CHAPTER 8.0 AIR QUALITY, ODOUR AND HUMAN HEALTH

FIGURES (Volume 2 bound separately)

APPENDICES (Volume 3 bound separately)

8.0 AIR QUALITY, ODOUR AND HUMAN HEALTH

8.1 Introduction

8.1.1 This chapter considers the potential impacts of the Proposed Development on local air quality and odour. The main focus of the chapter is the emissions from the stack associated with the Proposed Development. However, impacts from fugitive emissions of dust during the construction phase, the emissions from traffic associated with the import and export of materials and potential fugitive emissions of dust and odour during operational phase have also been assessed.

8.1.2 This chapter is supported by the following technical appendices:

- Appendix 8-1 Baseline Analysis, which provides a detailed analysis of the existing air quality in the area;
- Appendix 8-2 Construction Dust Assessment Methodology, which provides all the technical details of the assessment methodology for construction phase dust impacts;
- Appendix 8-3 Emissions Modelling, which provides all the technical details of the dispersion modelling of process emissions undertaken;
- Appendix 8-4 Human Health Risk Assessment;
- Appendix 8-5 Ecological Interpretation of Air Quality Assessment; and
- Appendix 8-6 Information to Inform a Habitats Regulations Assessment

Competence

8.1.3 This EIA and supporting technical appendices have been prepared by Hannah Lederer and reviewed by Rosalind Flavell at Fichtner Consulting Engineers. Hannah is a recent geography (BSc Hons) graduate from Durham University. Rosalind (CEnv CSci MIAQM MIEnvSc PIEMA) is a chartered member of the IAQM and IES and a practitioner member of the IEMA. Rosalind has over ten years of experience undertaking air quality assessments for planning and permitting purposes for a wide range of developments including Energy from Waste facilities across the UK.

8.2 Methodology

Legislation and Guidance

8.2.1 European air quality legislation is consolidated under the Ambient Air Quality Directive (Directive 2008/50/EC), which came into force on 11 June 2008. This Directive consolidates previous legislation which was designed to deal with specific pollutants in a consistent manner and provides Ambient Air Directive (AAD) Limit Values for sulphur dioxide, nitrogen dioxide, benzene, carbon monoxide, lead and particulate matter with a diameter of less than 10µm (PM_{10}) and a new AAD Target Value and Limit Value for fine particulates (those with a diameter of less than 2.5µm ($PM_{2.5}$). The fourth daughter Directive - 2004/107/EC - was not included within the consolidation. It sets health-based Target Values for polycyclic aromatic hydrocarbons (PAHs), cadmium, arsenic, nickel and mercury, for which there is a requirement to reduce exposure to as low as reasonably achievable. Directives 2008/50/EC and 2004/107/EC are transposed into UK Law into the Air Quality Standards Regulations (2010) and subsequent amendments.

8.2.2 The UK Government and the devolved administrations are required under the Environment Act (1995) to produce a national air quality strategy. This was last reviewed and published in 2007. The Air Quality Strategy (AQS) sets out the UK's air quality objectives and recognises that action at national, regional and local level may be needed, depending on the scale and nature of the air quality problem. This includes additional targets and limits for 15-minute sulphur dioxide and 1,3-butadiene and more stringent requirements for benzene and PAHs, known as AQS Objectives. Environmental Assessment Levels (EALs) for other pollutants are presented on the gov.uk website as part of the Environment Agency's (EA) Environmental Management Guidance (Air emissions risk assessment for your environmental permit), which was last updated on 1 March 2016 and is referred to here as the Air Emissions Guidance. AAD Target and Limit Values, AQS Objectives, and EALs are set at levels well below those at which significant adverse health effects have been observed in the general population and in particularly sensitive groups. For the remainder of this chapter these are collectively referred to as AQALs.

8.2.3 The UK Government published the Clean Air Strategy (CAS) in January 2019. This sets out the methods by which air pollution from all sectors will be reduced. The CAS has not introduced any new air quality limits.

8.2.4 Local Air Quality Management Technical Guidance (2016) referred to as LAQM.TG(16), outlines that the AQALs apply in the following locations:

- Annual mean - all locations where members of the public might be regularly exposed - i.e. building facades of residential properties, schools, hospitals, care homes etc.
- 24-hour mean and 8-hour mean - all locations where the annual mean objective would apply together with hotels and gardens of residential properties.
- 1-hour mean - all locations where the annual mean, 24-hour and 8-hour mean apply together with kerbside sites and any areas where members of the public might be reasonably expected to spend one hour or more.
- 15-minute mean - all locations where members of the public might reasonably be exposed for a period of 15 minutes or more.

8.2.5 The AQALs relevant to this project are summarised in Appendix 8-3 and summarised in the following tables.

Table 8.1: Air Quality Assessment Levels

Pollutant	AQAL ($\mu g/m^3$)	Averaging Period	Frequency of Exceedance	Source
Nitrogen dioxide	200	1 hour	18 times per year (99.79th percentile)	AAD Limit Value
	40	Annual	-	AAD Limit Value
Sulphur dioxide	266	15 minutes	35 times per year (99.9th percentile)	AQS Objective
	350	1 hour	24 times per year (99.73rd percentile)	AAD Limit Value
	125	24 hours	3 times per year (99.18th percentile)	AAD Limit Value
Particulate matter (PM_{10})	50	24 hours	35 times per year (90.41st percentile)	AAD Limit Value
	40	Annual	-	AAD Limit Value
Particulate matter ($PM_{2.5}$)	25	Annual	-	AAD Limit Value
Carbon monoxide	10,000	8 hours, running	-	AAD Limit Value

Pollutant	AQAL (µg/m^3)	Averaging Period	Frequency of Exceedance	Source
	30,000	1 hour		Air Emissions Guidance
Hydrogen chloride	750	1 hour	-	Air Emissions Guidance
Hydrogen fluoride	160	1 hour	-	Air Emissions Guidance
	16	Annual	-	Air Emissions Guidance
Ammonia	2,500	1 hour	-	Air Emissions Guidance
	180	Annual	-	Air Emissions Guidance
Benzene	195	1-hour	-	Air Emissions Guidance
	5	Annual	-	AQS Objective
1,3-butadiene	2.25	Annual, running	-	AQS Objective
PCBs	6	1-hour	-	Air Emissions Guidance
	0.2	Annual	-	Air Emissions Guidance
PAHs – benzo(a)pyrene	0.00025	Annual	-	AQS Objective

Table 8.2: Air Quality Assessment Levels for Metals

Pollutant	AAD Target – Long Term (µg/m^3)	Long Term Air Emissions Guidance (µg/m^3)	Short Term Air Emissions Guidance (µg/m^3)
Cadmium	0.005	0.005	-
Thallium	-	-	-
Mercury	-	0.25	7.5
Antimony	-	5	150
Arsenic	0.006	0.003	-
Cadmium	0.005	0.005	-
Chromium (II & III)	-	5	150
Chromium (VI)	-	0.0002	-
Cobalt	-	-	-
Copper	-	10	200
Lead	-	0.25	-
Manganese	-	0.15	1500
Nickel	0.020	0.020	-
Vanadium	-	5	1

8.2.6 Critical Levels for the protection of sensitive ecosystems and habitats are also outlined within the Air Quality Standards Regulations for oxides of nitrogen and sulphur dioxide. Limits for ammonia and hydrogen fluoride are contained in the Air Emissions Guidance. The Critical Levels relevant to this project are presented in the following table.

