10 AIR QUALITY & HUMAN HEALTH

10.1 Introduction

10.1.1 This Chapter describes the potential air quality, odour and human health impacts and effects associated with the development of the proposed Energy from Waste (EfW) facility at Hownsgill Industrial Estate, Consett, County Durham. The assessment has been carried out by Air Quality Consultants on behalf of Enzygo Ltd.

10.1.2 This Chapter is supported by detailed technical reports as follows:

- Air Quality Assessment and Stack Height Testing Report (Appendix 10.1 to the Environmental Statement (ES))
- Human Health Risk Assessment (Appendix 10.2 to the Environmental Statement (ES))
- Odour Risk Assessment (Appendix 10.3 to the Environmental Statement (ES))

10.2 Aims and Objectives

10.2.1 The proposed development is located to the southwest of the town of Consett, within the local authority area of County Durham. Durham County Council has declared two Air Quality Management Areas (AQMAs), in the city of Durham and Chester-le-Street, due to exceedances of the annual mean nitrogen dioxide (NO_2) objective. The proposed development is located more than 15 km from both of these AQMAs, and will not significantly affect air quality within them.

10.2.2 During the construction phase, there is potential for construction activities to impact upon existing local receptors, and this has been assessed. The main pollutants of concern relating to construction activities are dust and PM_{10}. Emissions from on-site plant and vehicles during the construction phase have not been assessed, as they are unlikely to have a significant impact (Moorcroft and Barrowcliffe et al, 2017).

10.2.3 During the operational phase, emissions to air from the main stack, as well as those from the backup gas-fired boilers, have been assessed. In relation to human health, consideration has been given to a comprehensive range of pollutants that may be emitted, as defined in the Industrial Emissions Directive (IED), to which the facility will have to conform for the purposes of environmental permitting. These pollutants are:

- nitrogen dioxide (NO_2)

- total dust (PM_{10} and $PM_{2.5}$);
- carbon monoxide (CO);
- volatile organic compounds (VOCs)
- sulphur dioxide (SO_2);
- hydrogen chloride (HCl);
- hydrogen fluoride (HF);
- ammonia (NH_3);
- dioxins and furans (PCDD/F);
- polyaromatic hydrocarbons (PAH) as benzo[a]pyrene (B[a]P);
- polychlorinated biphenyls (PCBs);
- the following trace metals:
    - cadmium (Cd);
    - thallium (Tl);
    - mercury (Hg)
    - antimony (Sb);
    - arsenic (As);
    - lead (Pb);
    - chromium (Cr);
    - cobalt (Co);
    - copper (Cu);
    - manganese (Mn);
    - nickel (Ni); and
    - vanadium (V).

10.2.4 In addition to the assessment of impacts to human health, the potential air quality impacts on sensitive ecological habitats have also been addressed. The North Pennine Moors, a European designated Special Area of Conservation (SAC) and Special Protection Area (SPA), is located within 10 km of the proposed development, and has the potential to be affected by emissions from the facility. There are also a number of Ancient Woodland (AW) and Local Nature Reserve (LNR) sites identified within 2 km of the proposed development, which have also been assessed. These distance thresholds are those recommended by the Environment Agency (EA). These sites are shown in Figure 10-1. The pollutants relevant to sensitive ecosystems are:

- nitrogen oxides (NOx);
- ammonia (NH_3);
- sulphur dioxide (SO_2);
- hydrogen fluoride (HF);
- nutrient nitrogen deposition (to which NOx and NH_3 emissions contribute); and
- acid deposition (to which NOx, NH_3, SO_2 and HCl emissions contribute).

