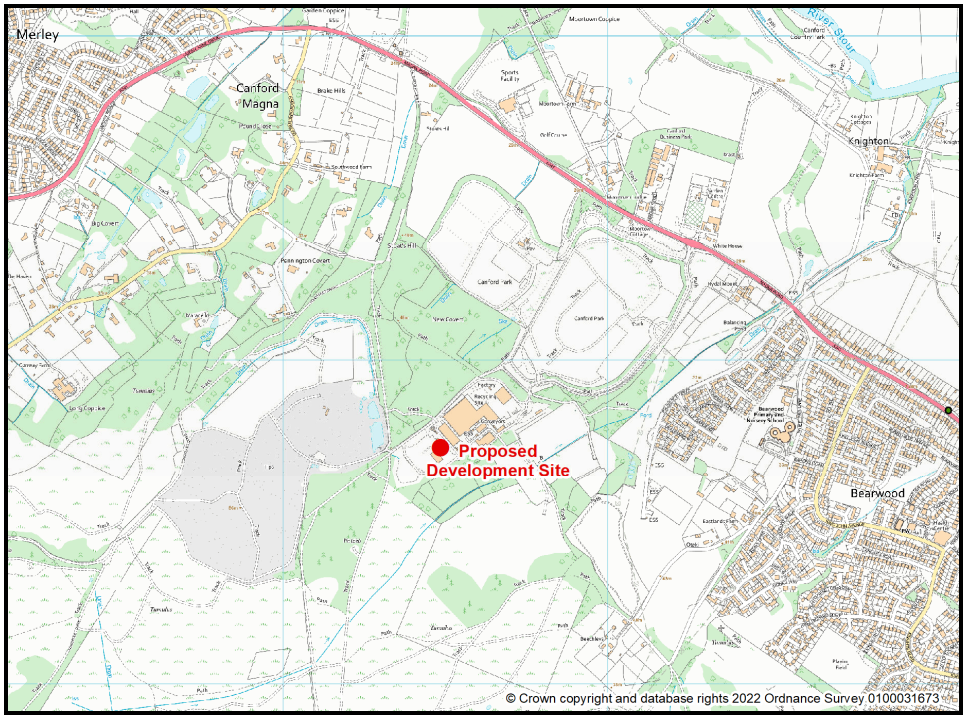
CANFORD ENERGY FROM WASTE COMBINED HEAT AND POWER FACILITY:

OPERATIONAL AIR QUALITY ASSESSMENT



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Independent Air Quality & Odour Specialists

CONTENTS

1 INTRODUCTION

1.1 PURPOSE OF THE ASSESSMENT

Dr Amanda Gair of Gair Consulting Ltd has been commissioned by Savills 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. Construction impacts associated with the Proposed Development have been provided by Savills.

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.

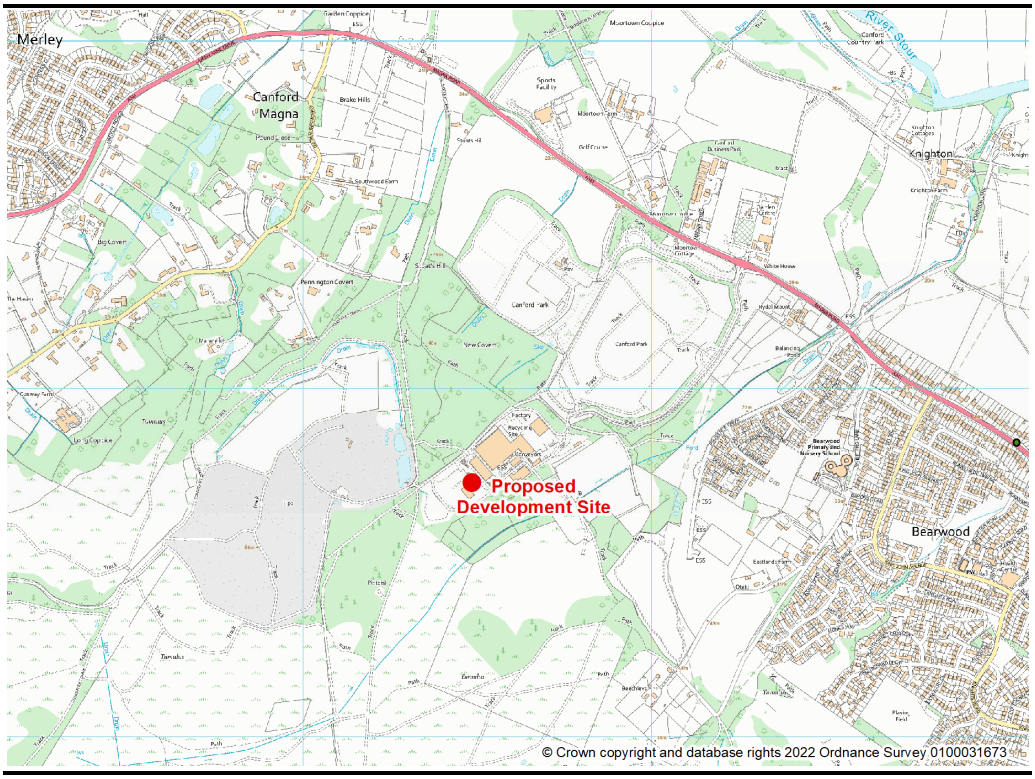
1.2 BACKGROUND TO THE IMPACT ASSESSMENT

The Proposed Development is located at the Canford Resource Park (refer *Figure 1.1*). The Proposed Development 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 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 Proposed Development is not located within or close to an AQMA.

The nearest residential receptors to the Proposed Development 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 Proposed Development would be along Arena Way off Magna Road (A341).

FIGURE 1.1 LOCATION OF THE PROPOSED DEVELOPMENT



1.3 SCOPE OF THE ASSESSMENT

1.3.1 Potential Air Quality Impacts

The potential air quality impacts arising from the Proposed Development are as follows:

- construction impacts including construction dust and emissions from on-site construction plant;
- traffic-related air quality impacts from vehicles accessing the Proposed Development during construction and operation; and
- emissions to air from the combustion sources associated with the Proposed Development.

Construction impacts have been provided by Savills and this report only documents the operational impacts associated with operational traffic and emissions to air from on-site combustion sources including the EfW CHP Facility and an emergency diesel generator (EDG).

1.3.2 Operational Traffic-related Air Quality Impacts

Guidance is provided by the IAQM and Environmental Protection UK (EPUK) on indicative criteria for requiring a detailed traffic-related air quality assessment in their Land-use Planning Development Control: Planning for Air Quality (January 2017) [1]. For sites that are not located within an air quality management area (AQMA), these are 500 LDVs AADT (annual average daily traffic) and/or 100 HDVs AADT. Within an AQMA, these are reduced to 100 LDV and/or 25 HDV. The Proposed Development is not located within an AQMA.

During operation, the Proposed Development is expected to generate up to 162 HDV movements per day. Around 68% of these movements (110) would access/egress the Site in a westerly direction along Magna Road and 32% in an easterly direction (52 movements). Therefore, the number of vehicles movements along Magna Road to the west would exceed the IAQM HDV criterion for requiring a detailed assessment. However, in practice many of these HDV and other waste vehicles are already on the local road network in the baseline scenario without the Proposed Development as they access existing waste management resources within Canford Resource Park (Materials Recycling Facility (MRF) and Mechanical Biological Treatment (MBT) facility) which are adjacent to the facility.

The Traffic Consultants for the Proposed Development (Paul Basham Associates) estimate that the Proposed Development would give rise to an additional 90 HDV movements with 30,000 tonnes per annum (tpa) coming from the adjacent MRF and 110,500 tpa arising from the adjacent MBT facility. Therefore, of the total 260,000 tpa, only 119,500 tpa would generate new vehicle movements on the local road network (46%). On this basis, it is estimated that there would be 90 additional HDV movements on Arena Way, 52 movements on Magna Road west and 38 movements on Magna Road east. These are all below the IAQM criterion for requiring a detailed assessment (100 HDV). However, it is feasible that all of the traffic generated by the Proposed Development could comprise new vehicles and a detailed assessment of traffic-related air quality impacts for the operation of the Proposed Development is provided on the basis of this worst-case scenario. Therefore, a traffic-related air quality assessment is provided separately (refer **Appendix 6.2: Traffic-related Air Quality Assessment** of the Environment Statement (ES)).

1.3.3 Combustion Emissions

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

1 Land-Use Planning & Development Control: Planning for Air Quality, EPUK and IAQM (January 2017)

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) [2], 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;
- 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.

1.4 QUALIFICATIONS OF THE AUTHOR

Dr Amanda Gair of Gair Consulting Limited has over 30 years' experience in environmental consultancy specialising in air quality, odour and human health risk assessments. Qualifications and professional memberships include the following:

- Bachelor of Science (BSc) in Environmental Chemistry (Joint Honours);
- Doctor of Philosophy (PhD) in Atmospheric Chemistry;
- Member of the Institute of Air Quality Management (MIAQM);
- Member of the Institution of Environmental Sciences (MIEnvSc); and
- Chartered Environmentalist (CEnv).

Dr Gair provides technical support to the permitting of major projects via the completion of detailed air quality assessments and health risk assessments for planning applications, environmental permitting and general regulatory support. Dr Gair has extensive experience in power (including energy from

2 The Industrial Emissions Directive, 2010/75/EU

waste, biomass and bioethanol facilities), waste management, ceramics and cement works, construction, chemical, wastewater and manufacturing industries.

1.5 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* provides an assessment of cumulative air quality impacts.
- *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 Proposed Development.

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 for England, Scotland, Wales and Northern Ireland

The Government's policy on air quality within the UK is set out in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland published in July 2007[3], pursuant to the requirements of Part IV of the Environment Act 1995. The Air Quality Strategy sets out a framework for reducing hazards to health from air pollution and ensuring that international commitments are met in the UK. The Air Quality Strategy is designed to be an evolving process that is monitored and regularly reviewed.

The Air Quality Strategy sets standards and objectives for ten main air pollutants to protect health, vegetation and ecosystems. These are benzene,

3 The Air Quality Strategy for England, Scotland, Wales and Northern Ireland – July 2007

1,3-butadiene, carbon monoxide, lead, nitrogen dioxide, particulate matter (PM_{10} and $PM_{2.5}$), sulphur dioxide, ozone and polycyclic aromatic hydrocarbons.

The air quality standards are long-term benchmarks for ambient pollutant concentrations which represent negligible or zero risk to health, based on medical and scientific evidence reviewed by the Expert Panel on Air Quality Standards (EPAQS) and the World Health Organisation (WHO). These are general concentration limits, above which sensitive members of the public (e.g. children, the elderly and the unwell) might experience adverse health effects.

The air quality objectives are medium-term policy-based targets set by the Government which take into account economic efficiency, practicability, technical feasibility and timescale. Some objectives are equal to the EPAQS recommended standards or WHO guideline limits, whereas others involve a margin of tolerance, i.e. a limited number of permitted exceedances of the standard over a given period.

For some pollutants there is both a long-term (annual mean) standard and a short-term standard. In the case of nitrogen dioxide (NO_2), the short-term standard is for a 1-hour averaging period, whereas for fine particles (PM_{10}) it is for a 24-hour averaging period. These periods reflect the varying impacts on health of differing exposures to pollutants (e.g. temporary exposure on the pavement adjacent to a busy road, compared with the exposure of residential properties adjacent to a road).

2.2.3 Air Quality (England) Regulations

The Air Quality Standards (England) Regulations 2010 [4] have adopted into UK law the limit values required by EU Directive 2008/50/EC [5] 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.

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

5 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

2.2.4 Environment Act 2021

The Environment Act 2021 [6] establishes a legally binding duty on the government to bring forward new air quality targets by 31 October 2022 for $PM_{2.5}$.

The proposed air quality targets currently under consultation (consultation closed on 27th June 2022) are:

- an Annual Mean Concentration Target - a maximum concentration of 10 µg m^{-3} to be met across England by 2040; and
- a Population Exposure Reduction Target ('exposure target') - a 35% reduction in population exposure by 2040 (compared to a base year of 2018).

Schedule 11 of the Environment Act 2021 also strengthens the Local Air Quality Management (LAQM) framework which was introduced by the Environment Act 1995. Schedule 11 requires the LAQM framework to be reviewed and where appropriate modified within 12 months of the Environment Act coming into force and every 5 years following the initial review. Schedule 11 also places a duty on the local authority to have regard to the LAQM framework when exercising a function which could affect air quality (i.e. determining a planning application with air quality implications).

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

6 Environment Act 2021, 2021 Chapter 30

Assessment work [7]. This guidance, referred to as LAQM.TG(22), has been used where appropriate in the assessment.

2.2.6 National Planning Policy Framework

The National Planning Policy Framework (NPPF) [8] sets out the Government's planning policies for England and how these are expected to be applied.

In conserving and enhancing the natural environment, the NPPF states that (Paragraph 174) *'preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality.'*

The NPPF also states that (Paragraph 186) '*planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan.*'

Paragraph 188 of the NPPF states that '*the focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities.'*

2.2.7 EPUK and IAQM Land Use Planning and Development Control

Environmental Protection UK (EPUK) & Institute of Air Quality Management (IAQM) published the Land Use Planning and Development Control Air Quality guidance in January 2017 [9] to provide guidance on the assessment of air quality in relation to planning proposals and ensure that air quality is adequately considered within the planning control process.

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).

8 Ministry of Housing, Communities & Local Government: National Planning Policy Framework (2021)

9 EPUK & IAQM. Land-use Planning and Development Control: Planning for Air Quality, January 2017

The main focus of the guidance is to ensure all developments apply good practice principles to ensure emissions and exposure are kept to a minimum. It also sets out criteria for identifying when a more detailed assessment of operational impacts is required, guidance on undertaking detailed assessments and criteria for assigning the significance of any identified impacts. This guidance has been used within this assessment.

2.2.8 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; 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.

2.2.9 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 provided in **Appendix 6.3: Human Health Risk Assessment** of the ES.