Table 8.3: Critical Levels for the Protection of Ecosystems

Pollutant	Critical Level ($\mu g/m^3$)	Averaging period	Source
Nitrogen oxides (as nitrogen dioxide)	75	Daily mean	Air Emissions Guidance
	30	Annual mean	AAD
Sulphur dioxide	10	Annual mean for sensitive lichen communities and bryophytes and ecosystems where lichens and bryophytes are an important part of the ecosystems integrity	Air Emissions Guidance
	20	Annual mean for all higher plants	AAD
Hydrogen fluoride	<5	Daily mean	Air Emissions Guidance
	<0.5	Weekly mean	Air Emissions Guidance
Ammonia	1	Annual mean for sensitive lichen communities and bryophytes and ecosystems where lichens and bryophytes are an important part of the ecosystems integrity	Air Emissions Guidance
	3	Annual mean for all higher plants	Air Emissions Guidance

8.2.7 In addition to the Critical Levels, the Air Pollution Information System (APIS) provides habitat specific Critical Loads for nitrogen and acid deposition. Full details of the habitat specific Critical Loads can be found in Appendix 8-3.

Industrial Pollution Regulation

8.2.8 Atmospheric emissions from industrial processes are controlled in the UK through the Environmental Permitting (England and Wales) Regulations (2010), and subsequent amendments. The Proposed Development will be regulated by the Environment Agency and so will need an Environmental Permit to operate. The Environmental

Permit will include conditions to prevent fugitive emissions of dust and odour beyond the boundary of the installation. The Environmental Permit will also include limits on emissions to air.

8.2.9 The Industrial Emissions Directive (IED) (Directive 2010/75/EU), was adopted on 07 January 2013, and is the key European Directive which covers almost all regulation of industrial processes in the European Union (EU). Within the IED, the requirements of the relevant sector BREF (Best Available Techniques Reference documents) become binding as BAT (Best Available Techniques) guidance. The Waste Incineration BREF was published by the European Integrated Pollution Prevention and Control (IPPC) Bureau in December 2019. The BREF has introduced BAT-AELs (BAT Associated Emission Levels) which are more stringent than those currently set out in the IED for some pollutants. The Proposed Development would be designed to meet the requirements of the BREF for a new plant. Therefore, it has been assumed that the emissions from the Proposed Development would comply with the BAT-AELs set out in the BREF for new plants, or the emission limits in Annex VI Part 3 of the IED for waste incineration plants where BAT-AELs are not applicable.

Local Air Quality Management

8.2.10 Under Section 82 of the Environment Act (1995) (Part IV), local authorities are required to periodically review and assess air quality within their area of jurisdiction, under the system of Local Air Quality Management (LAQM). This review and assessment of air quality involves assessing present and likely future ambient pollutant concentrations against AQALs. If it is predicted that levels at the façade of buildings where members of the public are regularly present (normally residential properties) are likely to be exceeded, then the local authority is required to declare an Air Quality Management Area (AQMA). For each AQMA, the local authority is required to produce an Air Quality Action Plan (AQAP), the objective of which is to reduce pollutant levels in pursuit of the relevant AQALs. A review of the local area shows that the closest AQMA is the Westbury AQMA which at its closest point is located approximately 1.7 m from the Site. This assessment fully quantifies the impact on the local AQMAs. Appendix 8-1 includes a detailed overview of the local AQMA and the AQAP.

Control of Dust and Emissions during Construction and Demolition

8.2.11 The main requirements with respect to dust control from industrial or trade premises such as the Proposed Development construction site, are those provided in Section 80 of Part III of the Environmental Protection Act (1990). The Act defines nuisance as: *"any dust, steam, smell or other effluvia arising on industrial trade or business premises and being prejudicial to health or a nuisance."*

8.2.12 Enforcement of the Act, in regard to nuisance, is currently under the jurisdiction of the local Environmental Health Department, whose officers are deemed to provide an independent evaluation of nuisance. If the local authority is satisfied that a statutory nuisance exists, or is likely to occur or happen again, it must serve an Abatement Notice under Part III of the Act requiring abatement and any necessary works to achieve it.

Assessment Methodology

Dust from Construction Activities

8.2.13 There is the potential for dust to be released into the atmosphere as a result of construction activities. These fugitive dust emissions have been assessed on a qualitative basis in accordance with the methodology outlined within the 2014 IAQM guidance document - 'Guidance on the assessment of dust from demolition and construction'. A detailed description of the methodology for the assessment of construction phase dust impacts is presented in Appendix 8-2.

Vehicle Emissions

8.2.14 The IAQM document 'Land-Use Planning & Development Control: Planning for Air Quality' (2017) states that an air quality assessment is required where a development would cause a "*significant change*" in light duty vehicles (LDVs) or heavy goods vehicles (HGV). The indicative criteria to process to an assessment are:

- A change in LDV flows of:
    - more than 100 Annual Average Daily Traffic (AADT) within or adjacent to an AQMA; or
    - more than 500 AADT elsewhere.
- A change in HGV flows of:
    - more than 25 AADT within or adjacent to an AQMA; or
    - more than 100 AADT elsewhere.

8.2.15 The IAQM guidance does not clearly state the level of assessment which is required. However, if the change in LDV and HGV flows does not exceed the above criteria, the Proposed Development is not expected to cause a significant change and the significance of effect is deemed to be negligible and further detailed analysis of the impact is not needed.

Operational Phase Process Emissions

8.2.16 This assessment has been undertaken using the Advanced Dispersion Modelling System (ADMS) 5.2 dispersion model, and the five most recent years for which weather data is available. Full details of the dispersion modelling methodology and inputs can be found in Appendix 8-3. The model has been used to predict the ground level concentration of pollutants on a long and short-term basis across a grid of points. It has also been used to predict the concentration at nominated points to represent sensitive receptors.

8.2.17 For some pollutants which accumulate in the environment such as dioxins and dioxin-like PCBs, inhalation is only one of the potential exposure routes and the assessment levels is expressed as a sum of the exposure from inhalation and ingestion. Therefore, other exposure routes have been considered. A detailed Human Health Risk Assessment has been carried out using the Industrial Risk Assessment Program - Human Health (IRAP-h View - Version 5.0). The programme, created by Lakes Environmental, is based on the United States Environment Protection Agency (USEPA) Human Health Risk Assessment Protocol. This Protocol is a development of the approach defined by Her Majesty's Inspectorate for Pollution (HMIP) in 1996, taking account of further research since that date. Full details of the modelling methodology and inputs can be found in Appendix 8-4.

