of use of the land. • indicative examples include playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads.		
Notes: (A) Only applicable if ecological habitats are present which may be sensitive to dust effects.			

Assessment of Impact Significance – Dust Effects

Table A-2 to Table A-4 illustrate how the sensitivity of the area may be determined for dust soiling, human health and ecosystem impacts, respectively. The highest level of sensitivity from each table should be recorded.

Table A-2
Sensitivity of Area to Dust Soiling Effects on People and Property

Receptor Sensitivity	Number of Receptors	Distance from Source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10 – 100	Medium	Medium	Low	Low
	1 – 10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	<1	Low	Low	Low	Low

Table A-3
Sensitivity of Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number of Receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
High	>32µg/m^3	>100	High	High	High	Medium	Low
		10 – 100	High	High	Medium	Low	Low
		1 – 10	High	Medium	Low	Low	Low
	28 – 32µg/m^3	>100	High	High	Medium	Low	Low
		10 – 100	High	Medium	Low	Low	Low
		1 – 10	High	Medium	Low	Low	Low
	24 – 28µg/m^3	>100	High	Medium	Low	Low	Low
		10 – 100	High	Medium	Low	Low	Low
		1 – 10	Medium	Low	Low	Low	Low
	<24µg/m^3	>100	Medium	Low	Low	Low	Low
		10 – 100	Low	Low	Low	Low	Low
		1 – 10	Low	Low	Low	Low	Low
Medium	>32µg/m^3	>10	High	Medium	Low	Low	Low
		1 – 10	Medium	Low	Low	Low	Low
	28 – 32µg/m^3	>10	Medium	Low	Low	Low	Low

		1 – 10	Low	Low	Low	Low	Low
	24 – 28µg/m^3	>10	Low	Low	Low	Low	Low
		1 – 10	Low	Low	Low	Low	Low
	<24µg/m^3	>10	Low	Low	Low	Low	Low
		1 – 10	Low	Low	Low	Low	Low
Low	-	1	Low	Low	Low	Low	Low

Table A-4
Sensitivity of Area to Ecological Impacts

Receptor Sensitivity	Distance from the Source (m) (A)	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low
Note: (A) For trackout, the stand-offs should be measured from the side of the roads used by construction traffic.		

Defining the Risk of Impact

Table A-5 to Table A-8 illustrates how the dust emission magnitude should be combined with the sensitivity of the area to determine the risk of impacts with no mitigation measures applied.

Table A-5
Risk of Dust Impacts – Demolition

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

Table A-6
Risk of Dust Impacts – Earthworks

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table A-7
Risk of Dust Impacts – Construction

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table A-8
Risk of Dust Impacts – Trackout

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

APPENDIX B

Atmospheric Dispersion Modelling Technical Appendix

Source of Emission

The operation of the Site has the potential to release emissions to atmosphere. These are to be emitted from the existing and proposed stacks serving the papermill site operations, including from the CHP plant.

Modelling Scenarios

The scenarios considered within the dispersion modelling assessment are detailed in Table B-1.

Table B-1
Operational Phase Dispersion Modelling Scenarios – Combustion Emissions Assessment

Pollutant	Modelled As	
	Short-term	Long-Term
NO_2	24-hour mean (1st high)	Annual mean
	99.79 percentile of 1-hour means	
PM_{10}	90.41 percentile of 1-hour means	Annual mean
SO_2	99.73 percentile of 1-hour means	Annual mean
	99.18 percentile of 24-hour means	
	99.9 percentile of 15-minute means	
CO	8-hour rolling mean (1st high)	-

Process Conditions

Reference should be made to Table B-2 and B-3 for details of process conditions and inputs utilised within the dispersion modelling assessment for the existing site and proposed site, respectively, as provided by WEPA UK Limited. Stack naming is in accordance with the Environmental Permit for the existing site.