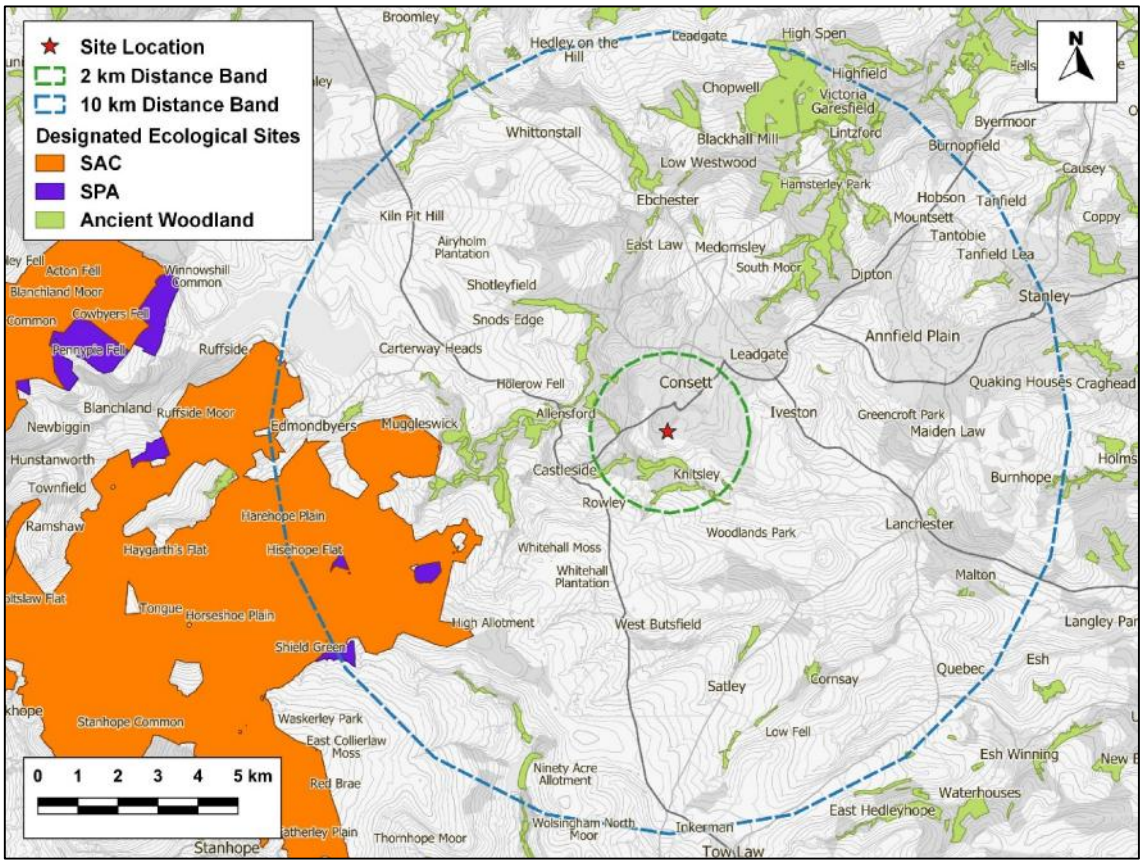

Figure 10-1 – Study Area and Ecological Sites within 2 km and 10 km of the Proposed Development

10.2.5 Furthermore, the proposed development will also lead to changes in vehicle flows on local road, which may impact on air quality at existing receptors along the local road network. The main air pollutants of concern relating to road traffic are NO_2 and fine particulate matter (PM_{10} and $PM_{2.5}$).

10.2.6 This chapter describes existing local air quality conditions and the predicted impacts of the proposed development on air quality in the future, where relevant comparing scenarios where the proposed development does, or does not proceed.

10.2.7 As the proposed facility will process refuse-derived fuel (RDF), which is composed of waste, there is also potential to generate odour, and it is necessary to consider the potential impacts

of odour on local sensitive receptors. The assessment has utilised an odour risk assessment approach as recommend in Institute of Air Quality Management (IAQM) guidance on the assessment of odours for planning (IAQM, 2018).

10.3 Legislation and Policy Context

10.3.1 The legislation and policy informing the assessment are summarised below, and are detailed in depth in Appendix 10.1.

Policy for the Protection of Human Health

- European Framework Directive on Ambient Air Quality and Cleaner Air for Europe (2008/50/EC);
- European Waste Framework Directive (2008/98/EC);
- European Industrial Emissions Directive (IED) (2010/75/EU);
- The Environmental Permitting (England and Wales) Regulations (2016) and the Environmental Permitting (England and Wales) (Amendment) (EU Exit) Regulations (2019);
- The Waste (England and Wales) Regulations (2011);
- The UK Air Quality Strategy (2007);
- Air Quality (England) Regulations (2000) and Air Quality (England) (Amendment) Regulations (2002);
- Air Quality Standards Regulations (2010);
- Clean Air Strategy (2019); and
- Environmental Protection Act (1990).

Policy for the Protection of Sensitive Ecosystems

- Habitats Directive (92/43/EEC) and the Conservation of Habitats and Species Regulations 2017;
- Birds Directive (2009/147/EC) and the Conservation of Habitats and Species Regulations 2010;
- National Parks and Access to the Countryside Act (1949);

- Wildlife and Countryside Act (1981);
- Countryside and Rights of Way Act (2000);
- Environment Act (1995); and
- Natural Environment and Rural Communities Act (2006).

Planning Policy

- National Planning Policy Framework (NPPF), supported by Planning Practice Guidance (PPG);
- Adopted County Durham Plan (2020).

Guidance Notes

- Waste Incineration Best Available Techniques (BAT) Reference Document ("the BREF");
- Environment Agency Air Emissions Risk Assessment Guidance
- Environment Agency Interim Guidance Note for Metals
- Health and Safety Executive EH40/2005 Workplace Exposure Limits document.

10.4 Assessment Methodology

Consultation

10.4.1 The formal Scoping Process established that the proposed scope and methodologies presented in the scoping report are appropriate, thus no further consultation was considered necessary.

The Study Area

10.4.2 The construction impacts assessment considers the potential for dust impacts within 350 m of the site boundary; or within 50 m of roads used by construction vehicles.

10.4.3 For operational air quality impacts, the modelling has been carried out to predict pollutant process contributions across a 10 km x 10 km model domain, with the proposed facility stack as the centre. This consists of a nested Cartesian grid of receptor points, modelled at a height of 1.5 m, representing ground-floor level concentrations.

10.4.4 In addition, discrete receptor locations have been modelled to represent worst-case human health exposure (including at residential properties and care facilities), and designated

ecosystems. 19 locations have been identified to represent human health receptors, and 38 locations have been identified to represent designated sensitive ecosystems. The modelled receptor locations are shown in Figure 10-2 and Figure 10-3.

