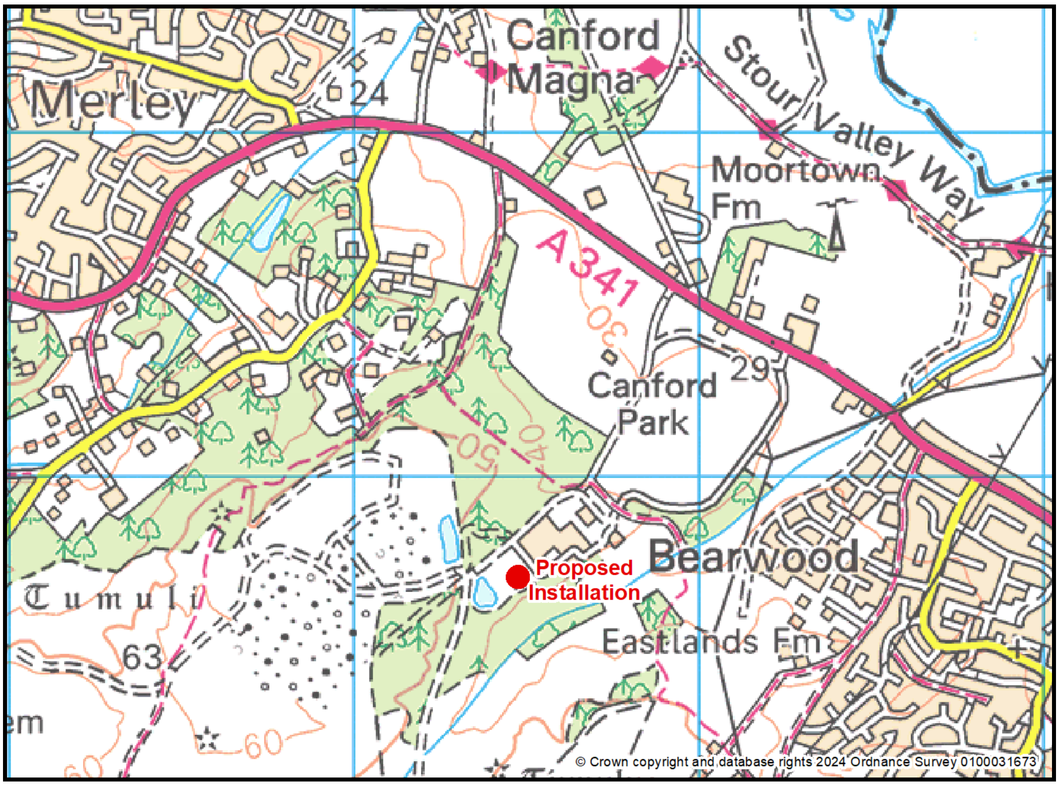
CANFORD ENERGY FROM WASTE COMBINED HEAT AND POWER FACILITY:

AIR QUALITY ASSESSMENT



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CONTENTS

1 INTRODUCTION

1.1 PURPOSE OF THE ASSESSMENT

Gair Consulting Ltd has been commissioned by Air Quality Consultants Limited, on behalf of MVV, to provide an air quality assessment of operational emissions to atmosphere from a proposed Energy from Waste (EfW) Combined Heat and Power (CHP) Facility (the EfW CHP Facility) at Canford Resource Park, Arena Way, Magna Road, Wimborne, Dorset, BH21 3BW. The assessment is provided to support the Environmental Permit application for the Installation.

The primary purpose of the EfW CHP Facility is to treat the waste from the Bournemouth, Christchurch, Poole, and surrounding areas of Dorset that cannot be recycled, reused, or composted, i.e., it is residual waste that would otherwise be landfilled or exported to alternative EfW facilities, either in the UK or Europe.

The EfW CHP Facility is designed to treat up to 260,000 tonnes (t) of residual waste per annum at the thermal design point of 100.5 Megawatts thermal (MWth). It will have a design throughput of 33.2 tonnes per hour (tph) of waste with a Calorific Value (CV) of 10.9 Megajoules per kilogram (MJ/kg)) and an availability of 89.4% (equal to approximately 7,830 full load operational hours per year). However, as a worst-case it is assumed for this air quality assessment that the EfW CHP Facility operates continuously at the maximum permissible emission limit values.

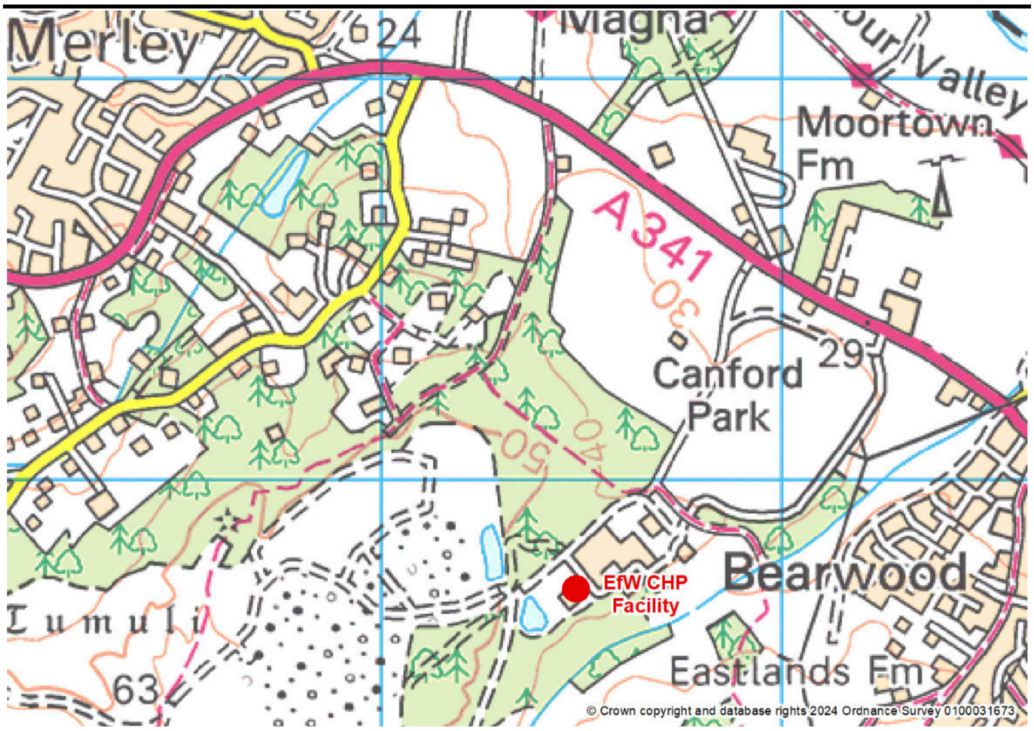
1.2 BACKGROUND TO THE IMPACT ASSESSMENT

The Installation site is located at the Canford Resource Park (refer *Figure 1.1*). The Installation is located within the administrative area of Bournemouth, Christchurch and Poole (BCP) Council. BCP Council has declared two areas as Air Quality Management Areas (AQMAs). One of these is located within and around Ashley Road 4.6 km to the south of the EfW CHP Facility. The other (Poole AQMA) is located along Commercial Road and its junctions with Station Road and Curzon Road (5.3 km to the south). These are both declared due to exceedances of the annual mean air quality objective for nitrogen dioxide (NO_2). At these distances it is unlikely that emissions from the EfW CHP Facility would have a significant impact on air quality within these AQMAs. Therefore, the Installation is not located within or close to an AQMA.

The nearest residential receptors to the Installation are located off Provence Drive approximately 670 m east of the EfW CHP Facility. Other sensitive receptors in close proximity to the Site include the proposed Provence Drive business units and Canford Sports Club.

Operational access to the Installation would be along Arena Way off Magna Road (A341).

FIGURE 1.1 LOCATION OF THE EFW CHP FACILITY



1.3 SCOPE OF THE ASSESSMENT

Operational impacts associated with the combustion sources have been assessed using a dispersion model to predict the impact at ground level utilising five years of meteorological data from Bournemouth Airport (2016 to 2020). This has considered the impact on human health and sensitive habitat sites.

Emissions to air from the EfW CHP Facility will be governed by the Industrial Emissions Directive (IED) [1], which requires adherence to emission limits for the following pollutants:

- nitrogen oxides (NOx as NO_2);
- carbon monoxide;
- total dust (as PM_{10} and $PM_{2.5}$);
- gaseous and vaporous organic substances, expressed as total organic carbon;
- sulphur dioxide;
- hydrogen chloride;

1 The Industrial Emissions Directive, 2010/75/EU

- hydrogen fluoride;
- twelve trace metals; and
- dioxins and furans.

The assessment has also considered emissions of polycyclic aromatic hydrocarbons (PAH, as benzo[a]pyrene) and polychlorinated biphenyls (PCBs). It is proposed that NOx emissions will be controlled via the injection of urea and will result in emissions of ammonia from ammonia slip. Therefore, ammonia emissions have also been included in the assessment.

In addition to the EfW CHP Facility emissions, there would be an Emergency Diesel Generator (EDG) that would be used during emergency conditions. This would be used for a maximum of 50 hours per annum (h/a) mainly during testing of the generator. Testing would take place fortnightly for a duration of 30 minutes. Emergency use would occur very infrequently and only during complete loss of electrical power to the EfW CHP Facility. Combined modelling of the EDG and the EfW CHP Facility is provided.

1.4 STRUCTURE OF THE REPORT

The remainder of this report is presented as follows:

- *Section 2* presents an assessment of baseline conditions for the location.
- *Section 3* provides a description of the assessment methodology.
- *Section 4* presents an assessment of the operational impact of emissions on human health and local air quality.
- *Section 5* presents an assessment of the operational impact of emissions on sensitive habitat sites.
- *Section 6* presents an assessment of emissions at half-hourly averages, the effect of abnormal emissions and a sensitivity analysis.
- *Section 7* summarises and concludes the air quality assessment.

2 BASELINE CONDITIONS

2.1 INTRODUCTION

This section of the report defines the baseline environment for the assessment and provides the following:

- a summary of relevant legislation and policy;
- a discussion of appropriate ambient air quality assessment criteria;
- a review of background monitoring data for the local area; and
- a description of local conditions that will affect the dispersion and dilution of emissions arising from the Installation.

2.2 LEGISLATION, POLICY AND GUIDANCE

2.2.1 The European Directive on Ambient Air and Cleaner Air for Europe

European Directive 2008/50/EC of the European Parliament and of the Council of 21st May 2008, sets legally binding Europe-wide limit values for the protection of public health and sensitive habitats. The Directive streamlines the European Union's air quality legislation by replacing four of the five existing Air Quality Directives within a single, integrated instrument.

The pollutants included are sulphur dioxide (SO_2), nitrogen dioxide (NO_2), particulate matter of less than 10 micrometres (µm) in aerodynamic diameter (PM_{10}), particulate matter of less than 2.5 µm in aerodynamic diameter ($PM_{2.5}$), lead (Pb), carbon monoxide (CO), benzene, ozone (O_3), polycyclic aromatic hydrocarbons (PAHs), cadmium (Cd), arsenic (As), nickel (Ni) and mercury (Hg).

2.2.2 Air Quality Strategy 2023

The Air Quality Strategy [2] is the government's strategic framework for local authorities and other partners. It sets out their powers, responsibilities, and further actions the government expects them to take. It sets out a framework to enable local authorities to deliver for their communities and contribute to the government's long-term air quality goals, including ambitious new targets for fine particulate matter ($PM_{2.5}$).

It fulfils the statutory requirement of the Environment Act 1995 as amended by the Environment Act 2021 to publish an Air Quality Strategy setting out air quality standards, objectives, and measures for improving ambient air quality

2 Air Quality Strategy, Framework for Local Authority Delivery, Department for Environment, Food and Rural Affairs (2023)

every 5 years. It does not replicate or replace other air quality guidance documents relevant to local authorities.

The government's national-level air quality regulations for concentrations consist of the Air Quality Standards Regulations 2010, which set limits for several pollutants, including nitrogen oxides, particulate matter, and others. In addition, under the Environment Act 2021, the government has set two new legally-binding long-term targets to reduce concentrations of fine particulate matter, $PM_{2.5}$.

The two new targets are an annual mean concentration of 10 µg m^{-3} and a reduction in average population exposure by 35% by 2040, compared to a 2018 baseline. These targets are designed to help drive reductions in the worst $PM_{2.5}$ hotspots across the country, whilst ensuring nationwide action to improve air quality for everyone.

There are also an interim targets for each long-term target in the Environmental Improvement Plan which will promote early action and improvement. These are an annual mean $PM_{2.5}$ concentration of 12 µg m^{-3} by January 2028 and a 22% reduction in average population exposure by January 2028 compared to a 2018 baseline.

2.2.3 Air Quality (England) Regulations

The Air Quality Standards (England) Regulations 2010 [3] have adopted into UK law the limit values required by EU Directive 2008/50/EC [4] and came into force on the 10th June 2010. These regulations prescribe the 'relevant period' (referred to in Part I2V of the Environment Act 1995) that local authorities must consider in their review of the future quality of air within their area. The regulations also set out the air quality objectives to be achieved by the end of the 'relevant period'.

Ozone is not included in the Regulations as, due to its transboundary nature, mitigation measures must be implemented at a national level rather than at a local authority level.

2.2.4 The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023

The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 [5] implements the requirements of The Environment Act 2021 [6] by

3 The Air Quality Standards Regulations 2010 – Statutory Instrument 2010 No. 1001

4 Directive 2008/50/EC of the European Parliament and of the Council of 21st May 2008, on ambient air quality and cleaner air for Europe

5 The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 - Statutory Instrument 2023 No. 96

6 Environment Act 2021, 2021 Chapter 30

establishing a legally binding duty on the government to bring forward new air quality targets for fine particulate matter. The instrument sets two legally binding environmental targets for air quality relating to the reduction of levels of fine particulate matter ($PM_{2.5}$) in ambient air: one with the purpose of reducing $PM_{2.5}$ in locations where concentrations are highest, the annual mean concentration target ("AMCT"); and a second with the purpose of reducing average exposure across the country, the population exposure reduction target ("PERT"). This instrument establishes for each target the level to be achieved and the date for its achievement, as well as making provision about monitoring, measurement, and calculation to assess whether the targets are met.

2.2.5 Local Air Quality Management (LAQM)

Part IV of the Environment Act 1995 also requires local authorities to periodically review and assess the quality of air within their administrative area. The Reviews are required to consider the present and future air quality and whether any air quality objectives prescribed in the Regulations are being achieved or are likely to be achieved in the future.

Where any of the prescribed air quality objectives are not likely to be achieved the authority concerned must designate that part an Air Quality Management Area (AQMA).

For each AQMA, the local authority 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 air quality objectives. Local authorities are not statutorily obliged to meet the objectives, but they must show that they are working towards them.

The Department for Environment, Food and Rural Affairs (Defra) has published technical guidance for use by local authorities in their Review and Assessment work [7]. This guidance, referred to as LAQM.TG(22), has been used where appropriate in the assessment.

2.2.6 Industrial Emissions Directive

The Industrial Emissions Directive (2010/75/EU) came into force on the 6th January 2011, replacing the seven existing Directives, including the Waste Incineration Directive (WID) and Large Combustion Plant Directive (LCPD), implemented through the Environmental Permitting Regulations (EPR).

The aim of the new Directive is to simplify the existing legislation and reduce administrative costs, whilst maintaining a high level of protection for the environment and human health. Permits will still be issued under EPR;

7 Department for Environment, Food and Rural Affairs (Defra), (August 2022): Part IV The Environment Act 1995 Local Air Quality Management Review and Assessment Technical Guidance LAQM.TG(22).

however existing and new sites will be required to comply with the requirements of the IED, which places greater emphasis on new plant best available technology (BAT).

The IED has been transposed into UK law via the Environmental Permitting (England and Wales) (Amendment) Regulations 2013 (SI 2013 No, 390), which came into force on 27th February 2013. The design and operation of all new waste incinerations facilities must ensure compliance with emission limit values (ELVs) set out in the IED.

2.2.7 Best Available Techniques Reference Document for Waste Incineration

The European Union Best Available Techniques (BAT) Reference Document (BREF) for Waste Incineration was adopted in December 2019. The proposed EfW CHP Facility does not currently have an Environmental Permit. Therefore, it would be classed as a new plant.

The BREF provides BAT Associated Emission Levels (AEL) for new plants and existing plants. For the purposes of this assessment, it is assumed that the EfW CHP Facility will need to comply with the requirements for new plant and for some pollutants the ELVs will be more stringent than those provided in the IED. Except for HF, the ELVs are provided as a range of concentrations for each pollutant. Therefore, for the purposes of this assessment it is assumed that the EfW CHP Facility will comply with the upper range of emissions. The ELVs adopted are provided in *Table 3.5* in *Section 3.4.3*.

2.3 ASSESSMENT CRITERIA

2.3.1 Non-metals

Air quality assessment levels (AQALs) for the non-metals considered for the assessment are summarised in *Table 2.1* and include UK air quality objectives (AQO), European limit values and Environment Agency Environmental Assessment Levels (EALs). There are no AQALs for dioxins and furans. The impact of emissions of dioxins and furans for the EfW CHP Facility has been assessed via a human health risk assessment (HHRA) which considers exposure via direct pathways (inhalation) and indirect pathways (ingestion). The HHRA is reported separately and submitted in support of the permit application.

TABLE 2.1 AIR QUALITY ASSESSMENT LEVELS FOR NON-METALS

Pollutant	Averaging Period	AQAL ($\mu g\ m^{-3}$)	Comments
Nitrogen dioxide (NO_2)	Annual mean	40	UK AQO and EU limit value
	1-hour mean	200	UK AQO and EU limit value, not to be exceeded more than 18 times per annum, equivalent to the 99.8th percentile of 1-hour means
	Annual mean	40	UK AQO and EU limit value

TABLE 2.1 AIR QUALITY ASSESSMENT LEVELS FOR NON-METALS

Pollutant	Averaging Period	AQAL ($\mu g\ m^{-3}$)	Comments
Fine particles (as PM_{10})	24-hour mean	50	UK AQO and EU limit value, not to be exceeded more than 35 times per annum, equivalent to the 90.4th percentile of 24-hour means
Fine particles (as $PM_{2.5}$)	Annual mean	20	EU limit value
Sulphur dioxide (SO_2)	24-hour mean	125	UK AQO and EU limit value, not to be exceeded more than 3 times per annum, equivalent to the 99.2nd percentile of 24-hour means
	1-hour mean	350	UK AQO and EU limit value, not to be exceeded more than 24 times per annum, equivalent to the 99.7th percentile of 1-hour means
	15-minute mean	266	UK AQO, not to be exceeded more than 35 times per annum, equivalent to the 99.9th percentile of 15-minute means
Carbon monoxide (CO)	8-hour mean	10,000	UK AQO and EU limit value
	1-hour mean	30,000	Environment Agency EAL (a)
Hydrogen chloride (HCl)	1-hour mean	750	Environment Agency EAL (a)
Hydrogen fluoride (HF)	Monthly mean	16	Environment Agency EAL (a)
	1-hour mean	160	Environment Agency EAL (a)
TOC (as 1,3-butadiene)	Annual mean	2.25	UK AQO
	24-hour mean (short-term)	2.25	Environment Agency EAL (a)
PAH (as benzo(a)pyrene	Annual mean	0.00025	UK AQO
Ammonia (NH_3)	Annual mean	180	Environment Agency EAL (a)
	1-hour mean	2,500	Environment Agency EAL (a)
Polychlorinated biphenyls (PCBs)	Annual mean	0.2	Environment Agency EAL (a)
	1-hour mean	6	Environment Agency EAL (a)
(a) Environment Agency Environmental Assessment Level (EAL) as provided in their risk assessment guidance (formerly H1)			

2.3.2 Trace Metals

For the trace metals considered, assessment criteria exist in the form of UK AQO and Environmental Assessment Levels (EALs) provided by the Environment Agency in their Risk Assessment Guidance (RAG, formerly H1). A summary of the appropriate criteria for the trace metals considered is presented in *Table 2.2*. The World Health Organization (WHO) also provides guidelines for the concentration of some trace metals in air. These are also presented in *Table 2.2*.

TABLE 2.2 AIR QUALITY ASSESSMENT LEVELS AND GUIDELINE VALUES FOR TRACE METALS

Metal	Source	Averaging Period	Value (µg m^{-3})
Antimony (Sb)	EA RAG	1-hour mean	150
		Annual mean	5
Arsenic (As)	EA RAG	Annual mean	0.006
	UK AQO	Annual mean	0.006 (b)
Cadmium (Cd)	UK AQO/WHO (c)	Annual mean	0.005 (b)
	EA RAG	24-hour mean (short-term)	0.03
Chromium compounds (as Cr)	EA RAG	24-hour mean (long-term)	2.0
Chromium VI	EA RAG	Annual mean	0.00025
Cobalt (Co)	Derived from HSE EH40/2002 OEL	Annual mean	1
Copper (Cu)	EA RAG	24-hour mean (long-term)	0.05
Lead	UK AQO	Annual mean	0.25
Manganese (Mn)	EA RAG	1-hour mean	1,500
	WHO (c)	Annual mean	0.15
Mercury (Hg)	EA RAG	1-hour mean	0.6
		24-hour mean (long-term)	0.06
Nickel (Ni)	EPAQS (a)/ UK AQO	Annual mean	0.02
	EA RAG	1-hour mean	0.7
Thallium (Tl)	Derived from HSE EH40/2002 OEL	Annual mean	1
Vanadium (V)	WHO (c)	24-hour mean	1

(a) Guidelines for Metals and Metalloids in Ambient Air for the Protection of Human Health, EPAQS (May 2009)

(b) Target value for total content in PM_{10} fraction, should be met by 31/12/2012

(c) World Health Organisation WHO, Air quality Guidelines 2000

(d) Additional safety factor of 5 applied to the OEL as this compound has a maximum exposure limit

2.4 LOCAL CONDITIONS

2.4.1 The Dispersion and Dilution of Emissions

For meteorological data to be suitable for dispersion modelling purposes a number of meteorological parameters need to be measured, on an hourly basis. These parameters include wind speed, wind direction, cloud cover and temperature. There are only a limited number of sites where the required meteorological measurements are made. In the UK, all of these sites are quality controlled by the Met Office.

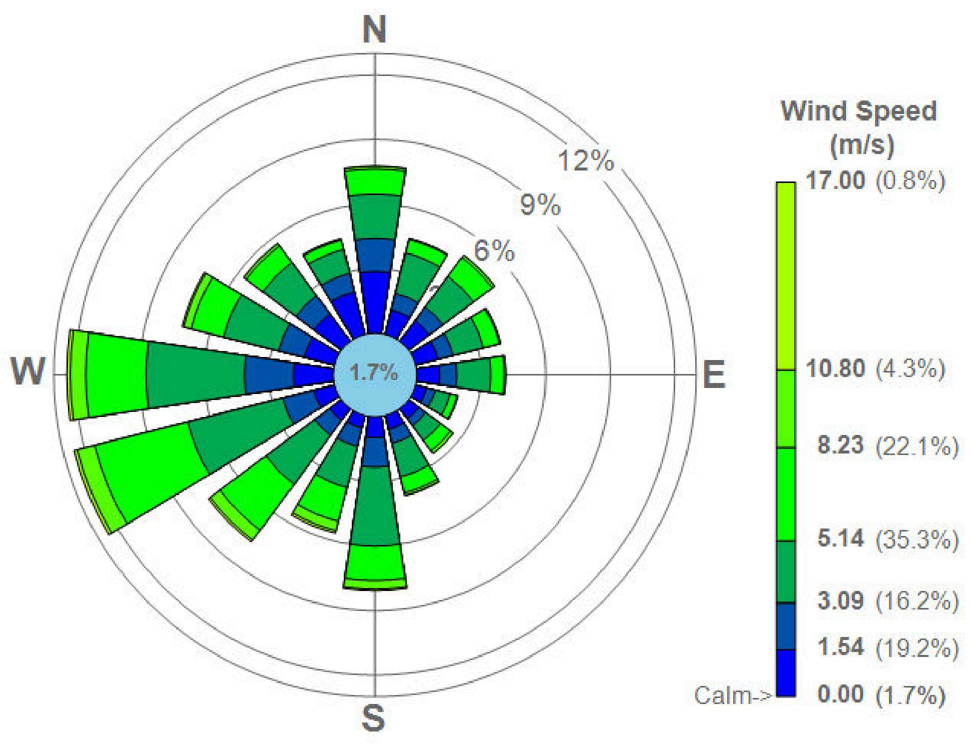
The most important climatological parameters governing the atmospheric dispersion of pollutants are as follows:

- **Wind direction** determines the broad transport of the emission and the sector of the compass into which the emission is dispersed.
- **Wind speed** will affect low-level emissions by increasing the initial dilution of pollutants in the emission whereas for high-level emissions, such as from a stack, higher winds will bring the plume to ground sooner than otherwise would be the case.
- **Atmospheric stability** is a measure of the turbulence, particularly of the vertical motions present.

2.4.2 Local Wind Climate for the Location

Met Office observing stations are limited and the most appropriate Met Office observing station to the Installation site, with full data suitable for dispersion modelling, is located at Bournemouth Airport, approximately 8 km to the east. Five years of meteorological data have been obtained (2016 to 2020) and a wind rose for the five years is presented in *Figure 2.1*.

FIGURE 2.1 WIND ROSE FOR BOURNEMOUTH AIRPORT (2016 TO 2020)



The predominant wind directions are from the west-southwest (12.5%) and the west (12.4%). Calm conditions occur for 1.7% of the time.

2.4.3 Topography

The presence of elevated terrain can significantly affect the dispersion of pollutants in a number of ways. For stack emissions, the presence of 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 an elevated source and reducing concentrations further away.

The Installation is located in an area of gently undulating terrain and the dispersion of airborne emissions is unlikely to be influenced by the local topography. However, for completeness, information relating to the topography of the area surrounding the Installation has been used in the dispersion modelling assessment.

2.5 BACKGROUND AIR QUALITY

2.5.1 Ambient Air Quality Monitoring

This section provides an assessment of baseline conditions for the Installation and its surroundings. The assessment of impacts requires an analysis of the change in pollutant concentrations with the relevant air quality assessment level taking into account background concentrations of the pollutant. Background monitoring data is not always available locally, particularly in areas that have good air quality. However, it is normal practice to obtain data from a comparable location to describe the air quality at the site. Therefore, air quality at the EfW CHP Facility has been characterised based on monitoring data and modelled data obtained from national and local sources.

BCP Council carried out automatic ambient air quality monitoring of NO_2 at two sites in 2021. Both monitoring sites are affiliated to the Department for Environment, Food and Rural Affairs (Defra’s) Automatic Urban and Rural Network (AURN). One of these (BORN) is located in Bournemouth 9.5 km to the east-southeast of the Installation and is classed as an urban background site. Monitoring of the oxides of nitrogen (NO_x), ozone and $PM_{2.5}$ is carried out at this location. The other monitoring site is located in Christchurch, 3.3 km to the east-southeast of the Installation and is classed as a roadside site. Monitoring of NO_x and $PM_{2.5}$ is undertaken at this location. BCP council also has an extensive network of diffusion tube locations for monitoring of nitrogen dioxide (NO_2) within its administrative area.