Plume Visibility

8.2.18 There is the potential for the plume to be visible under certain circumstances. ADMS 5.2 includes a plume visibility module, which models the dispersion and cooling of water vapour and predicts whether the plume will be visible, based on the liquid water content of the plume. This module has been used to quantify the number of visible plumes likely to occur during the operation of the Proposed Development. These results have been drawn upon in the ES Chapter 5 (Landscape and Visual).

Fugitive Dust and Odour

8.2.19 There is the potential for fugitive emissions of dust and odour to be released from the Proposed Development during the operational phase, especially during the delivery, unloading and storing of materials. The impact of fugitive odour emissions has been assessed on a qualitative basis in accordance with the methodology outlined within the IAQM guidance document 'Guidance on the Assessment of Odour for Planning' (the IAQM (2018) guidance). This guidance sets out a methodology for assessing the effects of odour on amenity.

8.2.20 There is no specific guidance for assessing the impact of dust from operational sites. Therefore, we have applied the principals of the construction phase dust assessment methodology to determine the impact of fugitive dust emissions which could arise during operation of the Proposed Development.

Assessment of Significance / Assessment Criteria

Dust from Construction Activities

8.2.21 The effect of construction phase activities has been assessed in accordance with IAQM guidance. The guidance is structured to determine the risk of dust effects arising from four types of construction phase activities. These are:

- Demolition;
- Earthworks;
- Construction; and
- Trackout (defined as the transport of dust and dirt from the construction / demolition site onto the public road network).

8.2.22 A site is allocated to a risk category for dust emissions for each of the activities above based on two factors; dust emission magnitude, and the sensitivity of the area. These factors are combined to give the risk of dust impacts.

8.2.23 The highest risk category identified is used to define appropriate, site-specific, mitigation measures. The final stage is to determine whether significant effects are likely. For almost all construction phase activities, the aim should be to prevent

significant effects on receptors through the use of effective mitigation. Experience has shown that this is normally possible.

8.2.24 A detailed description of the assessment criteria for the assessment of construction phase dust impacts is presented in Appendix 8-2.

Process Emissions

8.2.25 For the Proposed Development to operate it will need to satisfy industrial permitting requirements set out and monitored by the Environment Agency. However, Environment Agency guidance has not been developed for conducting an assessment to accompany a planning application. Consequently, the IAQM guidance document “Land-Use Planning & Development Control: Planning for Air Quality” (2017) has been developed for professionals operating within the planning system. It provides planning officers and developers with a means of reaching sound decisions, having regard to the air quality implications of development proposals. The IAQM (2017) guidance states that it may be adapted using professional judgement. Therefore, where appropriate, Environment Agency guidance has been incorporated which is considered appropriate given that the Proposed Development will need to satisfy the industrial permitting requirements set out by the Environment Agency.

8.2.26 The IAQM (2017) guidance includes the following matrix which should be used to describe the impact based on the change in concentration relative to the AQAL and the overall predicted concentration from the scheme - i.e. the future baseline plus the process contribution.

Table 8.4: Magnitude of Change Descriptors

Long term average concentration at receptor in assessment year	% change in concentration relative to the Air Quality Assessment Level (AQAL)			
	1	2-5	6-10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

8.2.27 It is intended that the change in concentration relative to the AQAL (the process contribution) is rounded to the nearest whole number. Therefore, any impact which is between 0.5% and 1.5% would be classified as a 1% change in concentration. An impact of less than 0.5% is described as negligible, irrespective of the total concentration.

8.2.28 The above matrix is only designed to be used with annual mean concentrations. The approach for assessing the impact of short-term emissions has been carried out in line with the IAQM (2017) guidance. This does not take into account the background concentrations as it is noted that background concentrations are less important in determining the severity of impact for short term concentrations.

8.2.29 Consequently, for short term concentrations (i.e. those averaged over a period of an hour or less), the following descriptors of change are used to describe the impact:

- < 10% - negligible;
- 10 - 20% - slight;
- 20 - 50% - moderate; and
- > 50% - substantial.

8.2.30 Following quantification of the magnitude of change the assessor should determine the significance of effect using professional judgement and should take into account such factors as:

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

8.2.31 The IAQM (2017) states that, in relation to the significance of short-term impacts, *"In most cases, the assessment of impact severity for a proposed development will be governed by the long-term exposure experienced by receptors and it will not be a necessity to define the significance of effects by reference to short-term impacts. The severity of the impact will be substantial when there is a risk that the relevant AQAL for short-term concentrations is approached through the presence of the new source, taking into account the contribution of other prominent local sources."*

8.2.32 Therefore, if a short-term impact cannot be screened out as negligible or insignificant, consideration will be given to the risk of exceeding the short-term AQAL when determining the significance of effect.

8.2.33 The IAQM (2017) guidance does not provide any descriptors for averaging periods of between 1 hour and a year. Therefore, for these periods the Air Emissions Guidance criteria have been used, which state that:
"process contributions can be considered insignificant if:

- *the long term process contribution is <1% of the long term environmental standard; and*
- *the short term process contribution is <10% of the short term environmental standard."*

8.2.34 Where an impact cannot be screened out as "insignificant" based on the outputs of the initial screening and modelling, the significance of the effect has been determined based on professional scientific judgement of the likelihood of emissions causing an exceedance of an AQAL. This is a standard approach which allows the risk and likelihood of exceedance to be investigated and assessed in detail, following the first stage assessment.

8.2.35 In addition, the Environment Agency guidance document 'Guidance on assessing group 3 metals stack emissions from incinerators - V.4 June 2016' for assessing the impact of emissions of metals relative to their respective AQALs, states that where the process contribution (PC) for any metal exceeds 1% of the long term or 10% of the short term environmental standard (in this case the AQAL), this is considered to have potential for significant pollution. Where the PC exceeds these criteria, the Predicted Environmental Contribution (PEC) should be compared to the environmental standard. The PEC can be screened out where the PEC is less than the environmental standard. Where the impact is within these parameters, it can be

concluded that there is no risk of exceeding the AQAL and, as such, the magnitude of change and significance of effect is considered negligible.

8.2.36 For those substances which have the potential to accumulate in the environment, Tolerable Daily Intakes (TDI) (the amount of contaminant which can be ingested daily over a lifetime without appreciable health risk) and Index Doses (ID) (a level of exposure which is associated with a negligible risk to human health), are defined. Where the impact of process emissions is within these levels, emissions are expected to make a negligible impact on human health.

8.2.37 In June 2019 the IAQM released the guidance document 'A guide to the assessment of air quality impacts on designated nature conservation sites' (the IAQM (2019) guidance). This guidance draws on the Environment Agency's Air Emissions Guidance, which states that to screen out impacts as 'insignificant' at European and UK statutory designated sites:

- the long-term process contribution must be less than 1% of the long-term environmental standard (i.e. the Critical Level or Load); and
- the short-term process contribution must be less than 10% of the short-term environmental standard.