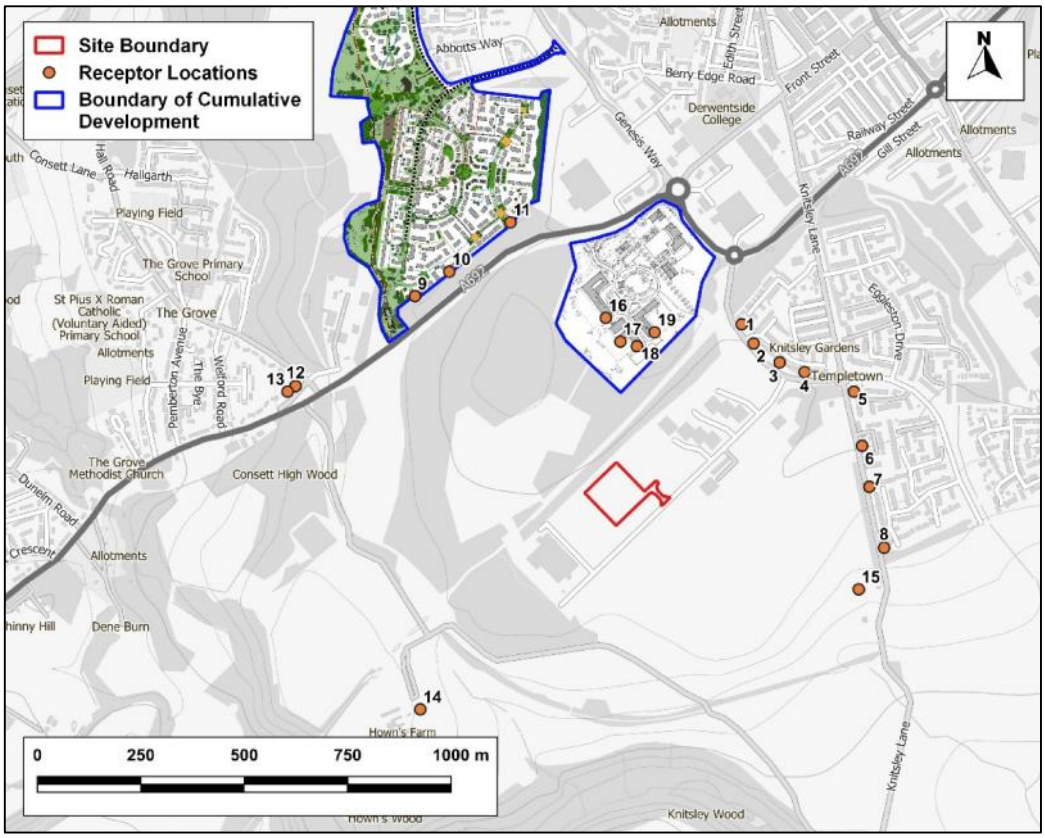

Figure 10-2 – Modelled Specific Sensitive Receptors (Human Health)

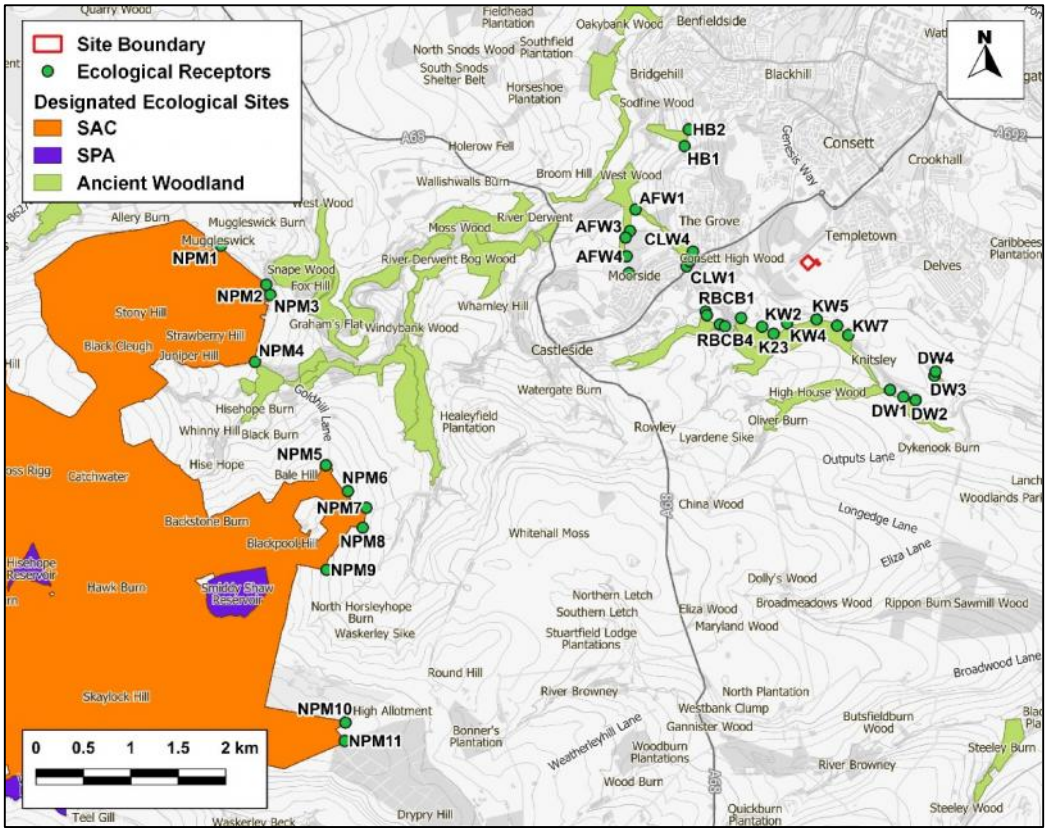

Figure 10-3 – Modelled Receptors (Designated Ecosystems)

10.4.5 For the odour risk assessment, 12 locations, some representing broader areas of exposure, have been chosen as representative receptors where members of the public will be regularly present. These include 11 existing locations, and the proposed Derwent View development, approximately 200 m north of the proposed facility. These locations are shown in Figure 10-4.