Table B-2
Operational Phase Combustion Emissions – Stack Source Process Conditions: Existing

Parameter	A1 Gas Turbine	A2 Shell Boiler	A4 Jupiter Machine
Stack Height (m)	37.0	30.0	20.3
Stack Diameter (internal) (m)	2.2	0.9	1.5
Stack Location (m) (X, Y)	X: 287981.95 Y: 187040.31	X: 287984.48 Y: 187054.79	X: 287859.10 Y: 187111.86
Flue gas emission velocity (stack conditions) (m/s)	11.41	4.73	6.31
Actual Flow Rate (Am^3/s)	43.37	3.01	11.15

Parameter	A1 Gas Turbine	A2 Shell Boiler	A4 Jupiter Machine
Normalised Flow Rate (Nm^3/s)	8.24	1.48	10.51
Temperature (°C)	175	210	80

Table B-3
Operational Phase Combustion Emissions – Stack Source Process Conditions: Proposed

Parameter	A1 Gas Turbine	A2 Shell Boiler	A4 Jupiter Machine	New A1 Gas Turbine (additional turbine)	New 02 emission point (Yankee Hood Air Syst)
Stack Height (m)	37.0	30.0	20.3	37.0	30.4
Stack Diameter (internal) (m)	2.2	0.9	1.5	2.2	1.0
Stack Location (m) (X, Y)	X: 287981.95 Y: 187040.31	X: 287984.48 Y: 187054.79	X: 287859.10 Y: 187111.86	X: 287981.95 Y: 187040.31	X: 287882.31 Y: 187035.92
Flue gas emission velocity (stack conditions) (m/s)	11.41	4.73	6.31	11.41	26.74
Actual Flow Rate (Am^3/s)	43.37	3.01	11.15	43.37	21.0
Normalised Flow Rate (Nm^3/s)	8.24	1.48	10.51	8.24	
Temperature (°C)	175	210	80	175	80

Applied Emission Rates

Emission rates for all pollutants have been calculated based upon the emission limits presented within the Environmental Permit for the existing WEPA UK Limited paper mill (Environmental Permit number: EPR/EP3738NG). Emission concentrations for proposed additional combustion point sources were provided by WEPA UK Limited. Reference should be made to Table B-4 and Table B-5 for emission rates applied for the existing and proposed site layouts, respectively.

Table B-4
Operational Phase, Combustion Plant Emissions – Applied Emission Limits: Existing Site

Pollutant	Emission Concentration (mg/Nm^3)	Emission Rate (g/s)
A1 Gas Turbine		
NOx	250	2.06
SO_2	50	0.41
Particulates (PM)	10	0.08

Pollutant	Emission Concentration (mg/Nm³)	Emission Rate (g/s)
CO	150	1.24
A2 Shell Boiler		
NOx	250	0.37
SO_2	50	0.07
PM	10	0.01
CO	150	0.22
A4 Jupiter Machine		
NOx	40	0.42

Table B-5
Operational Phase, Combustion Plant Emissions – Applied Emission Limits: Proposed Site

Pollutant	Emission Concentration (mg/Nm³)	Emission Rate (g/s)
A1 Gas Turbine		
NOx	250	2.06
SO_2	50	0.41
PM	10	0.08
CO	150	1.24
A2 Shell Boiler		
NOx	250	0.37
SO_2	50	0.07
PM	10	0.01
CO	150	0.22
A4 Jupiter Machine		
NOx	40	0.42
New A1 Gas Turbine (additional turbine)		
NOx	250	2.06
SO_2	50	0.41
PM	10	0.08
CO	150	1.24
New 02 emission point (Yankee Hood Air Syst)		
NOx	40	0.84

In air quality terms, particulate matter is classified in terms of its aerodynamic diameter; with PM_{10} relating to particles with an aerodynamic diameter of less than 10µm. Other smaller relevant fractions of particulate matter such as $PM_{2.5}$ are a sub-fraction of the PM_{10} fraction i.e. PM_{10} includes $PM_{2.5}$.

Emissions of particulate matter from the existing and proposed Application Site would range in particle size, with only a proportion being PM_{10} or smaller. The Application Site will utilise abatement technology, which is considered to reduce the total PM emission from the site.

The ELV stated within the existing Permit is stated as total 'particulates'. However, for the purposes of the modelling it was considered that the entire PM emission consisted of only PM_{10}, allowing the maximum ground level impacts with respect to the AQOs to be considered.

Emission rates were applied 24/7 365-days per year assuming no periods of shut-down, as a precautionary assessment of potential impacts.

Dispersion Model Set-up

For this assessment the Lakes AERMOD v9.5.0 model has been applied with due consideration to relevant guidance. This model is widely used and accepted by UK planning authorities for undertaking such assessments and its predictions have been validated against real-time monitoring data by the USEPA. It is therefore considered a suitable model for this assessment.

Given the 'rural' setting of the Application Site, the 'rural dispersion' coefficient was selected in accordance with AERMOD guidance on land-use classifications.