8.2.38 If the above criteria are met, no further assessment is required. If the long-term process contribution exceeds 1% of the long-term environmental standard, the PEC must be calculated and compared to the standard. If the resulting PEC is less than 70% of the long-term environmental standard, the Air Emissions Guidance states that the emissions are 'insignificant' and further assessment is not required. In accordance with the guidance, calculation of the PEC for short-term standards is not required.

8.2.39 The Air Emissions Guidance states further that to screen out impacts as 'insignificant' at local nature sites:

- the long-term process contribution must be less than 100% of the long-term environmental standard; and
- the short-term process contribution must be less than 100% of the short-term environmental standard.

8.2.40 In accordance with the Air Emissions Guidance, calculation of the PEC for local nature sites is not required. However, with regard to locally designated sites, the

IAQM (2019) guidance states: *"For local wildlife sites and ancient woodlands, the Environment Agency uses less stringent criteria in its permitting decisions. Environment Agency policy for its permitting process is that if either the short-term or long-term PC is less than 100% of the critical level or load, they do not require further assessment to support a permit application. In ecological impact assessments of projects and plans, it is, however, normal practice to treat such sites in the same manner as SSSIs and European Sites, although the determination of the significance of an effect may be different. It is difficult to understand how the Environment Agency's approach can provide adequate protection."*

8.2.41 As such, it is considered appropriate to apply the screening criteria for SSSIs and European Sites to locally designated sites to screen out the requirement for further consideration of the significance of effect for planning. Where an impact cannot be screened out as 'insignificant' further analysis has been undertaken by the project ecologist and this analysis is provided in Appendix 8-5.

Operational Phase - Fugitive Dust and Odour

8.2.42 The IAQM (2018) guidance has been developed to assist in the assessment of the effects of odour on amenity. The IAQM note that before an adverse effect can occur there must be odour exposure. For odour exposure to occur all three links in the source-pathway-receptor chain must be present. The magnitude of effect experienced is determined by the scale of the exposure (considering the Frequency, Intensity, Duration and Odour unpleasantness, FIDO) and the sensitivity of the receptor (L, denoting the location), which is often taken to be a surrogate for the sensitivity and incorporates the social and physical factors that can be expected for a given community.

8.2.43 As with the dust assessment the likely magnitude of effect is a combination of the risk of exposure and the sensitivity of the receptors. The risk of exposure is determined based on the source odour potential and the pathway effectiveness.

8.2.44 When determining the risk of exposure, the first stage is to categorise the source odour potential using the following risk ranking:

Table 8.5: Source Odour Potential Criteria

Source Potential	Description
Large	• Larger Permitted processes of odorous nature or large Sewage Treatment Works (STWs). • Highly odorous compounds with very low detection thresholds with unpleasant to very unpleasant odours. • Open air operation with no containment.
Medium	• Smaller Permitted processes or small STWs. • Moderately odorous compounds with neutral to unpleasant odours. • Some mitigation measures in place, but significant residual odour remains.
Small	• Smaller Permitted processes or small STWs. • Processes classed as "Less offensive. • Effective, tangible mitigation measures in place (e.g. Best Available Techniques (BAT), Best Practicable Means (BPM) leading to little or no residual odour.

8.2.45 The next stage is to determine the pathway effectiveness as a transport mechanism for odour. This includes consideration of the distance, whether the receptors are down wind of the odour source, the effectiveness of the release, the topography and terrain between the source and receptor. Using the following risk ranking the pathway effectiveness can be categorised as ineffective, moderately effective or highly effective.

Table 8.6: Pathway Effectiveness Criteria

Pathway Effectiveness	Description
Highly effective	• Receptor is adjacent to the source/site. • Direction – high frequency (%) of winds from source to receptor (or, qualitatively, receptors downwind of source with respect to prevailing wind).
Moderately effective	• Receptor is local to the source.
Ineffective	• Receptor is remote from the source. • Direction – low frequency (%) of winds from source to receptor (or, qualitatively, receptors upwind of source with respect to prevailing wind).

8.2.46 The risk of odour at receptor locations is then determined using the following matrix considering the pathway effectiveness and source odour potential.

Table 8.7: Risk of Odour Exposure Criteria

Pathway Effectiveness	Source Odour Potential		
	Small	**Medium**	**Large**
Highly effective	Low Risk	Medium Risk	High Risk
Moderately effective	Negligible Risk	Low Risk	Medium Risk
Ineffective	Negligible Risk	Negligible Risk	Negligible Risk

8.2.47 The sensitivity of receptors to odours is determined using the following principles.

Table 8.8: Sensitivity of Receptor

Sensitivity of receptor	Description
High	Surrounding land where: • users can reasonably expect enjoyment of a high level amenity; and • people would reasonably be expected to be present here continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. Examples may include residential dwellings, hospitals, schools/education and tourist/cultural.
Medium	Surrounding land where: • users would expect to enjoy a reasonable level of amenity, but wouldn't reasonably expect to enjoy the same level as amenity as in their home; or • people wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land. Examples may include places of work, commercial/retail premises and playing/recreation fields.
Low	Surrounding land where: • the enjoyment of amenity would not reasonably be expected; or • there is transient exposure, where the people would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land. Examples may include industrial use, farms, footpaths and roads.

8.2.48 The next step is to estimate the effect of that odour impact on the exposed receptor, taking into account its sensitivity, as shown by the following matrix.

Table 8.9: Odour Impact Criteria

Risk of Odour Exposure	Receptor Sensitivity		
	Low	Medium	High
High risk	Slight Adverse	Moderate Adverse	Substantial Adverse
Medium risk	Negligible	Slight Adverse	Moderate Adverse
Low risk	Negligible	Negligible	Slight Adverse
Negligible	Negligible	Negligible	Negligible

8.2.49 Where the overall effect is greater than "slight adverse" the effect is likely to be considered significant.

8.2.50 Although not specifically developed for assessing fugitive dust from operational sites the approach for construction dust has been applied when determining the impact of fugitive dust release from the Site in lieu of any other specific guidance.

Limitations

8.2.51 Limitations of the assessment have been taken into account wherever possible. For instance:

- The assessment has been undertaken using standard methods outlined in guidance produced by the Environment Agency and the IAQM. Standard assessment criteria, developed by nationally recognised institutions, minimise any uncertainty on the applicability of the approach used.
- Baseline data has been collected from local and national monitoring networks. Where site specific monitoring is not available, worst-case assumptions have been made and if impacts cannot be screened out as negligible irrespective of the baseline concentration, then the choice of baseline concentrations has been considered in greater detail.
- The impact of process emissions from the Proposed Development has been determined, based on operation at the ELVs. In practice the Proposed Development will operate below the ELVs and will be offline for periods of maintenance. Therefore, impacts would be even lower.
- The assessment has used five years of meteorological data to ensure inter-annual variability is taken into account and considered the predicted concentrations at the point of maximum impact and receptor locations.

- A range of sensitivities of model inputs have been analysed in line with best practice. Where assumptions have been made, these are conservative yet realistic.