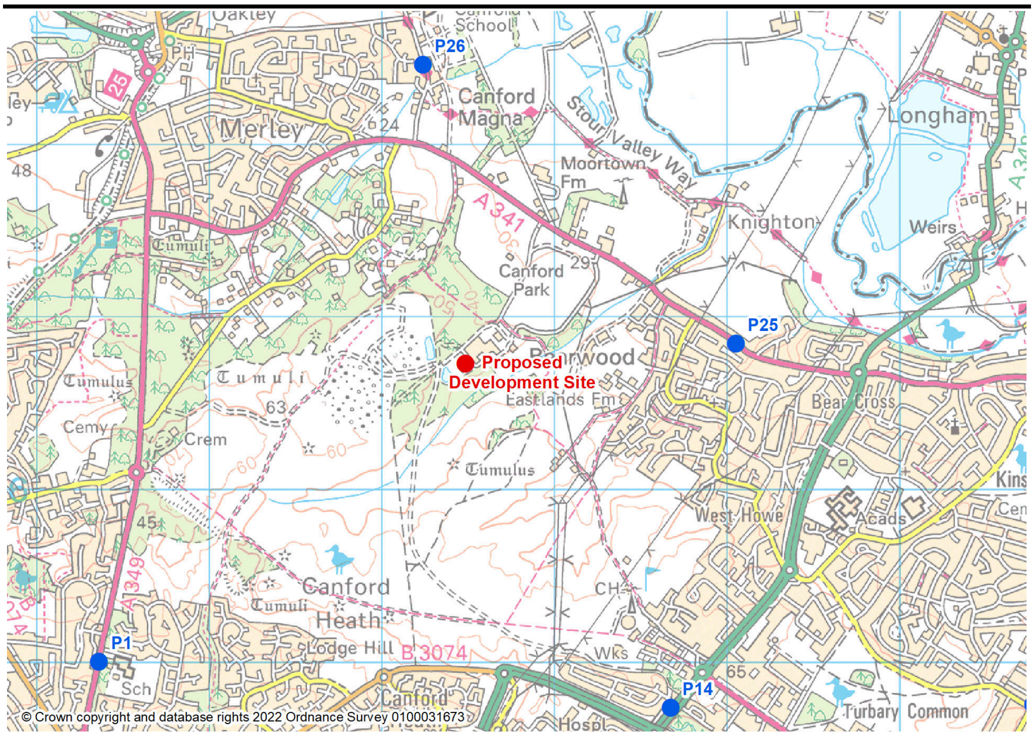
2.5.2 Nitrogen Dioxide (NO_2)

BCP Council has a network of 85 diffusion tube sites for monitoring NO_2. The majority of these are located at roadside sites within more urban areas than the Installation. However, there are four monitoring locations within 3 km of the Installation. The location of these is presented in *Figure 2.2* and the site locations are described in *Table 2.3*.

TABLE 2.3 DETAILS OF NITROGEN DIOXIDE DIFFUSION TUBE MONITORING SITES

Location	Site Type	Distance to Relevant Exposure	Distance to Kerb of Nearest Road
P1. Gravel Hill	Kerbside	35.5 m	1.0 m
P14. Dolbery Road North	Kerbside	12.1 m	0.5 m
P25. 94 Magna Road	Roadside	13.9 m	1.5 m
P26. Canford Village	Kerbside	1.6 m	1.0 m

FIGURE 2.2 DIFFUSION TUBE LOCATIONS WITHIN 3 KM OF THE FACILITY



Measured concentrations of NO_2 at the four diffusion tube monitoring sites and the two continuous monitor sites between 2018 and 2022 are presented in *Table 2.4*.

TABLE 2.4 ANNUAL MEAN CONCENTRATIONS OF NO_2 (µg m^{-3})

Site	Type (a)	2018	2019	2020	2021	2022
BORN	UB	11.5	11.3	9.4	10.1	10.0
CHBR	UT	20.1	19.4	14.8	17.2	16.3
P1. Gravel Hill	K	26.3	23.7	21.0	23.4	21.4
P14. Dolbery Road North	K	22.6	22.8	25.2	20.3	19.1
P25. 94 Magna Road	R	No data	24.2	19.1	19.6	16.8
P26. Canford Village	K	No data	16.3	14.6	12.5	11.2
(a) Key: R = Roadside, K = Kerbside, UB = Urban Background, UT = Urban Traffic, I = Industrial (b) Not available						

Measured concentrations in 2020 are generally much lower than previous years and are likely due to the COVID pandemic resulting in reduced traffic flows on local roads. It is also likely that concentrations measured in 2021 are also similarly affected but to a lesser extent. The average measured concentrations in 2019 for the six sites is 19.6 µg m^{-3} (49% of the air quality objective of 40 µg m^{-3}). For 2022, the average for the six sites is 15.8 µg m^{-3} (40% of the air quality objective).

Annual mean NO_2 background concentrations for 2022 have also been obtained from the Defra UK Background Air Pollution Maps. The latest background maps were issued in August 2020 and are based on 2018 monitoring data. The 2022 mapped annual mean NO_2 background concentration for the Installation and surrounding area is 10.1 µg m^{-3}, 25% of the air quality objective. This is the maximum for the nine 1 km^2 grid squares surrounding the Installation. This is substantially lower than measured at the roadside/kerbside monitoring sites.

For the purposes of the assessment, a background concentration of 19.6 µg m^{-3} has been adopted for the assessment as measured as an average at the six BCP Council sites in 2019. This is considered to be representative of a worst-case and is used to avoid underestimating the contribution from other local sources, including future emission sources within the local area.

2.5.3 Fine Particles (PM_{10} and $PM_{2.5}$)

BCP Council undertook automatic monitoring of $PM_{2.5}$ only. Measured annual mean concentrations between 2018 and 2022 were up to 10.8 µg m^{-3} at the Bournemouth site (2019) and up to 12.8 µg m^{-3} at the Christchurch site (also 2019). These are well below the target value for $PM_{2.5}$ of 20 µg m^{-3}. BCP Council did not undertake any continuous monitoring of PM_{10}.

The maximum Defra background mapped concentrations for 2022 is 12.4 µg m^{-3} for PM_{10} and 8.5 µg m^{-3} for $PM_{2.5}$ for the nine 1 km^2 grids located around the Installation. Mapped concentrations of $PM_{2.5}$ are lower than measured at the two continuous monitoring sites. As a precautionary approach, the background $PM_{2.5}$ concentration is assumed to be 12.8 µg m^{-3}, maximum measured concentration. A precautionary PM_{10} concentration has been derived based on the difference between mapped concentrations of PM_{10} and $PM_{2.5}$ and measured concentrations of $PM_{2.5}$. This provides a precautionary annual mean concentration for PM_{10} of 18.7 µg m^{-3} (12.8*12.4/8.5). As for NO_2, these are considered to be representative of a worst-case and are used to avoid underestimating the contribution from other local sources, including future emission sources within the local area.

2.5.4 Sulphur Dioxide (SO_2)

Automatic monitoring of SO_2 concentrations is not currently undertaken by BCP Council. The Defra mapped background SO_2 concentrations for the area have been obtained for 2001 and the maximum for the 1 km^2 grids surrounding the site is 6.6 µg m^{-3}. Concentrations of SO_2 are presented for 2001, which is the most recent mapped data available and represents a worst-case for the area. Therefore, for the purposes of the assessment an annual mean SO_2 concentration of 6.6 µg m^{-3} has been assumed.

2.5.5 Carbon Monoxide (CO)

BCP Council did not undertake routine monitoring of carbon monoxide within its administrative area. The Defra mapped background CO concentrations for the area surrounding the site indicate annual mean concentrations of 153 µg m^{-3} would be appropriate following the application of a yearly adjustment factor for 2022 of 0.448.

Therefore, the background annual mean CO concentration for the area is assumed to be 153 µg m^{-3}.

2.5.6 Hydrogen Fluoride (HF)

Measurements obtained in the UK between 1984 and 1986 in the Marston Vale region of Bedfordshire where there was a high density of brickworks, a known source of HF, revealed monthly mean concentrations of 0.040 to 0.86 µg m^{-3} [8]. Daily mean concentrations of up to 2.2 µg m^{-3} were also measured. These concentrations would not be characteristic of measured concentrations around the Installation Site as there are no significant sources of HF in the area and concentrations measured forty years ago would not reflect present day regulatory controls. Data provided by the UK National Atmospheric Emissions Inventory (NAEI) indicates that emissions of HF have reduced from around 8 kilotonnes per annum (kt/a) in 1993 to less than 1 kt/a in 2021 mainly due to the decommissioning of coal fired power stations.

8 EPAQS (February 2006), Guidelines for Halogen and Hydrogen Halides in Ambient Air for Protecting Human Health Against Acute Irritancy Effects.

Information provided by the World Health Organization (WHO) in 2002 [9] indicated that in areas not in the direct vicinity of emission sources, the mean concentrations of fluoride in ambient air would be generally less than 0.1 µg m^{-3}. Therefore, given the reduction in emissions since this time it is concluded that a concentration of 0.1 µg m^{-3} as a weekly/monthly mean would be representative of the worst-case for the Installation Site.

2.5.7 Hydrogen Chloride (HCl)

Ambient monitoring of hydrogen chloride is carried out as part of the Defra Acid Gases and Aerosol Network (AGAnet) at a number of locations around the UK. The nearest monitoring station to the Installation site is located at Chilbolton Observatory in Hampshire, designated as a rural background site. This is located around 55 km to the northeast of the Installation. In 2015 (last year data available), the monthly mean HCl concentration at this site varied between 0.01 and 0.26 µg m^{-3} with an average of 0.14 µg m^{-3}.

The maximum measured monthly mean concentration in 2015 (0.26 µg m^{-3}) is assumed to provide a reasonable estimate of the annual mean background concentration of HCl at the Installation site and surroundings.

2.5.8 Total Organic Carbon (TOC) as 1,3-Butadiene

It is assumed that volatile organic compounds (VOCs) emitted comprise entirely of 1,3-butadiene as this has the most stringent air quality assessment level. BCP Council do not undertake ambient monitoring of VOCs. Therefore, concentrations have been obtained from the Defra UK Background Air Pollution Maps. The mapped 1,3-butadiene concentrations are based on 2001 monitoring data, projected to 2003. This is the most recent projection available and is assumed to be representative of concentrations in future years.

The maximum estimated 2003 annual mean background 1,3-butadiene concentration for the area surrounding the Installation is 0.18 µg m^{-3}.

2.5.9 Poly Aromatic Hydrocarbons (PAHs) as Benzo(a)pyrene

Monitoring of benzo(a)pyrene (BaP) is currently carried out by Defra at a number of locations in the UK as part of the TOMPs and PAH monitoring and analysis network. The nearest monitoring site is located at Southampton Centre and is an urban background site but there is limited data for this site as monitoring did not commence until the middle of 2021. Monitoring of BaP is also undertaken at the Chilbolton Observatory. Measured annual mean concentrations of BaP at this site varied between 0.061 and 0.078 ng m^{-3} between 2017 and 2021. It is assumed that the maximum annual mean for this site

9 Fluorides, Environmental Health Criteria 227, World Health Organization (2002)

(0.078 ng m-3) is a reasonable estimate of the background concentration in the vicinity of the Installation.

2.5.10 Dioxins and Furans

Monitoring of PCDD/Fs is currently carried out by Defra at six locations in the UK (Hazelrigg, High Muffles, London, Manchester, Auchencorth Moss and Weybourne) as part of the Toxic Organic Micropollutants (TOMPs) Network.

To provide an indication of the range of PCDD/F concentrations that occur in the UK, a summary of the annual mean concentrations measured between 2014 and 2016 is presented in *Table 2.5*. These are the latest data currently available on the UK-AIR (Air Information Resource) website.

In general, the concentration of dioxins and furans at rural locations is considerably lower than at urban locations. The mean for urban background locations for the three years is 10.6 fg TEQ m^{-3}. Whereas for the rural background sites the mean is 3.2 fg TEQ m^{-3}.

Therefore, the average concentration measured at the four rural background monitoring sites from 2014 to 2016 (3.2 fg TEQ m^{-3}) is assumed to be reasonably representative of the baseline dioxin and furan concentration in the vicinity of the Installation and nearby sensitive receptors.

TABLE 2.5 SUMMARY OF ANNUAL MEAN PCDD/F CONCENTRATIONS FOR 2014 TO 2016 (fg TEQ m^{-3}) (a)

Site	Type	2014	2015	2016
London	Urban background	2.9	4.4	21
Manchester	Urban background	17.0	6.0	12
Auchencorth	Rural background	0.01	0.01	0.15
High Muffles	Rural background	1.1	0.5	2.8
Hazelrigg	Rural background	2.6	5.3	4.6
Weybourne	Rural background	1.6	1.4	18 (b)

(a) Where 1 fg m^{-3} (femtogramme per cubic metre) is equivalent to 1×10^{-15} g m^{-3} or 1×10^{-9} µg m^{-3}

(b) Measured annual mean influenced by high concentration of 54 fg TEQ m^{-3} measured during the first quarter, thought to be a local source

2.5.11 Polychlorinated Biphenyls

Monitoring of PCBs is currently carried out by Defra at six locations in the UK as part of the TOMPs Network. The average PCB concentration measured at the urban background monitoring sites (London and Manchester) from 2016 to 2018 is 86.8 pg m^{-3} and for the rural background sites (Auchencorth Moss, High Muffles, Hazelrigg and Weybourne) 26.8 pg m^{-3}. Given the more rural nature of the Installation Site, the average rural background concentration is assumed to be reasonably representative of the baseline PCB concentration in the vicinity of the Installation site and nearby sensitive receptors.

2.5.12 Trace Metals

Monitoring of trace elements has been undertaken by Defra since 1976. Currently the UK Heavy Metals Monitoring Network comprises 24 monitoring sites at predominantly urban and industrial locations. The nearest monitoring site is located at Chilbolton Observatory in Hampshire. This site is a rural background site.

A summary of the annual average metal concentrations for 2017 to 2019 for this site is provided in *Table 2.6*. Where data are available, measured concentrations are well below their respective EALs. For the purposes of the assessment the maximum annual mean for each metal is used to characterise air quality in the vicinity of the Installation and surroundings.

TABLE 2.6 RANGE OF ANNUAL MEAN TRACE METAL CONCENTRATIONS (2017 TO 2019)

Metal	2017 (ng m^{-3})	2018 (ng m^{-3})	2019 (ng m^{-3})	Assessment Criteria (ng m^{-3})
Antimony (Sb)	Not measured			5,000
Arsenic (As)	0.64	0.63	0.63	6
Cadmium (Cd)	0.11	0.093	0.097	5
Chromium (Cr)	1.1	1.1	0.92	-
Cobalt (Co)	0.042	0.050	0.038	1,000
Copper (Cu)	2.6	2.7	2.6	-
Lead (Pb)	3.9	3.5	3.6	250
Manganese (Mn)	2.1	2.6	2.4	150
Mercury (Hg)	2.7			-
Nickel (Ni)	0.66	0.49	0.44	20
Thallium (Tl)	Not measured			1,000
Vanadium (V)	0.70	0.72	0.66	-

There are no measurements of antimony, mercury or thallium. There have been some historical measurements of gaseous mercury at a couple of monitoring locations up to 2018 when monitoring appears to have ceased. Measured concentrations of gaseous mercury were measured at the London Westminster site and the Runcorn Weston Point site between 2015 and 2018. Neither of these sites are characteristic of the installation location as London is heavily trafficked and Runcorn Weston Point is heavily industrial. Maxima annual mean concentrations at these two sites for the four years were 2.7 ng m^{-3} and 20.1 ng m^{-3} for the London Westminster and Runcorn Weston Point site, respectively. For the purposes of the assessment, it is assumed that measured concentrations at London Westminster (2.7 ng m^{-3}) are characteristic of the site and surroundings.

Guidance issued by the Environment Agency [10] for the assessment of Group 3 metals, states that for screening purposes it should be assumed that hexavalent chromium (CrVI) comprises 20% of the total background chromium. On this basis the average CrVI concentration would 0.22 ng m^{-3}, slightly in excess of the EAL of 0.2 ng m^{-3}.

2.5.13 Ammonia (NH_3)

The Air Pollution Information System (APIS) provides mapped background ammonia concentrations principally for the assessment of airborne impacts of ammonia on habitat sites. This indicates that background ammonia concentrations in the vicinity of the Installation and surroundings are 1.3 µg m^{-3}.

2.5.14 Background Concentrations for Comparison with Concentrations Predicted by Detailed Dispersion Modelling

A summary of the annual mean background concentrations that have been used in the assessment is presented in *Table 2.7*

TABLE 2.7 SUMMARY OF BACKGROUND CONCENTRATIONS FOR THE ASSESSMENT

Pollutant	Averaging Period	Concentration
Particles (PM_{10})	Annual	18.7 µg m^{-3}
	24-Hour	22.1 µg m^{-3} (a)(b)
Particles ($PM_{2.5}$)	Annual	12.8 µg m^{-3}
Nitrogen Dioxide (NO_2)	Annual	19.6 µg m^{-3}
	1-Hour	39.2 µg m^{-3} (a)
Sulphur Dioxide (SO_2)	Annual	6.6 µg m^{-3}
	24-Hour	7.8 µg m^{-3} (a)(b)
	1-Hour	13.2 µg m^{-3} (a)
	15-Minute	17.7 µg m^{-3} (a)(c)
Carbon Monoxide (CO)	Annual	153 µg m^{-3}
	8-Hour	214 µg m^{-3} (a)(d)
	1-hour	306 µg m^{-3} (a)
Hydrogen Fluoride (HF)	Annual/weekly/monthly	0.1 µg m^{-3}
	1-Hour	0.2 µg m^{-3} (a)
Hydrogen Chloride (HCl)	Annual	0.26 µg m^{-3}
	1-Hour	0.52 µg m^{-3} (a)
Total Organic Carbon (as 1,3-butadiene)	Annual	0.18 µg m^{-3}
	24-Hour	0.21 (a)(b)

10 Environment Agency (June 2016) Guidance on Assessing Group 3 Metal Stack Emissions from Incinerators (Version 4)

TABLE 2.7 SUMMARY OF BACKGROUND CONCENTRATIONS FOR THE ASSESSMENT

Pollutant	Averaging Period	Concentration
PAH as Benzo(a)pyrene	Annual	0.078 ng m^{-3}
Dioxins and Furans (PCDD/Fs)	Annual	3.2 fg m^{-3}
Polychlorinated biphenyls (PCBs)	Annual	0.027 ng m^{-3}
	1-hour	0.054 ng m^{-3}
Cadmium (Cd)	Annual	0.11 ng m^{-3}
	24-Hour	0.13 ng m^{-3} (a)(b)
Thallium (Tl)	No data available	
Mercury (Hg)	Annual 24-Hour 1-Hour	2.7 ng m^{-3} 3.2 ng m^{-3} (a)(b) 5.4 ng m^{-3} (a)
Antimony (Sb)	No data available	
Arsenic (As)	Annual	0.64 ng m^{-3}
Chromium (Cr)	Annual	1.1 ng m^{-3}
	24-Hour	1.3 ng m^{-3} (a)(b)
Cobalt (Co)	Annual	0.050 ng m^{-3}
Copper (Cu)	Annual	2.7 ng m^{-3}
	24-Hour	3.2 ng m^{-3} (a)(b)
Lead (Pb)	Annual	3.9 ng m^{-3}
Manganese (Mn)	Annual	2.6 ng m^{-3}
	1-Hour	5.2 ng m^{-3} (a)
Nickel (Ni)	Annual	0.66 ng m^{-3}
	1-Hour	1.3 ng m^{-3} (a)
Vanadium (V)	Annual	0.72 ng m^{-3}
	24-Hour	0.85 ng m^{-3} (a)(b)
Ammonia (NH_3)	Annual	1.3 µg m^{-3}
	1-Hour	2.6 µg m^{-3} (a)

(a) 1-hour mean background concentration estimated by multiplying the annual mean by a factor of 2 in accordance with the Risk Assessment Guidance.

(b) 24-hour mean background concentration estimated by multiplying the 1-hour mean by a factor of 0.59 in accordance with the Risk Assessment Guidance.

(c) 15-minute mean background concentration estimated by multiplying the 1-hour mean by a factor of 1.34 in accordance with the Risk Assessment Guidance.

(d) 8 hour mean background concentration estimated by multiplying the 1-hour mean by a factor of 0.70 in accordance with the Risk Assessment Guidance.

3 ASSESSMENT METHODOLOGY

3.1 INTRODUCTION

Emissions to air from the EfW CHP Facility have been modelled using the UK Atmospheric Dispersion Modelling System (ADMS Version 6) and a five year meteorological data set from Bournemouth Airport (2016 to 2020). Predicted concentrations are compared with air quality standards and objectives set for the protection of human health. Operational impacts on habitat sites are assessed in *Section 5*.

3.2 SENSITIVE HUMAN RECEPTORS

LAQM.TG(22) describes in detail typical locations where consideration should be given to pollutants defined in the Regulations. Generally, the guidance suggests that all locations 'where members of the public are regularly present' should be considered. At such locations, members of the public will be exposed to pollution over the time that they are present, and the most suitable averaging period of the pollutant needs to be used for assessment purposes.

For instance, on a footpath, where exposure will be transient (for the duration of passage along that path) comparison with short-term standards (i.e. 15-minute mean or 1-hour mean) may be relevant. In a school, or adjacent to a private dwelling, however; where exposure may be for longer periods, comparison with long-term (such as 24-hour mean or annual mean) standards may be most appropriate. In general terms, concentrations associated with long-term standards are lower than short-term standards owing to the chronic health effects associated with exposure to low level pollution for longer periods of time.

Initial results are presented as the maximum predicted within the modelling domain. However, this represents worst-case conditions. Therefore, to assess the impact at sensitive receptor locations, the impact of emissions on selected discrete receptors is also provided. The locations of the sensitive human receptors considered for this assessment are provided in *Table 3.1* and presented in *Figure 3.1*.

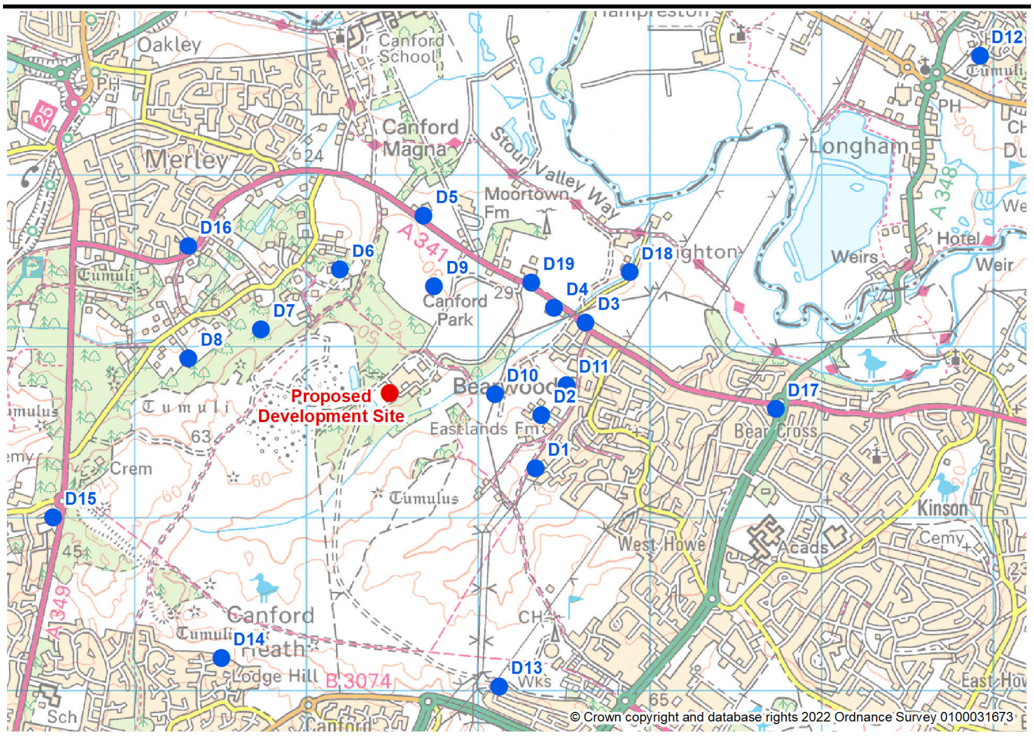
TABLE 3.1 DESCRIPTION OF SENSITIVE HUMAN RECEPTORS

Label	Receptor	Type	Grid Reference	
D1	Viscount Walk	Residential	404335	96289
D2	Wheelers Lane (new dev.)	Residential	404370	96601
D3	Magna Road	Residential	404627	97138
D4	Waggy Tails Rescue	Residential/commercial	404443	97224
D5	The Hamworthy Club	Leisure	403684	97765

TABLE 3.1 DESCRIPTION OF SENSITIVE HUMAN RECEPTORS

Label	Receptor	Type	Grid Reference	
D6	Arrowsmith Road	Residential	403195	97447
D7	Maranello	Residential	402736	97100
D8	Magna Care Centre	Care home	402315	96929
D9	Canford Sports Club House	Leisure	403744	97351
D10	Provence Drive	Commercial	404100	96723
D11	Bearwood Primary School	School	404517	96776
D12	Ferndown	Residential	406923	98695
D13	Belben Road, Bournemouth	Residential	404124	95023
D14	Pilsdon Drive, Bournemouth	Residential	402507	95187
D15	Gravel Hill, Broadstone	Residential	401527	96002
D16	Egdon Drive, Merley	Residential	402314	97585
D17	Marpet Close, Bear Cross	Residential	405735	96637
D18	Knighton Lane, Knighton	Residential	404883	97432
D19	White House	Commercial	404311	97373

FIGURE 3.1 LOCATION OF SENSITIVE HUMAN RECEPTORS CONSIDERED FOR THE ASSESSMENT



Pollutant concentrations have been predicted at both discrete receptor locations and the maximum predicted concentration over a 20 km by 20 km Cartesian grid of 160 m grid resolution.

3.3 SENSITIVE HABITAT RECEPTORS

The Environment Agency's Risk Assessment Guidance [11] states that the impact of emissions to air on vegetation and ecosystems should be assessed for the following habitat sites within 10 km of the source:

- Special Areas of Conservation (SACs) and candidate SACs (cSACs) designated under the EC Habitats Directive;
- Special Protection Areas (SPAs) and potential SPAs designated under the EC Birds Directive; and
- Ramsar Sites designated under the Convention on Wetlands of International Importance.

Within 2 km of the source:

- Sites of Special Scientific Interest (SSSI) established by the 1981 Wildlife and Countryside Act;
- National Nature Reserves (NNR);
- Local Nature Reserves (LNR);
- local wildlife sites (Sites of Interest for Nature Conservation, SINC and Sites of Local Interest for Nature Conservation, SLINC); and
- Ancient Woodland (AW).

In response to the planning application for the Installation, Natural England also requested that the impact of the EfW CHP Facility should be considered for the following internationally designated sites and SSSI:

- Dorset Heathlands SPA;
- Dorset Heathlands Ramsar;
- Dorset Heaths SAC;
- Dorset Heaths (Purbeck & Wareham) & Studland Dunes SAC;
- Poole Harbour SPA;
- Poole Harbour Ramsar;
- Canford Heath SSSI;
- Bourne Valley SSSI;
- Corfe & Barrow Hills SSSI;
- Turbary & Kinson Commons SSSI;
- Luscombe Valley SSSI;
- Slop Bog & Uddens Heath SSSI;

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

- Hurn Common SSSI;
- Parley Common SSSI;
- Holt & West Moors Heaths SSSI;
- Arne SSSI; and
- Moors River System SSSI.

For some larger emissions sources (greater than 50 MW), the Environment Agency advise that further distances should be considered as follows for permitting:

- 15 km for SACs, SPAs and Ramsar sites; and
- 10 km or 15 km for SSSIs.

Consequently, additional habitat receptors have been identified which includes European sites within 15 km and SSSIs within 10 km and include the following:

- Avon Valley Ramsar SPA;
- River Avon SAC;
- New Forest SAC;
- Isle of Portland to Studland Cliffs SAC;
- Corfe Mullen Pastures SSSI;
- St Leonards and St Ives Heaths SSSI;
- Poole Bay Cliffs SSSI;
- Lions Hill SSSI;
- Town Common SSSI;
- Upton Heath SSSI;
- Poole Harbour SSSI;
- Ham Common SSSI;
- Holton and Sandford Heaths SSSI;
- Studland and Godlington Heaths SSSI; and
- Ferndown Common SSSI.

Therefore, habitat receptor designations and locations relevant to the assessment are presented in *Table 3.2* and the location of each is presented in *Figure 3.2*.