Meteorological Data

Meteorological data used in this assessment comprised a 5-year sequential hourly average dataset to comply with current EA modelling guidance. This accounts for inter-year variability in meteorological conditions, with the average of the 5-year data set being used.
The meteorological data for St. Athan observation station was converted to the required surface and profile formats for use in AERMOD using AERMET Pro. Details specific to the exact site location were used for the conversion, such as latitude, longitude and surface characteristics in accordance with the latest guidance[15].

Surface roughness was calculated using classification of land use and distance weighting, utilising the surface roughness factors as presented in the Aermet User Guide[16]. The Bowen ratio and albedo were assigned based on the predominant land use in the areas surrounding the site. Reference should be made to Table B-6 for details of the applied values.

Table B-6
St Athan Meteorological Data Preparation – Applied Surface Characteristics

Zone (Start)	Zone (End)	Albedo	Bowen	Roughness
120	275	0.2075	1.625	1
275	120	0.28	0.75	0.0725

Table B-7 presents statistics on the meteorological dataset illustrating the number of calm hours and the number of missing hours recorded within the 5-year period. Data capture, in terms of the percentage of calm hours and missing hours recorded are less than 10% and therefore, within acceptable limits.

Table B-7
St Athan: Meteorological Data Statistics

Year	Calm Hours (%)	Missing Hours (%)
2015	0.45	0.57
2016	0.49	1.49
2017	0.53	0.25

[15] AERMOD Implementation guide. AERMOD implementation workgroup, USEPA. Last revised August, 2019.
[16] User's Guide for the AERMOD Meteorological Preprocessor (AERMET), USEPA, August 2019. Table 4-2.

Year	Calm Hours (%)	Missing Hours (%)
2018	0.46	2.47
2019	0.51	1.08

Wind roses for each considered meteorological year are presented in Figure B-1 to Figure B-5.