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
Fine particles (as PM_{10})	Annual mean	40	UK AQO and EU limit value
	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 benzene)	Annual mean	5	AQO and EU limit value
	24-hour mean	30	Environment Agency EAL (a)
PAH (as benzo(a)pyrene	Annual mean	0.001	EU limit value

TABLE 2.1 AIR QUALITY ASSESSMENT LEVELS FOR NON-METALS

Pollutant	Averaging Period	AQAL (μg m^{-3})	Comments
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, there are only UK air quality objectives for lead. For other trace metals, assessment criteria in the form of Environmental Assessment Levels (EALs) are 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 (d)	Annual mean	0.005 (b)
Chromium compounds (as Cr)	EA RAG	1-hour mean	150
		Annual mean	5
Chromium VI	EPAQS (a)	Annual mean	0.0002
Cobalt (Co)	Derived from HSE EH40/2002 OEL	Annual mean	1
Copper (Cu)	EA RAG	1-hour mean	200
		Annual mean	10
Lead	UK AQO	Annual mean	0.25
Manganese (Mn)	EA RAG	1-hour mean	1,500
	WHO (d)	Annual mean	0.15
Mercury (Hg)	EA RAG	1-hour mean	7.5
		Annual mean	0.25
	WHO (d)	Annual mean	1.0
Nickel (Ni)	EPAQS (a)/ UK AQO	Annual mean	0.02

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

Metal	Source	Averaging Period	Value (μg m^{-3})
Thallium (Tl)	Derived from HSE EH40/2002 OEL	Annual mean	1
Vanadium (V)	WHO (d)	24-hour mean	1
	EA RAG	Annual mean	5

(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:

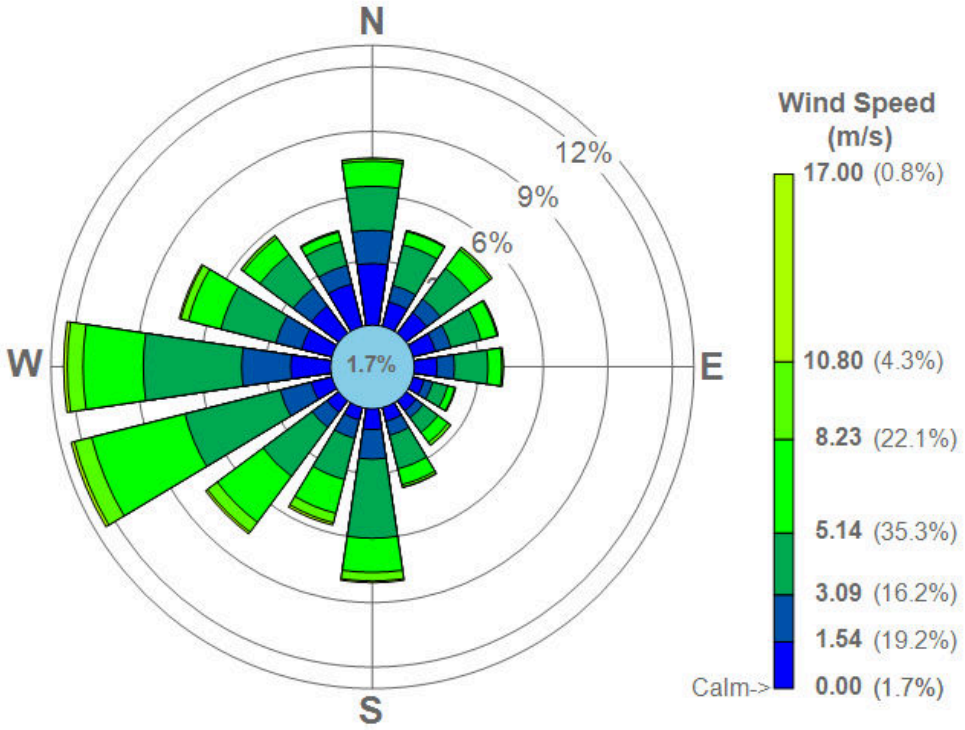
- **Wind direction** determines the broad transport of the emission and the sector of the compass into which the emission is dispersed.
- **Wind speed** will affect low-level emissions by increasing the initial dilution of pollutants in the emission whereas for high-level emissions, such as from a stack, 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 Proposed Development, 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*.

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.

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



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 Proposed Development 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 Proposed Development 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 Proposed Development 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 Proposed Development 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 Proposed Development 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.

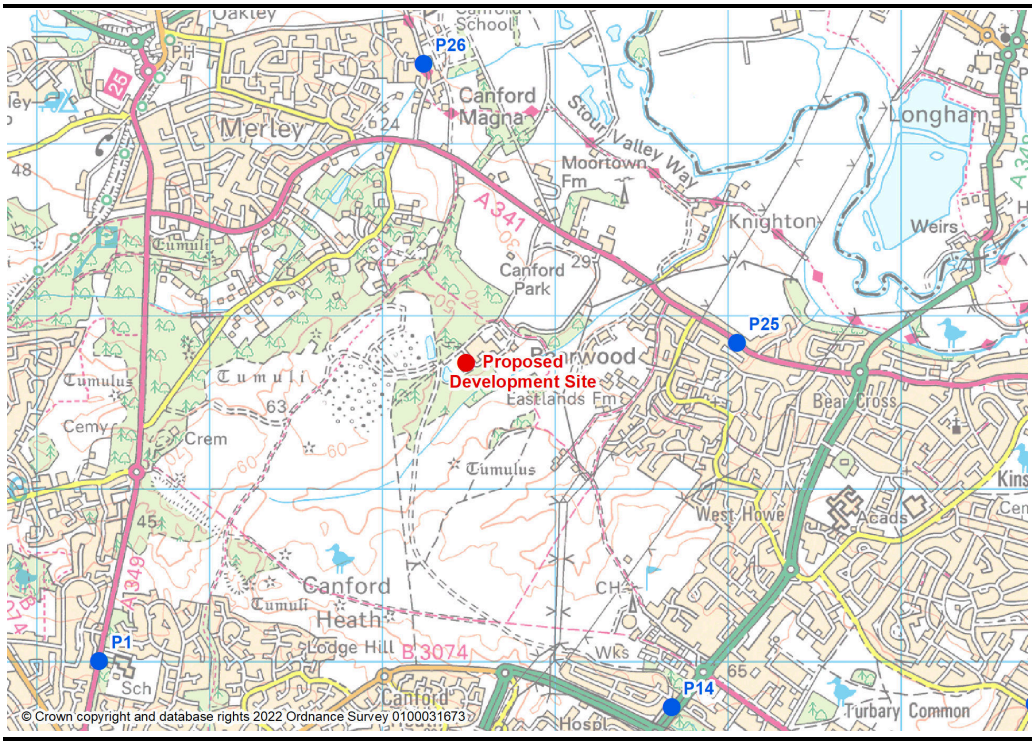
2.5.2 Nitrogen Dioxide (NO_2)

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 Proposed Development. However, there are four monitoring locations within 3 km of the Proposed Development. 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 2017 and 2021 are presented in *Table 2.4*.

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

Site	Type (a)	2017	2018	2019	2020	2021
BORN	UB	13.9	11.5	11.3	9.4	10.1
CHBR	UT	20.6	20.1	19.4	14.8	17.2
P1. Gravel Hill	K	27.0	26.3	23.7	21.0	23.4
P14. Dolbery Road North	K	24.0	22.6	22.8	25.2	20.3
P25. 94 Magna Road	R	No data		24.2	19.1	19.6
P26. Canford Village	K	No data		16.3	14.6	12.5

(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}).

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 Proposed Development 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 Proposed Development. 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. 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 in 2018 and 2019 were up to 10.8 µg m^{-3} at the Bournemouth site and up to 12.8 µg m^{-3} at the Christchurch site. 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 Proposed Development. 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)

Monitoring of ambient levels of hydrogen fluoride is not currently carried out in the UK. However, the Expert Panel on Air Quality Standards (EPAQS) report on halogen and hydrogen halides in ambient air [10] cites a modelling study which suggests that the typical natural background HF concentration is 0.5 µg m^{-3}, with an elevated background of 3 µg m^{-3} where there are local anthropogenic emission sources.

There is no indication that a significant source of HF is present at the Proposed Development and a background HF concentration of 0.5 µg m^{-3} is assumed to be applicable at sensitive human health and habitat receptors in the vicinity of the Proposed Development.

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 Proposed Development is located at Chilbolton Observatory in Hampshire, designated as a rural background site. This is located around 55 km to the northeast of the Proposed Development. 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 Proposed Development.

2.5.8 Total Organic Carbon (TOC) as Benzene

BCP Council did not undertake ambient monitoring of benzene or other volatile organic compounds (VOCs). Therefore, concentrations have been obtained from the Defra UK Background Air Pollution Maps. The mapped

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

benzene concentrations are based on 2001 monitoring data, projected to 2010. This is the most recent projection available and is assumed to be representative of concentrations in future years.

The maximum estimated 2010 annual mean background benzene concentration for the area surrounding the Proposed Development is 0.40 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 (0.078 ng m^{-3}) is a reasonable estimate of the background concentration in the vicinity of the Proposed Development.

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 Proposed Development 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 x 10^{-15} g m^{-3} or 1 x 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 Proposed Development site, the average rural background concentration is assumed to be reasonably representative of the baseline PCB concentration in the vicinity of the Proposed Development 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 Proposed Development 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
Total chromium (Cr)	1.1	1.1	0.92	5,000
Cobalt (Co)	0.042	0.050	0.038	200
Copper (Cu)	2.6	2.7	2.6	10,000
Lead (Pb)	3.9	3.5	3.6	250
Manganese (Mn)	2.1	2.6	2.4	150
Mercury (Hg)	Not measured			250
Nickel (Ni)	0.66	0.49	0.44	20
Thallium (Tl)	Not measured			1,000
Vanadium (V)	0.70	0.72	0.66	5,000

Guidance issued by the Environment Agency [11] 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 Proposed Development and surroundings are around 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*

11 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
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	0.5 µg m^{-3}
	1-Hour	1.0 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 Benzene)	Annual	0.40 µg m^{-3}
	24-Hour	0.47 (a)(b)
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}
Cadmium (Cd)	Annual	0.11 ng m^{-3}
Thallium (Tl)	No data available	
Mercury (Hg)	No data available	
Antimony (Sb)	No data available	
Arsenic (As)	Annual	0.64 ng m^{-3}
	1-Hour	1.3 ng m^{-3}
Chromium (Cr)	Annual	1.1 ng m^{-3}
	1-Hour	2.2 ng m^{-3}
Cobalt (Co)	Annual	0.050 ng m^{-3}
Copper (Cu)	Annual	2.7 ng m^{-3}
	1-Hour	5.4 ng m^{-3}
Lead (Pb)	Annual	3.9 ng m^{-3}
Manganese (Mn)	Annual	2.6 ng m^{-3}
	1-Hour	5.2 ng m^{-3}

TABLE 2.7 SUMMARY OF BACKGROUND CONCENTRATIONS FOR THE ASSESSMENT

Pollutant	Averaging Period	Concentration
Nickel (Ni)	Annual	0.66 ng m^{-3}
Vanadium (V)	Annual	0.72 ng m^{-3}
	24-Hour	0.85 ng m^{-3}
Ammonia (NH_3)	Annual	1.3 µg m^{-3}
	1-Hour	2.6 µg m^{-3}

(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 5.2) 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*.

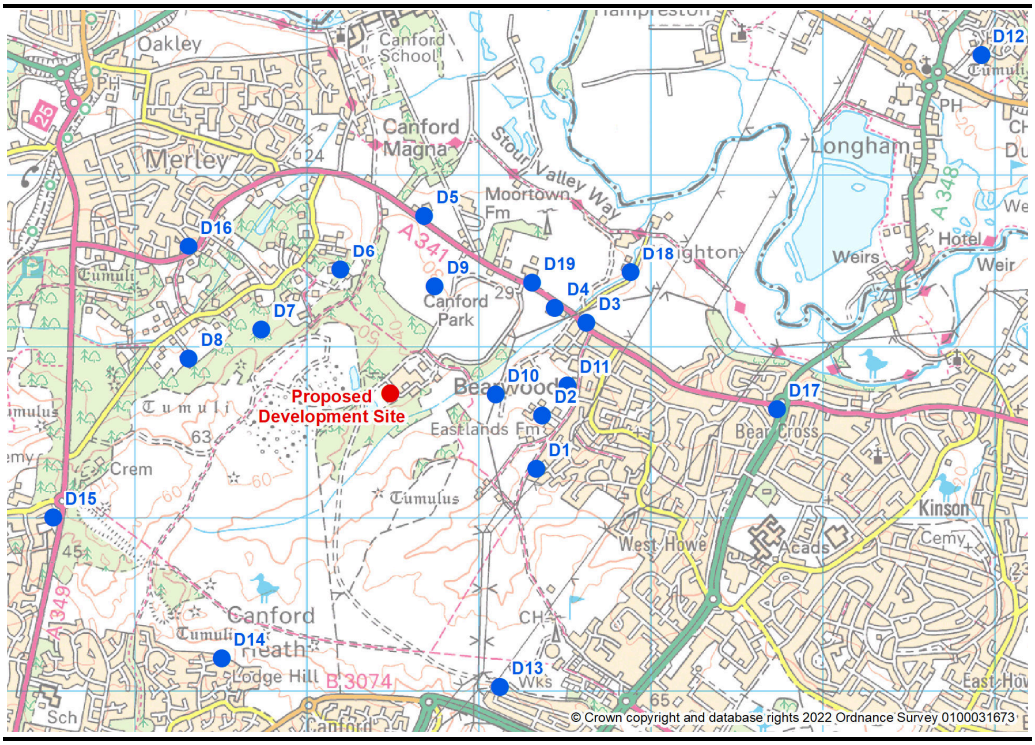
TABLE 3.1 DESCRIPTION OF SENSITIVE HUMAN RECEPTORS

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

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 [12] 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 scoping, Natural England also requested that the impact of the Proposed Development 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;

12 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.

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*. More details on the habitat sensitivities for each of these sites is provided in the **Chapter 8 (Ecology and Nature Conservation)** of the Environmental Statement.