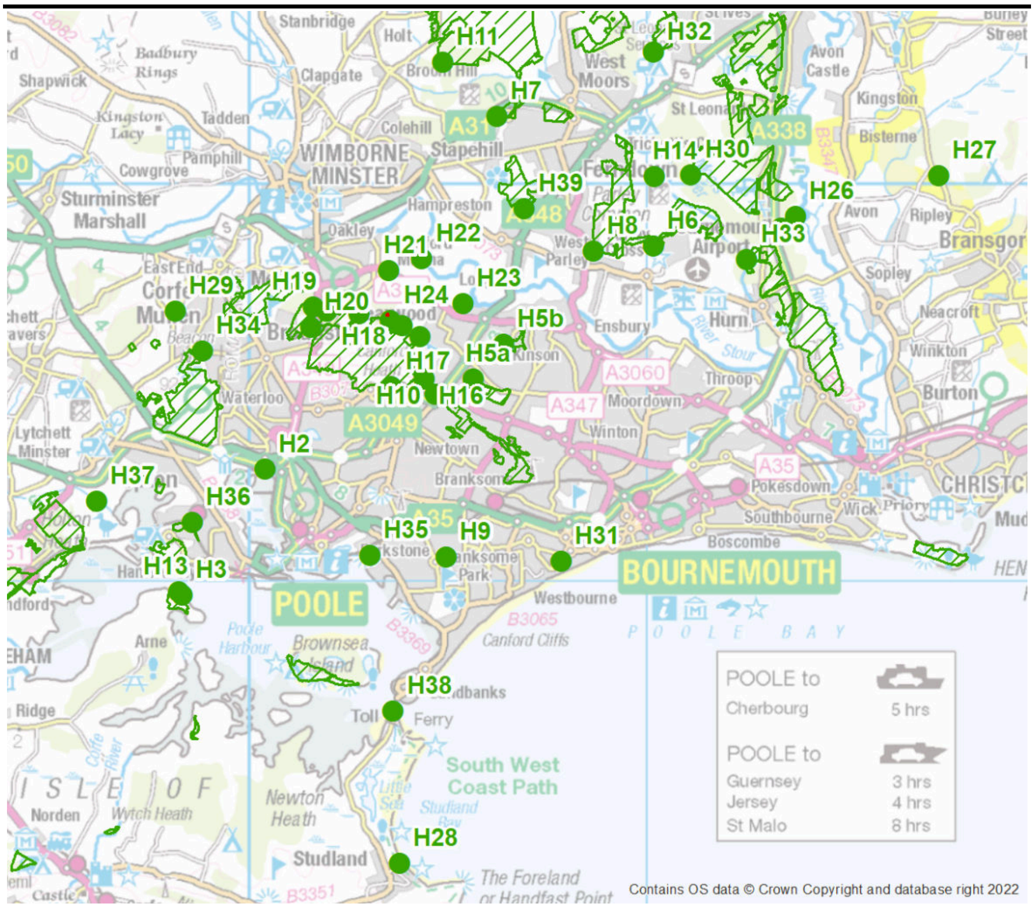
TABLE 3.2 HABITATS CONSIDERED FOR THE HABITAT RISK ASSESSMENT

Receptor	Primary Habitats
H1 Dorset Heaths SAC/SPA/Ramsar	Coniferous woodland, dwarf shrub heath and bogs
H2 Poole Harbour SPA/Ramsar	Coastal dune grasslands (grey dunes) – acid type and Supralittoral sediment (acidic type)
H3 Dorset Heaths (Purbeck & Wareham) and Studland Dunes SAC	Bog woodland and bogs
H4 Canford Heath SSSI	Bogs and fen, marsh and swamp
H5 Turbary & Kinson Commons SSSI	Bogs and fen, marsh and swamp
H6 Hurn Common SSSI	Dwarf shrub heath and fen, marsh and swamp
H7 Slop Bog & Uddens Heath SSSI	Bogs and fen, marsh and swamp
H8 Parley Common SSSI	Bogs and fen, marsh and swamp
H9 Luscombe Valley SSSI	Bogs and fen, marsh and swamp
H10 Bourne Valley SSSI	Bogs and fen, marsh and swamp
H11 Holt & West Moors Heath SSSI	Dwarf shrub heath and fen, marsh and swamp
H12 Corfe & Barrow Hills SSSI	Dwarf shrub heath and fen, marsh and swamp
H13 Arne SSSI	Bogs
H14 Moors River System SSSI	Broadleaved deciduous woodland
H15 Knighton Heath GC SNCI	Dwarf shrub heath
H16 Alderney Waterworks SNCI	Acid grassland
H17 Haymoor Bottom SNCI	Dwarf shrub heath
H18 Arrowsmith Coppice SNCI/AW	Heathland habitats
H19 Delph Woods SNCI	Deciduous woodland
H20 Dunyeats Hill HRS	Dwarf shrub heath
H21 Moortown Copse SNCI	Deciduous woodland
H22 Canford Park SANG LCNR	Acid grassland
H23 Bearwood SNCI	Woodland/grassland
H24 Frogmoor Wood SNCI	Birch woodland and semi-acid grassland
H25 Avon Valley Ramsar SPA	Gadwall and Tundra swan
H26 River Avon SAC	Alkaline fens
H27 New Forest SAC	Bog woodland and bogs
H28 Isle of Portland to Studland Cliffs SAC	Coastal dune grasslands (grey dunes) and calcareous grasslands
H29 Corfe Mullen Pastures SSSI	Valley mires, poor fens and transition mires and bogs

TABLE 3.2 HABITATS CONSIDERED FOR THE HABITAT RISK ASSESSMENT

Receptor	Primary Habitats
H30 St Leonards and St Ives Heaths SSSI	Raised and blanket bogs
H31 Poole Bay Cliffs SSSI	Lacerta agilis (sand lizard)
H32 Lions Hill SSSI	Raised and blanket bogs
H33 Town Common SSSI	Raised and blanket bogs
H34 Upton Heath SSSI	Raised and blanket bogs
H35 Poole Harbour SSSI	Valley mires, poor fens and transition mires and dwarf shrub heath
H36 Ham Common SSSI	Raised and blanket bogs
H37 Holton and Sandford Heaths SSSI	Dry heaths
H38 Studland and Godlingston Heaths SSSI	Dry heaths
H39 Ferndown Common SSSI	Raised and blanket bogs

FIGURE 3.2 SENSITIVE HABITAT RECEPTORS INCLUDED IN THE ASSESSMENT



Dorset Heaths SAC/SPA/Ramsar site (H1 and identified by hatched areas) and Frogmoor Wood SNCI (H24) have been included in the model as polygon features due to their extent and close proximity to the Installation. Therefore, the model predicts the maximum concentration anywhere within these habitat sites and represents a worst-case. The other habitat receptors are represented by a single point except for Canford Heath SSSI which is represented by two discrete points.

3.4 DISPERSION MODELLING OF EMISSIONS

3.4.1 The Dispersion Model

The potential impact of emissions from the EfW CHP Facility has been assessed using a dispersion model to predict airborne ground level concentrations of pollutants emitted from the main chimney.

The operational impacts from the emission sources have been assessed using the ADMS (Atmospheric Dispersion Modelling System version 6) model. ADMS allows for the modelling of dispersion under convective meteorological conditions using a skewed Gaussian concentration distribution. It is able to simulate the effects of terrain and building downwash simultaneously. It can also calculate concentrations for direct comparison with air quality standards. It is used extensively in the UK for assessing the air quality impacts of industrial and other polluting processes.

3.4.2 Building Downwash

Structures associated with the Installation or nearby buildings may affect the dispersion of emissions from the chimney. The EfW CHP Facility comprises a number of integrated buildings at various heights with a maximum height above ground level of around 50 m. Building downwash effects are likely to occur for buildings in excess of one third of the chimney height (37 m for a 110 m chimney). Details of the building structures that have been included in the dispersion model to allow for building downwash effects are presented in *Table 3.3*. It should be noted that these are the measurements assumed to represent the various buildings for the dispersion modelling rather than the actual dimensions of the buildings. In particular, for some building units, the roof areas are larger than the building footprints due to overhangs at roof level. Therefore, the larger area is used to provide a worst-case assessment. A sensitivity analysis indicated that the Boiler House (ID04) as the 'main' building within the model resulted in highest predicted concentrations.

TABLE 3.3 BUILDINGS INCLUDED IN THE DISPERSION MODEL

Building	Height	Easting	Northing	X Length	Y Width	Angle
Boiler house (ID04) – Main Building	48.2	403431	96706	50	37.3	140
ACC (ID10)	37	403437	96754	48.2	29	140
APC (ID05)	40	403464	96731	50	42.3	140
General (ID17)	31	403374	96696	39	14.9	140
Turbine hall (ID09)	25	403406	96721	42.5	24	140
Waste bunker (ID03)	43.4	403398	96676	50	56.2	140
Tipping hall (ID02)	21.4	403369	96649	35.85	39	140

3.4.3 Emission Sources

EfW CHP Facility

Emission parameters for the EfW CHP Facility chimney are presented in *Table 3.4*. These data have been provided by MVV. Except for NH_3, the adopted emission limits are based on the BAT-AELs provided in the BREF document for waste incineration. For NH_3, a lower emission concentration of 5 mg Nm^{-3} has been adopted to minimise impacts on the adjacent European habitat site.

An emission limit of 9×10^{-5} mg Nm^{-3} has been assumed for PAH (benzo(a)pyrene) based on the Defra (WR0608) report on emissions from waste management facilities [12]. Information on PCB emissions has also been obtained from the Defra report WR0608. Based on the information provided, a maximum emission concentration of 3.6×10^{-9} mg Nm^{-3} is assumed for PCBs.

The BAT-AELs provided in the BREF document are given as daily limits only. However, within the IED, emission limits are set for two averaging periods: daily and half-hourly. The half hourly average recognises that short term elevated emissions may occur due to routine process variables. However, over the longer term the daily average values must be achieved. The air quality standards and guidelines used in this assessment largely refer to averaging periods of one hour or greater. In addition, the UK air quality standards for several pollutants also have a number of 'allowable' occasions in which the limit value may be exceeded within any one calendar year before the standard is deemed to have been breached. Therefore, short term emissions occurring for less than 30 minutes are unlikely to have a significant impact on short term air quality, particularly as the number of excursions of the emission concentrations to the 30-minute value is effectively limited by the Directive. On this basis, the initial impact assessment is based upon daily average values for emissions from

12 WR 0608 Emissions from Waste Management Facilities, ERM Report on Behalf of Defra (July 2011)

the EfW CHP Facility. A sensitivity analysis is provided in *Section 6.1* that assesses the impact on air quality at the half-hourly emission limits.

TABLE 3.4 SUMMARY OF THE EFW CHP FACILITY EMISSIONS DATA FOR DISPERSION MODELLING

Parameter	Emission Parameters	
Number of sources	1	
Chimney height above ground level (m)	110	
Temperature of emission (°C)	135	
Actual flow rate (m^3 s^{-1})	87.9	
Emission velocity at chimney exit (m s^{-1})	17.9	
Moisture content (%v/v)	18.4	
Oxygen content (%v/v dry)	8.0	
Normalised flow rate (Nm^3 s^{-1}) (a)	62.2	
Chimney diameter (m)	2.5	
Pollutant	**Emission Concentration (mg Nm^{-3}) (b)**	**Emission Rate (g s^{-1}) (c)**
Particles	5	0.31
NOx	120	7.5
SO_2	30	1.9
CO	50	3.1
HF	1	0.062
HCl	6	0.37
TOC	10	0.62
PCDD/Fs (b)(c)	0.04 (b)	2.5 (c)
Cadmium and Thallium	0.02	0.0012
Mercury	0.02	0.0012
Other metals (As, Cr, Co, Cu, Pb, Mn, Ni, Sb and V)	0.3	0.019
PAH (as benzo(a)pyrene)	9.0×10^{-5}	5.6×10^{-6}
Polychlorinated biphenyls (PCBs)	3.6×10^{-9}	2.2×10^{-10}
Ammonia	5	0.31

(a) Reference conditions of 273K, 1 atmosphere, dry and 11% oxygen

(b) Emission concentrations expressed as mg Nm^{-3} (at reference conditions) except for PCDD/Fs, which are in ng Nm^{-3} (at reference conditions)

(c) Emission rate expressed as g s^{-1} except for PCDD/Fs, which are in ng s^{-1}

Emergency Diesel Generator (EDG)

The EDG would be used during emergency conditions and testing. This would be used for a maximum of 50 hours per annum (h/a) mainly during testing of the generator. Testing would take place fortnightly for a duration of up to 30 minutes. Emergency use would occur very infrequently and only during complete loss of electrical power to the EFW CHP Facility. At MVV's Devonport site there have been no 'black site' incidents within the last five years. However, MVV has indicated that an emergency condition, should it occur, might continue for up to three hours. Emissions data for the EDG are provided in *Table 3.5*.

TABLE 3.5 STACK EMISSIONS DATA FOR THE ON-SITE EMERGENCY DIESEL GENERATOR

Parameter	**Emission Parameters**	
Stack height (m)	5.5	
Temperature of emission (°C)	441	
Actual flow rate (m^3 s^{-1})	5.63	
Emission velocity at stack exit (m s^{-1})	57.3	
Moisture content (%v/v)	Not corrected for moisture	
Oxygen content (%v/v dry)	11	
Normalised flow rate (Nm^3 s^{-1}) (a)	1.34	
Stack diameter (m)	0.354	
Operational hours (h/a)	50	
Pollutant	**Emission Concentration (mg Nm^{-3}) (a)**	**Emission Rate (g s^{-1})**
NOx	2,000	0.015 (long term) 2.68 (short term) 1.34 (short term testing) 0.34 (24-hour emergency)
(a) Reference conditions of 273K, 1 atmosphere, dry and 5% oxygen		

Long-term NO_x emissions (for calculating annual mean concentrations) have been prorated by the number of operational hours (i.e. 2.68 g s^{-1} x 50/8760). For testing, the generator will only operate for 30 minutes and the hourly average short -term emission would be 1.34 g s^{-1} (2.68 x 30/60).

For predicting annual mean concentrations of NO_2, the long-term emission rate has been used and for short-term (hourly means) the testing emission rate has been used. For long-term impacts on habitat sites the long-term emission rate is used. For the prediction of 24 hour mean NO_x concentrations, it is assumed that the generator operates for 3 hours at the short-term emission rate of 2.68 g s^{-1} averaged over a day (2.68 x 3/24).

Typical Metal Emissions – EfW CHP Facility

Within the IED, emissions of metals are divided into three groups. The total emissions of metals within each group are not permitted to exceed the prescribed emission limit set for the group. For the purposes of the modelling, initially the assumption is made that each metal is emitted as 100% of the total emission for the group. This allows the initial screening out of metals that do not pose a significant risk even based on very worst-case assumptions. In reality, this assumption is clearly highly conservative and is likely to greatly overestimate the actual impacts associated with emissions of metals. In accordance with Environment Agency guidance [13], where metals cannot be considered insignificant a further step, with a less conservative assumption is applied, whereby metals are assessed based on typical emissions of these metals derived from data from other operational facilities, as provided by the Environment Agency. The emissions data used for this purpose are presented in *Table 3.6*.

TABLE 3.6 SUMMARY OF TYPICAL METAL EMISSIONS FROM WASTE COMBUSTION FACILITIES

Metal Species	IED Limit (mg Nm^{-3})	Typical Emission as %age of IED Limit
Antimony	0.5	2.3%(a)
Arsenic	0.5	5.0%(a)
Cadmium	0.05	3.4%(b)
Chromium	0.5	18.4%(a)
Chromium VI	0.5	0.03%(c)
Cobalt	0.5	1.1%(a)
Copper	0.5	5.8%(a)
Lead	0.5	10.1%(a)
Manganese	0.5	12.0%(a)
Mercury	0.05	6.8%(b)
Nickel	0.5	11.0%(a)
Thallium	0.05	3.4%(b)
Vanadium	0.5	1.2%(a)

(a) Environment Agency guidance for Group 3 metals (maximum)

(b) Average compliance with emission limit values provided by the Tolvik Consulting Report – UK Energy from Waste Statistics - 2021

(c) Derived from information provided by the Environment Agency for Group 3 metals

Where the typical emissions are applied, if the process contribution (PC) exceeds 1% of the long-term AQAL or 10% of the short-term AQAL then the total predicted environmental concentration (PEC) should be considered. The PEC is the PC plus the background pollutant concentration. The impact can be screened out where the PEC is less than 100% of the AQAL.

The Environment Agency also provides guidance on the assumptions relating to CrVI as a proportion of total chromium, following is assumed:

- for initial screening, CrVI is assumed to comprise 20% of the Group 3 emission limit;

13 Environment Agency (June 2016) Guidance on Assessing Group 3 Metal Stack Emissions from Incinerators (Version 4)

- for typical emissions, CrVI is assumed to comprise 0.03% of the Group 3 IED emission limit in accordance with the Environment Agency guidance; and
- background concentrations of CrVI are assumed to be 20% of the total chromium concentration.

3.5 SIGNIFICANCE CRITERIA

3.5.1 Impacts on Human Health

The Environment Agency's Environmental Management guidance for risk assessments specifies criteria to enable the potential significance of an impact to be determined [14]. For the process contribution (PC), the impact is deemed not significant if the annual mean PC is less than 1% of the environmental assessment level (EAL) and the short term PC is less than 10% of the EAL. If either of these criteria is exceeded, they are potentially significant and it is then necessary to consider the total predicted environmental concentration (PEC, which is the PC plus the ambient background concentration).

For the annual mean, if the PEC is below 70% of the assessment criterion, then it is considered unlikely that an exceedance of the limit will occur and there should be no adverse impact. For short term concentrations, more detailed assessments are required where the short term PC is greater than 20% of the short term standard minus twice the long term background concentration.

3.5.2 Habitat Sites

The Environment Agency's Risk Assessment Guidance [14] specifies criteria to enable the potential significance of an impact to be determined. For the process contribution (PC), the impact is deemed insignificant if the annual mean PC is less than 1% of the critical level (or critical load) and the short term PC is less than 10% of the critical level (or critical load). If either of these criteria are exceeded, they are not necessarily significant but, it is then necessary to consider the total predicted environmental concentration or deposition (PC plus the background contribution) as discussed above.

For local wildlife sites (SINCs, SLINC's, NNRs, LNRs and ancient woodland), a process contribution (PC) is considered not significant if:

- the long term PC < 100% of the long-term critical level;
- the short term PC < 100% of the short-term critical level.

14 https://www.gov.uk/guidance/risk-assessments-for-your-environmental-permit

4 PREDICTED OPERATIONAL IMPACT ON HUMAN HEALTH

4.1 INTRODUCTION

The predicted impact of emissions to air from the EfW CHP Facility are presented. Initially, results are presented as the maximum predicted across the dispersion modelling domain. Results for each receptor are then provided for each pollutant.

For each averaging period (e.g. annual mean, maximum hourly mean etc.), the result presented is the maximum for the five years of meteorological data used for dispersion modelling purposes.

A number of assumptions have been made to characterise the various emission sources and the surrounding environment into which these emissions are emitted. Worst-case assumptions have been adopted to avoid underestimating the predicted impact of emissions on air quality. In particular, it is assumed that the EfW CHP Facility operates continuously at the adopted maximum permissible emissions and results are presented for the worst-case meteorological year.

4.2 MAXIMUM PREDICTED CONCENTRATIONS

4.2.1 Long-term Impacts

A comparison of predicted long-term (annual mean) concentrations with the relevant air quality assessment levels (AQALs) is provided in *Table 4.1*. This is the maximum predicted concentration anywhere within the model domain. Furthermore, for the trace metals, each metal is assumed to be emitted at the emission limit value (ELV) for the group. This assumption is clearly highly conservative and is likely to greatly overestimate the actual impacts associated with emissions of metals. For metals, where the impact cannot be screened out according to the Environment Agency guidance (refer *Section 3.4.3*) they are identified as requiring further assessment.

For all non-metals other than VOCs, the impact would be assessed as not significant even for the worst-case assumptions adopted. For VOCs, the PC exceeds 1% of the AQAL but the PEC is less than 70% of the AQAL. Therefore, it is unlikely that the AQAL would be exceeded. For the metals, further assessment is required for chromium VI (CrVI).

4.2.2 Short-term Impacts

For those pollutants that have short-term (e.g. hourly, 8-hourly, 24-hourly) AQALs, predicted maximum concentrations are presented in *Table 4.2*.

TABLE 4.1: MAXIMUM PREDICTED LONG-TERM (ANNUAL MEAN AND LONG-TERM 24-HOUR MEAN) CONCENTRATIONS

Pollutant	Averaging Period	Units	AQAL	Facility Contribution (PC)	PC as %age AQAL	Total Concentration (%age AQAL)	Impact Descriptor or Screened Out
PM_{10}	Annual mean	µg/m³	40	0.019	<0.1%	46.8%	Not significant
$PM_{2.5}$	Annual mean	µg/m³	20	0.019	0.1%	64.1%	Not significant
NO_2	Annual mean	µg/m³	40	0.32	0.8%	49.8%	Not significant
HF	Monthly mean	µg/m³	16	0.014	0.1%	3.2%	Not significant
NH_3	Annual mean	µg/m³	180	0.019	<0.1%	0.7%	Not significant
VOCs (as 1,3-butadiene)	Annual mean	µg/m³	2.25	0.038	1.7%	9.7%	AQAL likely met
PAH	Annual mean	ng/m³	0.25	0.00034	0.1%	31.3%	Not significant
Dioxins/ furans	Annual mean	fg/m³	N/A	0.15	-	-	-
Cadmium (Cd)	Annual mean	ng/m³	5	0.075	1.5%	3.7%	Screened out
Thallium (Tl)	Annual mean	ng/m³	1,000	0.075	<0.1%	<0.1%	Screened out
Mercury (Hg)	24-hour (long-term)	ng/m³	60	0.72	1.2%	6.5%	Screened out
Antimony (Sb)	Annual mean	ng/m³	5,000	1.1	<0.1%	<0.1%	Screened out
Arsenic (As)	Annual mean	ng/m³	6	1.1	18.8%	29.4%	Screened out
Chromium (Cr)	24-hour (long-term)	ng/m³	2,000	10.9	0.5%	0.6%	Screened out
Chromium VI	Annual mean	ng/m³	0.25	0.23	90.0%	178%	Needs further assessment
Cobalt (Co)	Annual mean	ng/m³	1,000	1.1	0.1%	0.1%	Screened out
Copper (Cu)	24-hour (long-term)	ng/m³	50	10.9	21.7%	28.1%	Screened out
Manganese (Mn)	Annual mean	ng/m³	150	1.1	0.8%	2.5%	Screened out
Nickel (Ni)	Annual mean	ng/m³	20	1.1	5.6%	8.9%	Screened out
Lead (Pb)	Annual mean	ng/m³	250	1.1	0.5%	2.0%	Screened out
PCBs	Annual mean	ng/m³	200	1.4×10^{-8}	<0.1%	<0.1%	Not significant

TABLE 4.2: MAXIMUM PREDICTED SHORT-TERM IMPACTS

Pollutant	Averaging Period	Units	AQAL	Facility Contribution	%age AQAL	Impact Descriptor
PM_{10}	24-hour mean (90.4th%ile)	µg/m^3	50	0.072	0.1%	Not significant
NO_2	1-hour (99.8th %ile)	µg/m^3	200	2.3	1.2%	Not significant
SO_2	24-hour (99.2nd %ile)	µg/m^3	125	0.88	0.7%	Not significant
SO_2	1-hour (99.7th %ile)	µg/m^3	350	1.6	0.5%	Not significant
SO_2	15-minute (99.9th %ile)	µg/m^3	266	1.9	0.7%	Not significant
CO	8-hour	µg/m^3	10,000	2.4	<0.1%	Not significant
CO	1-hour	µg/m^3	30,000	7.2	<0.1%	Not significant
HF	1-hour	µg/m^3	160	0.14	0.1%	Not significant
HCl	1-hour	µg/m^3	750	0.87	0.1%	Not significant
NH_3	1-hour	µg/m^3	2,500	0.72	<0.1%	Not significant
VOCs as 1,3-butadiene	24-hour (short-term)	µg/m^3	2.25	0.36	16.1%	No further assessment
Cd	24-hour (short-term)	ng/m^3	30	0.72	2.4%	Screened out
Hg	1-hour	ng/m^3	600	2.9	0.5%	Screened out
Sb	1-hour	ng/m^3	150,000	43.4	<0.1%	Screened out
Mn	1-hour	ng/m^3	1,500,000	43.4	<0.1%	Screened out
Ni	1-hour	ng/m^3	700	43.4	6.2%	Screened out
V	24-hour	ng/m^3	1,000	10.9	1.1%	Screened out
PCBs	1-hour	ng/m^3	6,000	5.2×10^{-7}	<0.1%	Not significant

Except for VOC's (1,3-butadiene), the maximum predicted short-term concentrations are less than 10% of the short-term AQALs and would be assessed as not significant in accordance with the Environment Agency's Risk Assessment Guidance. For VOC's it is assumed that the VOC emission comprises entirely of 1,3-butadiene which has the most stringent EAL. This is a highly cautious assumption and predicted concentrations of 1,3-butadiene would be substantially below this. Furthermore, the PC at 0.36 µg m^{-3} is less than 20% of the difference between the AQAL and the background concentration (0.41 µg m^{-3}) and can be screened from further assessment.

4.3 DETAILED DISPERSION MODELLING RESULTS – EFW CHP FACILITY

4.3.1 Introduction

For the EfW CHP Facility, detailed results are presented for each pollutant. Results are presented as the process contribution (PC) which is the contribution of the EfW CHP Facility emissions to local air quality at each of the receptors. The maximum predicted environmental concentration (PEC) is also provided which is the maximum PC added to the background concentration. Results are compared to the relevant AQAL, and the impact assessed in accordance with the Environment Agency's Risk Assessment Guidance.

4.3.2 PM_{10}

Predicted ground level concentrations of PM_{10} arising as a result of the EfW CHP Facility emissions are presented in *Table 4.3*. As a worst-case, this assumes that all particles emitted by the EfW CHP Facility are less than 10 µm in diameter. Maximum predicted concentrations are provided as well as predicted concentrations at discrete receptors. The significance of the impact is assessed in accordance Environment Agency's Risk Assessment Guidance.

TABLE 4.3 PREDICTED PM_{10} CONCENTRATIONS FOR THE EFW CHP FACILITY

Receptor/Parameter	Annual Mean		90.4th Percentile of 24-hour Means	
	PC (µg m^{-3})	%age AQAL	PC (µg m^{-3})	%age AQAL
Maximum	0.019	<0.1%	0.072	0.1%
D1. Viscount Walk	0.0050	<0.1%	0.020	<0.1%
D2. Wheelers Lane (new dev.)	0.0079	<0.1%	0.033	0.1%
D3. Magna Road	0.016	<0.1%	0.060	0.1%
D4. Waggy Tails Rescue	0.019	<0.1%	0.074	0.1%
D5. The Hamworthy Club	0.0072	<0.1%	0.026	0.1%
D6. Arrowsmith Road	0.0047	<0.1%	0.018	<0.1%
D7. Maranello	0.0017	<0.1%	0.0053	<0.1%
D8. Magna Care Centre	0.0027	<0.1%	0.0094	<0.1%
D9. Canford Sports Club House	0.0029	<0.1%	0.011	<0.1%

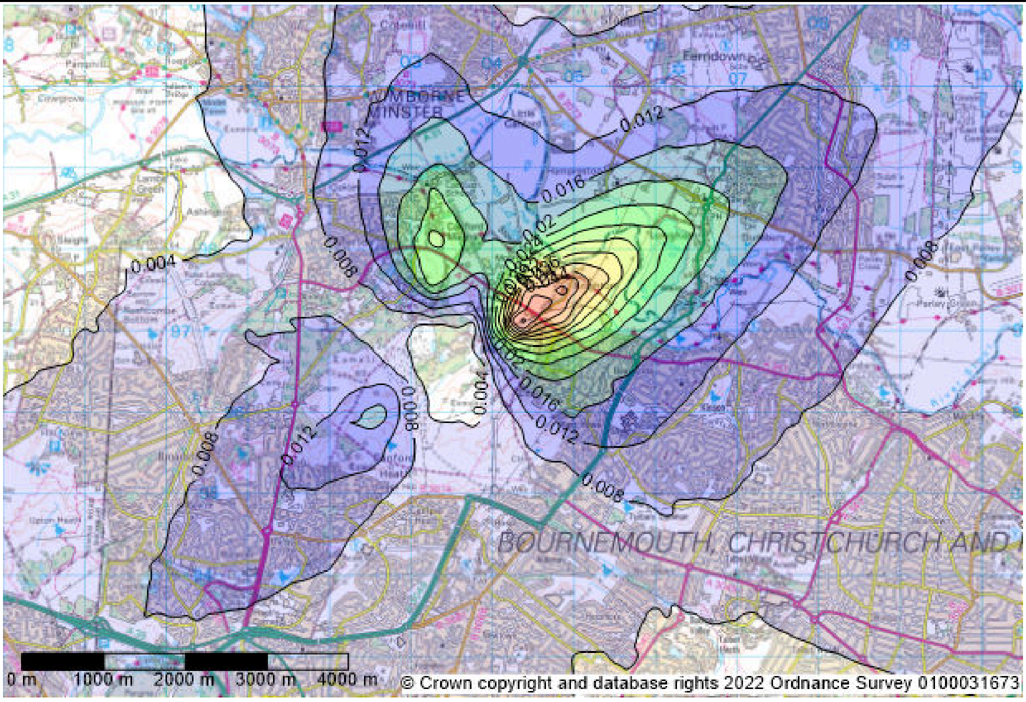
TABLE 4.3 PREDICTED PM_{10} CONCENTRATIONS FOR THE EFW CHP FACILITY

Receptor/Parameter	Annual Mean		90.4th Percentile of 24-hour Means	
	PC (µg m^{-3})	%age AQAL	PC (µg m^{-3})	%age AQAL
D10. Provence Drive	0.0053	<0.1%	0.020	<0.1%
D11. Bearwood Primary School	0.011	<0.1%	0.037	0.1%
D12. Ferndown	0.0062	<0.1%	0.021	<0.1%
D13. Belben Road, Bournemouth	0.0025	<0.1%	0.011	<0.1%
D14. Pilsdon Drive, Bournemouth	0.0038	<0.1%	0.015	<0.1%
D15. Gravel Hill, Broadstone	0.0035	<0.1%	0.012	<0.1%
D16. Egdon Drive, Merley	0.0019	<0.1%	0.0070	<0.1%
D17. Marpet Close, Bear Cross	0.0057	<0.1%	0.020	<0.1%
D18. Knighton Lane, Knighton	0.016	<0.1%	0.059	0.1%
D19. White House	0.015	<0.1%	0.055	0.1%
Maximum off-site (PC) (a)	*0.019 (<0.1%)*		*0.072 (0.1%)*	
Assumed background	*18.7*		*22.1*	
Total concentration (PEC) (a)	*18.7 (46.8%)*		*22.1 (44.3%)*	
AQAL	*40*		*50*	
Impact descriptor	*Not significant*		*Not significant*	
(a) Values in parentheses are the percentages of the air quality assessment level				

The maximum predicted off-site concentrations for both averaging periods are less than 0.1% of the AQALs. The maximum annual mean PEC is 18.7 µg m^{-3}, which is 46.8% of the AQAL of 40 µg m^{-3}. The maximum 90.4th percentile of 24-hour means PEC is 22.1 µg m^{-3}, which is 44.3% of the 24-hour mean AQAL of 50 µg m^{-3}. Therefore, it is concluded that emissions of PM_{10} from the EfW CHP Facility are not significant.