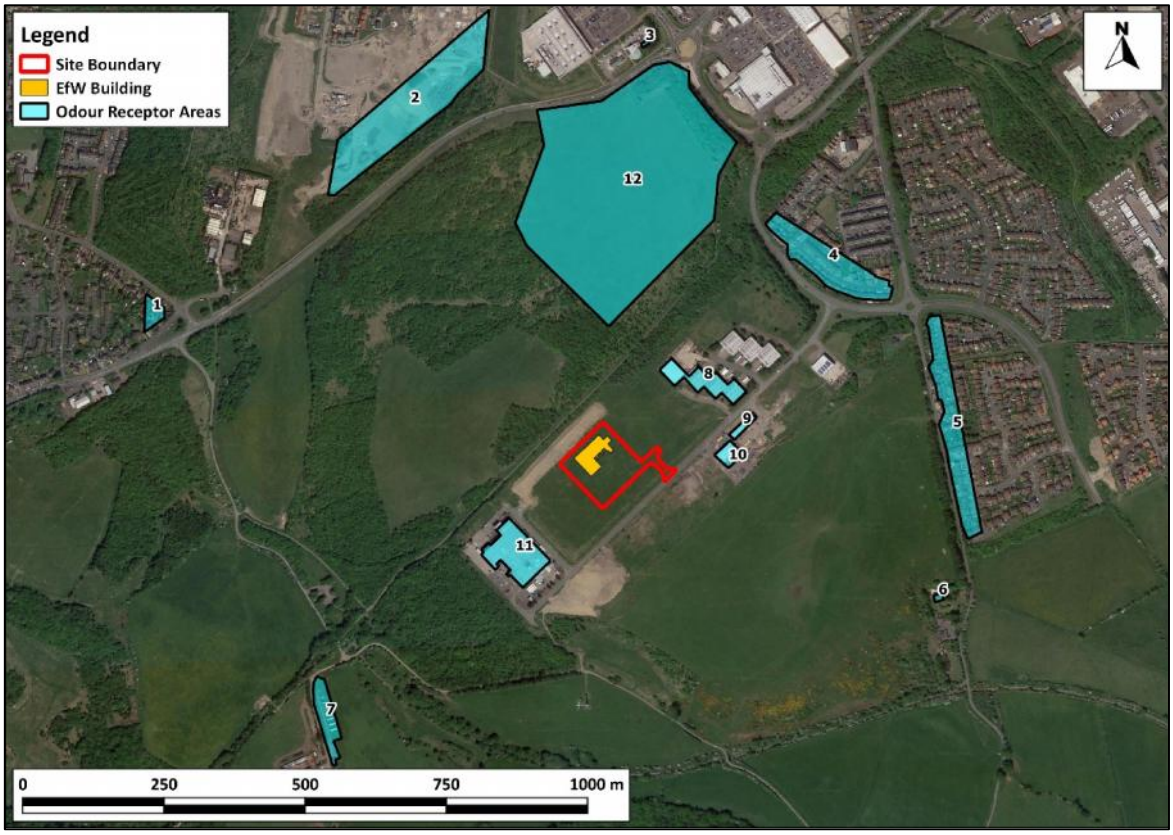

Figure 10-4 – Receptors (Odour Risk Assessment)

Baseline Assessment

10.4.6 Existing sources of emissions and baseline air quality conditions within the study area have been defined using a number of approaches:

- industrial and waste management sources that may affect the area have been identified using Defra's Pollutant Release and Transfer Register (Defra, 2020a);
- local sources have been identified through examination of Durham County Council's Air Quality Review and Assessment reports;
- information on existing air quality has been obtained by collating the results of monitoring carried out by Durham County Council, and by Defra as part of their national automatic and non-automatic monitoring networks (Defra, 2020d);
- background concentrations have been defined using Defra's background maps (Defra, 2020b), which cover the whole of the UK on a 1x1 km grid;
- background nitrogen deposition fluxes to the ecological sites have been taken from the APIS website (APIS, 2020) and represent 3-year averages for the period 2016-2018; and
- whether or not there are any exceedances of the annual mean EU limit value for nitrogen dioxide in the study area has been identified using the maps of roadside

concentrations published by Defra (2020c) (2020d). These maps have also been used to determine appropriate baseline roadside concentrations, where no representative monitoring is available.

Construction Impacts

10.4.7 There are no formal assessment criteria for dust. In the absence of formal criteria, the approach developed by the Institute of Air Quality Management (IAQM)[1] (2016) has been used.

10.4.8 The assessment methodology is that provided by IAQM (2016). This follows a sequence of steps. Step 1 is a basic screening stage, to determine whether the more detailed assessment provided in Step 2 is required. Step 2a determines the potential for dust to be raised from on-site works and by vehicles leaving the site. Step 2b defines the sensitivity of the area to any dust that may be raised. Step 2c combines the information from Steps 2a and 2b to determine the risk of dust impacts without appropriate mitigation. Step 3 uses this information to determine the appropriate level of mitigation required to ensure that there should be no significant impacts.

Operational Impacts – Air Quality

10.4.9 The impacts of emissions from the main stack and boilers within the proposed facility have been modelled using the ADMS-5 dispersion model. An appropriate stack height for the main stack has been determined through stack height testing, a summary of which is presented in Appendix 10.1.

10.4.10 The facility will include an emergency diesel generator to provide power in case of emergencies, which will be tested briefly once per week as part of routine maintenance checks. This is expected to amount to a total operation of approximately 13 hours per year. Given this very limited usage, it is expected that the contribution of the generator to concentrations of nitrogen dioxide and particulate matter will be so small as to be insignificant when compared to that of the emissions from the main stack and boilers, and it is therefore not considered further.

10.4.11 The road traffic generation of the proposed development has been screened against the criteria set out in the EPUK/IAQM guidance (Moorcroft and Barrowcliffe et al, 2017). Where impacts can be screened out, there is no need to progress to a more detailed assessment. Consideration has also been given to the potential cumulative impacts of development-generated road traffic emissions alongside those from the main stack and supplementary boilers.

[1] The IAQM is the professional body for air quality practitioners in the UK.

10.4.12 Model input parameters (stack diameter, volumetric flow rate, temperature and gas composition in terms of volume of water and oxygen) have been provided by the applicant. Where new pollutant emission rates have been defined in the BREF, these have been used; where no new emission rate has been presented, those from the IED have been used. Further details on the pollutant emission parameters are provided in Appendix 10.1.