TABLE 3.2 HABITATS CONSIDERED FOR THE HABITAT RISK ASSESSMENT

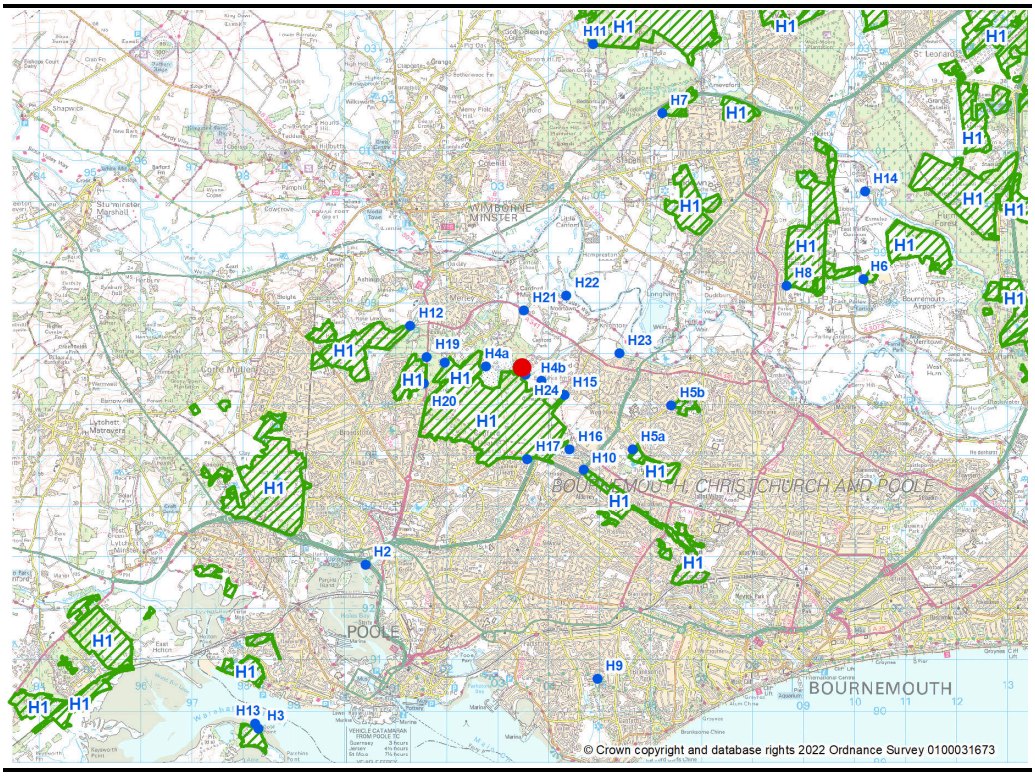
Receptor	Primary Habitats
H1 Dorset Heaths SAC/SPA/Ramsar	Coniferous woodland, dwarf shrub heath and bogs
H2 Poole Harbour SPA/Ramsar	Supralittoral sediment (acidic type)
H3 Dorset Heaths (Purbeck & Wareham) and Studland Dunes SAC	Bog woodland and bogs
H4 Canford Heath SSSI	Bogs and fen, marsh and swamp
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	Acid grassland and fen, marsh and swamp
H10 Bourne Valley SSSI	Bogs and fen, marsh and swamp
H11 Holt & West Moors Heath SSSI	Fen, marsh and swamp
H12 Corfe & Barrow Hills SSSI	Fen, marsh and swamp
H13 Arne SSSI	Bogs
H14 Moors River System SSSI	Broadleaved deciduous woodland and acid grassland
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	Woodland and heathland habitats
H19 Delph Woods SNCI	Deciduous woodland

TABLE 3.2 HABITATS CONSIDERED FOR THE HABITAT RISK ASSESSMENT

Receptor	Primary Habitats
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

Dorset Heaths SAC/SPA/Ramsar site (H1) and Frogmoor Wood SNCI (H24) have been included in the model as polygon features due to their extent and proximity to the Proposed Development. Therefore, the model predicts the maximum concentration anywhere within these habitat sites and represents a worst-case.

FIGURE 3.2 SENSITIVE HABITAT RECEPTORS INCLUDED IN THE ASSESSMENT



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 5.2) 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 Proposed Development 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

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.

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}

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 [13]. 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.

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

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 impact assessment is based upon daily average values for emissions from the EfW CHP Facility.

3.4.4 Typical Metal Emissions

Within the IED, emissions of metals are divided into three groups. The total emissions of metals within each group is 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 [14], 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 3.5*.

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;

14 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.

TABLE 3.5 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

3.5 SIGNIFICANCE CRITERIA

3.5.1 Impacts on Human Health - Planning

The Environmental Protection UK (EPUK) and Institute of Air Quality Management (IAQM) 2017 guidance [15] has been used to determine the significance of any impacts. The impact descriptors for individual receptors are presented in *Table 3.6*. Impacts can be described as being 'adverse' or 'beneficial' depending on whether a proposed development results in an increase or decrease in pollutant concentrations.

15 Land-Use Planning & Development Control: Planning for Air Quality, EPUK and IAQM (January 2017)

It should be noted that the table is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which then makes it clearer which cell the impact falls within. The user is encouraged to treat the numbers with recognition of their likely accuracy and not assume a false level of precision. Changes of 0% (i.e. less than 0.5%) will be described as 'negligible'.

TABLE 3.6 IMPACT DESCRIPTION FOR INDIVIDUAL RECEPTORS

Concentration with Development	Percentage Change in Air Quality Relative to the Air Quality Assessment Level (AQAL)			
	1%	1 to 5%	6 to 10%	>10%
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76 to 94% of AQAL	Negligible	Slight	Moderate	Moderate
95 to 102% of AQAL	Slight	Moderate	Moderate	Substantial
103 to 109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

In relation to short-term impacts, the IAQM/EPUK guidance states:

> *'6.39 Where such peak short term concentrations from an elevated source are in the range 11-20% of the relevant AQAL, then their magnitude can be described as small, those in the range 21-50% medium and those above 51% as large. These are the maximum concentrations experienced in any year and the severity of this impact can be described as slight, moderate and substantial respectively, without the need to reference background or baseline concentrations. That is not to say that background concentrations are unimportant, but they will, on an annual average basis, be a much smaller quantity than the peak concentration caused by a substantial plume and it is the contribution that is used as a measure of the impact, not the overall concentration at a receptor. This approach is intended to be a streamlined and pragmatic assessment procedure that avoids undue complexity.'*

Therefore, the following descriptors for assessing the impact magnitude resulting from short term impacts are applied in this assessment:

- 10% or less: negligible;
- 11-20%: slight;
- 21-50%: moderate; and
- 51% or greater: substantial.

The assessment of significance is principally left to professional opinion and guidance is provided on the factors that need to be considered when judging significance and include the following:

- the existing and future air quality in the absence of the development;
- the extent of current and future population exposure to impacts;
- the worst-case assumptions adopted when undertaking the prediction of impacts; and
- the extent to which a proposed development has adopted best practice to eliminate and minimise emissions.

3.5.2 Impacts on Human Health - Environmental Permitting

The Environment Agency's Environmental Management guidance for risk assessments specifies criteria to enable the potential significance of an impact to be determined [16]. 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.

3.5.3 Habitat Sites

The Environment Agency's risk assessment guidance [16] 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.

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

The IAQM has issued guidance on the assessment of air quality impacts on designated nature conservation sites [17]. It is the IAQM's opinion that the Environment Agency's 1% and 10% screening criteria should not be used rigidly and '*not to a numerical precision greater than the expression of the criteria themselves'*. Furthermore, the IAQM guidance suggests that LWS should be treated in the same manner as SSSIs and European sites '*although the determination of the significance of an effect may be different*'.

17 A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites, IAQM (June 2019)

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 3.4.4*) they are identified as requiring further assessment.

For non-metals, the impact is described based on the IAQM planning guidance.

For all non-metals, the impact would be described as negligible even for the worst-case assumptions adopted. 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) CONCENTRATIONS

Pollutant	Units	AQAL	Facility Contribution (PC)	PC as %age AQAL	Total Concentration (%age AQAL)	Impact Descriptor or Screened Out
PM_{10}	$\mu g/m^3$	40	0.019	0%	47%	Negligible
$PM_{2.5}$	$\mu g/m^3$	20	0.019	0%	64%	Negligible
NO_2	$\mu g/m^3$	40	0.31	1%	50%	Negligible
HF	$\mu g/m^3$	16	0.0037	0%	3%	Negligible
NH_3	$\mu g/m^3$	180	0.019	0%	1%	Negligible
VOCs (as benzene)	$\mu g/m^3$	5	0.037	1%	9%	Negligible
PAH	ng/m^3	1	0.00034	0%	8%	Negligible
Dioxins/ furans	fg/m^3	N/A	0.15	-	-	-
Cadmium (Cd)	ng/m^3	5	0.075	1%	4%	Screened out
Thallium (Tl)	ng/m^3	1,000	0.075	0%	0%	Screened out
Mercury (Hg)	ng/m^3	250	0.075	0%	0%	Screened out
Antimony (Sb)	ng/m^3	5,000	1.1	0%	0%	Screened out
Arsenic (As)	ng/m^3	6	1.1	19%	29%	Screened out
Chromium (Cr)	ng/m^3	5,000	1.1	0%	0%	Screened out
Chromium VI	ng/m^3	0.2	0.22	112%	222%	Needs further assessment
Cobalt (Co)	ng/m^3	1,000	1.1	0%	0%	Screened out
Copper (Cu)	ng/m^3	10,000	1.1	0%	0%	Screened out
Manganese (Mn)	ng/m^3	150	1.1	1%	2%	Screened out
Nickel (Ni)	ng/m^3	20	1.1	6%	9%	Screened out
Lead (Pb)	ng/m^3	250	1.1	0%	2%	Screened out
Vanadium (V)	ng/m^3	5,000	1.1	0%	0%	Screened out
PCBs	ng/m^3	200	1.3×10^{-8}	0%	0%	Negligible

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/m³	50	0.068	0%	Negligible
NO_2	1-hour (99.8th %ile)	µg/m³	200	2.3	1%	Negligible
SO_2	24-hour (99.2nd %ile)	µg/m³	125	0.83	1%	Negligible
SO_2	1-hour (99.7th %ile)	µg/m³	350	1.6	0%	Negligible
SO_2	15-minute (99.9th %ile)	µg/m³	266	1.9	1%	Negligible
CO	8-hour	µg/m³	10,000	2.5	0%	Negligible
CO	1-hour	µg/m³	30,000	10.3	0%	Negligible
HF	1-hour	µg/m³	160	0.21	0%	Negligible
HCl	1-hour	µg/m³	750	1.2	0%	Negligible
NH_3	1-hour	µg/m³	2,500	1.0	0%	Negligible
VOCs as benzene	24-hour	µg/m³	30	0.37	1%	Negligible
Hg	1-hour	ng/m³	7,500	4.1	0%	Screened out
Sb	1-hour	ng/m³	150,000	61.7	0%	Screened out
As	1-hour	ng/m³	15,000	61.7	0%	Screened out
Cr	1-hour	ng/m³	150,000	61.7	0%	Screened out
Cu	1-hour	ng/m³	200,000	61.7	0%	Screened out
Mn	1-hour	ng/m³	1,500,000	61.7	0%	Screened out
V	24-hour	ng/m³	1,000	11.0	1%	Screened out
PCBs	1-hour	ng/m³	6,000	7.4×10^{-7}	0%	Negligible

For all pollutants, the maximum predicted short-term concentrations are less than 10% of the short-term AQALs and would be described as negligible in accordance with the IAQM planning guidance.

4.3 DETAILED DISPERSION MODELLING RESULTS

4.3.1 Introduction

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 IAQM planning 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 with the IAQM planning 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%	0.068	0%
D1. Viscount Walk	0.0050	0%	0.018	0%
D2. Wheelers Lane (new dev.)	0.0080	0%	0.030	0%
D3. Magna Road	0.016	0%	0.054	0%
D4. Waggy Tails Rescue	0.019	0%	0.068	0%
D5. The Hamworthy Club	0.0068	0%	0.030	0%
D6. Arrowsmith Road	0.0046	0%	0.021	0%
D7. Maranello	0.0017	0%	0.0062	0%
D8. Magna Care Centre	0.0028	0%	0.0088	0%
D9. Canford Sports Club House	0.0028	0%	0.010	0%
D10. Provence Drive	0.0054	0%	0.021	0%
D11. Bearwood Primary School	0.011	0%	0.036	0%
D12. Ferndown	0.0061	0%	0.020	0%
D13. Belben Road, Bournemouth	0.0026	0%	0.010	0%
D14. Pilsdon Drive, Bournemouth	0.0039	0%	0.014	0%
D15. Gravel Hill, Broadstone	0.0035	0%	0.011	0%

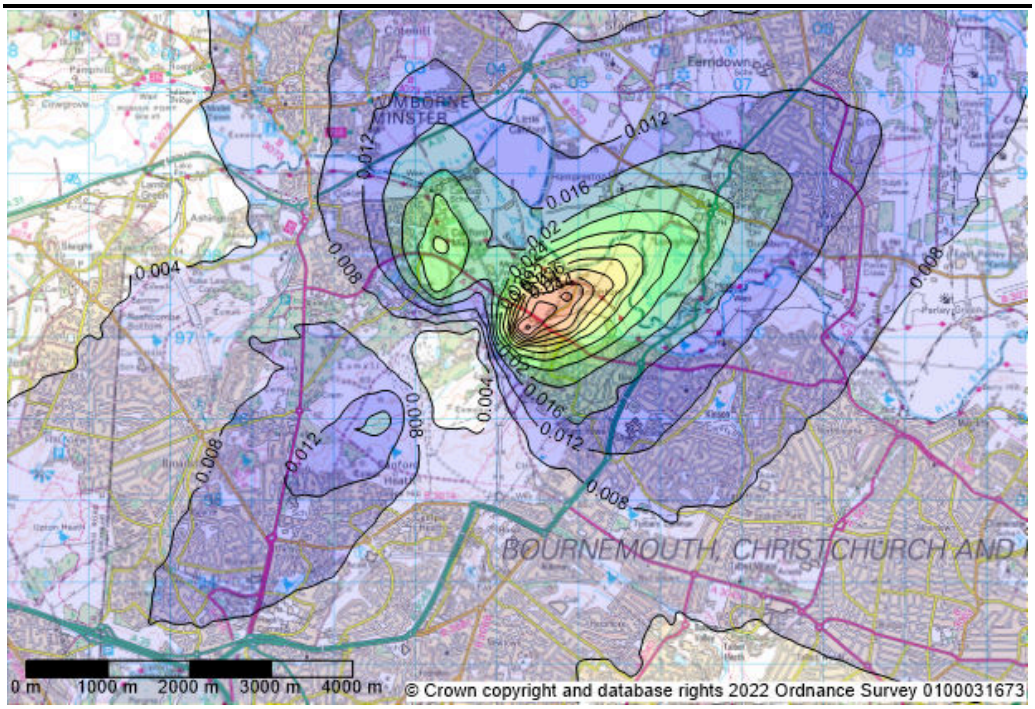
TABLE 4.3 PREDICTED PM_{10} CONCENTRATIONS FOR THE EFW CHP FACILITY

Receptor/Parameter	Annual Mean		90.4th Percentile of 24-hour Means	
	PC (µg m^{-3})	%age AQAL	PC (µg m^{-3})	%age AQAL
D16. Egdon Drive, Merley	0.0019	0%	0.0074	0%
D17. Marpet Close, Bear Cross	0.0057	0%	0.019	0%
D18. Knighton Lane, Knighton	0.016	0%	0.056	0%
D19. White House	0.015	0%	0.053	0%
Maximum off-site (PC) (a)	*0.019 (0%)*		*0.068 (0%)*	
Assumed background	*18.7*		*22.1*	
Total concentration (PEC) (a)	*18.7 (47%)*		*22.1 (44%)*	
AQAL	*40*		*50*	
Impact descriptor	*Negligible*		*Negligible*	
(a) Values in parentheses are the percentages of the air quality assessment level				

The maximum annual mean PEC is 18.7 µg m^{-3}, which is 47% 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% 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 Proposed Development.