Predicted 90.4th percentiles of 24-hour mean concentrations of PM_{10} are presented as a contour plot in *Figure 4.1* for the most recent meteorological year (2020).

FIGURE 4.1 **PREDICTED 90.4TH PERCENTILE OF 24-HOUR MEAN PM_{10} CONCENTRATIONS FOR THE EFW CHP FACILITY (µg m^{-3}) - 2020**



Highest 24-hour mean concentrations (as the 90.4th percentile) occur to the north and east of the Installation.

4.3.3 $PM_{2.5}$

Predicted ground level concentrations of $PM_{2.5}$ for the proposed EfW CHP Facility emissions are presented in *Table 4.4*. As a worst-case, these have been calculated on the basis that all particles are within the $PM_{2.5}$ fraction. Predicted concentrations are compared to the EU target value of 20 µg m^{-3}. Predicted annual mean concentrations of $PM_{2.5}$ (and PM_{10}) are presented as a contour plot in *Figure 4.2*.

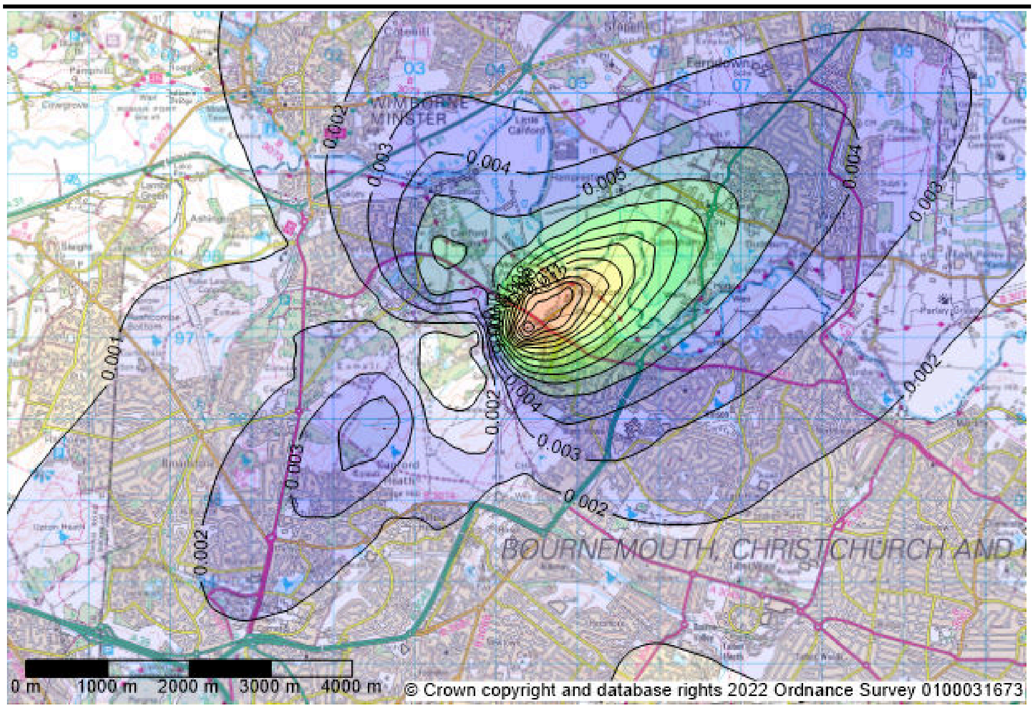
TABLE 4.4 **PREDICTED $PM_{2.5}$ CONCENTRATIONS FOR THE EFW CHP FACILITY**

Receptor/Parameter	Annual Mean	
	PC (µg m^{-3})	%age AQAL
Maximum	0.019	0.1%
D1. Viscount Walk	0.0050	<0.1%
D2. Wheelers Lane (new dev.)	0.0079	<0.1%
D3. Magna Road	0.016	0.1%
D4. Waggy Tails Rescue	0.019	0.1%
D5. The Hamworthy Club	0.0072	<0.1%
D6. Arrowsmith Road	0.0047	<0.1%
D7. Maranello	0.0017	<0.1%
D8. Magna Care Centre	0.0027	<0.1%

TABLE 4.4 PREDICTED $PM_{2.5}$ CONCENTRATIONS FOR THE EFW CHP FACILITY

Receptor/Parameter	Annual Mean	
	PC (µg m^{-3})	%age AQAL
D9. Canford Sports Club House	0.0029	<0.1%
D10. Provence Drive	0.0053	<0.1%
D11. Bearwood Primary School	0.011	0.1%
D12. Ferndown	0.0062	<0.1%
D13. Belben Road, Bournemouth	0.0025	<0.1%
D14. Pilsdon Drive, Bournemouth	0.0038	<0.1%
D15. Gravel Hill, Broadstone	0.0035	<0.1%
D16. Egdon Drive, Merley	0.0019	<0.1%
D17. Marpet Close, Bear Cross	0.0057	<0.1%
D18. Knighton Lane, Knighton	0.016	0.1%
D19. White House	0.015	0.1%
Maximum off-site (PC) (a)	*0.019 (0.1%)*	
Assumed background	*12.8*	
Total concentration (PEC) (a)	*12.8 (64.1%)*	
AQAL	*20*	
Impact descriptor	*Not significant*	
(a) Values in parentheses are the percentages of the air quality assessment level		

FIGURE 4.2 PREDICTED ANNUAL MEAN $PM_{2.5}$ (AND PM_{10}) CONCENTRATIONS FOR THE EFW CHP FACILITY (µg m^{-3}) - 2020



The maximum predicted off-site concentration is 0.1% of the AQAL. The maximum off-site PEC (including the estimated background $PM_{2.5}$

concentration) is 12.8 µg m^{-3}, which is 64.1% of the AQAL. Therefore, predicted concentrations of $PM_{2.5}$ with the addition of background concentrations are well below the AQAL of 20 µg m^{-3}. Therefore, it is concluded that emissions of $PM_{2.5}$ from the proposed EfW CHP Facility emissions would be not significant.

The Environmental Targets Regulations 2023 provides a legally binding annual mean concentration target of 10 µg m^{-3}, to be met across England by 2040. The maximum predicted PC would be 0.2% of the 2040 air quality target. In accordance with the Environment Agency's Risk Assessment Guidance, this impact would be described as not significant.

4.3.4 Nitrogen Dioxide

Predicted annual and hourly mean ground level concentrations of NO_2 arising as a result of emissions from the proposed EfW CHP Facility are presented in *Table 4.5*. Maximum predicted concentrations are provided along with predicted concentrations for the discrete receptors.

Guidance issued by the Environment Agency's Air Quality Assessment and Modelling Unit (AQMAU) [15] indicates that an initial screening approach would be to assume that 100% of annual average and 50% of peak hourly average concentrations of NO_x are in the form of NO_2. For a more detailed worst-case assessment such as this, the guidance recommends a conversion rate of 70% and 35% for annual and hourly concentrations, respectively.

TABLE 4.5 PREDICTED NO_2 CONCENTRATIONS FOR THE EFW CHP FACILITY

Receptor/Parameter	Annual Mean		99.8th Percentile of 1-hour Means	
	PC (µg m^{-3})	%age AQAL	PC (µg m^{-3})	%age AQAL
Maximum	0.32	0.8%	2.3	1.2%
D1. Viscount Walk	0.085	0.2%	1.7	0.9%
D2. Wheelers Lane (new dev.)	0.13	0.3%	2.3	1.1%
D3. Magna Road	0.28	0.7%	2.0	1.0%
D4. Waggy Tails Rescue	0.32	0.8%	2.1	1.0%
D5. The Hamworthy Club	0.12	0.3%	1.9	1.0%
D6. Arrowsmith Road	0.079	0.2%	2.1	1.0%
D7. Maranello	0.028	0.1%	1.6	0.8%
D8. Magna Care Centre	0.046	0.1%	2.0	1.0%
D9. Canford Sports Club House	0.048	0.1%	1.4	0.7%
D10. Provence Drive	0.089	0.2%	1.9	1.0%
D11. Bearwood Primary School	0.18	0.4%	2.2	1.1%

15 Conversion Ratios for NOx and NO2, Air Quality Modelling and Assessment Unit of the Environment Agency (undated)

TABLE 4.5 PREDICTED NO_2 CONCENTRATIONS FOR THE EFW CHP FACILITY

Receptor/Parameter	Annual Mean		99.8th Percentile of 1-hour Means	
	PC (µg m-3)	%age AQAL	PC (µg m-3)	%age AQAL
D12. Ferndown	0.10	0.3%	0.86	0.4%
D13. Belben Road, Bournemouth	0.043	0.1%	1.4	0.7%
D14. Pilsdon Drive, Bournemouth	0.064	0.2%	1.3	0.6%
D15. Gravel Hill, Broadstone	0.059	0.1%	1.3	0.7%
D16. Egdon Drive, Merley	0.032	0.1%	1.4	0.7%
D17. Marpet Close, Bear Cross	0.096	0.2%	1.2	0.6%
D18. Knighton Lane, Knighton	0.27	0.7%	1.6	0.8%
D19. White House	0.26	0.6%	2.0	1.0%
Maximum off-site (PC) (a)	*0.32 (0.8%)*		*2.3 (1.2%)*	
Assumed background	*19.6*		*39.2*	
Total concentration (PEC) (a)	*19.9 (49.8%)*		*41.5 (20.8%)*	
AQAL	*40*		*200*	
Impact descriptor	*Not significant*		*Not significant*	
(a) Values in parentheses are the percentages of the air quality assessment level				

Predicted annual mean and predicted hourly mean (as the 99.8th percentile) ground level concentrations are also presented as contour plots in *Figure 4.3* and *Figure 4.4*, respectively.

FIGURE 4.3 PREDICTED ANNUAL MEAN NO_2 CONCENTRATIONS FOR THE EFW CHP FACILITY (µg m-3) - 2020

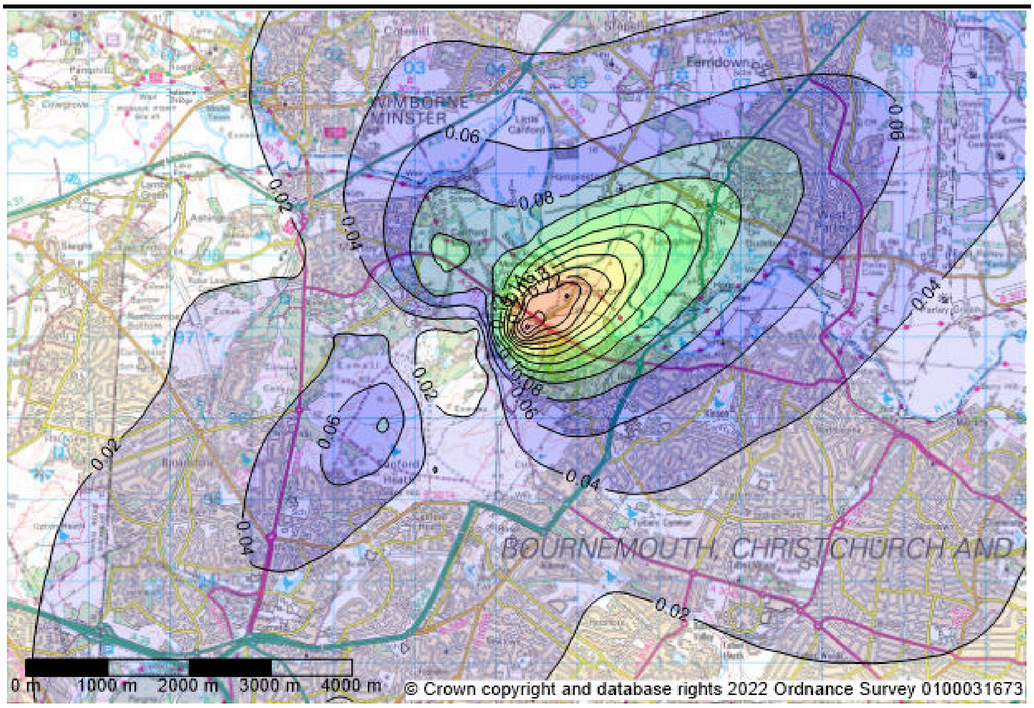
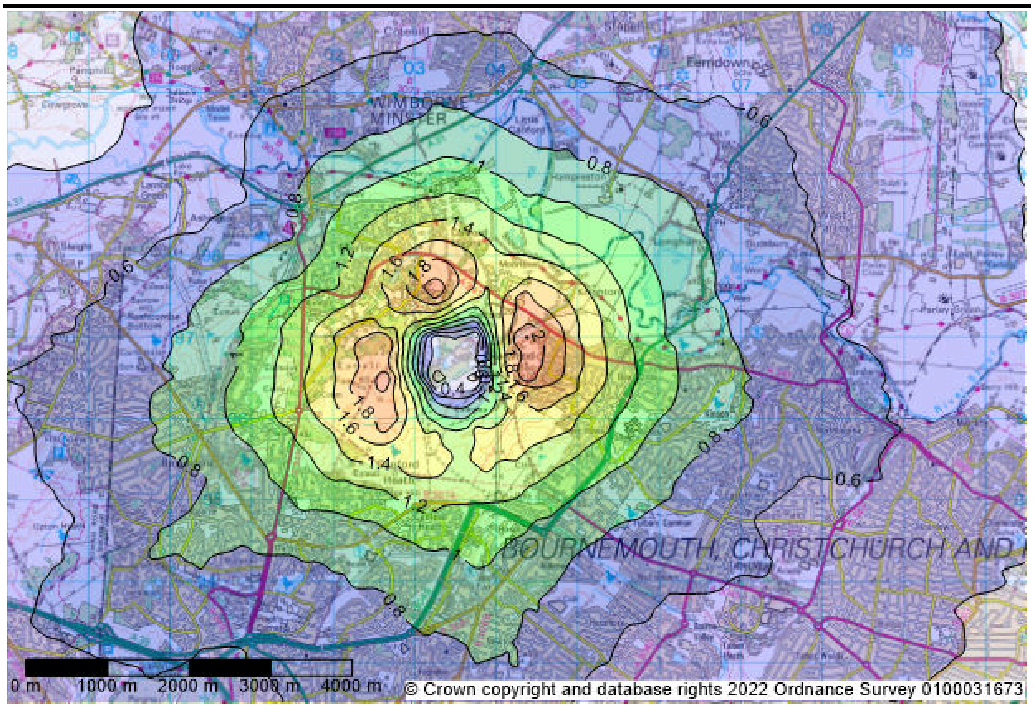


FIGURE 4.4 PREDICTED 99.8TH PERCENTILE OF HOURLY MEAN NO_2 CONCENTRATIONS FOR THE EFW CHP FACILITY (µg m-3) - 2020



Maximum predicted annual mean concentrations occur to the northeast of the proposed EfW CHP Facility. Relative to the annual mean air quality objectives, maximum concentrations are 0.8% of the AQAL and would be assessed as not significant. Predicted short-term concentrations are less than 10% of the AQAL and would also be assessed as not significant.

4.3.5 Sulphur Dioxide

Predicted ground level concentrations of SO_2 arising as a result of emissions from the proposed EfW CHP Facility are presented in *Table 4.6*. Maximum predicted concentrations are provided, and the significance of the impact is assessed according to the Environment Agency's Risk Assessment Guidance.

TABLE 4.6 MAXIMUM PREDICTED SO_2 CONCENTRATIONS FOR THE EFW CHP FACILITY

Receptor/Parameter	99.2nd Percentile of 24-hour Means		99.7th Percentile of 1-hour means		99.9th Percentile of 15-minute Means	
	PC (µg m-3)	%age AQAL	PC (µg m-3)	%age AQAL	PC (µg m-3)	%age AQAL
Maximum	0.88	0.7%	1.6	0.5%	1.9	0.7%
D1. Viscount Walk	0.35	0.3%	1.2	0.3%	1.5	0.6%
D2. Wheelers Lane (new dev.)	0.63	0.5%	1.6	0.5%	1.9	0.7%
D3. Magna Road	0.86	0.7%	1.4	0.4%	1.6	0.6%
D4. Waggy Tails Rescue	0.75	0.6%	1.5	0.4%	1.7	0.6%
D5. The Hamworthy Club	0.38	0.3%	1.4	0.4%	1.6	0.6%

TABLE 4.6 MAXIMUM PREDICTED SO_2 CONCENTRATIONS FOR THE EFW CHP FACILITY

Receptor/Parameter	99.2nd Percentile of 24-hour Means		99.7th Percentile of 1-hour means		99.9th Percentile of 15-minute Means	
	PC (µg m^{-3})	%age AQAL	PC (µg m^{-3})	%age AQAL	PC (µg m^{-3})	%age AQAL
D6. Arrowsmith Road	0.34	0.3%	1.4	0.4%	1.7	0.6%
D7. Maranello	0.30	0.2%	1.0	0.3%	1.7	0.6%
D8. Magna Care Centre	0.36	0.3%	1.4	0.4%	1.6	0.6%
D9. Canford Sports Club House	0.19	0.1%	0.96	0.3%	1.4	0.5%
D10. Provence Drive	0.50	0.4%	1.3	0.4%	1.7	0.6%
D11. Bearwood Primary School	0.68	0.5%	1.5	0.4%	1.7	0.7%
D12. Ferndown	0.23	0.2%	0.57	0.2%	0.94	0.4%
D13. Belben Road, Bournemouth	0.22	0.2%	0.98	0.3%	1.2	0.5%
D14. Pilsdon Drive, Bournemouth	0.34	0.3%	0.88	0.3%	1.1	0.4%
D15. Gravel Hill, Broadstone	0.29	0.2%	0.94	0.3%	1.2	0.5%
D16. Egdon Drive, Merley	0.25	0.2%	0.94	0.3%	1.3	0.5%
D17. Marpet Close, Bear Cross	0.35	0.3%	0.86	0.2%	1.1	0.4%
D18. Knighton Lane, Knighton	0.62	0.5%	1.1	0.3%	1.3	0.5%
D19. White House	0.62	0.5%	1.4	0.4%	1.6	0.6%
Maximum off-site (PC) (a)	*0.88 (0.7%)*		*1.6 (0.5%)*		*1.9 (0.7%)*	
Assumed background	*7.8*		*13.2*		*17.7*	
Total concentration (PEC) (a)	*8.7 (6.9%)*		*14.8 (4.2%)*		*19.6 (7.4%)*	
AQAL	*125*		*350*		*266*	
Impact descriptor	*Not significant*		*Not significant*		*Not significant*	
(a) Values in parentheses are the percentages of the air quality assessment level						

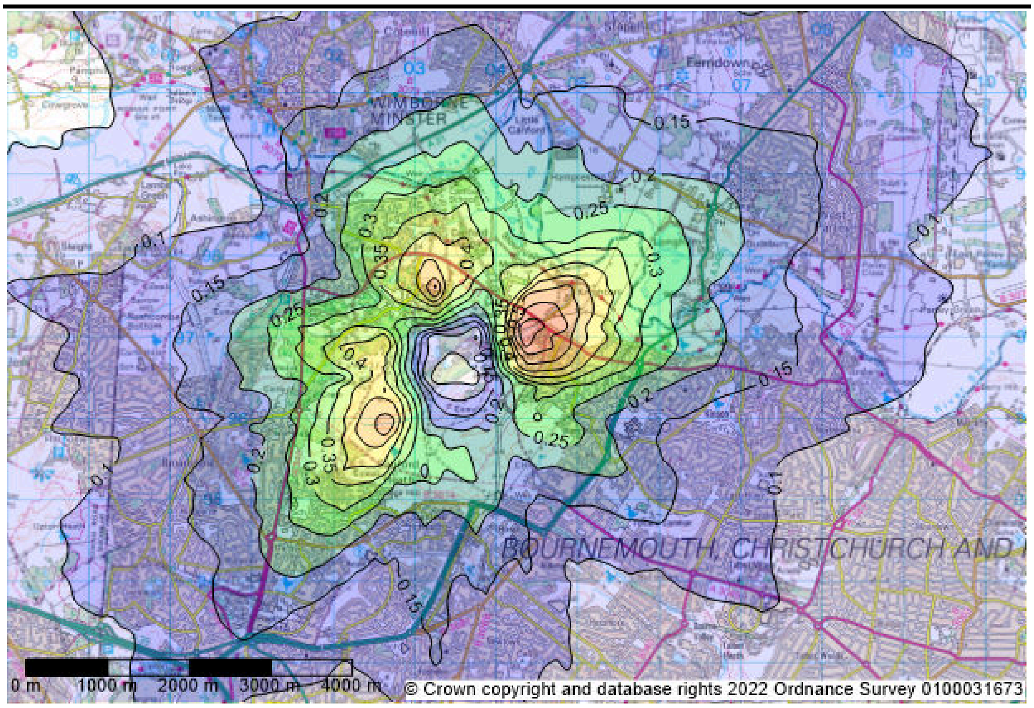
Predicted ground level SO_2 concentrations are well within the relevant AQALs. Compared to the AQAL for SO_2, predicted maximum concentrations may be summarised as follows:

- 0.7% of the 24-hour mean AQAL for SO_2;
- 0.5% of the 1-hour mean AQAL for SO_2; and
- 0.7% of the 15-minute mean AQAL for SO_2.

The predicted short-term SO_2 concentrations are all 10% or less of the relevant AQAL. Therefore, it is concluded that the impact of SO_2 emissions from the proposed EfW CHP Facility would be not significant.

Predicted 99.2nd percentile of 24-hour mean ground level concentrations of SO_2 are also presented as a contour plot in *Figure 4.5.*

FIGURE 4.5 **PREDICTED 99.2ND PERCENTILE OF 24-HOUR MEAN SO_2 CONCENTRATIONS FOR THE EFW CHP FACILITY (µg m⁻³) - 2020**



4.3.6 Carbon Monoxide

Predicted ground level concentrations of CO arising as a result of emissions from the proposed EfW CHP Facility are presented in *Table 4.7.*

TABLE 4.7 **MAXIMUM PREDICTED CO CONCENTRATIONS FOR THE EFW CHP FACILITY**

Receptor/Parameter	Maximum 8-Hour Mean		Maximum 1-Hour Mean	
	PC (µg m⁻³)	%age AQAL	PC (µg m⁻³)	%age AQAL
Maximum	2.4	<0.1%	7.2	<0.1%
D1. Viscount Walk	1.5	<0.1%	3.0	<0.1%
D2. Wheelers Lane (new dev.)	1.9	<0.1%	3.2	<0.1%
D3. Magna Road	2.1	<0.1%	3.0	<0.1%
D4. Waggy Tails Rescue	2.1	<0.1%	2.8	<0.1%
D5. The Hamworthy Club	2.1	<0.1%	2.8	<0.1%
D6. Arrowsmith Road	1.6	<0.1%	3.6	<0.1%
D7. Maranello	1.4	<0.1%	3.4	<0.1%
D8. Magna Care Centre	1.9	<0.1%	2.7	<0.1%
D9. Canford Sports Club House	1.3	<0.1%	3.5	<0.1%
D10. Provence Drive	2.0	<0.1%	4.1	<0.1%

D11. Bearwood Primary School	2.1	<0.1%	2.9	<0.1%
D12. Ferndown	0.67	<0.1%	2.8	<0.1%
D13. Belben Road, Bournemouth	1.0	<0.1%	2.6	<0.1%
D14. Pilsdon Drive, Bournemouth	1.1	<0.1%	2.5	<0.1%
D15. Gravel Hill, Broadstone	1.3	<0.1%	3.1	<0.1%
D16. Egdon Drive, Merley	1.1	<0.1%	2.4	<0.1%
D17. Marpet Close, Bear Cross	1.0	<0.1%	2.9	<0.1%
D18. Knighton Lane, Knighton	1.7	<0.1%	3.4	<0.1%
D19. White House	1.9	<0.1%	2.9	<0.1%
Maximum off-site (PC) (a)	*2.4 (<0.1%)*		*7.2 (<0.1%)*	
Assumed background	*214*		*306*	
Total concentration (PEC) (a)	*217 (2.2%)*		*313 (1.0%)*	
AQAL	*10,000*		*30,000*	
Impact descriptor	*Not significant*		*Not significant*	
(a) Values in parentheses are the percentages of the air quality assessment level				

Predicted ground level CO concentrations are well below the relevant AQALs. The maximum off-site 8-hour and 1-hour means are <0.1% of the AQALs and would be assessed as not significant.

4.3.7 Hydrogen Chloride and Hydrogen Fluoride

Predicted ground level concentrations of HCl and HF arising as a result of emissions from the proposed EfW CHP Facility are presented in *Table 4.8*.

TABLE 4.8 MAXIMUM PREDICTED HF AND HCL CONCENTRATIONS FOR THE EFW CHP FACILITY

Receptor/Parameter	HF Monthly (Weekly) Mean		HF Maximum Hourly Mean		HCl Maximum Hourly Mean	
	PC (µg m^{-3})	%age AQAL	PC (µg m^{-3})	%age AQAL	PC (µg m^{-3})	%age AQAL
Maximum	0.014	0.1%	0.14	0.1%	0.87	0.1%
D1. Viscount Walk	0.0050	<0.1%	0.060	<0.1%	0.36	<0.1%
D2. Wheelers Lane	0.0091	0.1%	0.064	<0.1%	0.38	0.1%
D3. Magna Road	0.013	0.1%	0.059	<0.1%	0.36	<0.1%
D4. Waggy Tails Rescue	0.014	0.1%	0.056	<0.1%	0.33	<0.1%
D5. The Hamworthy Club	0.0083	0.1%	0.057	<0.1%	0.34	<0.1%
D6. Arrowsmith Road	0.0045	<0.1%	0.071	<0.1%	0.43	0.1%
D7. Maranello	0.0036	<0.1%	0.068	<0.1%	0.41	0.1%
D8. Magna Care Centre	0.0051	<0.1%	0.054	<0.1%	0.32	<0.1%
D9. Canford Sports Club House	0.0033	<0.1%	0.071	<0.1%	0.43	0.1%
D10. Provence Drive	0.0077	<0.1%	0.081	0.1%	0.49	0.1%

TABLE 4.8 MAXIMUM PREDICTED HF AND HCL CONCENTRATIONS FOR THE EFW CHP FACILITY

Receptor/Parameter	HF Monthly (Weekly) Mean		HF Maximum Hourly Mean		HCl Maximum Hourly Mean	
	PC (µg m-3)	%age AQAL	PC (µg m-3)	%age AQAL	PC (µg m-3)	%age AQAL
D11. Bearwood Primary School	0.011	0.1%	0.059	<0.1%	0.35	<0.1%
D12. Ferndown	0.0044	<0.1%	0.056	<0.1%	0.34	<0.1%
D13. Belben Road	0.0032	<0.1%	0.051	<0.1%	0.31	<0.1%
D14. Pilsdon Drive	0.0064	<0.1%	0.050	<0.1%	0.30	<0.1%
D15. Gravel Hill, Broadstone	0.0079	<0.1%	0.061	<0.1%	0.37	<0.1%
D16. Egdon Drive, Merley	0.0037	<0.1%	0.047	<0.1%	0.28	<0.1%
D17. Marpet Close, Bear Cross	0.0055	<0.1%	0.059	<0.1%	0.35	<0.1%
D18. Knighton Lane, Knighton	0.012	0.1%	0.068	<0.1%	0.41	0.1%
D19. White House	0.011	0.1%	0.058	<0.1%	0.35	<0.1%
Maximum off-site (PC) (a)	*0.014 (0.1%)*		*0.14 (0.1%)*		*0.87 (0.1%)*	
Assumed background	*0.1*		*0.2*		*0.52*	
Total concentration (PEC) (a)	*0.11 (0.7%)*		*0.34 (0.2%)*		*1.4 (0.2%)*	
AQAL	*16*		*160*		*750*	
Impact descriptor	*Negligible*		*Negligible*		*Negligible*	

(a) Values in parentheses are the percentages of the air quality assessment level

Compared to the relevant AQAL, predicted maximum concentrations are very small and 0.1% or less of the AQAL and emissions from the proposed EfW CHP Facility would be assessed as not significant.