10.4.13 The proposed development will also include 3 no. natural gas-fired boilers to provide hot water during periods of routine maintenance of the main EfW. It is anticipated that the EfW will operate for approximately 8,000 hours per year, thus the boilers will operate for up to 760 hours per year. The principal pollutant of concern from the boilers is nitrogen dioxide.

10.4.14 The emission parameters for the boilers have been derived from technical datasheets for the units. Further information is provided in Appendix 10.1.

10.4.15 The dispersion model has been run to carry out for variations in meteorological data, building wake effects, terrain effects and variable surface roughness across the model domain. The dispersion models have been run using five years of hourly sequential meteorological data in order to account for any potential uncertainty. The results presented are the highest calculated in any of the model scenarios and therefore represent worst-case predictions.

10.4.16 Post-processing has been carried out in line with the approach recommended by the EA (Environment Agency, 2005) in the calculation of nitrogen dioxide concentrations. Deposition of pollutants to ecosystems has been calculated from predicted ambient concentrations using deposition velocities taken from AQTAG06 guidance (AQTAG, 2011).

Assessment Criteria

10.4.17 The EA has adopted criteria (Environment Agency, 2016a) that allow health-related Process Contributions (PCs), and those contributions to national or international ecological sites, to be screened out as not significant regardless of the baseline environmental conditions. The emissions from a process can be considered to be not significant if:

- the long-term (annual mean) process contribution is <1% of the long-term environmental standard; and
- the short-term (15-minute, 1-hour, 8-hour and 24-hour mean) process contribution is <10% of the short-term environmental standard.

10.4.18 In terms of locally-designated ecological sites (as opposed to those with national or European designation), the EA discounts the possibility of significant effects where the PC is less than 100% of the long-term or short-term EAL (Environment Agency, 2016a).

10.4.19 It should be recognised that these criteria determine when an impact can be screened out as insignificant. They do not imply that impacts will necessarily be significant above one or both of these criteria, merely that there is a potential for significant impacts to occur that should be considered using a detailed assessment methodology, such as a detailed dispersion modelling study (as has been carried out for this project in any event), and taking into account background pollutant concentrations.

10.4.20 The next step in the EA's screening process for long-term contributions is to add the process contribution (PC) to the local background concentration to calculate the predicted environmental concentration (PEC). For short-term contributions the PC is compared against the short-term environmental standard minus twice the long-term background concentration. The emissions are insignificant if:

- the long-term PEC is less than 70% of the long-term environmental standard; and
- the short-term PC is less than 20% of the short-term environmental standards minus twice the long-term background concentration.

10.4.21 However, the EA also advises that, where detailed dispersion modelling has been undertaken, no further action is required if resulting PECs do not exceed environmental standards.

10.4.22 For the assessment of trace metals, the EA's Guidance Note for Metals (Environment Agency, 2016b) has been used.

10.4.23 For nitrogen dioxide, the approach developed jointly by EPUK & IAQM (Moorcroft and Barrowcliffe et al, 2017) is that any change in concentration smaller than 0.5% of the long-term environmental standard will be negligible, regardless of the existing air quality conditions. Where the change in concentration represents more than 0.5% of the standard, existing conditions are taken into consideration when describing the impacts. This is more stringent than the Environment Agency screening criterion of 1% set out above, but the guidance was not specifically designed for industrial developments, being more relevant to considering impacts on the primary pollutants associated with road traffic emissions, nitrogen dioxide and particulate matter, thus it is considered more appropriate to use the Environment Agency criterion for other pollutants.

10.4.24 For road traffic, EPUK and the IAQM recommend a two-stage screening approach (Moorcroft and Barrowcliffe et al, 2017) to determine whether emissions generated by a development have the potential for significant air quality impacts. The approach first considers the size and parking provision of a development; if the development is residential and is for fewer than ten homes or covers less than 0.5 ha, or is non-residential and will provide less than 1,000 m^2 of floor space or cover a site area of less than 1 ha, and will provide ten or fewer parking spaces, then there is no need to progress to a detailed assessment.

10.4.25 The second stage then compares the changes in vehicle flows on local roads that a development will lead to against specified screening criteria. The screening thresholds inside an AQMA are a change in flows of more than 25 heavy duty vehicles or 100 light duty vehicles per day; outside of an AQMA the thresholds are 100 heavy duty vehicles or 500 light duty vehicles. Where these criteria are exceeded, a detailed assessment is likely to be required, although the guidance advises that *"the criteria provided are precautionary and should be treated as indicative"*, and *"it may be appropriate to amend them on the basis of professional judgement"*.

Operational Impacts – Human Health Risk Assessment

10.4.26 The human health risk assessment identifies any potential health risks associated with emissions of dioxins and furans from the proposed development. The assessment draws on the dispersion modelling discussed above, and additionally uses the United States Environmental Protection Agency's Human Health Risk Assessment Protocol (HHRAP). A range of worst-case assumptions has been applied and thus the assessment is very precautionary. The approach is described in detail in Appendix 10.2.

Operational Impacts – Odour

10.4.27 The potential impacts of odours emitted during the operation of the proposed development have been assessed using a risk assessment methodology published by the IAQM (2018). The methodology identified the potential risk of odour impacts in relation to 'FIDOR': Frequency; Intensity; Duration; Offensiveness; and Receptor location and sensitivity. Full details of the methodology are detailed in the Odour Risk Assessment (Appendix 10.3).

Cumulative

10.4.28 It has been judged that none of the major proposed developments within the vicinity of the project would lead to a significant change in the baseline situation; the assessment has taken a worst-case approach in terms of baseline roadside concentrations in any case.