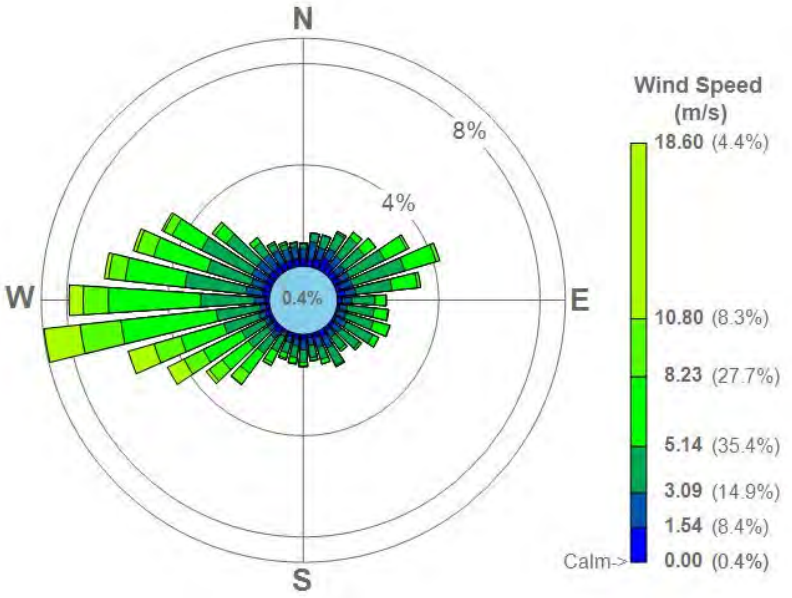

Figure B-1
St Athan Meteorological Data Wind Rose 2015

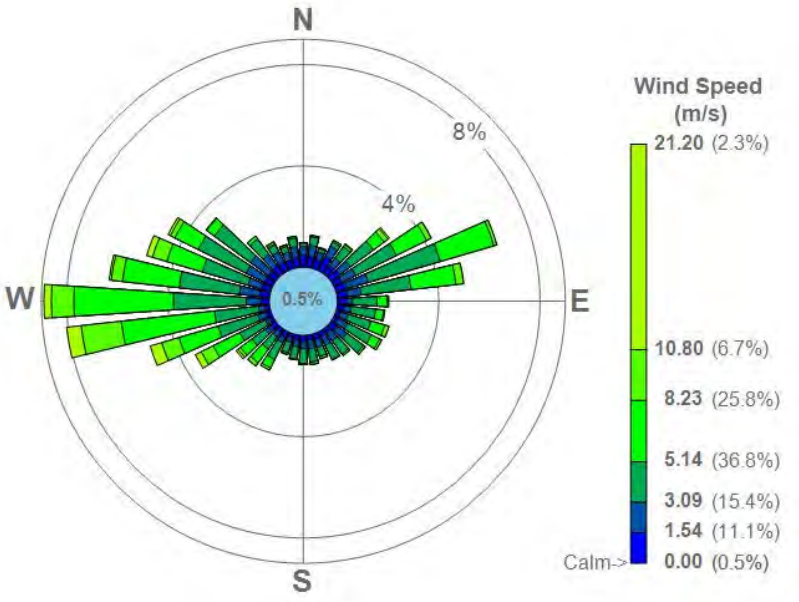

Figure B-2
St Athan Meteorological Data Wind Rose 2016

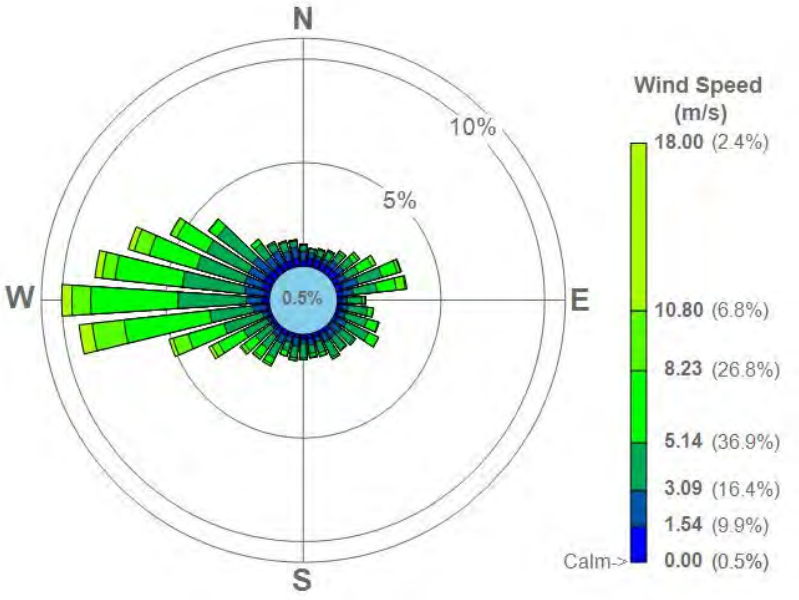

Figure B-3
St Athan Meteorological Data Wind Rose 2017

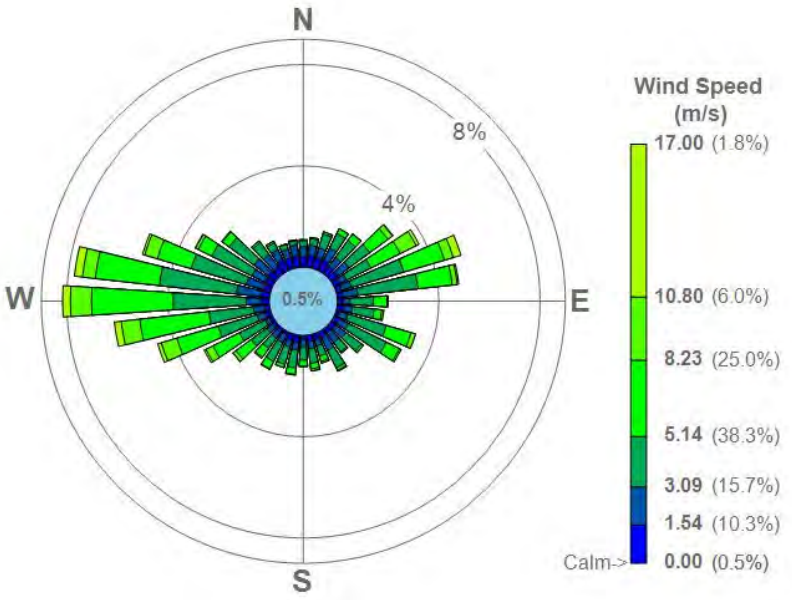

Figure B-4
St Athan Meteorological Data Wind Rose 2018

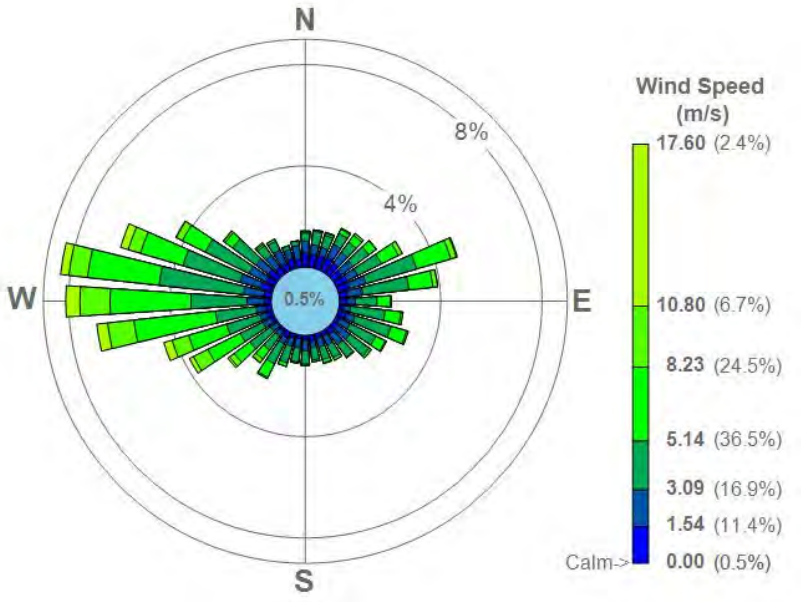

Figure B-5
St Athan Meteorological Data Wind Rose 2019

Model Domain

The potential air quality impact of Site was assessed over an area of 2km radius from the Site, centred on NGR: x287980, y187040. The receptor grid spacing resolution used was 25m.

In addition, the identified potentially sensitive locations, detailed in Table 4-1 were modelled as discrete receptors.

Terrain Data

The presence of elevated terrain can significantly affect the dispersion of pollutants and the resulting ground level concentration in a number of ways. Elevated terrain reduces the distance between the plume centre line and the ground level, thereby increasing ground level concentrations. Elevated terrain can also increase turbulence and, hence, plume mixing with the effect of increasing concentrations near to a source and reducing concentrations further away.

AERMOD utilises digital elevation data to determine the impact of topography on dispersion from a source. Topography was incorporated within the modelling using 30m resolution Shuttle Radar Topography Mission (SRTM) terrain data files.

The topography surrounding the site is varied and rises to the north-east and south-west of the site, from a base above ordnance datum (AOD) height of approximately 80m (covering the Site) to a maximum of approximately 250m within 1.5km of the site. As such topography has been incorporated into the model. Data was processed by the AERMAP function within AERMOD to calculate terrain heights as illustrated in Figure B-6.