4.3.8 Total Organic Carbon

Predicted annual mean concentrations of TOC (as 1,3-butadiene) arising as a result of emissions from the proposed EfW CHP facility are presented in *Table 4.9*.

TABLE 4.9 MAXIMUM PREDICTED CONCENTRATIONS OF 1,3-BUTADIENE FOR THE EFW CHP FACILITY

Receptor/Parameter	Annual Mean		Maximum 24-Hour Mean	
	PC (µg m-3)	%age AQAL	PC (µg m-3)	%age AQAL
Maximum	0.038	1.7%	0.36	16.1%
D1. Viscount Walk	0.010	0.4%	0.13	5.8%
D2. Wheelers Lane	0.016	0.7%	0.32	14.1%
D3. Magna Road	0.033	1.5%	0.32	14.4%
D4. Waggy Tails Rescue	0.038	1.7%	0.29	12.7%

TABLE 4.9 MAXIMUM PREDICTED CONCENTRATIONS OF 1,3-BUTADIENE FOR THE EFW CHP FACILITY

Receptor/Parameter	Annual Mean		Maximum 24-Hour Mean	
	PC (µg m^{-3})	%age AQAL	PC (µg m^{-3})	%age AQAL
D5. The Hamworthy Club	0.014	0.6%	0.19	8.3%
D6. Arrowsmith Road	0.0095	0.4%	0.15	6.6%
D7. Maranello	0.0034	0.1%	0.13	5.9%
D8. Magna Care Centre	0.0055	0.2%	0.18	7.8%
D9. Canford Sports Club House	0.0057	0.3%	0.11	5.0%
D10. Provence Drive	0.011	0.5%	0.28	12.4%
D11. Bearwood Primary School	0.021	0.9%	0.34	15.2%
D12. Ferndown	0.012	0.5%	0.09	4.0%
D13. Belben Road	0.0051	0.2%	0.12	5.5%
D14. Pilsdon Drive	0.0077	0.3%	0.14	6.4%
D15. Gravel Hill, Broadstone	0.0070	0.3%	0.21	9.5%
D16. Egdon Drive, Merley	0.0039	0.2%	0.14	6.1%
D17. Marpet Close, Bear Cross	0.011	0.5%	0.14	6.1%
D18. Knighton Lane, Knighton	0.033	1.4%	0.24	10.6%
D19. White House	0.031	1.4%	0.26	11.6%
Maximum off-site (PC) (a)	*0.038 (1.7%)*		*0.36 (16.1%)*	
Assumed background	*0.18*		*0.21*	
Total concentration (PEC) (a)	*0.22 (9.7%)*		*0.57 (25.5%)*	
AQAL	*2.25*		*2.25*	
Impact descriptor	*AQO likely met*		*Slight adverse*	

(a) Values in parentheses are the percentages of the air quality assessment level

Maximum predicted ground level TOC (assuming all 1,3-butadiene as a worst case) concentrations are well within the annual mean AQAL. The maximum off-site concentration is 1.7% of the annual mean but the PEC is less than 70% of the AQAL and it is unlikely that this would be exceeded. Predicted maximum 24-hourly mean concentrations exceed 10% of the short term AQAL at some receptors. However, as discussed in *Section 4.3.1*, this assumes that all of the TOC emission comprises entirely 1,3-butadiene which would be a very cautious assumption and in reality, predicted concentrations of 1,3-butadiene would be substantially less than predicted. Therefore, the impact would be assessed as not significant.

4.3.9 Benzo(a)pyrene

Predicted annual mean concentrations of PAHs (as benzo(a)pyrene) arising as a result of emissions from the proposed EfW CHP Facility are presented in *Table 4.10*.

TABLE 4.10 MAXIMUM PREDICTED BENZO(A)PYRENE CONCENTRATIONS FOR THE EFW CHP FACILITY

Receptor/Parameter	Annual Mean	
	PC (ng m^{-3})	%age AQAL
Maximum	0.00034	0.1%
D1. Viscount Walk	0.000091	<0.1%
D2. Wheelers Lane	0.00014	0.1%
D3. Magna Road	0.00030	0.1%
D4. Waggy Tails Rescue	0.00034	0.1%
D5. The Hamworthy Club	0.00013	0.1%
D6. Arrowsmith Road	0.000085	<0.1%
D7. Maranello	0.000030	<0.1%
D8. Magna Care Centre	0.000049	<0.1%
D9. Canford Sports Club House	0.000052	<0.1%
D10. Provence Drive	0.000095	<0.1%
D11. Bearwood Primary School	0.00019	0.1%
D12. Ferndown	0.00011	<0.1%
D13. Belben Road	0.000046	<0.1%
D14. Pilsdon Drive	0.000069	<0.1%
D15. Gravel Hill, Broadstone	0.000063	<0.1%
D16. Egdon Drive, Merley	0.000035	<0.1%
D17. Marpet Close, Bear Cross	0.00010	<0.1%
D18. Knighton Lane, Knighton	0.00029	0.1%
D19. White House	0.00028	0.1%
Maximum off-site (PC) (a)	*0.00034 (0.1%)*	
Assumed background	*0.078*	
Total concentration (PEC) (a)	*0.078 (31.3%)*	
AQAL	*0.25*	
Impact descriptor	*Not significant*	
(a) Values in parentheses are the percentages of the air quality assessment level		

Maximum predicted ground level benzo(a)pyrene concentrations are well below the annual mean AQAL and the impact would be assessed as not significant.

4.3.10 Dioxins and Furans

Maximum predicted ground level concentrations of dioxins and furans arising as a result of emissions from the proposed EfW CHP Facility are presented in *Table 4.11*. There are no air quality assessment levels available for dioxins and furans with which to compare predicted concentrations. The health impacts associated with the emissions from the proposed EfW CHP Facility have been considered in the human health risk assessment which is submitted in support of the Environmental Permit application.

TABLE 4.11 MAXIMUM PREDICTED DIOXIN AND FURAN CONCENTRATIONS FOR THE EFW CHP FACILITY

Receptor/Parameter	Annual Mean PC (fg I-TEQ m^{-3})
Maximum	0.15
D1. Viscount Walk	0.040
D2. Wheelers Lane	0.063
D3. Magna Road	0.13
D4. Waggy Tails Rescue	0.15
D5. The Hamworthy Club	0.057
D6. Arrowsmith Road	0.038
D7. Maranello	0.013
D8. Magna Care Centre	0.022
D9. Canford Sports Club House	0.023
D10. Provence Drive	0.042
D11. Bearwood Primary School	0.084
D12. Ferndown	0.049
D13. Belben Road	0.020
D14. Pilsdon Drive	0.031
D15. Gravel Hill, Broadstone	0.028
D16. Egdon Drive, Merley	0.015
D17. Marpet Close, Bear Cross	0.046
D18. Knighton Lane, Knighton	0.13
D19. White House	0.12
Maximum off-site (PC) (a)	*0.15*
Assumed background	*3.2*
Total concentration (PEC) (a)	*3.3*
AQAL	-
Impact descriptor	-

Without an air quality assessment level, it is not possible to determine the significance of the emissions with respect to dioxins and furans. However, maximum predicted annual mean concentrations are 4.7% of the assumed background concentration of 3.2 fg m^{-3}.

4.3.11 Ammonia

Predicted annual mean and maximum hourly mean concentrations of NH_3 arising as a result of emissions from the EfW CHP Facility are presented in *Table 4.12*.

TABLE 4.12 MAXIMUM PREDICTED CONCENTRATIONS OF AMMONIA FOR THE EFW CHP FACILITY

Receptor/Parameter	Annual Mean		Maximum 1-Hour Mean	
	PC (µg m-3)	%age AQAL	PC (µg m-3)	%age AQAL
Maximum	0.019	<0.1%	0.72	<0.1%
D1. Viscount Walk	0.0050	<0.1%	0.30	<0.1%
D2. Wheelers Lane	0.0079	<0.1%	0.32	<0.1%
D3. Magna Road	0.016	<0.1%	0.30	<0.1%
D4. Waggy Tails Rescue	0.019	<0.1%	0.28	<0.1%
D5. The Hamworthy Club	0.0072	<0.1%	0.28	<0.1%
D6. Arrowsmith Road	0.0047	<0.1%	0.36	<0.1%
D7. Maranello	0.0017	<0.1%	0.34	<0.1%
D8. Magna Care Centre	0.0027	<0.1%	0.27	<0.1%
D9. Canford Sports Club House	0.0029	<0.1%	0.35	<0.1%
D10. Provence Drive	0.0053	<0.1%	0.41	<0.1%
D11. Bearwood Primary School	0.011	<0.1%	0.29	<0.1%
D12. Ferndown	0.0062	<0.1%	0.28	<0.1%
D13. Belben Road	0.0025	<0.1%	0.26	<0.1%
D14. Pilsdon Drive	0.0038	<0.1%	0.25	<0.1%
D15. Gravel Hill, Broadstone	0.0035	<0.1%	0.31	<0.1%
D16. Egdon Drive, Merley	0.0019	<0.1%	0.24	<0.1%
D17. Marpet Close, Bear Cross	0.0057	<0.1%	0.29	<0.1%
D18. Knighton Lane, Knighton	0.016	<0.1%	0.34	<0.1%
D19. White House	0.015	<0.1%	0.29	<0.1%
Maximum off-site (PC) (a)	0.019 (<0.1%)		0.72 (<0.1%)	
Assumed background	1.3		2.6	
Total concentration (PEC) (a)	1.3 (0.7%)		3.3 (0.1%)	
AQAL	180		2,500	
Impact descriptor	*Not significant*		*Not significant*	
(a) Values in parentheses are the percentages of the air quality assessment level				

Maximum predicted ground level NH_3 concentrations are well below the annual mean and hourly mean AQALs. The maximum off-site annual mean and maximum hourly mean concentrations are <0.1% of the AQAL and would be assessed as not significant.

4.3.12 Polychlorinated Biphenyls

Predicted annual mean and maximum hourly mean concentrations of total PCBs arising as a result of emissions from the proposed EfW CHP Facility are presented in *Table 4.13*.

TABLE 4.13 MAXIMUM PREDICTED CONCENTRATIONS OF PCBS FOR THE EFW CHP FACILITY

Receptor/Parameter	Annual Mean		Maximum 1-Hour Mean	
	PC (ng m-3)	%age AQAL	PC (ng m-3)	%age AQAL
Maximum	1.4×10^{-8}	<0.1%	5.2×10^{-7}	<0.1%
D1. Viscount Walk	3.6×10^{-9}	<0.1%	2.2×10^{-7}	<0.1%
D2. Wheelers Lane	5.7×10^{-9}	<0.1%	2.3×10^{-7}	<0.1%
D3. Magna Road	1.2×10^{-8}	<0.1%	1.9×10^{-7}	<0.1%
D4. Waggy Tails Rescue	1.3×10^{-8}	<0.1%	2.0×10^{-7}	<0.1%
D5. The Hamworthy Club	4.9×10^{-9}	<0.1%	2.0×10^{-7}	<0.1%
D6. Arrowsmith Road	3.3×10^{-9}	<0.1%	2.6×10^{-7}	<0.1%
D7. Maranello	1.2×10^{-9}	<0.1%	2.5×10^{-7}	<0.1%
D8. Magna Care Centre	2.0×10^{-9}	<0.1%	1.9×10^{-7}	<0.1%
D9. Canford Sports Club House	2.0×10^{-9}	<0.1%	2.6×10^{-7}	<0.1%
D10. Provence Drive	3.9×10^{-9}	<0.1%	3.0×10^{-7}	<0.1%
D11. Bearwood Primary School	7.6×10^{-10}	<0.1%	2.1×10^{-7}	<0.1%
D12. Ferndown	4.4×10^{-8}	<0.1%	1.5×10^{-7}	<0.1%
D13. Belben Road	1.9×10^{-9}	<0.1%	1.8×10^{-7}	<0.1%
D14. Pilsdon Drive	2.8×10^{-8}	<0.1%	1.7×10^{-7}	<0.1%
D15. Gravel Hill, Broadstone	2.5×10^{-10}	<0.1%	1.7×10^{-7}	<0.1%
D16. Egdon Drive, Merley	1.4×10^{-10}	<0.1%	1.6×10^{-7}	<0.1%
D17. Marpet Close, Bear Cross	4.1×10^{-10}	<0.1%	1.9×10^{-7}	<0.1%
D18. Knighton Lane, Knighton	1.2×10^{-8}	<0.1%	1.8×10^{-7}	<0.1%
D19. White House	1.1×10^{-8}	<0.1%	2.1×10^{-7}	<0.1%
Maximum off-site (PC) (a)	1.4×10^{-8} (<0.1%)		5.2×10^{-7} (<0.1%)	
Assumed background	0.027		0.054	
Total concentration (PEC) (a)	0.027 (<0.1%)		0.054 (<0.1%)	
AQAL	200		6000	
Impact descriptor	*Not significant*		*Not significant*	
(a) Values in parentheses are the percentages of the air quality assessment level				

Maximum predicted ground level PCB concentrations are well below the annual mean and hourly mean AQALs. Predicted concentrations are <0.1% of the respective AQALs and would be assessed as not significant.

4.3.13 Trace Metals

Maximum predicted results presented in *Table 4.1* for long-term impacts and *Table 4.2* for short-term impacts indicates that further assessment is required for predicted annual mean ground level concentrations of CrVI. These results are predicted assuming each metal is emitted at the ELV for the group and this assumption is clearly highly conservative and likely to greatly overestimate the actual impacts associated with emissions of metals.

Using the maximum typical emission concentrations (as identified in *Table 3.5* in *Section 3.4.3*), the predicted impact of CrVI emissions from the proposed EfW CHP Facility are summarised in *Table 4.14*.

TABLE 4.14 MAXIMUM PREDICTED CRVI CONCENTRATIONS FOR THE EFW CHP FACILITY

Receptor/Parameter	Annual Mean Chromium VI	
	PC (ng m^{-3})	%age AQAL
Maximum	0.00056	0.2%
D1. Viscount Walk	0.00015	0.1%
D2. Wheelers Lane	0.00024	0.1%
D3. Magna Road	0.00049	0.2%
D4. Waggy Tails Rescue	0.00057	0.2%
D5. The Hamworthy Club	0.00022	0.1%
D6. Arrowsmith Road	0.00014	0.1%
D7. Maranello	0.000050	<0.1%
D8. Magna Care Centre	0.000082	<0.1%
D9. Canford Sports Club House	0.000086	<0.1%
D10. Provence Drive	0.00016	0.1%
D11. Bearwood Primary School	0.00032	0.1%
D12. Ferndown	0.00019	0.1%
D13. Belben Road	0.000076	<0.1%
D14. Pilsdon Drive	0.00011	<0.1%
D15. Gravel Hill, Broadstone	0.00010	<0.1%
D16. Egdon Drive, Merley	0.000058	<0.1%
D17. Marpet Close, Bear Cross	0.00017	0.1%
D18. Knighton Lane, Knighton	0.00049	0.2%
D19. White House	0.00046	0.2%
Maximum off-site (PC) (a)	0.00056 (0.2%)	
Assumed background	0.22	
Total concentration (PEC) (a)	0.22 (88.0%)	
AQAL	0.25	
Further assessment required?	*No*	
(a) Values in parentheses are the percentages of the air quality assessment level		

In accordance with the Environment Agency's Risk Assessment Guidance, the impact of CrVI would be described as not significant for the maximum predicted and all receptors for typical emissions. Furthermore, the contribution from the proposed EfW CHP Facility (PC) is less than 1% of the AQAL and in accordance with the Environment Agency guidance (refer *Section 3.4.3*) it can be screened out from further assessment.

Therefore, it is concluded that the impact of trace metal emissions from the proposed EfW CHP Facility would be not significant.

4.4 EfW CHP Facility and Emergency Diesel Generator

The combined impact of the EfW CHP Facility and the EDG on human health is presented in *Table 4.15*. Annual mean concentrations of NO_2 are predicted assuming that the EDG operates for 50 hours per annum. For hourly mean concentrations it is assumed that the EDG operates continuously and is representative of the worst-case.

Table 4.15 Combined EfW CHP Facility and EDG Impact on Predicted NO_2 Concentrations

Receptor	Annual Mean		99.8th Percentile of Hourly Means	
	EfW CHP and EDG ($\mu g\ m^{-3}$)	Percentage of AQAL	EfW CHP and EDG ($\mu g\ m^{-3}$)	Percentage of AQAL
D1. Viscount Walk	0.089	0.2%	5.3	2.6%
D2. Wheelers Lane (new dev.)	0.14	0.3%	8.2	4.1%
D3. Magna Road	0.28	0.7%	2.8	1.4%
D4. Waggy Tails Rescue	0.32	0.8%	3.1	1.5%
D5. The Hamworthy Club	0.12	0.3%	6.5	3.2%
D6. Arrowsmith Road	0.083	0.2%	12.8	6.4%
D7. Maranello	0.030	0.1%	11.6	5.8%
D8. Magna Care Centre	0.048	0.1%	7.4	3.7%
D9. Canford Sports Club House	0.053	0.1%	4.1	2.0%
D10. Provence Drive	0.10	0.2%	13.9	7.0%
D11. Bearwood Primary School	0.18	0.5%	7.7	3.8%
D12. Ferndown	0.10	0.3%	1.2	0.6%
D13. Belben Road, Bournemouth	0.044	0.1%	4.2	2.1%
D14. Pilsdon Drive, Bournemouth	0.066	0.2%	2.5	1.2%
D15. Gravel Hill, Broadstone	0.060	0.1%	4.0	2.0%
D16. Egdon Drive, Merley	0.033	0.1%	5.6	2.8%
D17. Marpet Close, Bear Cross	0.097	0.2%	3.6	1.8%
D18. Knighton Lane, Knighton	0.28	0.7%	2.3	1.1%
D19. White House	0.26	0.7%	3.3	1.6%
Maximum receptor (PC)	*0.32*	*0.8%*	*13.9*	*7.0%*

Due to the limited operational hours, the EDG has negligible impact on predicted annual mean concentrations at sensitive receptors. Predicted hourly mean concentrations (as the 99.8th percentile) increase from 2.3 µg m^{-3} for the EfW CHP Facility alone to 13.9 µg m^{-3} with the additional continuous operation of the EDG. This is representative of the worst-case and at less than 10% of the AQAL would be assessed as not significant.

5 PREDICTED OPERATIONAL IMPACT ON HABITAT SITES

5.1 CRITICAL LEVELS AND CRITICAL LOADS

5.1.1 Introduction

There are many impacts on ecosystems associated with elevated levels of atmospheric nitrogen and its deposition to sensitive habitats. The most important of these are:

- short-term direct effects of nitrogen gases and aerosols on individual species;
- soil mediated effects;
- increased susceptibility to secondary stress factors, such as drought or frost; and
- changes in (competitive) relationships between species, resulting in loss of biodiversity.

In order to provide benchmark levels, below which significant harmful effects to the environment do not occur, critical levels and critical loads have been developed referring to gaseous airborne concentrations of pollutants and deposition of pollution to land and water, respectively.

5.1.2 Critical Levels

Critical levels are thresholds of airborne pollutant concentrations above which damage may be sustained to sensitive plants and animals. High concentrations of pollutants in ambient air directly cause harm to leaves and needles of forests and other plant communities.

The 2008 Air Quality Directive set limit values for the protection of vegetation and ecosystems and these have been adopted by the Air Quality Strategy, but are not currently set in Regulations. The current critical levels, limit values and objectives are summarised in *Table 5.1*.

TABLE 5.1 CRITICAL LEVELS FOR THE PROTECTION OF VEGETATION AND ECOSYSTEMS

Pollutant	Description	Averaging Period	Concentration (μg m^{-3})
Nitrogen Oxides	Critical Level	Annual mean	30
	Critical Level	Daily mean	75
Sulphur Dioxide	Critical Level for ecosystems dominated by lichens and bryophytes	Annual mean	10
	Critical Level for all other ecosystems	Annual mean	20
Hydrogen Fluoride	Critical Level	Weekly mean	<0.5
	Critical Level	Daily mean	<5
Ammonia	Critical Level for ecosystems dominated by lichens and bryophytes	Annual mean	1
	Critical Level for all other ecosystems	Annual mean	3

5.1.3 Critical Loads

Introduction

Critical loads refer to the threshold beyond which deposition of pollutants to water or land results in measurable damage to vegetation and habitats. This takes the form of either gravitational settling of particulate matter (dry deposition) or wet deposition, where atmospheric pollutants dissolve in water vapour and then precipitate to the ground (e.g. as rain, snow, fog etc.).

The issue for ecosystems is the risk that the deposition rate of acid (acidification) or nutrient nitrogen (eutrophication) may be in excess of the amount that the ecosystem can tolerate. The point at which this occurs is the 'critical load'.

Eutrophication

Critical loads for nutrient nitrogen are determined largely on the basis of the species or habitat type affected. Critical loads have been determined for a number of habitat types at the European level and reflect the way different plants have adapted to differing availabilities of nutrient. Those in nutrient deficient environments, e.g. coastal sand dunes, will be less tolerant of excess nitrogen from aerial deposition.

Critical loads for eutrophication for the habitat types identified for each sensitive habitat receptor have been obtained from the Air Pollution Information System (APIS) [16] and are summarised in *Table 5.2*. For those habitat sites considered for the planning application, these values have been agreed with Natural England and The Environmental Dimension Partnership (EDP) the project ecologists for the Proposed Development during the planning process.

16 www.apis.co.uk

TABLE 5.2 CRITICAL LOADS FOR EUTROPHICATION

Habitat Site	Habitat Type	Critical Load (kg N $ha^{-1}a^{-1}$)
H1 Dorset Heaths SAC/SPA/Ramsar	Valley mires, poor fens and transition mires	5 – 15
	Acidophilous Quercus - dominated woodland	10 - 15
H2 Poole Harbour SPA/Ramsar	Coastal dune grasslands (grey dunes) – acid type	5 - 10
H3 Dorset Heaths (Purbeck & Wareham) and Studland Dunes SAC	Bog woodland	5 - 10
H4 Canford Heath SSSI	Bogs	5 - 10
H5 Turbary & Kinson Commons SSSI	Bogs	5 - 10
H6 Hurn Common SSSI	Dwarf shrub heath	5 - 15
H7 Slop Bog & Uddens Heath SSSI	Bogs	5 - 10
H8 Parley Common SSSI	Bogs	5 - 10
H9 Luscombe Valley SSSI	Bogs	5 - 10
H10 Bourne Valley SSSI	Bogs	5 – 10
H11 Holt & West Moors Heath SSSI	Dwarf shrub heath	5 - 15
H12 Corfe & Barrow Hills SSSI	Dwarf shrub heath	5 - 15
H13 Arne SSSI	Bogs	5 - 10
H14 Moors River System SSSI	Broadleaved deciduous woodland	10 - 15
H15 Knighton Heath GC SNCI	Scattered remnants of heath	5 - 15
H16 Alderney Waterworks SNCI	Acid grassland	5 - 15
H17 Haymoor Bottom SNCI	Remnant heath	5 - 15
H18 Arrowsmith Coppice SNCI/AW	Heathland habitats	5 - 15
H19 Delph Woods SNCI	Deciduous woodland	10 - 15
H20 Dunyeats Hill HRS	Heathland	5 - 15
H21 Moortown Copse SNCI	Deciduous woodland	10 – 15
H22 Canford Park SANG LCNR	Neutral grassland	10 – 20
H23 Bearwood SNCI	Woodland	10 – 15
H24 Frogmoor Wood SNCI	Birch woodland	10 - 15
H25 Avon Valley Ramsar SPA	Gadwall and Tundra swan	Not provided
H26 River Avon SAC	Alkaline fens	15 to 25
H27 New Forest SAC	Bog woodland	5 to 10
H28 Isle of Portland to Studland Cliffs SAC	Coastal dune grasslands (grey dunes)	5 to 15
H29 Corfe Mullen Pastures SSSI	Valley mires, poor fens and transition mires	5 to 15

TABLE 5.2 CRITICAL LOADS FOR EUTROPHICATION

Habitat Site	Habitat Type	Critical Load (kg N $ha^{-1}a^{-1}$)
H30 St Leonards and St Ives Heaths SSSI	Raised and blanket bogs	5 to 10
H31 Poole Bay Cliffs SSSI	Lacerta agilis (sand lizard)	Not provided
H32 Lions Hill SSSI	Raised and blanket bogs	5 to 10
H33 Town Common SSSI	Raised and blanket bogs	5 to 10
H34 Upton Heath SSSI	Raised and blanket bogs	5 to 10
H35 Poole Harbour SSSI	Valley mires, poor fens and transition mires	5 to 15
H36 Ham Common SSSI	Raised and blanket bogs	5 to 10
H37 Holton and Sandford Heaths SSSI	Dry heaths	5 to 15
H38 Studland and Godlingston Heaths SSSI	Dry heaths	5 to 15
H39 Ferndown Common SSSI	Raised and blanket bogs	5 to 10

Acidification

For acidic deposition, the critical load of a habitat site is determined mostly by the underlying geology and soils. Alkaline soils have an innate capacity for neutralising acidic deposition, whereas acidic soils do not. The level of acidification depends on the donation of hydrogen ions to the soil arising primarily from deposition of:

- sulphur dioxide, which reacts with water to produce sulphuric acid;
- nitrogen oxides, which react with water to produce nitric acid;
- ammonia, which reacts with water to generate ammonium which is then oxidised to nitrate generating hydrogen ions; and
- acid gases such as hydrogen chloride.

The critical load of acidification is defined by a critical load function which describes the relationship between the relative contributions of sulphur (S) and nitrogen (N) to the total acidification. The critical load function is defined by the following parameters:

- CLmaxS, the maximum critical load of acidity for S, assuming there is no N deposition;
- CLminN, is the critical load of acidity due to nitrogen removal processes in the soil only (i.e. independent of deposition); and
- CLmaxN, is the maximum critical load of acidity for N, assuming there is no S deposition.

The values of these parameters (as provided by APIS) for the selected habitat types are presented in *Table 5.3*.