4.3.3 $PM_{2.5}$

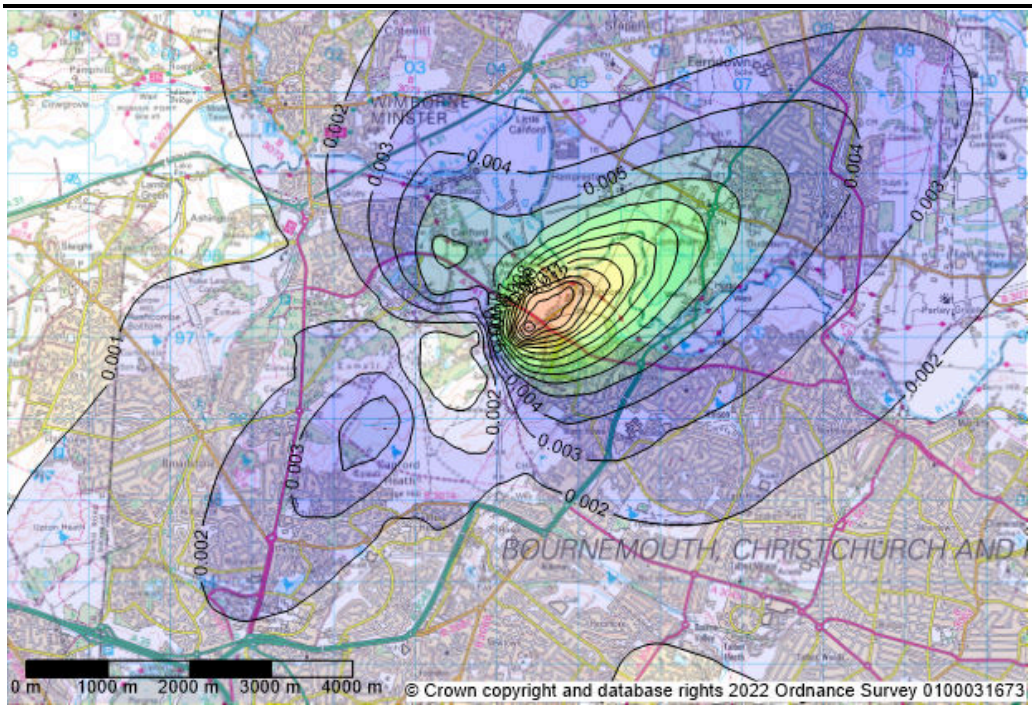
Predicted ground level concentrations of $PM_{2.5}$ for the proposed EfW CHP Facility emissions are presented in *Table 4.4*. As a worst-case, these have been calculated on the basis that all particles are within the $PM_{2.5}$ fraction. Predicted concentrations are compared to the EU target value of 20 $\mu g\, m^{-3}$. 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 ($\mu g\, m^{-3}$)	%age AQAL
Maximum	0.019	0%
D1. Viscount Walk	0.0050	0%
D2. Wheelers Lane (new dev.)	0.0080	0%
D3. Magna Road	0.016	0%
D4. Waggy Tails Rescue	0.019	0%
D5. The Hamworthy Club	0.0068	0%
D6. Arrowsmith Road	0.0046	0%
D7. Maranello	0.0017	0%
D8. Magna Care Centre	0.0028	0%
D9. Canford Sports Club House	0.0028	0%
D10. Provence Drive	0.0054	0%
D11. Bearwood Primary School	0.011	0%
D12. Ferndown	0.0061	0%
D13. Belben Road, Bournemouth	0.0026	0%
D14. Pilsdon Drive, Bournemouth	0.0039	0%
D15. Gravel Hill, Broadstone	0.0035	0%
D16. Egdon Drive, Merley	0.0019	0%
D17. Marpet Close, Bear Cross	0.0057	0%
D18. Knighton Lane, Knighton	0.016	0%
D19. White House	0.015	0%
Maximum off-site (PC) (a)	*0.019 (0%)*	
Assumed background	*12.8*	
Total concentration (PEC) (a)	*12.8 (64%)*	
AQAL	*20*	
Impact descriptor	*Negligible*	
(a) Values in parentheses are the percentages of the air quality assessment level		

The maximum predicted off-site concentration is 0% 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% 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'.

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



The Environment Act 2021 establishes a legally binding duty on the government to bring forward new air quality targets by 31 October 2022 for $PM_{2.5}$. The proposed annual mean concentration target of 10 µg m^{-3}, to be met across England by 2040, is currently under consultation (consultation closed on 27th June 2022).

The maximum predicted PC would be 0% of the proposed 2040 air quality target. In accordance with the IAQM planning guidance, this impact would be described as negligible.

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) [18] 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	0.31	1%	2.3	1%
D1. Viscount Walk	0.084	0%	1.8	1%
D2. Wheelers Lane (new dev.)	0.13	0%	2.3	1%
D3. Magna Road	0.28	1%	2.0	1%
D4. Waggy Tails Rescue	0.31	1%	2.0	1%
D5. The Hamworthy Club	0.12	0%	1.9	1%
D6. Arrowsmith Road	0.077	0%	2.1	1%
D7. Maranello	0.029	0%	1.6	1%
D8. Magna Care Centre	0.047	0%	2.0	1%
D9. Canford Sports Club House	0.046	0%	1.4	1%
D10. Provence Drive	0.090	0%	2.0	1%
D11. Bearwood Primary School	0.18	0%	2.2	1%
D12. Ferndown	0.10	0%	0.72	0%
D13. Belben Road, Bournemouth	0.044	0%	1.4	1%
D14. Pilsdon Drive, Bournemouth	0.066	0%	1.3	1%
D15. Gravel Hill, Broadstone	0.058	0%	1.3	1%
D16. Egdon Drive, Merley	0.032	0%	1.4	1%
D17. Marpet Close, Bear Cross	0.096	0%	1.2	1%
D18. Knighton Lane, Knighton	0.27	1%	1.6	1%
D19. White House	0.26	1%	2.0	1%
Maximum off-site (PC) (a)	*0.31 (1%)*		*2.3 (1%)*	
Assumed background	*19.6*		*39.2*	
Total concentration (PEC) (a)	*19.9 (50%)*		*41.5 (21%)*	
AQAL	*40*		*200*	
Impact descriptor	*Negligible*		*Negligible*	
(a) Values in parentheses are the percentages of the air quality assessment level				

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

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

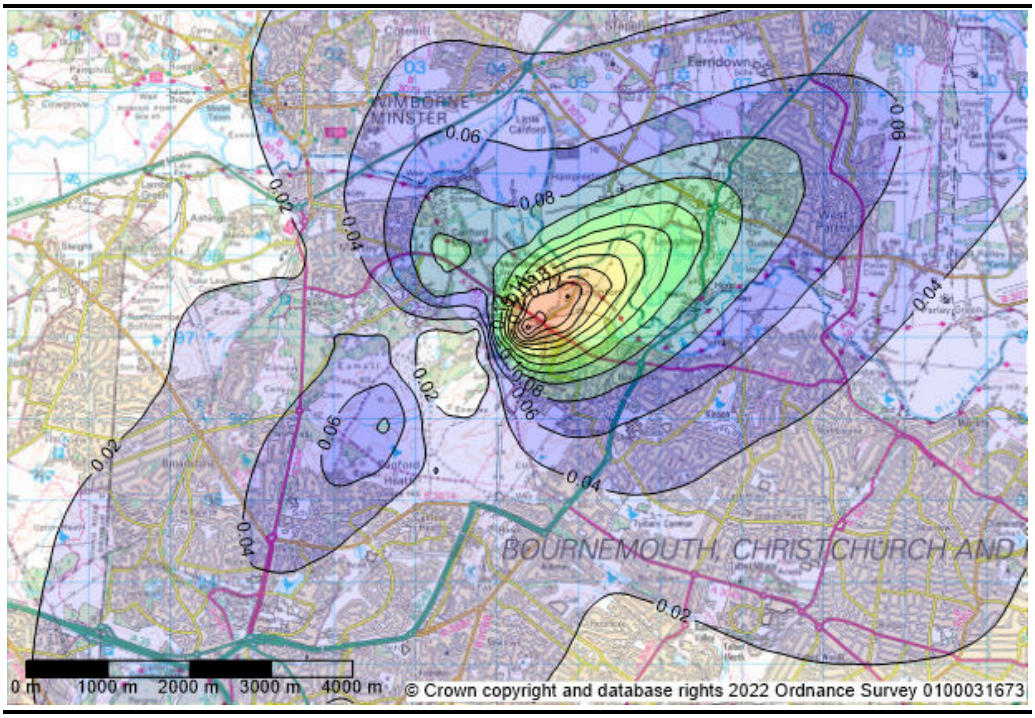
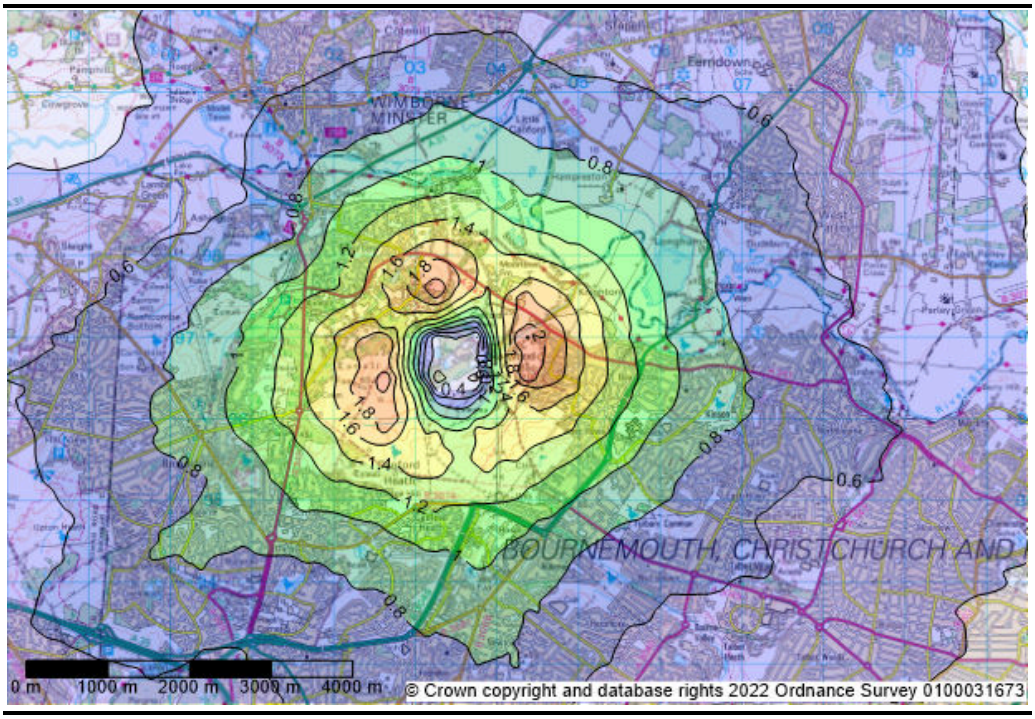


FIGURE 4.4 PREDICTED 99.8TH PERCENTILE OF HOURLY MEAN NO_2 CONCENTRATIONS FOR THE EFW CHP FACILITY (µg m^{-3}) - 2020



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 1% of the AQAL and would be assessed as 'negligible'. Predicted short-term concentrations are less than 10% of the AQAL and would also be assessed as 'negligible'. Therefore, it is concluded that the impact of emissions of NO_x from the proposed EfW CHP Facility would be '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 IAQM planning guidance. 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*.