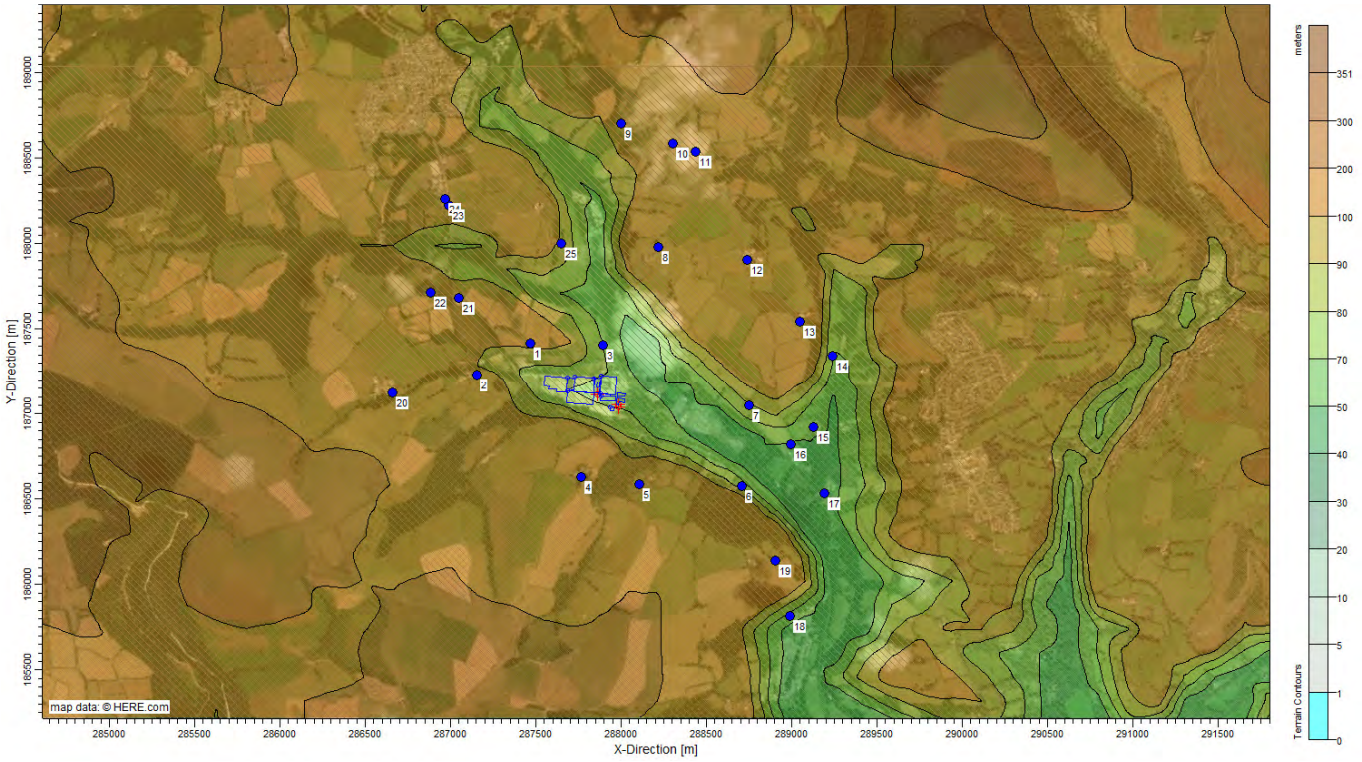

Figure B-6
Surrounding Topography – WEPA Bridgend Site

Building Downwash

The movement of air over and around buildings and other structures generates areas of flow re-circulation that can lead to increased ground level concentrations of pollutants close to the source. Where the stack height is less than 2.5 times the height of any nearby building (within 5 stack heights), downwash effects and entrainment can be significant. Building downwash occurs when turbulence, induced by nearby structures, causes pollutants emitted from an elevated source to be displaced and dispersed rapidly towards the ground, resulting in elevated ground level concentrations.

The integrated Building Profile Input Programme (BPIP) module within AERMOD was used to assess the potential impact of building downwash upon predicted dispersion characteristics. Building downwash occurs when turbulence, induced by nearby structures, causes pollutants emitted from an elevated source to be displaced and dispersed rapidly towards the ground, resulting in elevated concentrations.

Structures input to the model are represented in Figure B-7 and Figure B-8 for the existing and proposed Application Site layouts, respectively. Site building and structure height information were provided by WEPA UK Limited.