TABLE 5.3 CRITICAL LOADS FOR ACIDIFICATION (keq ha^{-1}a^{-1})

Habitat Site	Habitat Type	CLminN	CLmaxS	CLmaxN
H1 Dorset Heaths SAC/SPA/Ramsar	Bogs	0.321	0.232	0.553
	Dwarf shrub heath	0.642	0.23	0.872
	Coniferous woodland	0.142	0.728	1.013
H2 Poole Harbour SPA/Ramsar	Supralittoral sediment (acidic type)	0.856	4	4.856
H3 Dorset Heaths (Purbeck & Wareham) and Studland Dunes SAC	Bogs	0.321	0.237	0.558
H4 Canford Heath SSSI	Fen, marsh and swamp	0.321	0.25	0.571
H5 Turbary & Kinson Commons SSSI	Fen, marsh and swamp	0.321	0.244	0.565
H6 Hurn Common SSSI	Fen, marsh and swamp	0.642	0.24	0.882
H7 Slop Bog & Uddens Heath SSSI	Fen, marsh and swamp	0.321	0.268	0.589
H8 Parley Common SSSI	Fen, marsh and swamp	0.321	0.243	0.564
H9 Luscombe Valley SSSI	Fen, marsh and swamp	0.321	0.238	0.559
H10 Bourne Valley SSSI	Fen, marsh and swamp	0.321	0.24	0.561
H11 Holt & West Moors Heath SSSI	Fen, marsh and swamp	0.321	0.255	0.576
H12 Corfe & Barrow Hills SSSI	Fen, marsh and swamp	0.321	0.246	0.567
H13 Arne SSSI	Bogs	0.321	0.247	0.568
H14 Moors River System SSSI	Woodland	0.142	0.853	1.138
H15 Knighton Heath GC SNCI	Dwarf shrub heath	0.366	0.24	0.606
H16 Alderney Waterworks SNCI	Acid grassland	0.222	0.24	0.606
H17 Haymoor Bottom SNCI	Dwarf shrub heath	0.366	0.24	0.606
H18 Arrowsmith Coppice SNCI/AW	Dwarf shrub heath	0.366	0.24	0.606
H19 Delph Woods SNCI	Deciduous woodland	0.285	0.841	1.126
H20 Dunyeats Hill HRS	Dwarf shrub heath	0.366	0.24	0.606
H21 Moortown Copse SNCI	Deciduous woodland	0.142	1.635	1.777
H22 Canford Park SANG LCNR	Neutral grassland	0.856	4	4.856
H23 Bearwood SNCI	Woodland habitats	0.357	8.508	8.865

TABLE 5.3 CRITICAL LOADS FOR ACIDIFICATION (keq $ha^{-1}a^{-1}$)

Habitat Site	Habitat Type	CLminN	CLmaxS	CLmaxN
H24 Frogmoor Wood SNCI	Deciduous woodland	0.285	0.842	1.127
H25 Avon Valley Ramsar SPA	Gadwall and Tundra swan	Not sensitive		
H26 River Avon SAC	Alkaline fens	Not provided by APIS		
H27 New Forest SAC	Bogs	0.321	0.226	0.547
H28 Isle of Portland to Studland Cliffs SAC	Calcareous grasslands	0.856	4	4.856
H29 Corfe Mullen Pastures SSSI	Bogs	0.321	0.253	0.574
H30 St Leonards and St Ives Heaths SSSI	Bogs	0.321	0.249	0.57
H31 Poole Bay Cliffs SSSI	Lacerta agilis (sand lizard)	Not provided by APIS		
H32 Lions Hill SSSI	Bogs	0.321	0.271	0.592
H33 Town Common SSSI	Bogs	0.321	0.237	0.558
H34 Upton Heath SSSI	Bogs	0.321	0.245	0.566
H35 Poole Harbour SSSI	Dwarf shrub heath	0.499	0.22	0.862
H36 Ham Common SSSI	Bogs	0.321	0.251	0.572
H37 Holton and Sandford Heaths SSSI	Bogs	0.321	0.244	0.565
H38 Studland and Godlingston Heaths SSSI	Bogs	0.321	0.237	0.558
H39 Ferndown Common SSSI	Bogs	0.321	0.246	0.567

5.2 BACKGROUND DEPOSITION FLUXES AND AIRBORNE CONCENTRATIONS

5.2.1 Introduction

Information on background nutrient nitrogen deposition, acidification and airborne concentrations of NO_x, NH_3 and SO_2 have been obtained from information provided by the Centre for Ecology and Hydrology (CEH) and available from the Air Pollution Information System (APIS) website.

5.2.2 Airborne Concentrations

Background NO_x, NH_3 and SO_2 concentrations for the area surrounding the Installation have been obtained from the APIS and are summarised in *Table 5.4*. These are the corrected 2019 mid-year values. Background information on concentrations of HF is limited. Therefore, the weekly mean and daily mean values are assumed to be 0.5 µg m^{-3} as a weekly mean (as was assumed for assessing long-term impacts on human health) and 0.6 µg m^{-3} as a 24-hour mean.

TABLE 5.4 AIRBORNE CONCENTRATIONS OF NO_x, NH_3 AND SO_2 AT SENSITIVE HABITAT SITES

Habitat	Annual Mean NO_x (µg m^{-3})	24-hour Mean NO_x (µg m^{-3}) (a)	Annual Mean NH_3 (µg m^{-3})	Annual Mean SO_2 (µg m^{-3})
H1 Dorset Heaths SAC/SPA/Ramsar	13.65	16.11	1.8	1.57
H2 Poole Harbour SPA/Ramsar	18.59	21.94	1.8	1.54
H3 Dorset Heaths (Purbeck & Wareham) and Studland Dunes SAC	9.41	11.10	1.6	0.95
H4 Canford Heath SSSI	14.27	16.84	1.8	2.89
H5 Turbary & Kinson Commons SSSI	18.66	22.02	1.8	2.05
H6 Hurn Common SSSI	13.6	16.05	1.7	2.05
H7 Slop Bog & Uddens Heath SSSI	14.84	17.51	1.9	1.26
H8 Parley Common SSSI	12.94	15.27	1.8	1.16
H9 Luscombe Valley SSSI	12.83	15.14	1.6	1.24
H10 Bourne Valley SSSI	19.86	23.43	1.8	2.06
H11 Holt & West Moors Heath SSSI	9.26	10.93	2	0.94
H12 Corfe & Barrow Hills SSSI	12.43	14.67	1.9	1.28
H13 Arne SSSI	9.41	11.10	1.6	0.95
H14 Moors River System SSSI	11.1	13.10	1.7	0.96
H15 Knighton Heath GC SNCI	13.65	16.11	1.8	1.57
H16 Alderney Waterworks SNCI	14.95	17.64	1.8	1.59
H17 Haymoor Bottom SNCI	21.22	25.04	1.8	2.25
H18 Arrowsmith Coppice SNCI/AW	12.98	15.32	1.9	1.3
H19 Delph Woods SNCI	12.98	15.32	1.9	1.3
H20 Dunyeats Hill HRS	12.98	15.32	1.9	1.3
H21 Moortown Copse SNCI	12.43	14.67	1.8	1.31
H22 Canford Park SANG LCNR	11.09	13.09	1.9	1.06
H23 Bearwood SNCI	12.1	14.28	1.8	1.16
H24 Frogmoor Wood SNCI	12.38	14.61	1.8	1.59
H25 Avon Valley Ramsar SPA	12.88	15.20	1.20	1.05
H26 River Avon SAC	12.37	14.60	1.20	0.99
H27 New Forest SAC	9.24	10.90	1.21	0.77
H28 Isle of Portland to Studland Cliffs SAC	7.53	8.89	0.94	1.05
H29 Corfe Mullen Pastures SSSI	10.38	12.25	1.49	1.30

TABLE 5.4 **AIRBORNE CONCENTRATIONS OF NO_x, NH_3 AND SO_2 AT SENSITIVE HABITAT SITES**

Habitat	Annual Mean NO_x ($\mu g\ m^{-3}$)	24-hour Mean NO_x ($\mu g\ m^{-3}$) (a)	Annual Mean NH_3 ($\mu g\ m^{-3}$)	Annual Mean SO_2 ($\mu g\ m^{-3}$)
H30 St Leonards and St Ives Heaths SSSI	10.37	12.24	1.22	0.98
H31 Poole Bay Cliffs SSSI	12.65	14.93	1.12	1.03
H32 Lions Hill SSSI	13.68	16.14	1.32	1.10
H33 Town Common SSSI	13.49	15.92	1.18	1.27
H34 Upton Heath SSSI	10.31	12.17	1.46	1.25
H35 Poole Harbour SSSI	12.89	15.21	1.19	1.42
H36 Ham Common SSSI	14.03	16.56	1.28	3.19
H37 Holton and Sandford Heaths SSSI	10.66	12.58	1.31	1.00
H38 Studland and Godlingston Heaths SSSI	7.53	8.89	0.94	1.05
H39 Ferndown Common SSSI	10.77	12.71	1.38	1.12

(a) Derived from the annual by multiplying by 2 to generate an hourly mean and 0.59 to convert to a 24-hour mean

5.2.3 Nutrient Nitrogen Deposition (Eutrophication) and Acidification

APIS is able to provide an indication of background nutrient nitrogen deposition and acidification by geographical location and habitat type. The estimates are made from 5 km resolution mapped data, which are derived from a combination of modelling studies and measured deposition and acidification rates. A summary of the background fluxes provided by APIS for habitat sites selected for the assessment is presented in *Table 5.5*. These are the corrected 2019 mid-year values.

TABLE 5.5 **BACKGROUND NITROGEN DEPOSITION AND ACIDIFICATION FLUXES**

Habitat Type	Background Flux	
	Nutrient Nitrogen (kg N $ha^{-1}a^{-1}$)	Acidification (keq $ha^{-1}a^{-1}$)
H1 Dorset Heaths SAC/SPA/Ramsar		
Heathland habitats	16.7	1.26
Woodland habitats	28.7	2.14
H2 Poole Harbour SPA/Ramsar	16.4	1.2
H3 Dorset Heaths (Purbeck & Wareham) and Studland Dunes SAC	14.4	0.97
H4 Canford Heath SSSI	16.9	1.26

TABLE 5.5 BACKGROUND NITROGEN DEPOSITION AND ACIDIFICATION FLUXES

Habitat Type	Background Flux	
	Nutrient Nitrogen (kg N $ha^{-1}a^{-1}$)	Acidification (keq $ha^{-1}a^{-1}$)
H5 Turbary & Kinson Commons SSSI	16.5	1.25
H6 Hurn Common SSSI	15.7	1.25
H7 Slop Bog & Uddens Heath SSSI	16.9	1.21
H8 Parley Common SSSI	16.3	1.25
H9 Luscombe Valley SSSI	15.1	1.20
H10 Bourne Valley SSSI	16.5	1.20
H11 Holt & West Moors Heath SSSI	17.8	1.35
H12 Corfe & Barrow Hills SSSI	17.2	1.26
H13 Arne SSSI	14.4	0.97
H14 Moors River System SSSI	22.5	1.66
H15 Knighton Heath GC SNCI	16.7	1.26
H16 Alderney Waterworks SNCI	16.6	1.26
H17 Haymoor Bottom SNCI	16.6	1.20
H18 Arrowsmith Coppice SNCI/AW	17.0	1.26
H19 Delph Woods SNCI	29.1	2.14
H20 Dunyeats Hill HRS	17.0	1.26
H21 Moortown Copse SNCI	29.0	2.14
H22 Canford Park SANG LCNR	17.0	1.26
H23 Bearwood SNCI	28.7	2.14
H24 Frogmoor Wood SNCI	28.8	2.14
H25 Avon Valley Ramsar SPA	12.79	0.94
H26 River Avon SAC	12.89	0.94
H27 New Forest SAC	21.02	0.90
H28 Isle of Portland to Studland Cliffs SAC	10.69	0.77
H29 Corfe Mullen Pastures SSSI	14.38	1.08
H30 St Leonards and St Ives Heaths SSSI	13.23	0.97
H31 Poole Bay Cliffs SSSI	12.03	0.88
H32 Lions Hill SSSI	13.68	1.00
H33 Town Common SSSI	12.91	0.95
H34 Upton Heath SSSI	14.06	1.06
H35 Poole Harbour SSSI	12.48	0.92
H36 Ham Common SSSI	12.79	0.96
H37 Holton and Sandford Heaths SSSI	13.07	0.99

TABLE 5.5 BACKGROUND NITROGEN DEPOSITION AND ACIDIFICATION FLUXES

Habitat Type	Background Flux	
	Nutrient Nitrogen (kg N $ha^{-1}a^{-1}$)	Acidification (keq $ha^{-1}a^{-1}$)
H38 Studland and Godlingston Heaths SSSI	10.69	0.77
H39 Ferndown Common SSSI	13.77	1.04

5.2.4 Calculation of Acid and Nutrient Nitrogen Deposition

The deposition of acid and nutrient nitrogen is not directly modelled but is derived from the concentration predicted at each sensitive ecological receptor for each pollutant of interest. The derivation is based upon Environment Agency guidance [17] and uses the conversion factors set out in *Table 5.6*. The factors take into account the difference in deposition velocity and mechanisms experienced in woodlands, and grasslands and other non-arboreal areas. For HCl, the acidification is assigned to sulphur.

TABLE 5.6 FACTORS FOR CONVERSION OF ANNUAL MEAN CONCENTRATIONS TO NUTRIENT NITROGEN AND ACID DEPOSITION

Pollutant	Deposition Velocity – Grasslands (m s^{-1})	Deposition Velocity – Woodlands (m s^{-1})	Conversion Factor (μg m^{-2} s^{-1} to Kg N ha^{-1} $year^{-1}$)	Conversion Factor (kg N ha^{-1} $year^{-1}$ to keq ha^{-1} $year^{-1}$)
SO_2	0.012	0.024	158	0.063
NO_x as NO_2	0.0015	0.003	96	0.071
NH_3	0.02	0.03	260	0.071
HCl	0.025	0.06	307	0.028

AQTAG06 states that the wet deposition of SO_2, NO_2 and NH_3 is 'not significant' within a short range. However, wet deposition of HCl should be considered where a process emits these species. It is considered that within a few kilometres of the source, the wet deposition rate is comparable to the dry deposition rate and with increasing distance, the wet deposition fraction becomes a smaller fraction of the total HCl deposition. As a worst-case, the wet-to-dry deposition ratio is assumed to be 1 at all the identified habitat sites. Therefore, the HCl wet deposition is equivalent to the HCl dry deposition rate (i.e. the total deposition of HCl is twice the dry deposition rate of HCl).

17 AQTAG06 – Technical Guidance on Detailed Modelling Approach for an Appropriate Assessment for Emissions to Air, Environment Agency, produced 06/02/04, Version 8

5.3 PREDICTED IMPACT OF EFW CHP FACILITY EMISSIONS

5.3.1 Introduction

The impact at all habitat sites is provided. However, it should be noted that the maximum predicted at receptors H2 to H23 are representative of the discrete receptor locations (refer *Figure 3.2*). Where these form component parts of the Dorset Heaths SAC/SPA/Ramsar they may not represent the maximum predicted impact within that component part. However, as the entire Dorset Heaths site is modelled as a polygon receptor, the predicted impact at the Dorset Heaths SAC/SPA/Ramsar (H1) is the maximum predicted anywhere within the European habitat site.

The maximum impact of the EfW CHP Facility on the Dorset Heaths SAC/SPA/Ramsar site occurs within the Canford Heath SSSI component. This maximum occurs close to receptor H15 (Knighton Heath Golf Club SNCI) rather than at the discrete receptors selected for the Canford Heath SSSI.

5.3.2 Airborne Concentrations of NO_x, SO_2, NH_3 and HF

NO_x

Predicted maximum concentrations of NO_x, SO_2, NH_3 and HF are presented in *Tables 5.7* to *5.10*, respectively. Maximum concentrations are compared to the relevant critical levels.

TABLE 5.7 MAXIMUM PREDICTED AIRBORNE NO_X CONCENTRATIONS AT HABITAT SITES

Habitat	Annual Mean PC NO_x ($\mu g\ m^{-3}$)	Annual Mean %age Critical Level	24 Hour Mean PC NO_x ($\mu g\ m^{-3}$)	24 Hour Mean %age Critical Level
H1 Dorset Heaths SAC/SPA/Ramsar	0.13	0.4%	4.4	5.9%
H2 Poole Harbour SPA/Ramsar	0.045	0.2%	0.84	1.1%
H3 Dorset Heaths (Purbeck & Wareham) and Studland Dunes SAC	0.028	0.1%	0.44	0.6%
H4 Canford Heath SSSI	0.073	0.2%	2.2	2.9%
H5 Turbary & Kinson Commons SSSI	0.087	0.3%	1.1	1.4%
H6 Hurn Common SSSI	0.057	0.2%	0.40	0.5%
H7 Slop Bog & Uddens Heath SSSI	0.043	0.1%	0.71	0.9%
H8 Parley Common SSSI	0.079	0.3%	0.64	0.9%
H9 Luscombe Valley SSSI	0.027	0.1%	0.40	0.5%
H10 Bourne Valley SSSI	0.057	0.2%	1.0	1.4%

TABLE 5.7 MAXIMUM PREDICTED AIRBORNE NO_X CONCENTRATIONS AT HABITAT SITES

Habitat	Annual Mean PC NO_x ($\mu g\ m^{-3}$)	Annual Mean %age Critical Level	24 Hour Mean PC NO_x ($\mu g\ m^{-3}$)	24 Hour Mean %age Critical Level
H11 Holt & West Moors Heath SSSI	0.039	0.1%	0.47	0.6%
H12 Corfe & Barrow Hills SSSI	0.043	0.1%	1.2	1.7%
H13 Arne SSSI	0.027	0.1%	0.43	0.6%
H14 Moors River System SSSI	0.063	0.2%	0.51	0.7%
H15 Knighton Heath GC SNCI	0.11	0.4%	1.6	2.1%
H16 Alderney Waterworks SNCI	0.065	0.2%	1.3	1.8%
H17 Haymoor Bottom SNCI	0.077	0.3%	1.4	1.8%
H18 Arrowsmith Coppice SNCI/AW	0.076	0.3%	2.2	3.0%
H19 Delph Woods SNCI	0.065	0.2%	1.9	2.5%
H20 Dunyeats Hill HRS	0.074	0.2%	2.0	2.7%
H21 Moortown Copse SNCI	0.21	0.7%	2.6	3.4%
H22 Canford Park SANG LCNR	0.13	0.4%	1.6	2.2%
H23 Bearwood SNCI	0.19	0.6%	2.3	3.1%
H24 Frogmoor Wood SNCI	0.0031	<0.1%	0.45	0.6%
H25 Avon Valley Ramsar SPA	0.040	0.1%	0.29	0.4%
H26 River Avon SAC	0.039	0.1%	0.27	0.4%
H27 New Forest SAC	0.028	0.1%	0.20	0.3%
H28 Isle of Portland to Studland Cliffs SAC	0.015	<0.1%	0.24	0.3%
H29 Corfe Mullen Pastures SSSI	0.029	0.1%	0.62	0.8%
H30 St Leonards and St Ives Heaths SSSI	0.063	0.2%	0.42	0.6%
H31 Poole Bay Cliffs SSSI	0.028	0.1%	0.34	0.4%
H32 Lions Hill SSSI	0.042	0.1%	0.37	0.5%
H33 Town Common SSSI	0.043	0.1%	0.33	0.4%
H34 Upton Heath SSSI	0.044	0.1%	0.95	1.3%
H35 Poole Harbour SSSI	0.033	0.1%	0.53	0.7%
H36 Ham Common SSSI	0.032	0.1%	0.57	0.8%
H37 Holton and Sandford Heaths SSSI	0.030	0.1%	0.38	0.5%
H38 Studland and Godlingston Heaths SSSI	0.020	0.1%	0.34	0.5%
H39 Ferndown Common SSSI	0.127	0.4%	0.90	1.2%

TABLE 5.7 MAXIMUM PREDICTED AIRBORNE NO_x CONCENTRATIONS AT HABITAT SITES

Habitat	Annual Mean PC NO_x (µg m^{-3})	Annual Mean %age Critical Level	24 Hour Mean PC NO_x (µg m^{-3})	24 Hour Mean %age Critical Level
Critical Level	30		75	

For the European sites and SSSIs, predicted annual mean concentrations are less than 1% of the critical level and would be assessed as not significant. Predicted 24-hour mean NO_x concentrations at the European sites and SSSIs are also less than 10% of the short-term critical level of 75 µg m^{-3} and would be assessed as not significant. For the locally designated sites, predicted annual mean and 24-hour mean concentrations of NO_x are less than 100% of the critical levels and would be assessed as not significant in accordance with Environment Agency guidance. Furthermore, the PCs for the locally designated sites are less than 1% and 10% of the critical levels. Therefore, it is concluded that the impact of emissions of NO_x at habitat sites would be not significant.

SO_2

For sulphur dioxide, there are two critical levels (10 or 20 µg m^{-3}) depending on the presence of lichens. For screening purposes, the more stringent critical level of 10 µg m^{-3} has been adopted for all habitats. A comparison of predicted concentrations with this more stringent critical level is provided in *Table 5.8*.

TABLE 5.8 MAXIMUM PREDICTED AIRBORNE SO_2 CONCENTRATIONS AT HABITAT SITES

Habitat	Annual Mean PC SO_2 (µg m^{-3})	Annual Mean %age Critical Level
H1 Dorset Heaths SAC/SPA/Ramsar	0.034	0.3%
H2 Poole Harbour SPA/Ramsar	0.011	0.1%
H3 Dorset Heaths (Purbeck & Wareham) and Studland Dunes SAC	0.007	0.1%
H4 Canford Heath SSSI	0.018	0.2%
H5 Turbary & Kinson Commons SSSI	0.022	0.2%
H6 Hurn Common SSSI	0.014	0.1%
H7 Slop Bog & Uddens Heath SSSI	0.011	0.1%
H8 Parley Common SSSI	0.020	0.2%
H9 Luscombe Valley SSSI	0.007	0.1%
H10 Bourne Valley SSSI	0.014	0.1%
H11 Holt & West Moors Heath SSSI	0.010	0.1%
H12 Corfe & Barrow Hills SSSI	0.011	0.1%
H13 Arne SSSI	0.007	0.1%
H14 Moors River System SSSI	0.016	0.2%

TABLE 5.8 MAXIMUM PREDICTED AIRBORNE SO_2 CONCENTRATIONS AT HABITAT SITES

Habitat	Annual Mean PC SO_2 ($\mu g\ m^{-3}$)	Annual Mean %age Critical Level
H15 Knighton Heath GC SNCI	0.028	0.3%
H16 Alderney Waterworks SNCI	0.016	0.2%
H17 Haymoor Bottom SNCI	0.019	0.2%
H18 Arrowsmith Coppice SNCI/AW	0.019	0.2%
H19 Delph Woods SNCI	0.016	0.2%
H20 Dunyeats Hill HRS	0.018	0.2%
H21 Moortown Copse SNCI	0.053	0.5%
H22 Canford Park SANG LCNR	0.033	0.3%
H23 Bearwood SNCI	0.049	0.5%
H24 Frogmoor Wood SNCI	0.001	<0.1%
H25 Avon Valley Ramsar SPA	0.010	0.1%
H26 River Avon SAC	0.010	0.1%
H27 New Forest SAC	0.007	0.1%
H28 Isle of Portland to Studland Cliffs SAC	0.004	<0.1%
H29 Corfe Mullen Pastures SSSI	0.007	0.1%
H30 St Leonards and St Ives Heaths SSSI	0.016	0.2%
H31 Poole Bay Cliffs SSSI	0.007	0.1%
H32 Lions Hill SSSI	0.011	0.1%
H33 Town Common SSSI	0.011	0.1%
H34 Upton Heath SSSI	0.011	0.1%
H35 Poole Harbour SSSI	0.008	0.1%
H36 Ham Common SSSI	0.008	0.1%
H37 Holton and Sandford Heaths SSSI	0.007	0.1%
H38 Studland and Godlingston Heaths SSSI	0.005	0.1%
H39 Ferndown Common SSSI	0.032	0.3%
Critical Level	*10*	

For the European sites and SSSIs, predicted annual mean concentrations are less than 1% of the most stringent critical level and would be assessed as not significant. For the LWS, the PCs are all less than 100% of the critical level. Furthermore, the PCs for the locally designated sites are less than 1% of the critical level. Therefore, it is concluded that the impact of emissions of SO_2 at habitat sites would be not significant.

NH_3

For ammonia, there are also two critical levels depending on the presence of bryophytes and lichens. For screening purposes, the more stringent critical level of 1 µg m^{-3} has been adopted for all habitats. A comparison of predicted concentrations with this more stringent critical level is provided in *Table 5.9*.

TABLE 5.9 MAXIMUM PREDICTED AIRBORNE NH_3 CONCENTRATIONS AT HABITAT SITES

Habitat	Annual Mean PC NH_3 (µg m^{-3})	Annual Mean %age Critical Level
H1 Dorset Heaths SAC/SPA/Ramsar	0.0056	0.6%
H2 Poole Harbour SPA/Ramsar	0.0019	0.2%
H3 Dorset Heaths (Purbeck & Wareham) and Studland Dunes SAC	0.0011	0.1%
H4 Canford Heath SSSI	0.0031	0.3%
H5 Turbary & Kinson Commons SSSI	0.0036	0.4%
H6 Hurn Common SSSI	0.0024	0.2%
H7 Slop Bog & Uddens Heath SSSI	0.0018	0.2%
H8 Parley Common SSSI	0.0033	0.3%
H9 Luscombe Valley SSSI	0.0011	0.1%
H10 Bourne Valley SSSI	0.0024	0.2%
H11 Holt & West Moors Heath SSSI	0.0016	0.2%
H12 Corfe & Barrow Hills SSSI	0.0018	0.2%
H13 Arne SSSI	0.0011	0.1%
H14 Moors River System SSSI	0.0026	0.3%
H15 Knighton Heath GC SNCI	0.0047	0.5%
H16 Alderney Waterworks SNCI	0.0027	0.3%
H17 Haymoor Bottom SNCI	0.0032	0.3%
H18 Arrowsmith Coppice SNCI/AW	0.0031	0.3%
H19 Delph Woods SNCI	0.0027	0.3%
H20 Dunyeats Hill HRS	0.0031	0.3%
H21 Moortown Copse SNCI	0.0088	0.9%
H22 Canford Park SANG LCNR	0.0055	0.6%
H23 Bearwood SNCI	0.0081	0.8%
H24 Frogmoor Wood SNCI	0.0001	<0.1%
H25 Avon Valley Ramsar SPA	0.0017	0.2%
H26 River Avon SAC	0.0016	0.2%
H27 New Forest SAC	0.0012	0.1%
H28 Isle of Portland to Studland Cliffs SAC	0.0006	0.1%
H29 Corfe Mullen Pastures SSSI	0.0012	0.1%

TABLE 5.9 MAXIMUM PREDICTED AIRBORNE NH_3 CONCENTRATIONS AT HABITAT SITES

Habitat	Annual Mean PC NH_3 (µg m^{-3})	Annual Mean %age Critical Level
H30 St Leonards and St Ives Heaths SSSI	0.0026	0.3%
H31 Poole Bay Cliffs SSSI	0.0012	0.1%
H32 Lions Hill SSSI	0.0018	0.2%
H33 Town Common SSSI	0.0018	0.2%
H34 Upton Heath SSSI	0.0018	0.2%
H35 Poole Harbour SSSI	0.0014	0.1%
H36 Ham Common SSSI	0.0013	0.1%
H37 Holton and Sandford Heaths SSSI	0.0012	0.1%
H38 Studland and Godlingston Heaths SSSI	0.0008	0.1%
H39 Ferndown Common SSSI	0.0053	0.5%
Critical Level	*1*	

For the European sites and SSSIs, predicted annual mean concentrations are less than 1% of the most stringent critical level and would be assessed as not significant. For the LWS, the PCs are all less than 100% of the critical level. Furthermore, the PCs for the locally designated sites are less than 1% of the critical level. Therefore, it is concluded that the impact of emissions of NH_3 at habitat sites would be not significant.

HF

A comparison of predicted weekly and 24-hour mean concentrations with the relevant critical levels for HF is provided in *Table 5.10*.