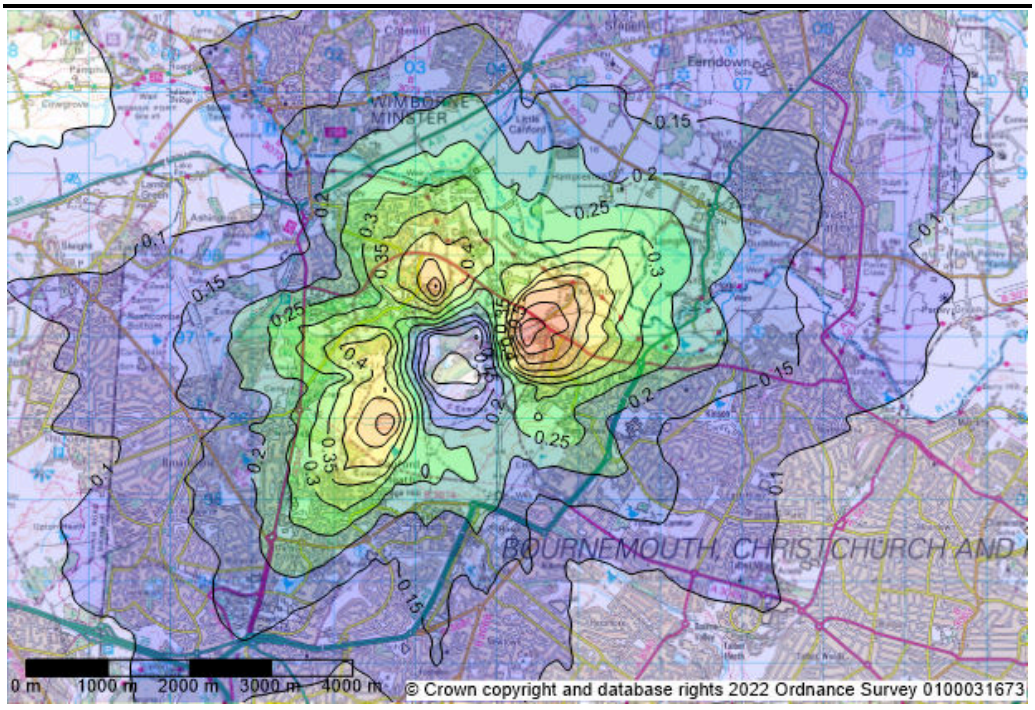
TABLE 4.6 MAXIMUM PREDICTED SO_2 CONCENTRATIONS FOR THE EFW CHP FACILITY

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	0.83	1%	1.6	0%	1.9	1%
D1. Viscount Walk	0.36	0%	1.2	0%	1.6	1%
D2. Wheelers Lane (new dev.)	0.63	1%	1.6	0%	1.9	1%
D3. Magna Road	0.83	1%	1.4	0%	1.6	1%
D4. Waggy Tails Rescue	0.75	1%	1.5	0%	1.7	1%
D5. The Hamworthy Club	0.41	0%	1.3	0%	1.6	1%
D6. Arrowsmith Road	0.53	0%	1.5	0%	1.8	1%
D7. Maranello	0.32	0%	1.0	0%	1.7	1%
D8. Magna Care Centre	0.42	0%	1.4	0%	1.6	1%
D9. Canford Sports Club House	0.20	0%	0.87	0%	1.5	1%
D10. Provence Drive	0.46	0%	1.4	0%	1.7	1%
D11. Bearwood Primary School	0.70	1%	1.5	0%	1.7	1%
D12. Ferndown	0.25	0%	0.50	0%	0.75	0%
D13. Belben Road, Bournemouth	0.24	0%	0.96	0%	1.2	0%
D14. Pilsdon Drive, Bournemouth	0.35	0%	0.91	0%	1.1	0%
D15. Gravel Hill, Broadstone	0.29	0%	0.92	0%	1.2	0%
D16. Egdon Drive, Merley	0.26	0%	0.95	0%	1.2	0%

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
D17. Marpet Close, Bear Cross	0.36	0%	0.85	0%	1.1	0%
D18. Knighton Lane, Knighton	0.60	0%	1.2	0%	1.3	1%
D19. White House	0.63	1%	1.4	0%	1.6	1%
Maximum off-site (PC) (a)	*0.83 (1%)*		*1.6 (0%)*		*1.9 (1%)*	
Assumed background	*7.8*		*13.2*		*17.7*	
Total concentration (PEC) (a)	*8.6 (7%)*		*14.8 (4%)*		*19.6 (7%)*	
AQAL	*125*		*350*		*266*	
Impact descriptor	*Negligible*		*Negligible*		*Negligible*	
(a) Values in parentheses are the percentages of the air quality assessment level						

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



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:

- 1% of the 24-hour mean AQAL for SO_2;
- 0% of the 1-hour mean AQAL for SO_2; and
- 1% 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'.

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	2.5	0%	10.3	0%
D1. Viscount Walk	1.5	0%	3.1	0%
D2. Wheelers Lane (new dev.)	1.9	0%	3.2	0%
D3. Magna Road	2.1	0%	2.6	0%
D4. Waggy Tails Rescue	2.1	0%	2.7	0%
D5. The Hamworthy Club	2.0	0%	2.8	0%
D6. Arrowsmith Road	1.8	0%	3.6	0%
D7. Maranello	1.5	0%	3.4	0%
D8. Magna Care Centre	1.9	0%	2.7	0%
D9. Canford Sports Club House	1.4	0%	3.6	0%
D10. Provence Drive	2.0	0%	4.1	0%
D11. Bearwood Primary School	2.1	0%	3.0	0%
D12. Ferndown	0.67	0%	2.1	0%
D13. Belben Road, Bournemouth	1.1	0%	2.5	0%
D14. Pilsdon Drive, Bournemouth	1.4	0%	2.3	0%
D15. Gravel Hill, Broadstone	1.3	0%	2.4	0%
D16. Egdon Drive, Merley	1.1	0%	2.2	0%
D17. Marpet Close, Bear Cross	1.0	0%	2.6	0%
D18. Knighton Lane, Knighton	1.7	0%	2.6	0%
D19. White House	1.9	0%	2.9	0%
Maximum off-site (PC) (a)	*2.5 (0%)*		*10.3 (0%)*	
Assumed background	*214*		*306*	
Total concentration (PEC) (a)	*217 (2%)*		*316 (1%)*	
AQAL	*10,000*		*30,000*	
Impact descriptor	*Negligible*		*Negligible*	
(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% 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 ($\mu g\ m^{-3}$)	%age AQAL	PC ($\mu g\ m^{-3}$)	%age AQAL	PC ($\mu g\ m^{-3}$)	%age AQAL
Maximum	0.014	0%	0.21	0%	1.2	0%
D1. Viscount Walk	0.0048	0%	0.061	0%	0.37	0%
D2. Wheelers Lane	0.0092	0%	0.063	0%	0.38	0%
D3. Magna Road	0.013	0%	0.052	0%	0.31	0%
D4. Waggy Tails Rescue	0.014	0%	0.055	0%	0.33	0%
D5. The Hamworthy Club	0.0081	0%	0.056	0%	0.34	0%
D6. Arrowsmith Road	0.0074	0%	0.071	0%	0.43	0%
D7. Maranello	0.0038	0%	0.069	0%	0.41	0%
D8. Magna Care Centre	0.0051	0%	0.053	0%	0.32	0%
D9. Canford Sports Club House	0.0031	0%	0.072	0%	0.43	0%
D10. Provence Drive	0.0076	0%	0.082	0%	0.49	0%
D11. Bearwood Primary School	0.011	0%	0.059	0%	0.35	0%
D12. Ferndown	0.0044	0%	0.042	0%	0.25	0%
D13. Belben Road	0.0033	0%	0.050	0%	0.30	0%
D14. Pilsdon Drive	0.0065	0%	0.047	0%	0.28	0%
D15. Gravel Hill, Broadstone	0.0080	0%	0.048	0%	0.29	0%
D16. Egdon Drive, Merley	0.0036	0%	0.045	0%	0.27	0%
D17. Marpet Close, Bear Cross	0.0056	0%	0.052	0%	0.31	0%
D18. Knighton Lane, Knighton	0.012	0%	0.051	0%	0.31	0%
D19. White House	0.011	0%	0.058	0%	0.35	0%
Maximum off-site (PC) (a)	*0.014 (0%)*		*0.21 (0%)*		*1.2 (0%)*	
Assumed background	*0.50*		*1.0*		*0.52*	
Total concentration (PEC) (a)	*0.51 (3%)*		*1.2 (1%)*		*1.7 (0%)*	
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% 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 benzene) 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 BENZENE 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	0.037	1%	0.37	1%
D1. Viscount Walk	0.010	0%	0.13	0%
D2. Wheelers Lane	0.016	0%	0.32	1%
D3. Magna Road	0.033	1%	0.32	1%
D4. Waggy Tails Rescue	0.037	1%	0.29	1%
D5. The Hamworthy Club	0.014	0%	0.19	1%
D6. Arrowsmith Road	0.0091	0%	0.26	1%
D7. Maranello	0.0034	0%	0.13	0%
D8. Magna Care Centre	0.0056	0%	0.23	1%
D9. Canford Sports Club House	0.0055	0%	0.12	0%
D10. Provence Drive	0.011	0%	0.28	1%
D11. Bearwood Primary School	0.021	1%	0.34	1%
D12. Ferndown	0.012	0%	0.090	0%
D13. Belben Road	0.0053	0%	0.12	0%
D14. Pilsdon Drive	0.0078	0%	0.14	0%
D15. Gravel Hill, Broadstone	0.0069	0%	0.21	1%
D16. Egdon Drive, Merley	0.0038	0%	0.13	0%
D17. Marpet Close, Bear Cross	0.011	0%	0.14	0%
D18. Knighton Lane, Knighton	0.032	1%	0.24	1%
D19. White House	0.030	1%	0.26	1%
Maximum off-site (PC) (a)	*0.037 (1%)*		*0.37 (1%)*	
Assumed background	*0.40*		*0.47*	
Total concentration (PEC) (a)	*0.44 (9%)*		*0.84 (3%)*	
AQAL	*5*		*30*	
Impact descriptor	*Negligible*		*Negligible*	
(a) Values in parentheses are the percentages of the air quality assessment level				

Maximum predicted ground level TOC (assuming all benzene as a worst case) concentrations are well within the annual mean AQAL. The maximum off-site

concentration is 1% of the annual mean. Predicted maximum 24-hourly mean concentrations are all less than 10% of the short term AQAL. 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%
D1. Viscount Walk	0.000090	0%
D2. Wheelers Lane	0.00014	0%
D3. Magna Road	0.00030	0%
D4. Waggy Tails Rescue	0.00034	0%
D5. The Hamworthy Club	0.00012	0%
D6. Arrowsmith Road	0.000082	0%
D7. Maranello	0.000031	0%
D8. Magna Care Centre	0.000050	0%
D9. Canford Sports Club House	0.000050	0%
D10. Provence Drive	0.000097	0%
D11. Bearwood Primary School	0.00019	0%
D12. Ferndown	0.00011	0%
D13. Belben Road	0.000048	0%
D14. Pilsdon Drive	0.000070	0%
D15. Gravel Hill, Broadstone	0.000062	0%
D16. Egdon Drive, Merley	0.000034	0%
D17. Marpet Close, Bear Cross	0.00010	0%
D18. Knighton Lane, Knighton	0.00029	0%
D19. White House	0.00027	0%
Maximum off-site (PC) (a)	*0.00034 (0%)*	
Assumed background	*0.078*	
Total concentration (PEC) (a)	*0.078 (8%)*	
AQAL	*1*	
Impact descriptor	*Negligible*	
(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 provided in **Appendix 6.3: Human Health Risk Assessment** of the ES.

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	0.064
D3. Magna Road	0.13
D4. Waggy Tails Rescue	0.15
D5. The Hamworthy Club	0.055
D6. Arrowsmith Road	0.037
D7. Maranello	0.014
D8. Magna Care Centre	0.022
D9. Canford Sports Club House	0.022
D10. Provence Drive	0.043
D11. Bearwood Primary School	0.084
D12. Ferndown	0.049
D13. Belben Road	0.021
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 5% 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 proposed 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	0%
D1. Viscount Walk	0.0050	0%	0.31	0%
D2. Wheelers Lane	0.0080	0%	0.32	0%
D3. Magna Road	0.016	0%	0.26	0%
D4. Waggy Tails Rescue	0.019	0%	0.27	0%
D5. The Hamworthy Club	0.0068	0%	0.28	0%
D6. Arrowsmith Road	0.0046	0%	0.36	0%
D7. Maranello	0.0017	0%	0.34	0%
D8. Magna Care Centre	0.0028	0%	0.27	0%
D9. Canford Sports Club House	0.0028	0%	0.36	0%
D10. Provence Drive	0.0054	0%	0.41	0%
D11. Bearwood Primary School	0.011	0%	0.30	0%
D12. Ferndown	0.0061	0%	0.21	0%
D13. Belben Road	0.0026	0%	0.25	0%
D14. Pilsdon Drive	0.0039	0%	0.23	0%
D15. Gravel Hill, Broadstone	0.0035	0%	0.24	0%
D16. Egdon Drive, Merley	0.0019	0%	0.22	0%
D17. Marpet Close, Bear Cross	0.0057	0%	0.26	0%
D18. Knighton Lane, Knighton	0.016	0%	0.26	0%
D19. White House	0.015	0%	0.29	0%
Maximum off-site (PC) (a)	0.019 (0%)		1.0 (0%)	
Assumed background	1.3		2.6	
Total concentration (PEC) (a)	1.3 (1%)		3.6 (0%)	
AQAL	180		2,500	
Impact descriptor	*Negligible*		*Negligible*	
(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% 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	1.3×10^{-8}	0%	7.4×10^{-7}	0%
D1. Viscount Walk	3.6×10^{-9}	0%	2.2×10^{-7}	0%
D2. Wheelers Lane	5.7×10^{-9}	0%	2.3×10^{-7}	0%
D3. Magna Road	1.2×10^{-8}	0%	1.9×10^{-7}	0%
D4. Waggy Tails Rescue	1.3×10^{-8}	0%	2.0×10^{-7}	0%
D5. The Hamworthy Club	4.9×10^{-9}	0%	2.0×10^{-7}	0%
D6. Arrowsmith Road	3.3×10^{-9}	0%	2.6×10^{-7}	0%
D7. Maranello	1.2×10^{-9}	0%	2.5×10^{-7}	0%
D8. Magna Care Centre	2.0×10^{-9}	0%	1.9×10^{-7}	0%
D9. Canford Sports Club House	2.0×10^{-9}	0%	2.6×10^{-7}	0%
D10. Provence Drive	3.9×10^{-9}	0%	3.0×10^{-7}	0%
D11. Bearwood Primary School	7.6×10^{-10}	0%	2.1×10^{-7}	0%
D12. Ferndown	4.4×10^{-8}	0%	1.5×10^{-7}	0%
D13. Belben Road	1.9×10^{-9}	0%	1.8×10^{-7}	0%
D14. Pilsdon Drive	2.8×10^{-8}	0%	1.7×10^{-7}	0%
D15. Gravel Hill, Broadstone	2.5×10^{-10}	0%	1.7×10^{-7}	0%
D16. Egdon Drive, Merley	1.4×10^{-10}	0%	1.6×10^{-7}	0%
D17. Marpet Close, Bear Cross	4.1×10^{-10}	0%	1.9×10^{-7}	0%
D18. Knighton Lane, Knighton	1.2×10^{-8}	0%	1.8×10^{-7}	0%
D19. White House	1.1×10^{-8}	0%	2.1×10^{-7}	0%
Maximum off-site (PC) (a)	1.3×10^{-8} (0%)		7.4×10^{-7} (0%)	
Assumed background	0.027		0.054	
Total concentration (PEC) (a)	0.027 (0%)		0.054 (0%)	
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% 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 3.4.4*), the predicted impact of CrVI emissions from the proposed EfW CHP Facility are summarised in *Table 4.14*.

In accordance with the IAQM planning guidance, the impact of CrVI would be described as 'negligible' 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 3.4.4*) it can be screened out from further assessment.