10.4.29 Potential sensitive receptors within nearby proposed developments have been accounted for within the assessment.

Limitations

10.4.30 There are many components that contribute to the uncertainty of modelling predictions. The ADMS-5 model used in this assessment is dependent upon the data that have been input, which will have inherent uncertainties associated with them. In order to account for this uncertainty, conservative and worst-case assumptions have been made where appropriate and required. In particular, by assuming continuous operation of the main plant throughout the year (when the EfW process will be shut down for 4-5 weeks per year), and by using emission concentrations set at the regulatory maxima (when the plant will operate well below these limits most of the time), the assessment is likely to have over-predicted the process contributions by a relatively large margin.

10.4.31 Additional steps have also been taken to account for model uncertainty, such as the use of five years of meteorological data, and the worst-case (highest) modelled concentrations form any of these five years have been presented for robustness.

10.5 Baseline Conditions

10.5.1 The proposed development is located within Hownsgill Technology Park, approximately 1 km to the southwest of Consett town centre. The application site is bounded to the southeast by the industrial estate access road. There are other industrial/commercial premises to the southwest and northeast, and a footpath/cycle route runs parallel to the north-western boundary, beyond which is an area of open countryside. The nearest residential receptors are located approximately 400 m to the east, in Templetown.

Industrial Sources

10.5.2 A search of the UK Pollutant Release and Transfer Register (Defra, 2020a) has not identified any significant industrial or waste management sources that are likely to affect the study area, in terms of air quality.

Local Air Quality Monitoring

10.5.3 Durham County Council does not operate any monitoring site close to the proposed development (the nearest monitoring site is in Chester-le-Street, 17 km away).

10.5.4 Baseline conditions for nitrogen dioxide are likely to be close to background concentrations at receptors which are located away from main roads. As there are no measured roadside concentrations from which to establish a baseline, Defra's roadside annual mean nitrogen dioxide maps (Defra, 2020d) have been used, which predict a concentration of 20.0 µg/m^3 along the A691 in 2018, approximately 2 km north of the proposed facility. As a conservative approach, the Defra mapped concentration has been used as the baseline concentration for roadside receptors in this assessment, although most of these receptors will be located next to much quieter roads.

Background Pollutant Concentrations and Deposition Rates

10.5.5 Background pollutant concentrations and deposition rates across the study area have been obtained from a number of sources. They are well below the relevant EAL, with the exception of background nutrient nitrogen deposition and total acid deposition rates, which are predicted to exceed the relevant critical loads. It is relatively common in the UK for background nutrient nitrogen and total acid deposition rates to exceed local and site-specific critical loads.

10.5.6 Full details of the background concentrations used in this assessment are presented in the air quality technical report (Appendix 10.1).

Odour

10.5.7 No significant existing sources of odour have been identified in the vicinity of the proposed development. The rural setting of the site suggests a potential for occasional odours from local agriculture; however, for the purposes of this assessment, it is assumed that no cumulative odour impacts need to be considered.

10.6 Identification and Evaluation of Key Impacts

Construction Impacts

10.6.1 It is anticipated that the additional heavy vehicle movements on local roads will be well below the EPUK/IAQM screening criterion (100 AADT) for potentially significant impacts on air quality at existing locations. It is, therefore, not considered necessary to assess the impacts of construction traffic emissions further.

10.6.2 There will be no requirement for demolition on site. Risk categories for the earthworks, construction and trackout, without mitigation, have been defined and set out in Table 10-1.

These risk categories have been used to determine the appropriate level of mitigation set out later in this chapter. The full and detailed construction dust risk assessment, providing greater detail on how these risk ratings have been arrived at, is provided in Appendix 10.1.

Table 10-1: Summary of Risk of Impacts Without Mitigation

Source	Dust Soiling	Human Health
Earthworks	Low Risk	Low Risk
Construction	Low Risk	Low Risk
Trackout	Low Risk	Low Risk

10.6.3 The IAQM does not provide a method for assessing the significance of effects before mitigation, and advises that pre-mitigation significance should not be determined. Guidance from IAQM (2016) is that, with appropriate mitigation in place, the effects of construction dust will be 'not significant'.

Operational Air Quality Impacts

Initial Screening Assessment – Human Health

10.6.4 The predicted maximum PCs at any location on the modelled receptor grid have initially been compared to the EA's screening criteria. For nitrogen dioxide, the PCs also include the emissions from the proposed boilers. The results are set out in Table 10-2, with conclusions based on the screening criteria for PCs set out in the final column.

Table 10-2: Maximum Predicted PCs in the Study Area (µg/m^3)

Pollutant	Averaging Period	Maximum PC	EAL	% of EAL	Detailed Assessment Required
Nitrogen Dioxide	Annual mean	1.10	40	2.7	**Yes**
	1-hour mean	11.99	200	6.0	No
PM_{10}	Annual mean	0.06	40	0.1	No
	24-hour mean	0.16	50	0.3	No
$PM_{2.5}$ [a]	Annual mean	0.06	25	0.2	No
SO_2	24-hour mean	1.47	125	1.2	No
	1-hour mean	15.82	350	4.5	No
	15-minute mean	19.81	266	7.4	No