TABLE 5.10 MAXIMUM PREDICTED AIRBORNE HF CONCENTRATIONS AT HABITAT SITES

Habitat	Weekly Mean PC HF (µg m^{-3})	Weekly Mean %age Critical Level	24 Hour Mean PC HF (µg m^{-3})	24 Hour Mean %age Critical Level
H1 Dorset Heaths SAC/SPA/Ramsar	0.012	2.4%	0.037	0.7%
H2 Poole Harbour SPA/Ramsar	0.0027	0.5%	0.0070	0.1%
H3 Dorset Heaths (Purbeck & Wareham) and Studland Dunes SAC	0.0014	0.3%	0.0036	0.1%
H4 Canford Heath SSSI	0.0049	1.0%	0.0180	0.4%
H5 Turbary & Kinson Commons SSSI	0.0033	0.7%	0.0088	0.2%
H6 Hurn Common SSSI	0.0017	0.3%	0.0034	0.1%

TABLE 5.10 MAXIMUM PREDICTED AIRBORNE HF CONCENTRATIONS AT HABITAT SITES

Habitat	Weekly Mean PC HF ($\mu g\ m^{-3}$)	Weekly Mean %age Critical Level	24 Hour Mean PC HF ($\mu g\ m^{-3}$)	24 Hour Mean %age Critical Level
H7 Slop Bog & Uddens Heath SSSI	0.0016	0.3%	0.0059	0.1%
H8 Parley Common SSSI	0.0025	0.5%	0.0053	0.1%
H9 Luscombe Valley SSSI	0.0011	0.2%	0.0033	0.1%
H10 Bourne Valley SSSI	0.0026	0.5%	0.0086	0.2%
H11 Holt & West Moors Heath SSSI	0.0011	0.2%	0.0039	0.1%
H12 Corfe & Barrow Hills SSSI	0.0027	0.5%	0.0103	0.2%
H13 Arne SSSI	0.0015	0.3%	0.0036	0.1%
H14 Moors River System SSSI	0.0020	0.4%	0.0042	0.1%
H15 Knighton Heath GC SNCI	0.0045	0.9%	0.0131	0.3%
H16 Alderney Waterworks SNCI	0.0029	0.6%	0.0110	0.2%
H17 Haymoor Bottom SNCI	0.0041	0.8%	0.0113	0.2%
H18 Arrowsmith Coppice SNCI/AW	0.0043	0.9%	0.0185	0.4%
H19 Delph Woods SNCI	0.0036	0.7%	0.0157	0.3%
H20 Dunyeats Hill HRS	0.0070	1.4%	0.0170	0.3%
H21 Moortown Copse SNCI	0.0109	2.2%	0.0213	0.4%
H22 Canford Park SANG LCNR	0.0046	0.9%	0.0135	0.3%
H23 Bearwood SNCI	0.0071	1.4%	0.0194	0.4%
H24 Frogmoor Wood SNCI	0.0006	0.1%	0.0037	0.1%
H25 Avon Valley Ramsar SPA	0.0013	0.3%	0.0024	<0.1%
H26 River Avon SAC	0.0012	0.2%	0.0022	<0.1%
H27 New Forest SAC	0.0009	0.2%	0.0017	<0.1%
H28 Isle of Portland to Studland Cliffs SAC	0.0007	0.1%	0.0020	<0.1%
H29 Corfe Mullen Pastures SSSI	0.0014	0.3%	0.0052	0.1%
H30 St Leonards and St Ives Heaths SSSI	0.0019	0.4%	0.0035	0.1%
H31 Poole Bay Cliffs SSSI	0.0009	0.2%	0.0028	0.1%
H32 Lions Hill SSSI	0.0010	0.2%	0.0031	0.1%
H33 Town Common SSSI	0.0014	0.3%	0.0027	0.1%
H34 Upton Heath SSSI	0.0025	0.5%	0.0079	0.2%
H35 Poole Harbour SSSI	0.0014	0.3%	0.0044	0.1%
H36 Ham Common SSSI	0.0020	0.4%	0.0047	0.1%

TABLE 5.10 MAXIMUM PREDICTED AIRBORNE HF CONCENTRATIONS AT HABITAT SITES

Habitat	Weekly Mean PC HF (µg m^{-3})	Weekly Mean %age Critical Level	24 Hour Mean PC HF (µg m^{-3})	24 Hour Mean %age Critical Level
H37 Holton and Sandford Heaths SSSI	0.0012	0.2%	0.0031	0.1%
H38 Studland and Godlingston Heaths SSSI	0.0009	0.2%	0.0028	0.1%
H39 Ferndown Common SSSI	0.0032	0.6%	0.0075	0.1%
Critical Level	*0.5*		*5*	

Except for the Dorset Heaths European site, predicted weekly mean concentrations at the European sites and SSSIs are less than 1% of the critical level and would be assessed as not significant. For the Dorset Heaths habitat site, the maximum predicted concentration is 2.4% of the long-term critical level of 0.5 µg m^{-3}. However, with the addition of the background of 0.1 µg m^{-3}, the PEC would be 0.112 µg m^{-3} (22% of the critical level). Therefore, it is unlikely that the critical level would be exceeded. For the LWS, the PCs are all less than 100% of the critical levels for HF.

Predicted concentrations as the 24-hour mean are less than 10% of the short-term critical level of 5 µg m^{-3} and the impact at all habitats would be assessed as not significant.

5.3.3 Acidification

Deposition of sulphur and nitrogen compounds (from NO_x and NH_3 emissions) cause acidification and have been taken into account in assessing the acidification impacts of the EfW CHP Facility emissions on habitat sites. The critical load for acidification is defined by three quantities CLmaxS, CLmaxN and CLminN. The critical load function tool provided by APIS has been used to assess the likelihood of exceedance of the critical load based on the nitrogen and sulphur PCs and PECs. For HCl, the acidification is assigned to sulphur. A summary of the predicted PCs is provided in *Table 5.11* and the predicted exceedance and deposition as a proportion of the critical load function is provided in *Table 5.12*.

TABLE 5.11 MAXIMUM PREDICTED SULPHUR AND NITROGEN PCS FOR ACIDIFICATION IMPACTS

Habitat	PC N (keq $ha^{-1}a^{-1}$)	PC S (keq $ha^{-1}a^{-1}$)
H1 Dorset Heaths SAC/SPA/Ramsar		
Coniferous woodland	0.0059	0.015
Bog, dwarf shrub heath, acid grassland	0.0035	0.0069
H2 Poole Harbour SPA/Ramsar	0.0012	0.0023
H3 Dorset Heaths (Purbeck & Wareham) and Studland Dunes SAC	0.0007	0.0014
H4 Canford Heath SSSI	0.0019	0.0069
H5 Turbary & Kinson Commons SSSI	0.0022	0.0044
H6 Hurn Common SSSI	0.0015	0.0029
H7 Slop Bog & Uddens Heath SSSI	0.0011	0.0022
H8 Parley Common SSSI	0.0020	0.0041
H9 Luscombe Valley SSSI	0.0007	0.0014
H10 Bourne Valley SSSI	0.0015	0.0029
H11 Holt & West Moors Heath SSSI	0.0010	0.0020
H12 Corfe & Barrow Hills SSSI	0.0011	0.0022
H13 Arne SSSI	0.0007	0.0014
H14 Moors River System SSSI	0.0027	0.0032
H15 Knighton Heath GC SNCI	0.0029	0.0058
H16 Alderney Waterworks SNCI	0.0017	0.0033
H17 Haymoor Bottom SNCI	0.0020	0.0040
H18 Arrowsmith Coppice SNCI/AW	0.0019	0.0039
H19 Delph Woods SNCI	0.0029	0.0073
H20 Dunyeats Hill HRS	0.0019	0.0038
H21 Moortown Copse SNCI	0.0093	0.023
H22 Canford Park SANG LCNR	0.0034	0.0068
H23 Bearwood SNCI	0.0085	0.022
H24 Frogmoor Wood SNCI	0.0001	0.0003
H25 Avon Valley Ramsar SPA	0.0010	0.0020
H26 River Avon SAC	0.0010	0.0020
H27 New Forest SAC	0.0007	0.0014
H28 Isle of Portland to Studland Cliffs SAC	0.0004	0.0008
H29 Corfe Mullen Pastures SSSI	0.0007	0.0015
H30 St Leonards and St Ives Heaths SSSI	0.0016	0.0032
H31 Poole Bay Cliffs SSSI	0.0007	0.0014
H32 Lions Hill SSSI	0.0011	0.0021

TABLE 5.11 MAXIMUM PREDICTED SULPHUR AND NITROGEN PCS FOR ACIDIFICATION IMPACTS

Habitat	PC N (keq $ha^{-1}a^{-1}$)	PC S (keq $ha^{-1}a^{-1}$)
H33 Town Common SSSI	0.0011	0.0022
H34 Upton Heath SSSI	0.0011	0.0023
H35 Poole Harbour SSSI	0.0009	0.0017
H36 Ham Common SSSI	0.0008	0.0016
H37 Holton and Sandford Heaths SSSI	0.0008	0.0015
H38 Studland and Godlingston Heaths SSSI	0.0005	0.0010
H39 Ferndown Common SSSI	0.0033	0.0065

TABLE 5.12 PREDICTED EXCEEDANCE AND DEPOSITION AS A PROPORTION OF THE CRITICAL LOAD FUNCTION - ACIDIFICATION

Habitat	PC	Background	PEC
H1 Dorset Heaths SAC/SPA/Ramsar			
Bog	1.9%	228%	230%
Dwarf shrub heath	1.2%	150%	151%
Acid grassland	1.8%	227%	228%
Coniferous woodland	2.1%	211%	213%
H2 Poole Harbour SPA/Ramsar	0.6%	205%	205%
H3 Dorset Heaths (Purbeck & Wareham) and Studland Dunes SAC	0.4%	174%	174%
H4 Canford Heath SSSI	1.0%	221%	222%
H5 Turbary & Kinson Commons SSSI	1.2%	221%	222%
H6 Hurn Common SSSI	0.7%	206%	207%
H7 Slop Bog & Uddens Heath SSSI	0.6%	205%	206%
H8 Parley Common SSSI	1.1%	222%	223%
H9 Luscombe Valley SSSI	0.4%	215%	215%
H10 Bourne Valley SSSI	0.8%	214%	215%
H11 Holt & West Moors Heath SSSI	0.5%	234%	235%
H12 Corfe & Barrow Hills SSSI	0.6%	222%	223%
H13 Arne SSSI	0.4%	171%	171%
H14 Moors River System SSSI	0.9%	225%	226%
H15 Knighton Heath GC SNCI	1.4%	208%	209%
H16 Alderney Waterworks SNCI	0.8%	208%	209%
H17 Haymoor Bottom SNCI	1.0%	198%	199%
H18 Arrowsmith Coppice SNCI/AW	1.0%	208%	209%
H19 Delph Woods SNCI	1.0%	211%	212%
H20 Dunyeats Hill HRS	0.9%	208%	209%

TABLE 5.12 PREDICTED EXCEEDANCE AND DEPOSITION AS A PROPORTION OF THE CRITICAL LOAD FUNCTION - ACIDIFICATION

Habitat	PC	Background	PEC
H21 Moortown Copse SNCI	3.2%	211%	214%
H22 Canford Park SANG LCNR	0.2%	26%	26%
H23 Bearwood SNCI	3.0%	211%	214%
H24 Frogmoor Wood SNCI	<0.1%	211%	211%
H25 Avon Valley Ramsar SPA	Not sensitive		
H26 River Avon SAC	CL not provided by APIS		
H27 New Forest SAC	0.4%	165%	165%
H28 Isle of Portland to Studland Cliffs SAC	<0.1%	16%	16%
H29 Corfe Mullen Pastures SSSI	0.4%	188%	189%
H30 St Leonards and St Ives Heaths SSSI	0.8%	170%	171%
H31 Poole Bay Cliffs SSSI	CL not provided by APIS		
H32 Lions Hill SSSI	0.5%	169%	169%
H33 Town Common SSSI	0.6%	170%	171%
H34 Upton Heath SSSI	0.6%	187%	188%
H35 Poole Harbour SSSI	0.3%	107%	107%
H36 Ham Common SSSI	0.4%	168%	168%
H37 Holton and Sandford Heaths SSSI	0.4%	175%	176%
H38 Studland and Godlingston Heaths SSSI	0.3%	138%	138%
H39 Ferndown Common SSSI	1.7%	183%	185%

For all habitat sites, the background deposition flux exceeds the relevant critical load except at Canford Park SANG and the Isle of Portland to Studland Cliffs SAC. At the European sites and the SSSIs, the maximum PC acid deposition rates arising from the EfW CHP Facility exceed 1% of the critical load at Dorset Heaths SAC/SPA/Ramsar, Canford Heath SSSI, Turbary & Kinson Commons SSSI, Parley Common SSSI and Ferndown Common SSSI. These SSSIs are all component parts of the Dorset Heaths European site. The predicted concentration at the Dorset Heaths European site is the maximum predicted anywhere within the habitat site.

Critical loads for acidification are not provided by APIS for River Avon SAC or Poole Bay Cliffs SSSI. However, predicted acidification rates are very small compared to background acidification. For the River Avon SAC, the PC is 0.0030 keq $ha^{-1}a^{-1}$ which is 0.3% of the background rate of 0.94 keq $ha^{-1}a^{-1}$. Similarly, the PC for Poole Bay Cliffs SSSI is 0.0021 keq $ha^{-1}a^{-1}$ (0.2% of the background acidification rate of 0.88 keq $ha^{-1}a^{-1}$). Therefore, it is concluded that these small additions to the background levels would not result in a detrimental impact to habitats present.

The impact at the Dorset Heaths European site and some of the component SSSIs cannot be screened out as not significant as the PC exceeds 1% of the critical load. The potential effect of these acidification levels on habitats present is presented in the Shadow Habitat Regulations Assessment (sHRA) Report [18]. Taking into consideration proposed mitigation during operation, it was concluded that habitat fragmentation in relation to Dorset Heathlands SPA and Ramsar no longer constitute a Likely Significant Effect (LSE). Mitigation included:

- Air pollution control systems to reduce levels of pollutants in the facility's emissions, including application at a lower ammonia ELV of 5 mg Nm^{-3}.
- Increasing the stack height from the initial design of 90 m to 110 m above ground level.
- Contributions towards appropriate management of Dorset Heaths SAC/SPA/Ramsar in the form of a Biodiversity Enhancement Contribution and Trickle Fund, in addition to a future monitoring strategy, to be secured through a Section 106 agreement.

Regarding impacts from air pollution on Dorset Heaths SAC/SPA/Ramsar, habitat surveys, soil sampling and bryophyte and lichen monitoring was undertaken to inform the impact assessment and provide baseline conditions. Following the assessment, the assessment concluded that with the identified mitigation, there will be no adverse effects on the integrity of the European sites as a result of the Proposed Development.

For the locally designated habitat sites, the PC is less than 100% of the respective critical load and in accordance with Environment Agency Risk Assessment Guidance would be assessed as not significant.

5.3.4 Nutrient Nitrogen Deposition

Predicted nutrient nitrogen deposition rates arising from emissions of NO_x and NH_3 from the EfW CHP Facility are presented in *Table 5.13*. These are presented as a percentage of the relevant critical loads in *Table 5.14*.

18 Proposed Energy from Waste Combined Heat and Power Facility at Canford Resource Park, EDP Report Reference edp7095_r011c (February 2024)

TABLE 5.13 MAXIMUM PREDICTED NUTRIENT NITROGEN DEPOSITION AT HABITAT SITES (kg N $ha^{-1}a^{-1}$)

Habitat	PC	Back-ground	PEC	Lower Critical Load
H1 Dorset Heaths SAC/SPA/Ramsar				
Heathland habitats	0.049	16.7	16.75	5
Woodland habitats	0.083	28.7	28.78	10
H2 Poole Harbour SPA/Ramsar	0.016	16.4	16.42	5
H3 Dorset Heaths (Purbeck & Wareham) and Studland Dunes SAC	0.017	14.4	14.42	5
H4 Canford Heath SSSI	0.026	16.9	16.95	5
H5 Turbary & Kinson Commons SSSI	0.031	16.5	16.53	5
H6 Hurn Common SSSI	0.021	15.7	15.72	5
H7 Slop Bog & Uddens Heath SSSI	0.016	16.9	16.92	5
H8 Parley Common SSSI	0.029	16.3	16.33	5
H9 Luscombe Valley SSSI	0.010	15.1	15.11	5
H10 Bourne Valley SSSI	0.021	16.5	16.52	5
H11 Holt & West Moors Heath SSSI	0.014	17.8	17.81	5
H12 Corfe & Barrow Hills SSSI	0.016	17.2	17.22	5
H13 Arne SSSI	0.010	14.4	14.41	5
H14 Moors River System SSSI	0.038	15.9	15.94	10
H15 Knighton Heath GC SNCI	0.041	16.7	16.74	5
H16 Alderney Waterworks SNCI	0.024	16.6	16.62	5
H17 Haymoor Bottom SNCI	0.028	16.6	16.63	5
H18 Arrowsmith Coppice SNCI/AW	0.046	17.0	17.05	5
H19 Delph Woods SNCI	0.040	29.1	29.14	10
H20 Dunyeats Hill HRS	0.027	17.0	17.03	5
H21 Moortown Copse SNCI	0.130	29.0	29.13	10
H22 Canford Park SANG LCNR	0.048	17.0	17.05	10
H23 Bearwood SNCI	0.119	28.7	28.82	10
H24 Frogmoor Wood SNCI	0.002	28.8	28.80	10
H25 Avon Valley Ramsar SPA	0.014	12.79	12.80	Not provided
H26 River Avon SAC	0.014	12.89	12.90	15
H27 New Forest SAC	0.017	21.02	21.04	5
H28 Isle of Portland to Studland Cliffs SAC	0.005	10.69	10.70	5
H29 Corfe Mullen Pastures SSSI	0.010	14.38	14.39	5

TABLE 5.13 MAXIMUM PREDICTED NUTRIENT NITROGEN DEPOSITION AT HABITAT SITES (kg N $ha^{-1}a^{-1}$)

Habitat	PC	Back-ground	PEC	Lower Critical Load
H30 St Leonards and St Ives Heaths SSSI	0.023	13.23	13.25	5
H31 Poole Bay Cliffs SSSI	0.010	12.03	12.04	Not provided
H32 Lions Hill SSSI	0.015	13.68	13.70	5
H33 Town Common SSSI	0.015	12.91	12.93	5
H34 Upton Heath SSSI	0.016	14.06	14.08	5
H35 Poole Harbour SSSI	0.012	12.48	12.49	5
H36 Ham Common SSSI	0.011	12.79	12.80	5
H37 Holton and Sandford Heaths SSSI	0.011	13.07	13.08	5
H38 Studland and Godlingston Heaths SSSI	0.007	10.69	10.70	5
H39 Ferndown Common SSSI	0.046	13.77	13.82	5

TABLE 5.14 MAXIMUM PREDICTED NUTRIENT NITROGEN DEPOSITION AS A PERCENTAGE OF THE RELEVANT CRITICAL LOAD

Habitat	PC	Background	PEC
H1 Dorset Heaths SAC/SPA/Ramsar			
Heathland habitats	1.0%	334%	335%
Woodland habitats	0.8%	287%	288%
H2 Poole Harbour SPA/Ramsar	0.3%	328%	328%
H3 Dorset Heaths (Purbeck & Wareham) and Studland Dunes SAC	0.3%	288%	288%
H4 Canford Heath SSSI	0.5%	338%	339%
H5 Turbary & Kinson Commons SSSI	0.6%	330%	331%
H6 Hurn Common SSSI	0.4%	314%	314%
H7 Slop Bog & Uddens Heath SSSI	0.3%	338%	338%
H8 Parley Common SSSI	0.6%	326%	327%
H9 Luscombe Valley SSSI	0.2%	302%	302%
H10 Bourne Valley SSSI	0.4%	330%	330%
H11 Holt & West Moors Heath SSSI	0.3%	356%	356%
H12 Corfe & Barrow Hills SSSI	0.3%	344%	344%
H13 Arne SSSI	0.2%	288%	288%
H14 Moors River System SSSI	0.4%	225%	225%
H15 Knighton Heath GC SNCI	0.8%	334%	335%
H16 Alderney Waterworks SNCI	0.5%	332%	332%

TABLE 5.14 MAXIMUM PREDICTED NUTRIENT NITROGEN DEPOSITION AS A PERCENTAGE OF THE RELEVANT CRITICAL LOAD

Habitat	PC	Background	PEC
H17 Haymoor Bottom SNCI	0.6%	332%	333%
H18 Arrowsmith Coppice SNCI/AW	0.5%	340%	341%
H19 Delph Woods SNCI	0.4%	291%	291%
H20 Dunyeats Hill HRS	0.5%	340%	341%
H21 Moortown Copse SNCI	1.3%	290%	291%
H22 Canford Park SANG LCNR	0.5%	170%	170%
H23 Bearwood SNCI	1.2%	287%	288%
H24 Frogmoor Wood SNCI	<0.1%	288%	288%
H25 Avon Valley Ramsar SPA	CL not provided by APIS		
H26 River Avon SAC	0.1%	86%	86%
H27 New Forest SAC	0.3%	420%	421%
H28 Isle of Portland to Studland Cliffs SAC	0.1%	214%	214%
H29 Corfe Mullen Pastures SSSI	0.2%	288%	288%
H30 St Leonards and St Ives Heaths SSSI	0.5%	265%	265%
H31 Poole Bay Cliffs SSSI	CL not provided by APIS		
H32 Lions Hill SSSI	0.3%	274%	274%
H33 Town Common SSSI	0.3%	258%	259%
H34 Upton Heath SSSI	0.3%	281%	282%
H35 Poole Harbour SSSI	0.2%	250%	250%
H36 Ham Common SSSI	0.2%	256%	256%
H37 Holton and Sandford Heaths SSSI	0.2%	261%	262%
H38 Studland and Godlingston Heaths SSSI	0.1%	214%	214%
H39 Ferndown Common SSSI	0.9%	275%	276%

The maximum PC nutrient nitrogen deposition rates arising from the EfW CHP Facility are low in comparison to the critical loads and the background deposition rates and the PCs are 1% or less of the lowest critical load for all European sites and SSSIs and less than 100% for LWS. Therefore, it is considered that the impact of nutrient nitrogen deposition on surrounding habitats is not significant.

Critical loads for nutrient nitrogen deposition are not provided by APIS for the Avon Valley SPA/Ramsar site or Poole Bay Cliffs SSSI. However, predicted nutrient nitrogen deposition rates are very small compared to background levels. For the Avon Valley SPA/Ramsar, the PC is 0.014 kg N ha^{-1} a^{-1} which is 0.1% of the background rate of 12.79 kg N ha^{-1} a^{-1}. Similarly, the PC for Poole Bay Cliffs SSSI is 0.010 kg N ha^{-1} a^{-1} (0.1% of the background rate of

12.03 kg N ha^{-1} a^{-1}). In addition, the impact at both would be less than 0.3% if a particularly stringent critical load of 5 kg N ha^{-1} a^{-1} was adopted for these habitat sites. Therefore, it is concluded that these small additions to the background levels would not result in a detrimental impact to habitats present.

5.4 PREDICTED IMPACT OF COMBINED EFW CHP FACILITY AND EDG EMISSIONS

5.4.1 Introduction

The combined impact of the EfW CHP Facility and the EDG on habitat sites is presented. Annual mean concentrations of NO_x, nutrient nitrogen deposition and acidification are predicted assuming that the EDG operates for 50 hours per annum. For 24-hour mean airborne concentrations it is assumed that the EDG operates for three hours per day every day and is representative of the worst-case.

As the impact of the EDG is very localised, the impact at all European sites within 10 km, SSSIs/LWS within 2 km and sensitive habitats identified by Natural England is provided only. It should be noted that the maximum predicted at receptors H2 to H23 and H39 are representative of the discrete receptor locations (refer *Figure 3.2*). Where these form component parts of the Dorset Heaths SAC/SPA/Ramsar they may not represent the maximum predicted impact within that component part. However, the predicted impact at H1 (Dorset Heaths SAC/SPA/Ramsar) is the maximum predicted anywhere within the European habitat site.

5.4.2 Airborne NO_x

Predicted maximum concentrations of NO_x as a percentage of the relevant critical levels (CL) are presented in *Tables 5.15*. For the annual mean, the impact of the additional contribution of the EDG is negligible and increases the maximum predicted concentration at the Dorset Heaths European site by 0.01 µg m^{-3}. As a maximum, predicted concentrations at this site are 0.5% of the critical level of 30 µg m^{-3}.

TABLE 5.15 MAXIMUM PREDICTED ANNUAL MEAN NO_x CONCENTRATIONS – EFW CHP FACILITY AND EDG COMBINED

Habitat	Annual Mean		Maximum 24-hour Mean	
	EfW CHP and EDG	Percentage of CL	EfW CHP and EDG	Percentage of CL
H1 Dorset Heaths SAC/SPA/Ramsar	0.14	0.5%	19.2	25.5%
H2 Poole Harbour SPA/Ramsar	0.046	0.2%	0.9	1.3%
H3 Dorset Heaths (Purbeck & Wareham) and Studland Dunes SAC	0.028	0.1%	0.5	0.6%
H4 Canford Heath SSSI	0.081	0.3%	3.4	4.6%

TABLE 5.15 MAXIMUM PREDICTED ANNUAL MEAN NO_X CONCENTRATIONS – EFW CHP FACILITY AND EDG COMBINED

Habitat	Annual Mean		Maximum 24-hour Mean	
	EfW CHP and EDG	Percentage of CL	EfW CHP and EDG	Percentage of CL
H5 Turbary & Kinson Commons SSSI	0.089	0.3%	1.1	1.5%
H6 Hurn Common SSSI	0.058	0.2%	0.5	0.6%
H7 Slop Bog & Uddens Heath SSSI	0.044	0.1%	0.8	1.0%
H8 Parley Common SSSI	0.080	0.3%	0.7	0.9%
H9 Luscombe Valley SSSI	0.028	0.1%	0.5	0.6%
H10 Bourne Valley SSSI	0.060	0.2%	1.2	1.5%
H11 Holt & West Moors Heath SSSI	0.039	0.1%	0.5	0.7%
H12 Corfe & Barrow Hills SSSI	0.044	0.1%	1.3	1.7%
H13 Arne SSSI	0.028	0.1%	0.5	0.6%
H14 Moors River System SSSI	0.063	0.2%	0.5	0.7%
H15 Knighton Heath GC SNCI	0.12	0.4%	2.1	2.9%
H16 Alderney Waterworks SNCI	0.069	0.2%	1.5	2.0%
H17 Haymoor Bottom SNCI	0.083	0.3%	1.5	2.0%
H18 Arrowsmith Coppice SNCI/AW	0.078	0.3%	2.5	3.3%
H19 Delph Woods SNCI	0.067	0.2%	1.7	2.3%
H20 Dunyeats Hill HRS	0.076	0.3%	2.2	3.0%
H21 Moortown Copse SNCI	0.22	0.7%	2.9	3.8%
H22 Canford Park SANG LCNR	0.14	0.5%	2.0	2.6%
H23 Bearwood SNCI	0.20	0.7%	2.5	3.3%
H24 Frogmoor Wood SNCI	0.13	0.4%	15.0	20.0%
H39 Ferndown Common SSSI	0.13	0.4%	1.0	1.3%
Critical Level	*30*		*75*	

For nearby habitat sites, the impact of the EDG emissions is potentially significant with the predicted 24-hour mean concentration exceeding 10% of the critical level at the Dorset Heaths European site (and the Canford Heath SSSI component part of the European site). However, the EDG is assumed to operate for 3 hours per day to correspond with the worst-case meteorological conditions. Conditions requiring the use of the EDG for extended periods would be very rare and occur very infrequently. Therefore, it is concluded that the short-term critical level would not be exceeded.

5.4.3 Acidification

The combined contribution of the EfW CHP Facility and EDG to acidification impacts is presented in *Table 5.16*.

TABLE 5.16 PREDICTED ACID DEPOSITION - EFW CHP FACILITY AND EDG COMBINED

Habitat	EfW CHP and EDG (keq $ha^{-1}a^{-1}$)	Percentage of Critical Load
H1 Dorset Heaths SAC/SPA/Ramsar		
Bog	0.011	1.9%
Dwarf shrub heath	0.011	1.2%
Acid grassland	0.011	1.9%
Coniferous woodland	0.021	2.1%
H2 Poole Harbour SPA/Ramsar	0.0036	0.1%
H3 Dorset Heaths (Purbeck & Wareham) and Studland Dunes SAC	0.0022	0.4%
H4 Canford Heath SSSI	0.0044	1.0%
H5 Turbary & Kinson Commons SSSI	0.0068	1.2%
H6 Hurn Common SSSI	0.0045	0.5%
H7 Slop Bog & Uddens Heath SSSI	0.0035	0.6%
H8 Parley Common SSSI	0.0062	1.1%
H9 Luscombe Valley SSSI	0.0020	0.4%
H10 Bourne Valley SSSI	0.0045	0.8%
H11 Holt & West Moors Heath SSSI	0.0028	0.5%
H12 Corfe & Barrow Hills SSSI	0.0032	0.6%
H13 Arne SSSI	0.0022	0.4%
H14 Moors River System SSSI	0.010	0.4%
H15 Knighton Heath GC SNCI	0.0089	1.5%
H16 Alderney Waterworks SNCI	0.0052	0.8%
H17 Haymoor Bottom SNCI	0.0060	1.0%
H18 Arrowsmith Coppice SNCI/AW	0.0048	1.0%
H19 Delph Woods SNCI	0.0083	0.9%
H20 Dunyeats Hill HRS	0.0058	0.9%
H21 Moortown Copse SNCI	0.030	1.9%
H22 Canford Park SANG LCNR	0.011	0.2%
H23 Bearwood SNCI	0.031	0.3%
H24 Frogmoor Wood SNCI	0.0031	0.9%
H39 Ferndown Common SSSI	0.0097	1.7%

Due to the limited number of hours the EDG would operate the impact of the additional contribution from the EDG is negligible. At the Dorset Heaths

European site, the EDG adds 0.0003 keq $ha^{-1}a^{-1}$ to heathland habitats and 0.0006 keq $ha^{-1}a^{-1}$ to woodland habitats compared to the EfW CHP Facility operating alone.