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

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%
D1. Viscount Walk	0.00015	0%
D2. Wheelers Lane	0.00024	0%
D3. Magna Road	0.00049	0%
D4. Waggy Tails Rescue	0.00056	0%
D5. The Hamworthy Club	0.00021	0%
D6. Arrowsmith Road	0.00014	0%
D7. Maranello	0.000052	0%
D8. Magna Care Centre	0.000084	0%
D9. Canford Sports Club House	0.000083	0%
D10. Provence Drive	0.00016	0%
D11. Bearwood Primary School	0.00032	0%
D12. Ferndown	0.00018	0%
D13. Belben Road	0.000079	0%

TABLE 4.14 MAXIMUM PREDICTED CRVI CONCENTRATIONS FOR THE EFW CHP FACILITY

Receptor/Parameter	Annual Mean Chromium VI	
	PC (ng m^{-3})	%age AQAL
D14. Pilsdon Drive	0.00012	0%
D15. Gravel Hill, Broadstone	0.00010	0%
D16. Egdon Drive, Merley	0.000057	0%
D17. Marpet Close, Bear Cross	0.00017	0%
D18. Knighton Lane, Knighton	0.00049	0%
D19. White House	0.00046	0%
Maximum off-site (PC) (a)	0.00056 (0%)	
Assumed background	0.22	
Total concentration (PEC) (a)	0.22 (110%)	
AQAL	0.2	
Further assessment required?	*No*	
(a) Values in parentheses are the percentages of the air quality assessment level		

4.4 DEPOSITION TO GROUND

The assessment presented in *Section 4.2* and *Section 4.3* focus on the impact of airborne concentrations. However, pollutants in the air may deposit to ground and accumulate in soils. This is more important for pollutants that may be in the particle phase (e.g. metals). The Environment Agency's former H1 guidance provided a methodology to assess the impact of pollutant deposition to ground and provide Maximum Deposition Rate (MDR) for assessing the potential impact of deposition for a number of substances. This is a screening assessment to determine whether a more detailed analysis is required. The deposition to ground is calculated as follows:

$$PC_{ground} = \frac{PC_{air} \times DV \times 3 \times 86400}{1000}$$

Where:

- PC_{ground} = the process contribution to daily deposition rate (mg m^{-2} d^{-1});
- PC_{air} = the process contribution to air (µg m^{-3});
- DV = the deposition velocity taken to be 0.01 m s^{-1};
- 3 in a nominal factor to convert dry deposition to total deposition; and
- 86,400 is a conversion factor (seconds per day).

The H1 guidance provide MDR for cadmium, mercury, arsenic, chromium, copper, nickel and lead. A comparison of the deposition to ground with the MDR is provided in *Table 4.15*. These have been predicted using the typical

emission concentrations provided in *Table 3.5*. Results are presented for the worst-case meteorological year and the maximum predicted location anywhere within the model domain.

TABLE 4.15 DEPOSITION TO GROUND COMPARED TO THE MAXIMUM DEPOSITION RATES

Substance	PC_{air} (µg m^{-3})	PC_{ground} (mg m^{-2} d^{-1})	MDR (mg m^{-2} d^{-1})	%age MDR
Cadmium (Cd)	6.3×10^{-6}	0.000016	0.009	0.2%
Mercury (Hg)	1.3×10^{-5}	0.000033	0.004	0.8%
Arsenic (As)	9.3×10^{-5}	0.000024	0.02	1.2%
Chromium (Cr)	3.4×10^{-4}	0.000089	1.5	0.1%
Copper (Cu)	1.1×10^{-4}	0.000028	0.25	0.1%
Nickel (Ni)	2.1×10^{-4}	0.000053	0.11	0.5%
Lead (Pb)	1.9×10^{-4}	0.000049	1.1	<0.1%

Except for arsenic, predicted concentrations are less than 1% of the MDR and would be assessed as not significant. For arsenic, predicted concentrations are slightly above 1% and would be assessed as potentially significant. However, for an average year the maximum predicted deposition to ground would be less than 1% of the MDR. Therefore, it is concluded that the deposition of trace metals to soils would not have an adverse impact.

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

	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) [19] and are summarised in *Table 5.2*. These values have been agreed with The Environmental Dimension Partnership (EDP) the project ecologists for the Proposed Development.

19 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	10 – 15
	Acidophilous Quercus - dominated woodland	10 - 15
H2 Poole Harbour SPA/Ramsar	Supralittoral sediment (acidic type)	8 - 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	10 - 20
H7 Slop Bog & Uddens Heath SSSI	Bogs	5 - 10
H8 Parley Common SSSI	Bogs	5 - 10
H9 Luscombe Valley SSSI	Acid grassland	8 - 15
H10 Bourne Valley SSSI	Bogs	5 - 10
H11 Holt & West Moors Heath SSSI	Fen, marsh and swamp	10 - 15
H12 Corfe & Barrow Hills SSSI	Fen, marsh and swamp	10 - 15
H13 Arne SSSI	Bogs	5 - 10
H14 Moors River System SSSI	Broadleaved deciduous woodland	10 - 20
H15 Knighton Heath GC SNCI	Scattered remnants of heath	10 - 20
H16 Alderney Waterworks SNCI	Acid grassland	8 - 15
H17 Haymoor Bottom SNCI	Remnant heath	10 - 20
H18 Arrowsmith Coppice SNCI/AW	Woodland and heathland habitats	10 - 20
H19 Delph Woods SNCI	Deciduous woodland	10 - 20
H20 Dunyeats Hill HRS	Heathland	10 - 20
H21 Moortown Copse SNCI	Deciduous woodland	10 – 20
H22 Canford Park SANG LCNR	Neutral grassland	10 - 20
H23 Bearwood SNCI	Woodland	10 - 20
H24 Frogmoor Wood SNCI	Birch woodland	10 - 20

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	0.499	0.2	0.842
	Coniferous woodland	0.142	0.728	1.013
H2 Poole Harbour SPA/Ramsar	Supralittoral sediment (acidic type)	0.223	0.22	0.586
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	0.366	0.24	0.606
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

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

Habitat Site	Habitat Type	CLminN	CLmaxS	CLmaxN
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	Acid grassland	0.2223	0.24	0.606
H15 Knighton Heath GC SNCI	Dwarf shrub heath	0.366	0.24	0.606
H16 Alderney Waterworks SNCI	Acid grassland	0.2223	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	0.142	0.728	1.013
H20 Dunyeats Hill HRS	Dwarf shrub heath	0.366	0.24	0.606
H21 Moortown Copse SNCI	Deciduous woodland	0.142	0.728	1.013
H22 Canford Park SANG LCNR	Neutral grassland	0.856	4	4.856
H23 Bearwood SNCI	Woodland habitats	0.142	0.728	1.013
H24 Frogmoor Wood SNCI	Deciduous woodland	0.142	0.728	1.013

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 Proposed Development 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

(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
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	15.9	1.13
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

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 [20] 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).

5.3 PREDICTED IMPACT OF EMISSIONS ON HABITAT SITES

5.3.1 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.

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'.

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

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%
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	0.0%	0.45	0.6%
Critical Level	*30*		*75*	

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%
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	0.0%
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	0.0%
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*. For the European sites and SSSIs, predicted concentrations are less than 10% of the critical levels and would be assessed as 'not significant'. For the LWS, the PCs are all less than 100% of the critical levels for HF. Furthermore, the PCs for the locally designated sites are less than 10% of the critical level. Therefore, it is concluded that the impact of emissions of HF at habitat sites would be 'not significant'.

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%	0.0366	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%
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%

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
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%
Critical Level	*0.5*		*5*	

5.3.2 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	0.0080
Bog, dwarf shrub heath, acid grassland	0.0035	0.0040
H2 Poole Harbour SPA/Ramsar	0.0012	0.0013
H3 Dorset Heaths (Purbeck & Wareham) and Studland Dunes SAC	0.0007	0.0008
H4 Canford Heath SSSI	0.0019	0.0022
H5 Turbary & Kinson Commons SSSI	0.0022	0.0026

TABLE 5.11 MAXIMUM PREDICTED SULPHUR AND NITROGEN PCS FOR ACIDIFICATION IMPACTS

Habitat	PC N (keq $ha^{-1}a^{-1}$)	PC S (keq $ha^{-1}a^{-1}$)
H6 Hurn Common SSSI	0.0015	0.0017
H7 Slop Bog & Uddens Heath SSSI	0.0011	0.0013
H8 Parley Common SSSI	0.0020	0.0023
H9 Luscombe Valley SSSI	0.0007	0.0008
H10 Bourne Valley SSSI	0.0015	0.0017
H11 Holt & West Moors Heath SSSI	0.0010	0.0011
H12 Corfe & Barrow Hills SSSI	0.0011	0.0013
H13 Arne SSSI	0.0007	0.0008
H14 Moors River System SSSI	0.0016	0.0019
H15 Knighton Heath GC SNCI	0.0029	0.0033
H16 Alderney Waterworks SNCI	0.0017	0.0019
H17 Haymoor Bottom SNCI	0.0020	0.0023
H18 Arrowsmith Coppice SNCI/AW	0.0019	0.0022
H19 Delph Woods SNCI	0.0029	0.0039
H20 Dunyeats Hill HRS	0.0019	0.0022
H21 Moortown Copse SNCI	0.0093	0.0125
H22 Canford Park SANG LCNR	0.0034	0.0039
H23 Bearwood SNCI	0.0085	0.0115
H24 Frogmoor Wood SNCI	0.0001	0.0002

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

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%

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

Habitat	PC	Background	PEC
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	0.8%	186%	187%
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%
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	0.0%	211%	211%

For all habitat sites, the background deposition flux exceeds the relevant critical load except at Canford Park SANG. 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, Turbary & Kinson Commons SSSI and Parley Common SSSI. The predicted concentration at the Dorset Heaths European site is the maximum predicted anywhere within the habitat site. Furthermore, Turbary & Kinson Commons SSSI and Parley Common SSSI are co-located with the Dorset Heaths European site. The effect of these emissions on the integrity of these habitat sites is presented in the **Chapter 8 (Ecology and Nature Conservation)** of the ES.

For the locally designated habitat sites, the PC is less than 100% of the respective critical load but exceeds 1% at Knighton Heath Golf Club SNCI, Moortown Copse SNCI and Bearwood SNCI.

5.3.3 Nutrient Nitrogen Deposition

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

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	10
Woodland habitats	0.083	28.7	28.78	10
H2 Poole Harbour SPA/Ramsar	0.016	16.4	16.42	8
H3 Dorset Heaths (Purbeck & Wareham) and Studland Dunes SAC	0.017	14.4	14.42	5
H4 Canford Heath SSSI	0.026	16.9	16.93	5
H5 Turbary & Kinson Commons SSSI	0.031	16.5	16.53	5
H6 Hurn Common SSSI	0.021	15.7	15.72	10
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	8
H10 Bourne Valley SSSI	0.021	16.5	16.52	5
H11 Holt & West Moors Heath SSSI	0.014	17.8	17.81	10
H12 Corfe & Barrow Hills SSSI	0.016	17.2	17.22	10
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	10
H16 Alderney Waterworks SNCI	0.024	16.6	16.62	8
H17 Haymoor Bottom SNCI	0.028	16.6	16.63	10
H18 Arrowsmith Coppice SNCI/AW	0.046	17.0	17.05	10
H19 Delph Woods SNCI	0.040	29.1	29.14	10
H20 Dunyeats Hill HRS	0.027	17.0	17.03	10
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

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	0.5%	167%	167%
Woodland habitats	0.8%	287%	288%
H2 Poole Harbour SPA/Ramsar	0.2%	205%	205%
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	0.2%	157%	157%
H7 Slop Bog & Uddens Heath SSSI	0.3%	338%	338%
H8 Parley Common SSSI	0.6%	326%	327%
H9 Luscombe Valley SSSI	0.1%	189%	189%
H10 Bourne Valley SSSI	0.4%	330%	330%
H11 Holt & West Moors Heath SSSI	0.1%	178%	178%
H12 Corfe & Barrow Hills SSSI	0.2%	172%	172%
H13 Arne SSSI	0.2%	288%	288%
H14 Moors River System SSSI	0.4%	159%	159%
H15 Knighton Heath GC SNCI	0.4%	167%	167%
H16 Alderney Waterworks SNCI	0.3%	208%	208%
H17 Haymoor Bottom SNCI	0.3%	166%	166%
H18 Arrowsmith Coppice SNCI/AW	0.5%	170%	170%
H19 Delph Woods SNCI	0.4%	291%	291%
H20 Dunyeats Hill HRS	0.3%	170%	170%
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	0.0%	288%	288%

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 less than 1% 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'.

6 CUMULATIVE IMPACTS

6.1 HUMAN HEALTH IMPACTS

6.1.1 Road Traffic Emissions

There are a wide range of permitted developments that have the potential to influence local air quality within the zone of influence of the Proposed Development from additional traffic on the local road network. The impact of traffic emissions on local air quality from the Proposed Development has been provided separately.

The principal air pollutants associated with traffic emissions are nitrogen dioxide (NO_2) and fine particles (PM_{10} and $PM_{2.5}$). Therefore, to allow for potential increases in pollutant concentrations as a result of this and other permitted developments, a precautionary approach was taken when selecting background pollutant concentrations for NO_2, PM_{10} and $PM_{2.5}$. (refer *Sections 2.5.2* and *2.5.3*). The adopted background PM_{10} and $PM_{2.5}$ concentrations were around 50% higher than the Defra mapped background concentrations.

The TRAQ assessment provided in the **Appendix 6.2: Traffic-related Air Quality Assessment** of the ES indicates that at worst the traffic generated by the Proposed Development would contribute 0.2 $\mu g\ m^{-3}$ to NO_2 concentrations and 0.1 $\mu g\ m^{-3}$ to PM_{10} and $PM_{2.5}$ concentrations. Therefore, it is concluded that the adopted background concentrations for these pollutants adequately allows for cumulative traffic impacts for this and other permitted developments within the immediate area.

6.1.2 Other Combustion Sources

Other On-site Emissions

There is a proposed diesel generator 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. 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 diesel generator are provided in *Table 6.1*. Long-term NO_x emissions (for calculating annual mean concentrations) have been prorated by the number of operational hours (i.e. 3.98 $g\ s^{-1}$ x 50/8760). For testing, the generator will only operate for 30 minutes and the hourly average short -term emission would be 1.99 $g\ s^{-1}$ (3.98 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 3.98 g s^{-1} averaged over a day (3.98 x 3/24).