Pollutant	Averaging Period	Maximum PC	EAL	% of EAL	Detailed Assessment Required
CO	8-hour rolling mean	10.14	10,000	0.1	No
HF	Annual mean	0.01	16	0.1	No
	1-hour mean	0.26	160	0.2	No
HCl [b]	Annual mean	0.07	20	0.4	No
	1-hour mean	15.37	750	2.0	No
TOC as Benzene	Annual mean	0.12	5	2.4	**Yes**
TOC as 1,3-butadiene	Annual mean	0.12	2.25	5.4	**Yes**
Cadmium	Annual mean	0.0002	0.005	4.9	**Yes**
Thallium [b]	Annual mean	0.0002	1	<0.1	No
	1-hour mean	0.0051	30	<0.1	No
Mercury	Annual mean	0.0001	0.25	<0.1	No
	1-hour mean	0.003	7.5	<0.1	No
Antimony	Annual mean	0.004	5	0.1	No
	1-hour mean	0.077	150	0.1	No
Arsenic	Annual mean	0.004	0.003	122.0	**Yes**
Lead	Annual mean	0.004	0.25	1.5	**Yes**
Chromium (III)	Annual mean	0.004	5	0.1	No
	1-hour mean	0.077	150	0.1	No
Chromium (VI) [b]	Annual mean	0.004	0.0002	1,829.4	**Yes**
	1-hour mean	0.077	15	0.5	No
Cobalt [b]	Annual mean	0.004	1	0.4	No
	1-hour mean	0.077	30	0.3	No
Copper	Annual mean	0.004	10	<0.1	No
	1-hour mean	0.077	200	<0.1	No
Manganese	Annual mean	0.004	0.15	2.4	**Yes**
	1-hour mean	0.077	1,500	<0.1	No
Nickel	Annual mean	0.004	0.02	18.3	**Yes**

Pollutant	Averaging Period	Maximum PC	EAL	% of EAL	Detailed Assessment Required
Vanadium	Annual mean	0.004	5	0.1	No
	1-hour mean	0.077	1	7.7	No
NH_3	Annual mean	0.12	180	0.1	No
	1-hour mean	2.56	2500	0.1	No
PCDD/F	Annual mean	7.3×10^{-10}	0.0000003	0.2	No
PAH (as B[a]P)	Annual mean	1.8×10^{-6}	0.00025	0.7	No
PCBs	Annual mean	9.8×10^{-10}	0.2	<0.1	No
	1-hour mean	2.1×10^{-8}	6	<0.1	No

[a] The $PM_{2.5}$ objective, which was to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it. The EU limit value is the same but was to be met by 2015.

[b] Long- and short-term EALs for thallium and cobalt, the long-term EAL for HCl and the short-term EAL for Cr(VI) have been calculated from the exposure limits in EH4024, and converted to the respective EAL using guidance in H1 (Environment Agency, 2010).

Initial Screening Assessment - Ecosystems

10.6.5 The predicted PCs relevant to designated ecosystems have been compared to the EA's screening criteria. The results are set out in Table 10-3 for the North Pennine Moors SAC/SPA, and in Table 10-4 for all locally designated ancient woodland sites.

Table 10-3: Maximum Predicted PCs to North Pennine Moors

Pollutant	Averaging Period	Maximum PC	EAL	% of EAL	Detailed Assessment Required
Nitrogen Oxides	Annual mean	0.02 µg/m^3	30 µg/m^3	0.1	No
	24-hour mean	0.39 µg/m^3	75 µg/m^3	0.5	No
Sulphur Dioxide	Annual mean	0.004 µg/m^3	20 µg/m^3	<0.1	No
HF	24-hour mean	0.002 µg/m^3	5 µg/m^3	<0.1	No
	Weekly mean	0.001 µg/m^3	0.5 µg/m^3	0.2	No
Ammonia	Annual mean	0.001 µg/m^3	3 µg/m^3	<0.1	No
Nutrient Nitrogen Deposition	Annual mean	0.008 kgN/ha/yr	5 kgN/ha/yr	0.2	No

Pollutant	Averaging Period	Maximum PC	EAL	% of EAL	Detailed Assessment Required
Acid Deposition	Annual mean	0.001 keq/ha/yr	0.491 keq/ha/yr	0.2	No

Table 10-4: Maximum Predicted PCs to Designated Ancient Woodland Sites

Pollutant	Averaging Period	Maximum PC	EAL	% of EAL	Detailed Assessment Required
Nitrogen Oxides	Annual mean	0.12 µg/m^3	30 µg/m^3	0.4	No
	24-hour mean	4.11 µg/m^3	75 µg/m^3	5.5	No
Sulphur Dioxide	Annual mean	0.029 µg/m^3	20 µg/m^3	0.1	No
HF	24-hour mean	0.018 µg/m^3	5 µg/m^3	0.4	No
	Weekly mean	0.011 µg/m^3	0.5 µg/m^3	2.1	No
Ammonia	Annual mean	0.010 µg/m^3	3 µg/m^3	0.3	No
Nutrient Nitrogen Deposition	Annual mean	0.10 kgN/ha/yr	10 kgN/ha/yr	1.0	No

10.6.6 The PCs are below the screening criteria for all pollutants and averaging periods at all ecological sites, therefore no further detailed assessment is required, and the potential impacts are all considered *insignificant*.

Detailed Assessment – Human Health

10.6.7 The approach taken for the detailed assessment has been to add the PCs to the baseline concentrations, and compare them to the relevant EALs or AQOs.

10.6.8 For all pollutants that require detailed assessment, the PECs are below the relevant EAL/AQO. The Air Quality Assessment and Stack Height Testing Report (Appendix 10.1) sets out the assessment in detail, including the assessment of Group III metals in line with EA guidance (Environment Agency, 2016b).

10.6.9 For nitrogen dioxide, the maximum PC is 0.9 µg/m^3, which equates to a maximum increase in concentration of 2% compared with the AQO. As the baseline concentration is less than 75% of

the AQO, it can be concluded that the impact of the proposed facility on annual mean nitrogen dioxide is *negligible*, in line with the EPUK/IAQM impact descriptor matrix.

Detailed Assessment – Ecosystems

10.6.10 No further assessment is required for any pollutant; the potential impacts are *insignificant* in line with the EA's guidance.

Road Traffic

10.6.11 The proposed development is expected to generate a total of 18 daily light vehicle trips and 20 daily heavy vehicle trips, with trips expected to distribute 50% southwest and 50% northeast on the A692. These daily trips are well below the screening thresholds recommended for use outside of an AQMA (see Paragraph 10.4.25). However, it is necessary to consider the possibility of cumulative air quality impacts as a result of both emissions from the operational facility and road traffic arising from the proposed development.