8.3 Baseline

Dust and Odour

8.3.1 The Site is within a trading estate. Adjacent to the Site is the existing mechanical and biological treatment (MBT) Facility. There is also a hazardous waste management site approximately 350 m to the south. The baseline odour in the local area is potentially impacted by these facilities. However, each facility is required to control odour beyond its installation boundary as a requirement of their respective Environmental Permits. Therefore, these should not be a source of considerable odour in the area. No other potentially significant sources of odour, such as wastewater treatment plants or other waste sites, have been identified in the local area. The closest wastewater treatment works is 1.2 km from the Site. Therefore, the baseline odour levels are not expected to be significant.

Atmospheric Pollution

8.3.2 A detailed review of baseline atmospheric pollution levels has been undertaken as provided in Appendix 8-1. This has included a review of local and national monitoring networks, and nationally modelling background data.

8.3.3 This analysis has shown that the monitoring of pollutants is limited. In lieu of any local monitoring of other pollutants reference has been made to the DEFRA mapped background dataset and national monitoring networks. This has shown that background concentrations (away from the local road network) are below the AQAL. For other pollutants, not included in the DEFRA mapped background dataset, to determine the baseline concentrations for this assessment reference has been made to national monitoring data and estimates of the local conditions made based on the maximum monitored concentrations for sites in a similar setting to the application Site.

Sensitive Receptors

Dust Sensitive Receptors

8.3.4 As a worst-case assumption, it has been assumed that dust generating activities will occur at the boundary of the Site. Figure 8.1 illustrates the screening distances for dust sensitive receptors from the boundary of the Site.

8.3.5 The IAQM methodology is based on:

- The dust emission magnitude for each activity undertaken at the site - which is based on the scale of each activity; and
- The sensitivity of the area - which is based on the number of properties within certain distances of the boundary of the works.

8.3.6 The following table outlines how many sensitive human receptor locations have been identified in the relevant distance bands from the Site. For clarity, the IAQM methodology states that one residential unit is one high sensitivity receptor.

Table 8.10: Dust Sensitive Receptors

Distance (m)	Estimated number of residential units			
	From Site Boundary		From Site Access Routes	
	High Risk	Medium Risk	High Risk	Medium Risk
< 20	0	0	13	8
< 50	0	2	25	12
< 100	2	~10	-	-
< 200	3	~30	-	-
< 350	~40	~55	-	-

8.3.7 There are a number of both high and medium risk receptors within the human receptor screening distances (i.e. within 350 m of the site boundary, or 50 m by any route used by construction vehicles on the public highway, up to 500 m from the site entrance) indicating the need for further assessment for human receptors.

8.3.8 No hospitals, schools, or hotels have been identified within the relevant screening distances. However, Westbury Lodge care home is located within 350 m of the Site, and is considered within the High Risk human receptors count in Table 8.10. There

are also a number of commercial and industrial premises surrounding the Site within 350 m, including the adjacent dairy. These have been considered in the medium risk human receptors count as shown in Table 8.10.

8.3.9 No designated ecological receptors have been identified within 50 m of the Site boundary or the route used by construction vehicles on the public highway, up to 500 m from the Site entrance. Therefore, there are no ecological receptors which require consideration in this assessment.

Odour Sensitive Receptors

8.3.10 The following table outlines the odour sensitive receptors identified for the purpose of this assessment, including their relative sensitivities to odour effects. These are displayed on Figure 8.2.

Table 8.11: Odour Sensitive Receptors

ID	Receptor Name	Sensitivity	Location		Distance from Site boundary (m)	Distance from Tipping Hall (m)
			X (m)	Y (m)		
OR1	Oakfield Business Centre	Medium	385676	152219	94	186
OR2	23 Storridge Road	High	385917	152362	286	410
OR3	Savencia Fromage & Dairy UK	Low	385858	152173	101	231
OR4	Brook Lane 1 (Residential)	High	385900	152063	61	209
OR5	Brook Lane 2 (Trading)	Medium	385926	152006	85	218
OR6	Brook Lane 3 (Trading)	Medium	385880	151936	101	174
OR7	Brook Lane 4(Trading)	Medium	385868	151825	190	218
OR8	Brook Lane 5 (Residential)	High	385561	151568	368	411
OR9	Brook Drove 1 (Farm)	Low	385551	151768	190	234
OR10	Brook Drove 2 (Residential)	High	385496	151812	199	240
OR11	Biss Brook Footpath 1	Low	385396	151931	197	268
OR12	Biss Brook Footpath 2	Low	385362	152061	233	291
OR13	Westbury Dairies	Medium/ High	385631	152069	21	53

8.3.11 The above is not an exhaustive list of sensitive receptors in the local area but those chosen to represent the closest likely areas of exposure in each wind direction. The identification of receptors has been limited to an area of 500 m from the Site boundary. The adjacent Westbury Dairies facility is an industrial process and as such would typically be considered to a medium sensitive receptor. However, as this process is potentially sensitive to odour (as noted in the previous applications for the Site) the sensitivity of this receptor has been increased to medium / high.

Process Emissions - Human Sensitive Receptors

8.3.12 The general approach to the assessment is to evaluate the highest predicted process contribution to ground level concentrations. In addition, the predicted process contribution has been evaluated at a number of sensitive receptor locations. These locations are displayed in Figure 8.3 and listed in the following table.

Table 8.12: Process Emissions Sensitive Receptors

ID	Receptor Name	Location		Distance from Stack (m)
		X (m)	Y (m)	
R1	Westbury Dairies	385654	152070	134
R2	Storridge Road 1	385947	152331	318
R3	Storridge Road 2	386022	152265	314
R4	Westbury Lodge	386078	152180	316
R5	Brook Lane 1	385912	152056	125
R6	Cossington Square	386351	152058	564
R7	Primmers Place 1	386416	151994	632
R8	Primmers Place 2	386496	151911	724
R9	Station Road	386523	151833	769
R10	Bridge Court	386474	151680	783
R11	Oldfield Road	386374	151590	749
R12	Phoenix Rise	386259	151457	763
R13	Hackney Way	386112	151140	972
R14	Sandlewood Road	386035	150412	1663
R15	Brook Lane 2	385564	151571	534
R16	Brook Drove 1	385494	151811	382
R17	Penleigh Road	385503	150879	1,211

ID	Receptor Name	Location		Distance from Stack (m)
		X (m)	Y (m)	
R18	Brook Drove 2	385021	151871	788
R19	Brokerswood Road	384441	153475	1,956
R20	Brook, Heywood	385051	153408	1,539
R21	High Wood	383896	152422	1,926
R22	Bebe Tots Nursery	387461	151765	1,699
R23	Bitham Brook Primary School and Kingfisher Nurseries	387679	151716	1,922
R24	Daisy Chain Pre- School	387043	151316	1,458
R25	Matravers School	386950	150932	1,617
R26	Bright Stars Pre-School	386721	150943	1,453
R27	Bright Stars Nursery	386646	151204	1,210
R28	Westbury Infant School	386647	151274	1,162
R29	Westbury C of E Junior School	386522	151267	1,078
R30	Westbury Leigh Primary School	385983	150314	1,753
R31	Ditton Marsh C of E Primary School and Step-up Pre-School	384878	149720	2,507
R32	On Track Education Centre	385679	153095	1,045

Process Emissions - Ecological Sensitive Receptors

8.3.13 The Air Emissions Guidance states that the following sites of ecological importance should be considered:

- Special Protection Areas (SPAs), Special Areas of Conservation (SACs), or Ramsar sites within 10 km of the site (or 15 km for a coal- or oil- fired power station);
- Sites of Special Scientific Interest (SSSIs) within 2 km of the site; and
- National Nature Reserves (NNR), Local Nature Reserves (LNRs), Local Wildlife Sites (LWSs) and ancient woodlands within 2 km of the site.