Figure B-7
Modelled Buildings and Structures – WEPA Bridgend Site: Existing

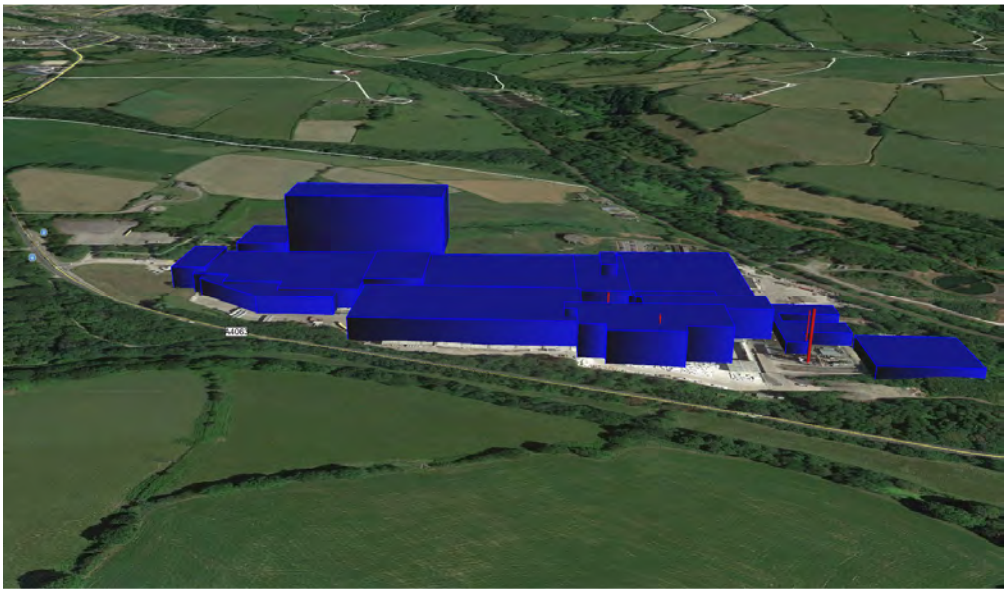

Figure B-8
Modelled Buildings and Structures – WEPA Bridgend Site: Proposed

Special Model Treatments

NOx to NO_2 Conversion

Oxides of nitrogen (NOx) emitted to atmosphere as a result of combustion will consist largely of nitric oxide (NO), a relatively innocuous substance. Once released into the atmosphere, NO is oxidised to NO_2. The proportion of NO converted to NO_2 depends on a number of factors including wind speed, distance from the source, solar radiation and the availability of oxidants, such as ozone (O_3).

A worse-case scenario has been applied in that 35% of NOx is presented as NO_2 in relation to short-term impacts and 70% of NOx is present as NO_2 in relation to long term impacts in accordance with the EA's Air Quality Modelling and Assessment Unit (AQMAU) guidance on conversion ratio for NOx and NO_2.

Ecological Assessment – Model Treatments

Calculation of Contribution to Critical Loads

Deposition rates were calculated using empirical methods recommended by the EA AQTAG06[17]. Dry deposition flux was calculated using the following equation:

Dry deposition flux (µg/m^2/s) = ground level concentration (µg/m3) x deposition velocity (m/s)

Wet deposition occurs via the incorporation of the pollutant into water droplets which are then removed in rain or snow and is not considered significant over short distances (AQTAG06) compared with dry deposition and therefore for the purposes of this assessment, wet deposition has not been considered.

The applied deposition velocities for the relevant chemical species are as shown in Table B-8.

Table B-8
Applied Deposition Velocities

Chemical Species	Recommended deposition velocity (m/s)	
NO_2	Grassland	0.0015
	Woodland	0.0030
SO_2	Grassland	0.012
	Woodland	0.024

It is noted that the 'grassland' deposition velocities have been applied to ecological receptors ER1 (Kenfig / Cynffig) and ER2 (Glaswelltiroedd Cefn Cribwr / Cefn Cribwr Grasslands). The 'woodland' deposition velocities have been applied to ecological receptor ER3 (Blackmill Woodlands).

Critical Loads – Eutrophication

The critical loads for nitrogen deposition (N) are recorded in units of kgN/ha/yr. The deposition PC is converted from µg/m^2/s to units of kgN/ha/year by multiplying the dry deposition flux by the standard conversion factors of 95.9 for NO_2.

[17] AQTAG06 – Technical Guidance on detailed modelling approach for an appropriate assessment for emissions to air. Environment Agency, March 2014 version.

Critical Loads – Acidification

The predicted deposition rates are converted to units of equivalents (keq/ha/year), which is a measure of how acidifying the chemical species can be, by multiplying by the dry deposition flux (kg/ha/year) by standard conversion factors as presented in Table B-9.

Table B-9
Applied Acidification Conversion Factors

Chemical Species	Conversion factor [kg/ha/year to keq/ha/year]
NO_2	6.84
SO_2	9.84

Calculation of PC as a Percentage of the Acid Critical Load Function

The calculation of the process contribution of N and S to the acid critical load function has been carried out according to the guidance on APIS, which is as follows:

> *'The potential impacts of additional sulphur and/or nitrogen deposition from a source are partly determined by PEC, because only if PEC of nitrogen deposition is greater than CLminN will the additional nitrogen deposition from the source contribute to acidity. Consequently, if PEC is less that CLminN only the acidifying affects of sulphur from the process need to be considered:*
>
> *Where PEC N Deposition < CLminN*
>
> *PC as % CL function = (PC S deposition/CLmaxS)*100*
>
> *Where PEC is greater than CLminN (the majority of cases), the combined inputs of sulphur and nitrogen need to be considered. In such cases, the total acidity input should be calculated as a proportion of the CLmaxN.*
>
> *Where PEC N Deposition > CLminN*
>
> *PC as %CL function = ((PC of S+N deposition)/CLmaxN)*100'*

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