10.6.12 As the increases in road traffic are well below the screening thresholds for potentially significant impacts on air quality, it can reasonably be assumed that the increase in roadside concentrations that the additional traffic will generate will be no greater than that which will trigger a *negligible* impact regardless of baseline concentrations when using the EPUK/IAQM impact descriptors (see Table 3 in Appendix 10.1). This threshold is 0.5% of the EAL, or 0.2 µg/m^3. Taking a worst-case approach, adding 0.2 µg/m^3 to the maximum predicted PC would result in an increase in concentration from the baseline of 1.1 µg/m^3 (2.8% of the EAL). This would be a *negligible* impact according to the EPUK/IAQM impact descriptor matrix, considering the total PEC (see Appendix 10.1). The cumulative impacts would, therefore, remain 'not significant'.

Significance of Operational Air Quality Effects

10.6.13 The operational air quality effects of the proposed development, on both human health and designated ecosystems, are judged to be 'not significant'.

Operational Impacts – Human Health Risk Assessment

10.6.14 The assessment has shown that the risks to health comply with the relevant benchmarks. All of the impacts are assessed to be insignificant. No specific mitigation measures are required

beyond those incorporated into the design of the facility. The full detailed assessment is provided in Appendix 10.2.

Operational Odour Impacts

10.6.15 The assessment of potential odour effects is presented in Table 10-5. This brings together the source odour potential, effectiveness of pathway and receptor sensitivity, all of which are described in considerable detail in the Odour Risk Assessment (Appendix 10.3).

Table 10-5: Assessment of Potential Odour Effects

Receptor	Risk of Odour Impact (Dose)			Receptor Sensitivity	Likely Odour Effect
	Source Odour Potential	Effectiveness of Pathway	Risk of Odour Impact		
1	Small	Ineffective	Negligible	High	Negligible
2	Small	Ineffective	Negligible	High	Negligible
3	Small	Ineffective	Negligible	Medium	Negligible
4	Small	Ineffective	Negligible	High	Negligible
5	Small	Ineffective	Negligible	High	Negligible
6	Small	Ineffective	Negligible	High	Negligible
7	Small	Ineffective	Negligible	High	Negligible
8	Small	Moderately Effective	Negligible	Low	Negligible
9	Small	Moderately Effective	Negligible	Low	Negligible
10	Small	Moderately Effective	Negligible	Low	Negligible
11	Small	Ineffective	Negligible	Low	Negligible
12	Small	Moderately Effective	Negligible	High	Negligible

10.6.16 The potential odour effects are summarised in the final column of Table 10-5. The potential for odour effects is negligible at all locations, and it is therefore judged that the overall significance of odour effects is *insignificant*.

10.7 Design Response and Mitigation

Construction

10.7.1 Measures to mitigate dust emissions will be required during the construction phase of the development in order to minimise effect upon nearby sensitive receptors.

10.7.2 The site has been identified as *low risk*, as set out in Table 10-1. Comprehensive guidance has been published by the IAQM (2016) that describes measures that should be employed, as appropriate, to reduce the impacts. This reflects best practice experience and has been used, together with the professional experience of the consultant who has undertaken the dust impact assessment and the findings of the assessment, to draw up a set of measures that should be incorporated into the specification for the works. These measures are described in Appendix A4 of the technical report (Appendix 10.1).

10.7.3 Where mitigation measures rely on water, it is expected that only sufficient water will be applied to damp down the material. There should not be any excess to potentially contaminate local watercourses.

Operation

10.7.4 The proposed facility will include all necessary emissions abatement and continuous emissions monitoring (CEMS) to ensure that the installation complies with the relevant IED/BREF emission limits. This will be a requirement of the environmental permit, regulated by the Environment Agency, that must be issued in order for the facility to operate. No additional mitigation measures are proposed for the development, given that its impact when adhering to these levels is *insignificant*.

Odour

10.7.5 No additional mitigation measures are proposed as the odour effects are predicted to be *insignificant*.

10.8 Residual Effects

Construction

10.8.1 The IAQM guidance is clear that, with appropriate mitigation in place, the residual effect will normal be ‘not significant’. The mitigation measures set out are based on the IAQM guidance,

and with these measures in place and effectively implemented, the residual effects are judged to be *insignificant*.

Operation

10.8.2 The residual effects will be the same as those identified above, and are judged to be *insignificant*.

Odour

10.8.3 The residual impacts will be the same as those identified above, and are judged to be *insignificant*.

10.9 Conclusions

10.9.1 The construction works have the potential to create dust. During construction, it will therefore be necessary to apply a package of mitigation measures to minimise dust emission, relevant to a *low risk* construction site. With these measures in place, it is expected that any residual effects will be *insignificant*.

10.9.2 Overall, the operational air quality impacts of the proposed development on human health and sensitive ecosystems are considered to be *insignificant*.

10.9.3 The potential for odour effects of the facility are considered negligible at all existing and cumulative development receptor locations, and it is therefore judged that overall significance of odour effects is *insignificant*.

10.9.4 Table 10-6 below contains a summary of the likely impacts of the proposed development:

Table 10-6: Summary of Impacts and Effects

Phase	Nature of Effect	Significance of Impact	Magnitude of Impact	Duration	Mitigation	Residual	Level
Construction	Human health	N/A	N/A	Temporary	See Appendix 10.1	Not Significant	Local
Construction	Nuisance Dust	N/A	N/A	Temporary	See Appendix 10.1	Not Significant	Local
Construction	Ecosystems	N/A	N/A	Temporary	See Appendix 10.1	Not Significant	Local

Operation	Human health	Not Significant	N/A	Permanent	None	Not Significant	Regional
Operation	Ecosystems	Not Significant	N/A	Permanent	None	Not Significant	Regional

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