TABLE 6.1 STACK EMISSIONS DATA FOR THE ON-SITE EMERGENCY DIESEL GENERATOR

Parameter	**Emission Parameters**	
Stack height (m)	5.5	
Temperature of emission (^oC)	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	2,970	0.023 (long term) 3.98 (short term) 1.99 (short term testing) 0.50 (24-hour emergency)
(a) Reference conditions of 273K, 1 atmosphere, dry and 5% oxygen		

Off-site Emissions

There are two permitted developments that have been identified that have combustion related emissions. These are as follows:

- Eco Sustainable Solutions (ESS) Ltd, Chapel Lane, Parley, Christchurch is an Energy Recovery Facility (planning reference 8/21/0207/FUL); and
- Whittle Power (WH), Ferndown Industrial Estate, Wimborne is an energy generating facility (planning reference 3/20/1945/FUL).

These are located some distance from the proposed EfW CHP Facility as indicated in *Figure 6.1*.

Emissions data for these emission sources have been obtained from the air quality assessments provided in support of the respective planning applications. These data are summarised in *Table 6.2*. For assessing human health impacts, emissions of NO_x from all facilities have been included within the model. For habitat sites, emissions of NO_x, NH_3, SO_2, HCl and HF have

been assessed in order to determine the cumulative impact of airborne concentrations, nutrient nitrogen deposition and acidification.

For human health impacts, emissions of NO_x from the emergency diesel generator (EDG) are assumed to be at the long-term emission for the prediction of annual average concentrations and at the short-term testing emission for hourly average predictions. The short -term predictions assume that the generator operates continuously at this emission so as to ensure operation during the worst-case meteorological conditions.

FIGURE 6.1 LOCATION OF OTHER COMBUSTION SOURCES CONSIDERED FOR THE CUMULATIVE IMPACT ASSESSMENT

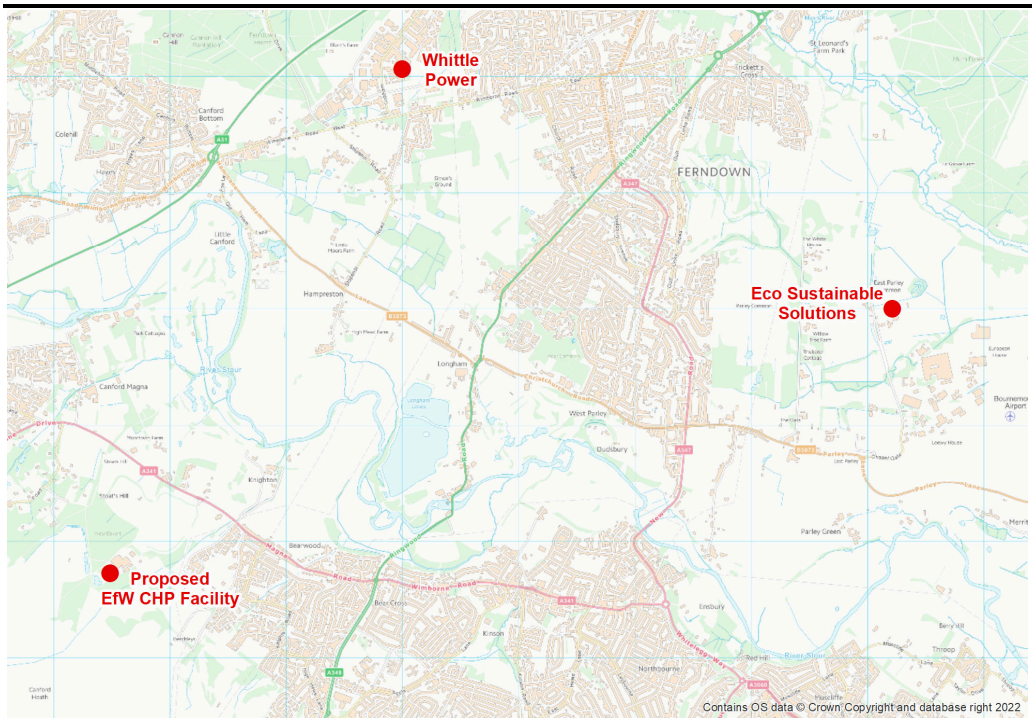


TABLE 6.2 SUMMARY OF THE ECO SUSTAINABLE SOLUTIONS AND WHITTLE POWER EMISSIONS DATA FOR DISPERSION MODELLING

Parameter	ESS	WH (per source)
Number of sources	1	2
Stack height (m)	38	7
Temperature of emission (°C)	140	420
Actual flow rate (m^3 s^{-1})	13.5	10.5
Emission velocity at stack exit (m s^{-1})	25	37
Normalised flow rate (Nm^3 s^{-1})		7.0 (at 15% O_2)
Stack diameter (m)	0.83	0.6
Pollutant	**Emission Rate (g s^{-1})**	**Emission Rate (g s^{-1})**
NOx	0.488	0.668
NH_3	0.020	-
SO_2	0.293	-
HCl	0.039	-
HF	0.010	-

6.1.3 Predicted Impact of NO_x Emissions on Human Health

Predicted annual mean and hourly mean (as the 99.8th percentile) NO_2 concentrations arising from all emissions are presented in *Table 6.3* and *Table 6.4*, respectively. Results are presented for the discrete sensitive receptors identified in close proximity to the EfW CHP Facility and are representative of the highest impact from the Proposed Development.

TABLE 6.3 CUMULATIVE IMPACT OF NO_2 EMISSIONS ON HUMAN HEALTH – ANNUAL MEANS

Receptor	Annual Mean (µg m^{-3})			
	All Sources	EfW CHP and EDG	ESS	WH
D1. Viscount Walk	0.12	0.092	0.005	0.029
D2. Wheelers Lane (new dev.)	0.17	0.14	0.005	0.031
D3. Magna Road	0.31	0.28	0.005	0.037
D4. Waggy Tails Rescue	0.36	0.32	0.005	0.037
D5. The Hamworthy Club	0.16	0.12	0.004	0.038
D6. Arrowsmith Road	0.11	0.082	0.004	0.032
D7. Maranello	0.063	0.032	0.004	0.029
D8. Magna Care Centre	0.078	0.050	0.003	0.027
D9. Canford Sports Club House	0.085	0.054	0.004	0.036
D10. Provence Drive	0.13	0.10	0.005	0.032
D11. Bearwood Primary School	0.21	0.18	0.005	0.033
D12. Ferndown	0.17	0.10	0.008	0.071
D13. Belben Road, Bournemouth	0.074	0.048	0.005	0.022

TABLE 6.3 CUMULATIVE IMPACT OF NO_2 EMISSIONS ON HUMAN HEALTH – ANNUAL MEANS

Receptor	Annual Mean (µg m^{-3})			
	All Sources	EfW CHP and EDG	ESS	WH
D14. Pilsdon Drive, Bournemouth	0.092	0.068	0.004	0.021
D15. Gravel Hill, Broadstone	0.082	0.060	0.003	0.022
D16. Egdon Drive, Merley	0.062	0.033	0.003	0.031
D17. Marpet Close, Bear Cross	0.13	0.098	0.006	0.040
D18. Knighton Lane, Knighton	0.31	0.28	0.005	0.041
D19. White House	0.30	0.26	0.005	0.039
Maximum receptor (PC)	*0.36*	*0.32*	*0.008*	*0.071*
Maximum as percentage of AQAL	*0.9%*	*0.8%*	*0.0%*	*0.2%*

For the annual mean, highest concentrations are predicted for the Proposed Development (EfW CHP and EDG combined) since receptors are located in close proximity to the Proposed Develpment. The ESS and WH facilities are located at some distance from the Proposed Development and contribute very little to the annual mean concentration of NO_2. Predicted annual mean concentrations for all sources are less than 1% of the annual mean AQAL of 40 µg m^{-3} and the cumulative impact would be assessed as negligible.

Short-term concentrations are also dominated by emissions from the Proposed Development due to the proximity of receptors. The maximum predicted concentration for all sources is 23.3 µg m^{-3} (11.7% of the AQAL of 200 µg m^{-3}). However, this assumes as a worst-case that the EDG operates continuously.

TABLE 6.4 CUMULATIVE IMPACT OF NO_2 EMISSIONS ON HUMAN HEALTH – HOURLY MEANS

Receptor/Parameter	99.8th Percentile of Hourly Means (µg m^{-3})			
	All Sources	EfW CHP and EDG	ESS	WH
D1. Viscount Walk	14.1	14.1	0.11	0.72
D2. Wheelers Lane (new dev.)	15.3	15.3	0.11	0.76
D3. Magna Road	5.2	5.2	0.10	0.80
D4. Waggy Tails Rescue	5.5	5.5	0.10	0.80
D5. The Hamworthy Club	10.1	10.1	0.10	0.80
D6. Arrowsmith Road	17.6	17.6	0.09	0.74
D7. Maranello	16.6	16.6	0.10	0.70
D8. Magna Care Centre	10.8	10.8	0.11	0.64
D9. Canford Sports Club House	6.0	6.0	0.10	0.75
D10. Provence Drive	23.3	23.3	0.10	0.69
D11. Bearwood Primary School	12.7	12.7	0.10	0.75

TABLE 6.4 CUMULATIVE IMPACT OF NO_2 EMISSIONS ON HUMAN HEALTH – HOURLY MEANS

Receptor/Parameter	99.8th Percentile of Hourly Means (µg m^{-3})			
	All Sources	EfW CHP and EDG	ESS	WH
D12. Ferndown	1.7	1.6	0.17	1.46
D13. Belben Road, Bournemouth	7.2	7.2	0.13	0.65
D14. Pilsdon Drive, Bournemouth	4.1	3.6	0.11	0.56
D15. Gravel Hill, Broadstone	6.0	5.9	0.10	0.58
D16. Egdon Drive, Merley	7.9	7.9	0.08	0.75
D17. Marpet Close, Bear Cross	5.4	5.4	0.12	0.90
D18. Knighton Lane, Knighton	3.7	3.7	0.11	0.99
D19. White House	4.9	4.9	0.10	0.82
Maximum receptor (PC)	*23.3*	*23.3*	*0.17*	*1.5*
Maximum as percentage of AQAL	*11.7%*	*11.7%*	*0.1%*	*0.7%*

6.2 HABITAT IMPACTS

6.2.1 Introduction

The impact of the combined emissions of NO_x, SO_2, NH_3, HF and HCl from the EfW CHP Facility, the emergency diesel generator (EDG) and the two off-site developments (ESS and Whittle Power) is provided. The effect on the integrity of the habitats present for these combined emissions on habitat sites is presented in the **Chapter 8 (Ecology and Nature Conservation)** of the ES.

6.2.2 Airborne Concentrations of NO_x, SO_2, NH_3 and HF

NO_x

Predicted maximum concentrations of NO_x, SO_2 and NH_3 as a percentage of the most stringent critical level are presented in *Tables 6.5* to *6.8*, respectively.

TABLE 6.5 MAXIMUM PREDICTED ANNUAL MEAN NO_X CONCENTRATIONS AS A PERCENTAGE OF THE CRITICAL LEVEL – CUMULATIVE IMPACT

Habitat	All Sources	EfW CHP and EDG	ESS	WH
H1 Dorset Heaths SAC/SPA/Ramsar	2.3%	0.5%	1.0%	2.1%
H2 Poole Harbour SPA/Ramsar	0.2%	0.2%	0.0%	0.1%
H3 Dorset Heaths (Purbeck & Wareham) and Studland Dunes SAC	0.1%	0.1%	0.0%	0.0%
H4 Canford Heath SSSI	0.4%	0.3%	0.0%	0.1%
H5 Turbary & Kinson Commons SSSI	0.5%	0.3%	0.0%	0.2%
H6 Hurn Common SSSI	0.7%	0.2%	0.3%	0.2%

TABLE 6.5 MAXIMUM PREDICTED ANNUAL MEAN NO_x CONCENTRATIONS AS A PERCENTAGE OF THE CRITICAL LEVEL – CUMULATIVE IMPACT

Habitat	All Sources	EfW CHP and EDG	ESS	WH
H7 Slop Bog & Uddens Heath SSSI	1.8%	0.1%	0.0%	1.7%
H8 Parley Common SSSI	0.6%	0.3%	0.1%	0.2%
H9 Luscombe Valley SSSI	0.2%	0.1%	0.0%	0.1%
H10 Bourne Valley SSSI	0.3%	0.2%	0.0%	0.1%
H11 Holt & West Moors Heath SSSI	0.4%	0.1%	0.0%	0.2%
H12 Corfe & Barrow Hills SSSI	0.3%	0.1%	0.0%	0.1%
H13 Arne SSSI	0.1%	0.1%	0.0%	0.0%
H14 Moors River System SSSI	0.6%	0.2%	0.2%	0.2%
H15 Knighton Heath GC SNCI	0.5%	0.4%	0.0%	0.1%
H16 Alderney Waterworks SNCI	0.4%	0.2%	0.0%	0.1%
H17 Haymoor Bottom SNCI	0.4%	0.3%	0.0%	0.1%
H18 Arrowsmith Coppice SNCI/AW	0.4%	0.3%	0.0%	0.1%
H19 Delph Woods SNCI	0.3%	0.2%	0.0%	0.1%
H20 Dunyeats Hill HRS	0.4%	0.3%	0.0%	0.1%
H21 Moortown Copse SNCI	0.9%	0.7%	0.0%	0.2%
H22 Canford Park SANG LCNR	0.6%	0.5%	0.0%	0.2%
H23 Bearwood SNCI	0.9%	0.7%	0.0%	0.2%
H24 Frogmoor Wood SNCI	0.6%	0.4%	0.0%	0.1%
Critical Level	*30*			

Highest annual mean NO_x concentrations at the Dorset Heaths European site occur as a result of emissions from the Whittle Power facility and are 2.1% of the critical level. Combined the maximum impact from all sources is 2.3% of the critical level. Combined with the EDG, the EfW CHP facility contributes at most 0.5% to the critical level at the Dorset Heaths European site.

Predicted concentrations as the 24-hour mean are presented in *Table 6.6*. For the EDG, it is assumed that this would operate for 3 hours per day every day. Furthermore, it is assumed that the EfW CHP Facility operates at the same time as the EDG. Therefore, results presented represent an extreme worst-case scenario.