8.3.14 Picket and Clanger Wood SSSI lies out of the 2 km screening boundary. However, it is located downwind of the prevailing wind direction and was included in the previous assessments for the Site. Therefore, this site has been included in the assessment. Westbury Ironstone Quarry SSSI has been identified within 2 km screening zone but is significant for geological reasons rather than ecological ones, therefore this is not

considered to be sensitive to air quality impacts and has not been considered further in this assessment.

8.3.15 The locations of these sensitive ecological receptors are listed in the following table and displayed in Figure 8.4. A review of the citation and APIS website for each site has been undertaken to determine if lichens are an important part of the ecosystem's integrity, for the purposes of determining the relevant Critical Level for the habitat.

Table 8.13: Process Emissions – Ecologically Sensitive Receptors

Site	Distance from the Stack at the Closest Point (km)	Lichens identified as present?
European designated sites within 10 km		
Salisbury Plain	3.5	Yes
UK designated sites		
Picket and Clanger Wood	2.3	Yes
Local sites within 2 km		
High Wood/Hazel Wood	1.8	Yes[1]
Round Wood	1.5	Yes[1]
Note: [1] No information available on lichen presence. Assumed 'Yes' as a conservative measure.		

8.3.16 Reference should be made to Appendix 8-3 for full details of the discrete receptor points used to assess the impact on these ecological sites, the habitats present at each site and the habitat-specific Critical Loads.

8.4 Assessment of Effects

Incorporated Mitigation

8.4.1 The Proposed Development will require an Environmental Permit in order to operate. The Permit will include a list of conditions including limits on emissions to air known as ELVs. For the purpose of this ES Chapter, it has been assumed that the Proposed Development complies with the requirements of the Environmental Permit.

8.4.2 At the Proposed Development all operations will be conducted within enclosed buildings, and vehicles would deposit waste into an enclosed tipping hall. The tipping hall would be held under negative pressure, with the air being used in the combustion

process. This prevents the release of odours and dust from the building when the doors are opened for short periods for deliveries. Residual waste would be stored within a waste bunker, albeit this would be within the enclosed waste tipping hall and waste would not be stored for prolonged periods helping to minimise the conditions which can lead to the generation of malodours. There would be no waste stored outside the buildings. Any odours from the waste stored within the bunker would be drawn into the combustion process by the induced draft fan, where the odorous compounds would be destroyed as a result of the high temperatures within the furnace. Therefore, there would be no release of odour from the stack emissions.

8.4.3 In the event of a planned shut-down / closure, the incoming waste would be managed such that residual waste in the waste bunker would be processed prior to shut-down and the amount of residual waste remaining in the waste bunker would be minimal. However, the proposals also include for a secondary odour abatement system which will involve a carbon filter to abate the odour prior to release to atmosphere via a dedicated stack. This would be in operation whenever the combustion air for the ERF is not needed. This would minimise the risk of odours during these events.

8.4.4 It should be noted that as part of the Environmental Permit needed for the Proposed Development, all emissions, including fugitive dust and odour, would be controlled to ensure there is no impact beyond the installation boundary.

Construction Phase

8.4.5 Potential air quality impacts during the construction phase have been identified as:

- Generation of dust from construction activities on Site; and
- Generation of exhaust emissions from construction phase traffic.

Generation of Dust from Construction Activities on Site

8.4.6 The risk of dust emissions from a construction site causing loss of amenity and / or health or ecological effects is related to:

- The activities being undertaken (demolition, number of vehicles and plant etc.);
- The duration of these activities;
- The size of the site;
- The meteorological conditions (wind speed, direction and rainfall);

- The proximity of receptors to the activity;
- The adequacy of the mitigation measures applied to reduce or eliminate dust; and
- The sensitivity of the receptors to dust.

8.4.7 The quantity of dust emitted is related to the area of land being worked and the level of construction activities, in terms of the nature, magnitude and duration of those activities. The wind direction, wind speed and rainfall at the time when a construction activity is taking place will also influence whether there is likely to be a dust impact. Atmospheric conditions which promote adverse impacts can occur in any direction from the site. However, adverse impacts are more likely to occur downwind of the prevailing wind direction and / or close to the worked areas. Impacts are also more likely to occur during drier periods as rainfall acts as a natural dust suppressant.

8.4.8 Dust impacts from demolition activities have been screened out from the assessment as there are no demolition activities needed to construct the Proposed Development. The dust emission magnitude for earthworks, construction and trackout activities has been classified using the criteria outlined in Table 1 of Appendix 8-2:

- Earthworks - The total area of the Site is >10,000 m^2, and there will be a considerable amount (9,900 m^3) of earth excavation and earth movement required to dig the bunker hall. The site will be levelled to 62 m AOD and the surplus material used in a screening bund adjacent to the site. On this basis, the dust emission magnitude is classified as ‘large’.
- Construction - The total building volume is likely to be >100,000m^3 and involve potentially dusty activities. As a conservative assumption, the dust emission magnitude is deemed to be 'large'.
- Trackout - The peak HGV movement during construction is 50 movements per day. For a development of this scale and nature the dust emission magnitude from trackout is deemed to be 'large'.

8.4.9 The sensitivity of the area to dust effects is defined in the following table, taking into account the number of receptors and proximity to the source of potential dust emissions using the criteria outlined in Table 2 to Table 7 of Appendix 8-2.

Table 8.14: Sensitivity of the Surrounding Area

Activity	Sensitivity	Justification
Earthworks and Construction		
Dust soiling	Low	The closest sensitive receptors are classified as medium risk receptors and over 20 m of the Site boundary. The closest high risk receptors are over 100 m from the Site boundary
Human health impacts	Low	The closest sensitive receptors are classified as medium risk receptors and are over 20 m of the Site boundary. The closest high risk receptors are over 100 m from the Site boundary. The annual mean PM_{10} concentration are <24 µg/m^3.
Ecological effects	n/a	No ecological sites have been identified within the screening distances
Trackout		
Dust soiling	High	There are 13 high risk receptors within 20 m of the routes used by construction vehicles up to 500 m from the Site entrance, which have risk of being subject to trackout.
Human health impacts	Low	There are 13 high risk receptors within 20 m of the routes used by construction vehicles up to 500 m from the Site entrance, but the annual mean PM_{10} concentration is <24 µg/m^3.
Ecological effects	n/a	No ecological sites have been identified within the screening distances

8.4.10 The risk of dust impacts from construction activities is summarised in the following table. This is based on the dust emission magnitude and the sensitivity of the area.