5.4.4 Nutrient Nitrogen Deposition

The combined contribution of the EfW CHP Facility and EDG to nutrient nitrogen deposition is presented in *Table 5.17*. Due to the limited number of hours the EDG would operate the impact of the additional contribution from the EDG is negligible. At the Dorset Heaths European site, the EDG adds 0.001 kgN $ha^{-1}a^{-1}$ to heathland habitats and 0.002 kgN $ha^{-1}a^{-1}$ to woodland habitats compared to the EfW CHP Facility operating alone.

TABLE 5.17 PREDICTED NUTRIENT NITROGEN DEPOSITION - EFW CHP FACILITY AND EDG COMBINED

Habitat	EfW CHP and EDG (keq $ha^{-1}a^{-1}$)	Percentage of Critical Load
H1 Dorset Heaths SAC/SPA/Ramsar		
Heathland habitats	0.050	1.0%
Woodland habitats	0.085	0.8%
H2 Poole Harbour SPA/Ramsar	0.016	0.3%
H3 Dorset Heaths (Purbeck & Wareham) and Studland Dunes SAC	0.017	0.3%
H4 Canford Heath SSSI	0.028	0.6%
H5 Turbary & Kinson Commons SSSI	0.032	0.6%
H6 Hurn Common SSSI	0.021	0.4%
H7 Slop Bog & Uddens Heath SSSI	0.016	0.3%
H8 Parley Common SSSI	0.029	0.6%
H9 Luscombe Valley SSSI	0.010	0.2%
H10 Bourne Valley SSSI	0.021	0.4%
H11 Holt & West Moors Heath SSSI	0.014	0.3%
H12 Corfe & Barrow Hills SSSI	0.016	0.3%
H13 Arne SSSI	0.010	0.2%
H14 Moors River System SSSI	0.039	0.4%
H15 Knighton Heath GC SNCI	0.042	0.8%
H16 Alderney Waterworks SNCI	0.024	0.5%
H17 Haymoor Bottom SNCI	0.029	0.6%
H18 Arrowsmith Coppice SNCI/AW	0.028	0.6%
H19 Delph Woods SNCI	0.041	0.4%
H20 Dunyeats Hill HRS	0.027	0.5%
H21 Moortown Copse SNCI	0.13	1.3%
H22 Canford Park SANG LCNR	0.048	0.5%

TABLE 5.17 PREDICTED NUTRIENT NITROGEN DEPOSITION - EFW CHP FACILITY AND EDG COMBINED

Habitat	EfW CHP and EDG (keq $ha^{-1}a^{-1}$)	Percentage of Critical Load
H23 Bearwood SNCI	0.12	1.2%
H24 Frogmoor Wood SNCI	0.039	0.4%
H39 Ferndown Common SSSI	0.046	0.9%

6 ABNORMAL EMISSIONS AND SENSITIVITY ANALYSIS

6.1 EMISSIONS AT THE HALF-HOURLY EMISSION LIMIT VALUES

The dispersion modelling results presented in *Section 5* have been predicted assuming that the EfW CHP Facility is operating for all hours in the year with the pollutant concentrations exactly at the daily emission limit value prescribed within the permit. This is an extreme assumption, especially for the annual average concentrations, since the EfW CHP Facility could never operate with release rates as high as this in practice and remain compliant with legislation.

Short term peak concentrations may arise if the EfW CHP Facility emits pollutants at levels approaching the half hourly IED limit values. These pollutants are particulate matter, nitrogen dioxide, sulphur dioxide, hydrogen chloride, hydrogen fluoride and carbon monoxide and have the following half-hourly emission limit values:

- total dust – 30 mg Nm^{-3} (10 mg Nm^{-3} 97% compliance);
- hydrogen chloride – 60 mg Nm^{-3} (10 mg Nm^{-3} 97% compliance);
- hydrogen fluoride – 4 mg Nm^{-3} (2 mg Nm^{-3} 97% compliance),
- sulphur dioxide – 200 mg Nm^{-3} (50 mg Nm^{-3} 97% compliance);
- oxides of nitrogen – 400 mg Nm^{-3} (200 mg Nm^{-3} 97% compliance); and
- carbon monoxide – 100 mg m^{-3}.

Such excursions above daily limit values are permitted for only 3% of a year. The probability of such occasions occurring at the same time as the meteorological conditions that produce the highest one hour mean ground level concentrations is unlikely. On the basis of these worst-case assumptions, maximum predicted short-term concentrations for emissions at the half hourly limit values are provided in *Table 6.1*. It should be noted that these results represent an extreme worst-case as for some of the pollutants (NO_2, SO_2 and PM_{10}) there are a number of allowable exceedances of the AQO limit value.

TABLE 4.19 MAXIMUM PREDICTED SHORT-TERM CONCENTRATIONS AT THE HALF-HOURLY EMISSION LIMIT VALUES

Pollutant	Predicted Concentration (PC) (µg m^{-3})	Percentage of the AQO/AQAL
NO_2 (maximum 1-hour)	20.2	10.1%
SO_2 (maximum 15-minute)	38.7	14.6%
SO_2 (maximum 1-hour)	28.9	8.3%
SO_2 (maximum 24-hour)	7.2	5.8%
PM_{10} (maximum 24-hour)	1.1	2.2%
HCl (maximum 1-hour)	8.7	1.2%
HF (maximum 1-hour)	0.58	0.4%
CO (maximum 8-hour)	4.8	<0.1%
CO (maximum 1-hour)	14.5	<0.1%

Predicted concentrations are between <0.1% and 14.6% of the short term AQAL. Highest concentrations relative to the AQAL are predicted for SO_2 (as the maximum 15-minute mean). On the basis of these worst-case results, it is very unlikely that the AQAL would be exceeded. Therefore, it is concluded that emissions at the half hourly limits would not have a significant impact on air quality even assuming worst case dispersion conditions occurring during periods of elevated emissions.

6.2 ABNORMAL CHIMNEY EMISSIONS

6.2.1 Introduction

Initial results are based on normal operating conditions and using daily emission limits where daily and half hourly values are provided. Article 46 of the Industrial Emissions Directive (IED) allows abnormal operation, where emission limit values can be exceeded for certain periods, without being in contravention of the Environmental Permit for the Installation. This assessment identifies foreseeable events at the plant which constitute abnormal operations, which may have an impact on the subsequent emissions to air. The assessment then goes on to quantify the impacts to air quality in the vicinity of the Installation as a result of these changes in emissions. The assessment focuses on the potential changes in emissions arising from failure of abatement plant, and mechanical failure.

6.2.2 Overview of Abnormal Emissions

In the event of any process upset or mechanical failure the immediate action to implement process controls, which ensure that standby equipment, where available and associated abatement systems are operational. In addition, various actions and monitoring procedures will be initiated by the Operator to ensure that the plant combustion parameters and emissions remain within the

Environmental Permit, thereby avoiding an abnormal operation where possible. If any process upset or mechanical failure results in a significant change to the emission conditions or processes that cannot be easily and quickly remedied, the primary response from the operator will be to reduce load or initiate a controlled shutdown of the plant as appropriate.

Abnormal operation is not applicable to high CO or total organic carbon (TOC) emissions; in the event of emission levels of either being above the Emission Limit Value (ELV) the load would be reduced and a controlled shutdown initiated. Therefore, it is considered that periods where the plant continues to operate for extended periods with CO or TOC above the ELV would not occur.

6.2.3 Approach

The abnormal modelling approach has considered the short-term impacts during periods of abnormal operation, assuming a worst case of complete abatement failure. A series of factors have been derived in order to ascertain the likely increases in emissions that may occur for each pollutant due to various foreseeable abnormal operations. For particulate matter, CO, and TOC the limits in Annex VI, Part 3 of the IED were used for this assessment.

The dispersion modelling approach used to assess impacts under normal operating conditions uses daily emission limits to predict short term ground level pollutant concentrations. These predictions are then compared to the relevant air quality standard. For the assessment of abnormal emissions, the impact on short term concentrations is of more importance since occasional excursions above the ELV would have negligible impact on long term air quality impacts. However, the Environment Agency generally require that the long-term impact of abnormal conditions is considered for some pollutants namely dioxins and furans and PCBs.

6.2.4 Abnormal Emissions – Short-term Impacts

Article 46(6) of the IED states that 'under no circumstances continue to incinerate waste for a period of more than 4 hours uninterrupted where emission limits values are exceeded'. In addition, Article 46(6) also states that 'the cumulative duration of operation in such conditions over one year shall not exceed 60 hours'. Therefore, in order to assess the short-term ground level conditions that would result from the facility operating at plausible abnormal operational emission levels for four hours, the assessment has considered the short-term ground level concentrations where emissions occur at above half-hourly emission limits. The short-term emissions that are assumed to occur during abnormal conditions are presented in *Table 6.2*.

TABLE 6.2 SHORT-TERM ABNORMAL EMISSION CONCENTRATIONS – NON-METALS

Substance	Half-hour ELV (mg Nm^{-3})	Daily ELV (mg Nm^{-3})	Plausible Short-term Emission (mg Nm^{-3})(a)
NOx	400	120	800 (b)
SO_2	200	30	250 (15-minute) (c) 250 (hourly) (c) 67 (daily) (d)
Total dust (PM_{10})	30	10	29 (e)(f)
HCl	60	10	1,200 (c)
HF	4	1	60 (c)
CO	100	50	75 (8-hour) (g) 100 (hourly)
PCBs	-	3.6×10^{-9} (h)	3.6×10^{-7} (i)

(a) Abnormal emissions assumed to occur for 4 hours, for the remainder of the averaging period (e.g. for emissions with 24-hour or 8-hour AQO) emissions are assumed to be at the daily ELV

(b) Assumed 50% abatement efficiency factor for compliance with the half-hour ELV of 400 mg Nm^{-3}

(c) Assumed content of raw gas

(d) Calculated as 4 hours at 250 mg Nm^{-3} and 20 hours at 30 mg Nm^{-3}

(e) The maximum total dust emission is restricted to 150 mg Nm^{-3} (Annex VI, Part 3(2) of the IED)

(f) Calculated as 4 hours at 150 mg Nm^{-3} and 20 hours at 5 mg Nm^{-3}

(g) Calculated as 4 hours at 100 mg Nm^{-3} and 4 hours at 50 mg Nm^{-3}

(h) No ELV, emissions obtained from the Defra report WR0608

(i) Abnormal emission assumed to be 100 times the normal emission

For metals other than mercury, it is assumed that metals are associated with the particle phase and that the emission will increase as the ratio between the abnormal dust emission and the half-hourly ELV (i.e. by a factor of 5 = 150/30). For mercury, it is assumed that the abnormal emission concentration is 100 times the emission limit. Short-term emission concentrations for trace metals assumed for the abnormal assessment are provided in *Table 6.3*.

TABLE 6.3 SHORT-TERM ABNORMAL EMISSION CONCENTRATIONS – METALS

Substance	Daily ELV (mg Nm^{-3})	Hourly Abnormal Emission (mg Nm^{-3})	Plausible Short-term Emission (mg Nm^{-3})(a)
Cd (24-hour mean)	0.02	0.1	0.033
Hg (24-hour mean)	0.02	2	0.35
Hg (1-hour mean)	0.02	2	2
Sb (1-hour mean)	0.3	1.5	1.5
Cr (24-hour mean)	0.3	1.5	0.5
Cu (24-hour mean)	0.3	1.5	0.5
Mn (1-hour mean)	0.3	1.5	1.5
Ni (1-hour mean)	0.3	1.5	1.5
V (24-hour mean)	0.3	1.5	0.5

(a) Abnormal emissions assumed to occur for 4 hours, for the remainder of the averaging period (e.g. for emissions with 24-hour or 8-hour AQO) emissions are assumed to be at the daily ELV

6.2.5 Abnormal Emissions – Long-term Impacts

For assessing abnormal emissions on long-term concentrations of dioxins and furans and PCBs, it is assumed that complete failure of the abatement equipment occurs for the full 60 hours allowed per annum and that emissions are 100 times the limit for all of these 60 hours. There is no air quality standard (AQS) or environmental assessment level (EAL) for dioxins/furans. Therefore, the impact of abnormal emissions of dioxins and furans is considered in the human health risk assessment submitted in support of the permit application.

Assuming that the plant operates at the emission limit (or assumed emission concentration) for 8,700 hours and at 100 times the limit for 60 hours of the year, the emission concentrations for PCBs would be 6.0×10^{-9} mg Nm^{-3}.

6.2.6 Results – Short-term Impacts

Maximum predicted concentrations are provided for the relevant averaging period assuming that abnormal emissions occur during the period of worst-case dispersion conditions for the five years of meteorological data in *Table 6.4*. Exceedance of the limit value does not necessarily indicate non-compliance with the AQO as some of the pollutants considered (e.g. NO_2, SO_2 and PM_{10}) have AQO where a number of exceedances are allowed. The predicted ground level concentrations have been determined assuming that operating conditions, such as volumetric flow and temperature, remain the same.

TABLE 6.4 MAXIMUM PREDICTED SHORT-TERM CONCENTRATIONS FOR ABNORMAL EMISSIONS

Pollutant	Predicted Concentration (PC) (µg m-3)	Percentage of the AQO
NO_2 (maximum 1-hour)	40.5	20.2%
SO_2 (maximum 15-minute)	48.4	18.2%
SO_2 (maximum 1-hour)	36.1	10.3%
SO_2 (maximum 24-hour)	2.4	1.9%
PM_{10} (maximum 24-hour)	1.1	2.1%
HCl (maximum 1-hour)	173.5	23.1%
HF (maximum 1-hour)	8.7	5.4%
CO (maximum 8-hour)	3.6	<0.1%
CO (maximum 1-hour)	14.5	<0.1%
Pollutant	**Predicted Concentration (PC) (ng m-3)**	**Percentage of the AQS**
Cd (24-hour maximum)	1.2	4.0%
Hg (24-hour maximum)	12.7	21.1%
Hg (1-hour maximum)	289	48.2%
Sb (1-hour maximum)	217	0.1%
Cr (24-hour maximum)	18.1	0.9%
Cu (24-hour maximum)	18.1	36.2%
Mn (1-hour maximum)	217	0.1%
Ni (1-hour maximum)	217	31.0%
V (24-hour maximum)	18.1	1.8%
PCBs (1-hour maximum)	0.000052	<0.1%

Predicted concentrations range between <0.1% and 48.2% of the relevant AQALs. Highest concentrations are predicted for maximum hourly mean concentrations of mercury. Predicted concentrations are well below the AQAL and it is considered unlikely that the AQAL would be exceeded even with the addition of background concentrations.

6.2.7 Results – Long-term Impacts

The long-term impact of abnormal emissions of PCBs is summarised in *Table 6.5*. Predicted concentrations are provided for the worst-case meteorological year. The predicted ground level concentrations have been determined assuming that operating conditions, such as volumetric flow and temperature, remain the same. Predicted concentrations are less than 1% of the relevant EAL and would be assessed as 'not significant'.

TABLE 6.5 MAXIMUM PREDICTED ANNUAL MEAN CONCENTRATIONS FOR ABNORMAL EMISSIONS

Pollutant	Predicted Concentration (PC) (ng m^{-3})	Percentage of the AQS
PCBs	2.3×10^{-8}	<0.1%

6.3 ABNORMAL ODOUR EMISSIONS

During normal operation, the various treatment buildings would be maintained at a negative pressure to prevent the fugitive release of odours. Air extracted from these areas would be used as combustion air which would effectively oxidise any odours prior to release from the chimney. Therefore, the risk of odour annoyance during normal operation would be very low. However, when the furnace is undergoing maintenance and there is waste stored within the bunker there is the potential for odours to be released. To avoid odours during downtime of the furnace, extracted air would be vented via an activated carbon filter to reduce odours.

Dispersion modelling of emissions from the vented emissions has been carried out to predict the impact of emissions on odour annoyance. Emission parameters for the activated carbon filter used in the model are as follows:

- vent height of 52 m (2 m above the height of the boiler house);
- vent diameter of 1.37 m;
- design flow rate of 22.2 m^3 s^{-1};
- ambient temperature;
- discharge velocity of 15 m s^{-1};
- an odour release of 3,000 ou_E m^{-3} which assumes partial breakthrough of the activated carbon filter.

Predicted odour concentrations as the 98th percentile of hourly means are presented in *Table 6.6*. Results presented are the maximum for each of the five years of meteorological data and assume as a worst-case that the emissions are vented via the activated carbon filter continuously. Predicted concentrations are compared to an odour benchmark of 3.0 ou_E m^{-3}.

Maximum predicted concentrations at 1.2 ou_E m^{-3} represent 38.8% of the odour benchmark of 3.0 ou_E m^{-3}. At sensitive receptor locations, the maximum predicted concentration is 21.3% of the odour benchmark. Taking into consideration the worst-case assumptions adopted, it is concluded that it is very unlikely that the odour benchmark would be exceeded.

TABLE 6.6 PREDICTED ODOUR CONCENTRATIONS DURING ABNORMAL OPERATION

Receptor/Parameter	98th Percentile of Hourly Means	
	PC (ou_E m^{-3})	%age of Benchmark of 3.0 ou_E m^{-3}
Maximum	1.2	38.8%
D1. Viscount Walk	0.34	11.4%
D2. Wheelers Lane (new dev.)	0.39	13.1%
D3. Magna Road	0.18	5.9%
D4. Waggy Tails Rescue	0.18	5.8%
D5. The Hamworthy Club	0.14	4.7%
D6. Arrowsmith Road	0.23	7.7%
D7. Maranello	0.14	4.6%
D8. Magna Care Centre	0.10	3.3%
D9. Canford Sports Club House	0.33	11.1%
D10. Provence Drive	0.64	21.3%
D11. Bearwood Primary School	0.31	10.3%
D12. Ferndown	0.04	1.5%
D13. Belben Road, Bournemouth	0.20	6.6%
D14. Pilsdon Drive, Bournemouth	0.11	3.7%
D15. Gravel Hill, Broadstone	0.08	2.8%
D16. Egdon Drive, Merley	0.08	2.6%
D17. Marpet Close, Bear Cross	0.12	4.0%
D18. Knighton Lane, Knighton	0.11	3.7%
D19. White House	0.17	5.6%

6.4 SENSITIVITY ANALYSIS

6.4.1 Introduction

For the detailed assessment provided in *Section 4.3*, a conservative approach has been undertaken in order to avoid underestimating the impact of the EfW CHP Facility on local air quality. This has included emissions at the maximum permissible ELV (except for ammonia), the worst-case meteorological year for each averaging period and continuous operation of the Proposed Facility at full load. The effect of varying some of these parameters is considered. This sensitivity analysis has been carried out for emissions of NO_x as this is considered to be the key pollutant emitted from the EfW CHP Facility. Predicted concentrations of NO_2 are provided as the maximum predicted and the maximum discrete receptor concentration for the annual mean and the 99.8th percentile of hourly means.

A sensitivity analysis is also provided for ammonia that considers the maximum impact of emissions on the Dorset Heaths SAC.

6.4.2 Operational Hours

It is assumed that the EfW CHP Facility would operate continuously, 8760 hours per annum. However, there will be some downtime for maintenance etc and it is expected that the operational hours would be 7,830. This would reduce the maximum predicted annual mean NO_2 concentration to 0.29 µg m^{-3} from 0.32 µg m^{-3}, a 10.6% reduction.

6.4.3 Meteorological Data

Dispersion modelling for five years of meteorological data for Bournemouth Airport was undertaken. Results presented in *Section 4.3* are the highest predicted for each averaging period/receptor. A comparison of predicted concentrations of NO_2 for each of the five years is presented in *Table 6.7* as the maximum predicted anywhere within the model domain.

TABLE 6.7 MAXIMUM PREDICTED NO_2 CONCENTRATIONS FOR THE ANNUAL METEOROLOGICAL DATA SETS

Receptor/Parameter	Annual Mean		99.8th Percentile of 1-hour Means	
	PC (µg m^{-3})	%age AQO	PC (µg m^{-3})	%age AQO
2016 Bournemouth	0.26	0.7%	2.3	1.1%
2017 Bournemouth	0.25	0.6%	2.3	1.1%
2018 Bournemouth	0.19	0.5%	2.2	1.1%
2019 Bournemouth	0.26	0.7%	2.2	1.1%
2020 Bournemouth	0.32	0.8%	2.3	1.2%
Average	0.26	0.6%	2.3	1.1%

For the annual mean, predicted concentrations for the five years are quite variable with the lowest concentration (2018) being only 59% of the highest concentration (2020). The average for the five years is 0.26 µg m^{-3} (0.6% of the AQO) and is 81% of the predicted concentration for 2020.

6.4.4 Surface Roughness

Within ADMS surface roughness is defined for the site and for the selected meteorological station. For the detailed modelling, the site surface roughness was defined as 0.3 m and for the meteorological station 0.3 m. A value of 0.3 m for the site was defined as the surrounding area is semi-rural other than the Canford Resource Park. The EfW CHP Facility building would represent the largest structure on the Canford Resource Park and this is considered to be dealt with as it is included as a building for building downwash effects.

The effect of increasing the site surface roughness on the model results has been determined with values of 0.5 m and 0.7 m tested. A summary of these results is compared to the original results for the EfW CHP Facility in *Table 6.8*.

TABLE 6.8 PREDICTED NO_2 CONCENTRATIONS FOR VARYING SURFACE ROUGHNESS VALUES

Receptor/Parameter	Annual Mean		99.8th Percentile of 1-hour Means	
	PC (µg m-3)	%age AQO	PC (µg m-3)	%age AQO
2020, Surface Roughness 0.3 m	0.32	0.8%	2.3	1.2%
2020, Surface Roughness 0.5 m	0.34	0.8%	2.4	1.2%
2020, Surface Roughness 0.7 m	0.38	1.0%	2.4	1.2%

Increasing the surface roughness length for the site has the effect of increasing the predicted annual mean concentrations. However, compared to the original settings these changes are relatively small, at most 0.2% of the annual mean AQO. For short-term concentrations the effect of increasing the surface roughness is negligible.

6.4.5 Main Building Downwash Structure

In ADMS, which building is selected as the main building can influence predicted concentrations. The three structures likely to be representative of the main building are the Boiler House, Waste Bunker and the Air Pollution Control (APC) building. Detailed model results have been predicted assuming the Boiler House is the main building. In addition, the majority of buildings have rooves that overhang the building structures and in the detailed modelling the building footprint was taken as the size of the rooves rather than the actual footprint at floor level. A sensitivity analysis is presented where the Waste Bunker and APC building are selected as the main building and also where the Boiler House is the main building but the dimensions of all buildings are based on the building footprint at floor level. Results are presented in *Table 6.9*.

TABLE 6.9 PREDICTED NO_2 CONCENTRATIONS FOR VARYING BUILDING PARAMETERS

Receptor/Parameter	Annual Mean		99.8th Percentile of 1-hour Means	
	PC (µg m-3)	%age AQO	PC (µg m-3)	%age AQO
2020, Main = Boiler House, Overhanging Rooves	0.32	0.8%	2.3	1.2%
2020, Main = APC, Overhanging Rooves	0.23	0.6%	2.2	1.1%
2020, Main = Waste Bunker, Overhanging Rooves	0.28	0.7%	2.2	1.1%
2020, Main = Boiler House, No Overhanging Rooves	0.31	0.8%	2.3	1.1%

Highest predicted concentrations occur for Boiler House as the main building with building dimension including the overhanging rooves, as assumed for the detailed assessment. The APC building or Waste Bunker result in lower concentrations for annual means but there is very little variation in predicted short-term NO_2 concentrations. Inclusion of the extended building to take account of the overhangs has little impact on the results.

6.4.6 Ammonia Emission Limit Value

To minimise impacts on habitat sites, a lower emission limit value (ELV) for ammonia has been adopted (5 mg Nm^{-3}). The impact of the higher ELV of 10 mg Nm^{-3} on the Dorset Heaths SAC is presented. This provides an assessment of airborne concentrations, nutrient nitrogen deposition and acidification against the relevant critical level and critical loads (CL). Results are presented in *Table 6.10*.

TABLE 6.10 IMPACT OF HIGHER NH_3 EMISSION LIMIT ON THE DORSET HEATHS SAC

Parameter	Emission at 5 mg Nm^{-3}		Emission at 10 mg Nm^{-3}	
	PC (µg m^{-3})	%age CL	PC (µg m^{-3})	%age CL
Airborne NH_3 (µg m^{-3})	0.0056	0.6%	0.011	1.1%
Nutrient nitrogen deposition (kg N ha^{-1} a^{-1})	0.049	1.0%	0.078	1.6%
Acidification (keq $ha^{-1}a^{-1}$)	0.010	1.9%	0.012	2.2%

The higher ELV results in a two fold increase in airborne NH_3 and the maximum concentration within the SAC is in excess of 1% of the critical level of 1 µg m^{-3}. Nutrient nitrogen deposition and acidification also increase but to a lesser extent as these are also affected by other pollutant emissions. However, the nutrient nitrogen deposition rate for the higher ELV exceeds 1% of the critical load and there is a 0.3% increase for acidification relative to the most stringent critical load.

6.4.7 Summary

The sensitivity analysis has demonstrated that varying the assumptions made for the assessment does not significantly vary the predicted concentrations for most choices. Furthermore, in most cases, the assumptions adopted for the detailed assessment are representative of the worst-case. The most variable parameter was the selection of meteorological year where predicted concentrations for the worst-case year are 0.32 µg m^{-3} compared to an average for the five years of 0.26 µg m^{-3}. Therefore, the highest concentration is 23% higher than the average. For the detailed assessment provided, the maximum predicted concentration for each averaging period and each receptor was presented for the five years of meteorological data. Therefore, it is concluded that the assessment provided is robust and representative of worst-case conditions.

7 SUMMARY AND CONCLUSIONS

7.1 SUMMARY

An assessment has been carried out to determine the local air quality impacts associated with the operation of an Energy from Waste (EfW) Combined Heat and Power (CHP) Facility at Canford Resource Park, Arena Way, Magna Road, Wimborne, Dorset, BH21 3BW. The assessment is provided in support of the Environmental Permit application for the EfW CHP Facility.

Detailed air quality modelling of emissions from the EfW CHP Facility using the UK ADMS dispersion model has been undertaken to predict the impacts associated with EfW CHP Facility emissions and an Emergency Diesel Generator (EDG). Emissions from the Installation have been assumed to occur at the BREF daily emission limit values for new plant except for NH_3 where a reduced limit of 5 mg Nm^{-3} was adopted to minimise impacts on adjacent sensitive habitat sites.

For a proposed chimney height of 110 m above ground level (154.65 m above ordnance datum), predicted maximum off-site concentrations are assessed as 'not significant' and well below the relevant air quality standards for the protection of human health for all pollutants considered.

The predicted process contributions are 'not significant' compared with the critical levels for NO_x, SO_2, NH_3 and HF and critical loads for nutrient nitrogen deposition for European designated sites and nationally and locally designated habitat sites.

The impact at the Dorset Heaths European site and some of the component SSSIs cannot be screened out as not significant as the PC exceeds 1% of the critical load. The potential effect of these acidification levels on habitats present is presented in the Shadow Habitat Regulations Assessment (sHRA) Report [18]. Taking into consideration proposed mitigation during operation, it was concluded that habitat fragmentation in relation to Dorset Heathlands SPA and Ramsar no longer constitute a Likely Significant Effect (LSE). Mitigation included:

- Air pollution control systems to reduce levels of pollutants in the facility's emissions, including application at a lower ammonia ELV of 5 mg Nm^{-3}.
- Increasing the stack height from the initial design of 90 m to 110 m above ground level.
- Contributions towards appropriate management of Dorset Heaths SAC/SPA/Ramsar in the form of a Biodiversity Enhancement

Contribution and Trickle Fund, in addition to a future monitoring strategy, to be secured through a Section 106 agreement.

Regarding impacts from air pollution on Dorset Heaths SAC/SPA/Ramsar, habitat surveys, soil sampling and bryophyte and lichen monitoring was undertaken to inform the impact assessment and provide baseline conditions. Following the assessment, the sHRA concluded that with the identified mitigation, there will be no adverse effects on the integrity of the European sites as a result of the Proposed Development.

7.2 CONCLUSIONS

Therefore, it is concluded that air quality does not pose a constraint to the development of the Installation as proposed.

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