TABLE 6.6 MAXIMUM PREDICTED 24-HOUR MEAN NO_x CONCENTRATIONS AS A PERCENTAGE OF THE CRITICAL LEVEL

Habitat	All Sources	EfW CHP and EDG	ESS	WH
H1 Dorset Heaths SAC/SPA/Ramsar	37.1%	36.7%	3.4%	9.9%
H2 Poole Harbour SPA/Ramsar	1.4%	1.3%	0.1%	0.4%
H3 Dorset Heaths (Purbeck & Wareham) and Studland Dunes SAC	0.7%	0.7%	0.1%	0.2%
H4 Canford Heath SSSI	11.5%	11.5%	0.1%	0.8%
H5 Turbary & Kinson Commons SSSI	1.7%	1.7%	0.2%	1.0%
H6 Hurn Common SSSI	1.7%	0.6%	1.7%	1.0%
H7 Slop Bog & Uddens Heath SSSI	8.5%	1.1%	0.1%	7.4%
H8 Parley Common SSSI	0.9%	0.9%	0.8%	0.9%
H9 Luscombe Valley SSSI	1.0%	0.7%	0.1%	0.4%
H10 Bourne Valley SSSI	1.8%	1.7%	0.1%	0.6%
H11 Holt & West Moors Heath SSSI	1.5%	0.9%	0.1%	1.5%
H12 Corfe & Barrow Hills SSSI	1.8%	1.8%	0.1%	0.6%
H13 Arne SSSI	0.8%	0.7%	0.1%	0.3%
H14 Moors River System SSSI	1.2%	0.7%	1.2%	1.1%
H15 Knighton Heath GC SNCI	4.9%	4.9%	0.1%	1.0%
H16 Alderney Waterworks SNCI	2.5%	2.2%	0.1%	0.7%
H17 Haymoor Bottom SNCI	3.1%	3.1%	0.1%	0.7%
H18 Arrowsmith Coppice SNCI/AW	3.6%	3.6%	0.1%	0.8%
H19 Delph Woods SNCI	2.9%	2.9%	0.1%	0.6%
H20 Dunyeats Hill HRS	3.1%	3.1%	0.1%	0.7%
H21 Moortown Copse SNCI	4.6%	4.5%	0.1%	1.0%
H22 Canford Park SANG LCNR	2.8%	2.8%	0.1%	1.1%
H23 Bearwood SNCI	3.4%	3.4%	0.2%	0.8%
H24 Frogmoor Wood SNCI	27.8%	27.8%	0.1%	0.7%
Critical Level	*75*			

Maximum predicted 24-hour mean NO_x concentrations are highest for the Facility but are mainly due to emissions from the EDG. This 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.

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 6.7*. Results are presented for the Facility and the ESS only as the Whittle Power facility does not have significant emissions of SO_2.

TABLE 6.7 MAXIMUM PREDICTED ANNUAL MEAN SO_2 CONCENTRATIONS AS A PERCENTAGE OF THE CRITICAL LEVEL

Habitat	All Sources	EfW CHP	ESS
H1 Dorset Heaths SAC/SPA/Ramsar	2.1%	0.3%	2.0%
H2 Poole Harbour SPA/Ramsar	0.1%	0.1%	0.0%
H3 Dorset Heaths (Purbeck & Wareham) and Studland Dunes SAC	0.1%	0.1%	0.0%
H4 Canford Heath SSSI	0.2%	0.2%	0.0%
H5 Turbary & Kinson Commons SSSI	0.3%	0.2%	0.1%
H6 Hurn Common SSSI	0.7%	0.1%	0.5%
H7 Slop Bog & Uddens Heath SSSI	0.1%	0.1%	0.0%
H8 Parley Common SSSI	0.4%	0.2%	0.2%
H9 Luscombe Valley SSSI	0.1%	0.1%	0.0%
H10 Bourne Valley SSSI	0.2%	0.1%	0.0%
H11 Holt & West Moors Heath SSSI	0.1%	0.1%	0.0%
H12 Corfe & Barrow Hills SSSI	0.1%	0.1%	0.0%
H13 Arne SSSI	0.1%	0.1%	0.0%
H14 Moors River System SSSI	0.5%	0.2%	0.4%
H15 Knighton Heath GC SNCI	0.3%	0.3%	0.0%
H16 Alderney Waterworks SNCI	0.2%	0.2%	0.0%
H17 Haymoor Bottom SNCI	0.2%	0.2%	0.0%
H18 Arrowsmith Coppice SNCI/AW	0.2%	0.2%	0.0%
H19 Delph Woods SNCI	0.2%	0.2%	0.0%
H20 Dunyeats Hill HRS	0.2%	0.2%	0.0%
H21 Moortown Copse SNCI	0.5%	0.5%	0.0%
H22 Canford Park SANG LCNR	0.4%	0.3%	0.0%
H23 Bearwood SNCI	0.5%	0.5%	0.1%
H24 Frogmoor Wood SNCI	0.0%	0.0%	0.0%
Critical Level	*10*		

The ESS contributes 2.0% of the most stringent critical level at the Dorset Heaths SAC which increases to 2.1% for combined emissions with the EfW CHP Facility.

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 6.8*. Results are presented for the Facility and the ESS only as the Whittle Power facility does not have significant emissions of NH_3.

TABLE 6.8 MAXIMUM PREDICTED ANNUAL MEAN NH_3 CONCENTRATIONS AS A PERCENTAGE OF THE CRITICAL LEVEL

Habitat	All Sources	EfW CHP	ESS
H1 Dorset Heaths SAC/SPA/Ramsar	1.6%	0.6%	1.3%
H2 Poole Harbour SPA/Ramsar	0.2%	0.2%	0.0%
H3 Dorset Heaths (Purbeck & Wareham) and Studland Dunes SAC	0.1%	0.1%	0.0%
H4 Canford Heath SSSI	0.2%	0.3%	0.0%
H5 Turbary & Kinson Commons SSSI	0.4%	0.4%	0.0%
H6 Hurn Common SSSI	0.6%	0.2%	0.4%
H7 Slop Bog & Uddens Heath SSSI	0.2%	0.2%	0.0%
H8 Parley Common SSSI	0.4%	0.3%	0.1%
H9 Luscombe Valley SSSI	0.1%	0.1%	0.0%
H10 Bourne Valley SSSI	0.3%	0.2%	0.0%
H11 Holt & West Moors Heath SSSI	0.2%	0.2%	0.0%
H12 Corfe & Barrow Hills SSSI	0.2%	0.2%	0.0%
H13 Arne SSSI	0.1%	0.1%	0.0%
H14 Moors River System SSSI	0.5%	0.3%	0.3%
H15 Knighton Heath GC SNCI	0.5%	0.5%	0.0%
H16 Alderney Waterworks SNCI	0.3%	0.3%	0.0%
H17 Haymoor Bottom SNCI	0.3%	0.3%	0.0%
H18 Arrowsmith Coppice SNCI/AW	0.3%	0.3%	0.0%
H19 Delph Woods SNCI	0.2%	0.3%	0.0%
H20 Dunyeats Hill HRS	0.3%	0.3%	0.0%
H21 Moortown Copse SNCI	0.8%	0.9%	0.0%
H22 Canford Park SANG LCNR	0.6%	0.6%	0.0%
H23 Bearwood SNCI	0.9%	0.8%	0.0%
H24 Frogmoor Wood SNCI	0.0%	0.0%	0.0%
Critical Level	*10*		

The ESS contributes 1.3% of the most stringent critical level at the Dorset Heaths SAC which increases to 1.6% for combined emissions with the EfW CHP Facility.

HF

Predicted concentrations of HF for the combined emissions from the EfW CHP Facility and the ESS facility are less than 10% of the weekly mean and 24-hour mean critical levels at all habitat sites.

6.2.3 Acidification

The combined contribution of the emission sources to acidification impacts is presented in *Table 6.9*. Predicted deposition rates exceed 1% of the respective critical loads at the Dorset Heaths European site and a number of the SSSIs. For the Dorset Heaths European site, the biggest contributor is the ESS facility.

TABLE 6.9 PREDICTED ACID DEPOSITION AS A PROPORTION OF THE CRITICAL LOAD – CUMULATIVE IMPACTS

Habitat	All Sources	EfW CHP and EDG	ESS	WH
H1 Dorset Heaths SAC/SPA/Ramsar				
Bog	9.0%	1.9%	7.6%	1.2%
Dwarf shrub heath	5.9%	1.2%	5.0%	0.8%
Acid grassland	8.8%	1.8%	7.5%	1.2%
Coniferous woodland	10.1%	2.1%	8.5%	1.3%
H2 Poole Harbour SPA/Ramsar	0.7%	0.6%	0.1%	0.0%
H3 Dorset Heaths (Purbeck & Wareham) and Studland Dunes SAC	0.5%	0.4%	0.1%	0.0%
H4 Canford Heath SSSI	1.0%	1.0%	0.1%	0.1%
H5 Turbary & Kinson Commons SSSI	1.4%	1.2%	0.2%	0.1%
H6 Hurn Common SSSI	2.7%	0.7%	1.8%	0.1%
H7 Slop Bog & Uddens Heath SSSI	1.5%	0.6%	0.1%	0.9%
H8 Parley Common SSSI	1.8%	1.1%	0.6%	0.1%
H9 Luscombe Valley SSSI	0.5%	0.4%	0.1%	0.0%
H10 Bourne Valley SSSI	1.0%	0.8%	0.2%	0.1%
H11 Holt & West Moors Heath SSSI	0.7%	0.5%	0.1%	0.1%
H12 Corfe & Barrow Hills SSSI	0.7%	0.6%	0.1%	0.1%
H13 Arne SSSI	0.5%	0.4%	0.1%	0.0%
H14 Moors River System SSSI	2.1%	0.8%	1.3%	0.1%
H15 Knighton Heath GC SNCI	1.6%	1.4%	0.1%	0.1%
H16 Alderney Waterworks SNCI	1.0%	0.8%	0.2%	0.1%

H17 Haymoor Bottom SNCI	1.2%	1.0%	0.1%	0.1%
H18 Arrowsmith Coppice SNCI/AW	1.0%	1.0%	0.1%	0.1%
H19 Delph Woods SNCI	1.0%	1.0%	0.1%	0.1%
H20 Dunyeats Hill HRS	1.1%	0.9%	0.1%	0.1%
H21 Moortown Copse SNCI	3.2%	3.2%	0.1%	0.1%
H22 Canford Park SANG LCNR	0.2%	0.2%	0.0%	0.1%
H23 Bearwood SNCI	3.3%	3.0%	0.2%	0.1%
H24 Frogmoor Wood SNCI	0.5%	0.0%	0.2%	0.1%

6.2.4 Nutrient Nitrogen Deposition

The combined contribution of the emission sources to nutrient nitrogen deposition is presented in *Table 6.10*. Predicted deposition rates exceed 1% of the respective critical loads at the Dorset Heaths European site and at the Slop Bog & Uddens Heath SSSI. For the Dorset Heaths European site, the biggest contributors are the ESS and WH facilities.

TABLE 6.10 PREDICTED NUTRIENT NITROGEN DEPOSITION AS A PROPORTION OF THE CRITICAL LOAD – CUMULATIVE IMPACTS

Habitat	All Sources	EfW CHP and EDG	ESS	WH
H1 Dorset Heaths SAC/SPA/Ramsar				
Heathland habitats	1.4%	0.5%	1.1%	0.9%
Woodland habitats	2.4%	0.8%	1.9%	1.8%
H2 Poole Harbour SPA/Ramsar	0.3%	0.2%	0.0%	0.0%
H3 Dorset Heaths (Purbeck & Wareham) and Studland Dunes SAC	0.5%	0.3%	0.0%	0.1%
H4 Canford Heath SSSI	0.6%	0.5%	0.0%	0.1%
H5 Turbary & Kinson Commons SSSI	0.8%	0.6%	0.1%	0.2%
H6 Hurn Common SSSI	0.6%	0.2%	0.3%	0.1%
H7 Slop Bog & Uddens Heath SSSI	1.8%	0.3%	0.0%	1.5%
H8 Parley Common SSSI	1.0%	0.6%	0.2%	0.2%
H9 Luscombe Valley SSSI	0.2%	0.1%	0.0%	0.0%
H10 Bourne Valley SSSI	0.6%	0.4%	0.1%	0.1%
H11 Holt & West Moors Heath SSSI	0.3%	0.1%	0.0%	0.1%
H12 Corfe & Barrow Hills SSSI	0.2%	0.2%	0.0%	0.1%
H13 Arne SSSI	0.3%	0.2%	0.0%	0.0%
H14 Moors River System SSSI	0.9%	0.4%	0.4%	0.2%
H15 Knighton Heath GC SNCI	0.5%	0.4%	0.0%	0.1%
H16 Alderney Waterworks SNCI	0.4%	0.3%	0.0%	0.1%

TABLE 6.10 PREDICTED NUTRIENT NITROGEN DEPOSITION AS A PROPORTION OF THE CRITICAL LOAD – CUMULATIVE IMPACTS

Habitat	All Sources	EfW CHP and EDG	ESS	WH
H17 Haymoor Bottom SNCI	0.3%	0.3%	0.0%	0.0%
H18 Arrowsmith Coppice SNCI/AW	0.5%	0.5%	0.0%	0.1%
H19 Delph Woods SNCI	0.5%	0.4%	0.0%	0.1%
H20 Dunyeats Hill HRS	0.3%	0.3%	0.0%	0.0%
H21 Moortown Copse SNCI	1.4%	1.3%	0.0%	0.2%
H22 Canford Park SANG LCNR	0.6%	0.5%	0.0%	0.1%
H23 Bearwood SNCI	1.4%	1.2%	0.1%	0.2%
H24 Frogmoor Wood SNCI	0.5%	0.4%	0.0%	0.1%

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 a proposed Energy from Waste (EfW) Combined Heat and Power (CHP) Facility at Canford Resource Park, Arena Way, Magna Road, Wimborne, Dorset, BH21 3BW.

This report presents an assessment of operational impacts only. Construction impacts have been provided by Savills.

During operation, the number of additional vehicle movements generated by site activities potentially exceed the Institute of Air Quality Management (IAQM) planning guidance for requiring a detailed assessment of traffic emissions. Therefore, a detailed traffic-related air quality assessment has been provided (refer **Appendix 6.2: Traffic-related Air Quality Assessment** of the ES). Furthermore, a precautionary approach was adopted in selecting baseline concentrations for NO_2, PM_{10} and $PM_{2.5}$ (main pollutants associated with traffic emissions). This allowed for potential cumulative impacts arising from this and other developments.

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 plant emissions and an emergency diesel generator. Emissions from the Proposed Development 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. Predicted acidification impacts at the Dorset Heaths European site and some of the SSSIs could not be screened out as 'not significant'. Therefore, the impact of emissions on the integrity of these sites is provided in the **Chapter 8 (Ecology and Nature Conservation)** of the Environmental Statement.

7.2 CONCLUSIONS

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

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