Table 8.15: Summary of Dust Risk to Define Site Specific Mitigation

Activity	Risk	Justification
Demolition	N/a	No demolition activities to take place.
Earthworks	Low Risk	The dust emission magnitude is large but the sensitivity of the area is low.
Construction	Low Risk	The dust emission magnitude is large but the sensitivity of the area is low.
Trackout	High Risk	The dust emission magnitude is large and the sensitivity of the area to dust soiling is high.

8.4.11 In summary, the Site has been assessed to be of low risk for dust soiling and human health effects associated with earthworks and construction activities. However, the risk of the Site has been assessed as high risk for dust soiling and human health effects associated with trackout activities. There is no risk of ecological impacts.

8.4.12 In accordance with the IAQM assessment methodology, the risk category of the site is used to define suitable mitigation measures to minimise the risk which would be implemented via the Construction Environmental Management Plan (CEMP). Potential mitigation measures are detailed in the mitigation section of this chapter. These are based on a low risk site for earthworks and construction and high risk site for trackout. With the implementation of these mitigation measures the residual risk is not expected to be significant.

8.4.13 It should be recognised that any impacts would be temporary in nature, short-term in duration and would only occur during the construction period.

Generation of Exhaust Pollutants from Construction Phase Traffic

8.4.14 As set out in chapter 10 the number of construction phase vehicles is 250 AADT of which 50 are HGVs. This does not exceed the screening criteria – i.e. the change in LDV flows is less than 500 AADT, and the change in HGV flows is less than 100 AADT. Therefore, the Proposed Development is not expected to cause a significant change and the significance of effect is deemed to be negligible. Further consideration has been made to the change in vehicle numbers in the AQMA. This has shown that the predicted change in vehicles is 66 AADT of which 14 are HGVs. This does not exceed the screening threshold of 25 HGVs in an AQMA. Therefore, the Proposed Development is not expected to cause a significant change in vehicle numbers in the AQMA and the significance of effect is deemed to be negligible.

Operational Phase

8.4.15 Potential air quality impacts during the operational phase have been identified as:

- Generation of exhaust pollutants from operational phase traffic;
- Generation of process emissions from the Proposed Development; and
- Generation of dust and odour from operational phase activities on Site.

Generation of Exhaust Pollutants from Operational Phase Traffic

8.4.16 As set out in chapter 10 the number of operational phase vehicles is 110 AADT of which 54 are HGVs. This does not exceed the screening criteria – i.e. the change in LDV flows is less than 500 AADT, and the change in HGV flows is less than 100

AADT. Therefore, the Proposed Development is not expected to cause a significant change and the significance of effect is deemed to be negligible. Further consideration has been made to the change in vehicle numbers in the AQMA. This has shown that the predicted change in vehicles is 32 AADT of which 16 are HGVs. This does not exceed the screening threshold of 25 HGVs in an AQMA. Therefore, the Proposed Development is not expected to cause a significant change in vehicle numbers in the AQMA and the significance of effect is deemed to be negligible.

Operational Phase Process Emissions

8.4.17 Full details of the modelling methodology, input parameters, assumptions, sensitivity analysis, and results can be found in Appendix 8-3.

8.4.18 It should be noted that the first stage of the assessment is considered highly conservative as it assumes that:

- The Proposed Development operates at the ELVs for the entire year;
- The worst-case conversion of NOx to NO_2 has been applied;
- The entire dust emissions are assumed to consist of either PM_{10} or $PM_{2.5}$;
- The entire Volatile Organic Compound (VOC) emissions are assumed to consist of either benzene or 1,3-buitadiene; and
- Cadmium is released at the combined ELV for cadmium and thallium.

8.4.19 The following tables provides a summary of the maximum impact of process emissions when the Proposed Development is operating at the daily and short-term ELVs

Table 8.16: Summary of Dispersion Modelling Results – Point of Maximum Impact – Daily ELVs

Pollutant	Quantity	Units	AQAL	Background	PC	PC as % of AQAL	PEC	PEC as % of AQAL
Nitrogen dioxide	Annual mean	µg/m³	40	13.19	0.76	1.89%	13.95	34.87%
	99.79th%ile of hourly means	µg/m³	200	26.38	5.04	2.52%	31.42	15.71%
Sulphur dioxide	99.18th%ile of daily means	µg/m³	125	4.42	1.89	1.51%	6.31	5.05%
	99.73rd%ile of hourly means	µg/m³	350	4.42	3.57	1.02%	7.99	2.28%
	99.9th%ile of 15 min. means	µg/m³	266	4.42	4.06	1.53%	8.48	3.19%
PM_{10}	Annual mean	µg/m³	40	14.91	0.05	0.11%	14.96	37.39%
	90.41th%ile of daily means	µg/m³	50	29.82	0.15	0.30%	29.97	59.94%
$PM_{2.5}$	Annual mean	µg/m³	25	9.77	0.05	0.18%	9.82	39.26%
Carbon monoxide	8 hour running mean	µg/m³	10,000	532	8.20	0.08%	540.20	5.40%
	Hourly mean	µg/m³	30,000	532	10.63	0.04%	542.63	1.81%
Hydrogen chloride	Hourly mean	µg/m³	750	1.42	1.27	0.17%	2.69	0.36%
Hydrogen fluoride	Annual mean	µg/m³	16	2.35	0.01	0.06%	2.36	14.74%
	Hourly mean	µg/m³	160	4.7	0.21	0.13%	4.91	3.07%
Ammonia	Annual mean	µg/m³	180	2.93	0.09	0.05%	3.02	1.68%
	Hourly mean	µg/m³	2,500	5.86	2.13	0.09%	7.99	0.32%
VOCs (as benzene)	Annual mean	µg/m³	5	0.39	0.09	1.80%	0.48	9.60%

Pollutant	Quantity	Units	AQAL	Background	PC	PC as % of AQAL	PEC	PEC as % of AQAL
VOCs (as benzene)	Hourly mean	µg/m³	195	0.78	2.13	1.09%	2.91	1.49%
VOCs (as 1,3-butadiene)	Annual mean	µg/m³	2.25	0.16	0.09	4.01%	0.25	11.12%
Mercury	Annual mean	ng/m³	250	20.01	0.18	0.07%	20.19	8.08%
	Hourly mean	ng/m³	7500	40.02	4.25	0.06%	44.27	0.59%
Cadmium	Annual mean	ng/m³	5	0.57	0.18	3.61%	0.75	15.01%
	Hourly mean	ng/m³	-	1.14	4.25	-	5.39	-
PAHs	Annual mean	pg/m³	250	980	0.95	0.38%	980.95	392.38%
Dioxins	Annual mean	fg/m³	-	32.99	0.54	-	33.53	-
PCBs	Annual mean	ng/m³	200	0.13	0.05	0.02%	0.17	0.09%
	Hourly mean	ng/m³	6000	0.26	1.06	0.02%	1.32	0.02%

Table 8.17: Summary of Dispersion Modelling Results – Point of Maximum Impact – Short-term ELVs

Pollutant	Quantity	Units	AQAL	Background	PC	PC as % of AQAL	PEC	PEC as % of AQAL
Nitrogen dioxide	99.79th%ile of hourly means	µg/m³	200	26.38	16.80	8.40%	43.18	21.59%
Sulphur dioxide	99.73rd%ile of hourly means	µg/m³	350	4.42	23.81	6.80%	28.23	8.07%
	99.9th%ile of 15 min. means	µg/m³	266	4.42	27.07	10.18%	31.49	11.84%
Carbon monoxide	8 hour running mean	µg/m³	10,000	532	16.40	0.16%	548.40	5.48%
	Hourly mean	µg/m³	30,000	532	21.27	0.07%	553.27	1.84%
Hydrogen chloride	Hourly mean	µg/m³	750	1.42	12.74	1.70%	14.16	1.89%
Hydrogen fluoride	Hourly mean	µg/m³	160	4.7	0.85	0.53%	5.55	3.47%
VOCs (as benzene)	Hourly mean	µg/m³	195	0.78	4.25	2.18%	5.03	2.58%
Mercury	Hourly mean	ng/m³	7,500	40.02	7.44	0.10%	47.46	0.63%

8.4.20 As shown, at the point of maximum impact the contribution from the Proposed Development is less than 10% of the short term AQAL and less than 0.5% of the annual mean AQAL and can be screened out as negligible irrespective of the total concentration in accordance with the stated assessment methodology, with the exception for the following:

- Annual mean nitrogen dioxide impacts;
- 15-minute sulphur dioxide impacts;
- Annual mean VOC impacts; and
- Annual mean cadmium impacts.

8.4.21 For the above, further analysis of the likely future baseline concentrations has been undertaken to define the magnitude of change for annual mean impacts for, and the extent of relevant exposure has been undertaken to determine the magnitude of change for short-term impacts

Annual mean nitrogen dioxide impacts

8.4.22 For annual mean nitrogen dioxide, the process contribution at the point of maximum impact is 1.89% of the AQAL. Therefore, consideration needs to be given to baseline concentrations in order to determine the PEC. Figure 8.5 shows the spatial distribution of annual mean nitrogen dioxide impacts as a percentage of the annual mean AQAL. As shown, the point of maximum impact occurs in a small field to the north east of the proposed development off Station Road (i.e. an area where the annual mean AQAL does not apply). Baseline concentrations in the area where the point of maximum impact occurs are likely to be similar to the mapped background concentration (i.e. 13.19 µg/m^3). Applying this baseline concentration, the PEC at the point of maximum impact would be 34.87% of the AQAL. Therefore, using IAQM guidance the magnitude of change is described as negligible as the process contribution is less than 5.5% of the AQAL and the PEC is less than 75% of the AQAL.

8.4.23 The impact at local residential receptors has also been investigated, the detailed results table is provided in Appendix 8-3. Using the IAQM guidance, the impact at all but nine of the identified specific sensitive receptor locations is less than 0.5% of the AQAL and so can be described as negligible irrespective of baseline concentrations.

8.4.24 The area where impacts are greater than 0.5% of the AQAL are two distinct areas to the south-west and north-east of the Proposed Development. As shown in Figure 8.5.

8.4.25 The area to the south-west where the process contribution is greater than 0.5% of the AQAL includes the receptors identified as R15, R16 and R18. There are a few additional residential properties in this area which are not included as specific receptors. This area is distanced from any main road and therefore baseline concentrations are likely to be similar to the mapped background concentration which is 13.19 µg/m^3 (or 33 % of the AQAL). The PEC is well below 75% of the AQAL. Therefore, using the IAQM guidance the magnitude of change is described as negligible.

8.4.26 The area to the north-east where the process contribution is greater than 0.5% of the AQAL includes the receptors identified as R2 to R4 and R6 to R9. These are all located along Storridge Road and the B3097.There are also a number of additional residential properties in this area which are not included as specific receptors. This area is adjacent to the road and therefore baseline concentrations are likely to be greater than the mapped background concentration.

8.4.27 A review of the local monitoring (Appendix 8-1) shows that analyser P18/108 is most likely to be representative of conditions adjacent to Storridge Road and the B3097. Monitoring at this site is only available from 2018. However, this showed that monitored concentrations were 17 µg/m^3 (or .42.5% of the AQAL). The other site of note is P18/57 which is located adjacent to the A350 which is a much busier road. Concentrations at this site ranged between 29 µg/m^3 and 36 µg/m^3 (or 72.5% and 90% of the AQAL) between 2015 and 2018. This is only really applicable for conditions along the A350 due to the significantly higher traffic rates along this road.

8.4.28 Even applying the worst-case assumption that baseline concentrations for receptors along Storridge Road and the B3097 are similar to that monitored along the A350 the PEC is less than 95% of the AQAL. As the process contribution is between 0.5% and 1.5% of the AQAL in this area the magnitude of change is described as negligible.

8.4.29 It is noted that operational phase vehicles will travel along the local road network and are a source of emissions of oxides of nitrogen. As set out previously, the change in

vehicle numbers is well below the screening threshold and deemed to be negligible. It is unlikely that the magnitude of change would be described as anything other than negligible even if the additional contribution from road traffic is included, as the contribution from process emissions is small and the baseline concentrations relatively low. Therefore, the in combination nitrogen dioxide impact of process and road traffic emissions is deemed to be negligible.

8.4.30 As shown in Figure 8.5 the impact of process emissions is well below 0.5% of the AQAL in the AQMA. The maximum impact is between 0.2 and 0.4% of the AQAL. Therefore, the magnitude of change in the AQMA is described as negligible. Again, the change in vehicle numbers of well below the screening threshold and deemed to be negligible. It is unlikely that the magnitude of change would be described as anything other than negligible even if the additional contribution from road traffic is included, as the contribution from process emissions is small and the baseline concentrations relatively low. Therefore, the in combination nitrogen dioxide impact of process and road traffic emissions in the AQMA is deemed to be negligible.

15-minute sulphur dioxide impacts

8.4.31 As shown in Table 8.17, the 99.9th percentile of 15-minute sulphur dioxide PC from the Proposed Development is predicted to be 10.18% of the AQAL at the point of maximum impact if it assumed that the plant operates at the half-hourly ELV as set out in the IED (i.e. 200 mg/Nm^3). This is four times the daily ELV set in the IED (50 mg/Nm^3). The Waste Incineration BREF introduces a more stringent limit of 30 mg/Nm^3. If the same ratio is applied the maximum process contribution is predicted to be 6.11% of the AQAL. It is unlikely that the plant would operate at the half-hourly ELV during the worst-case weather conditions for dispersion. Therefore, there is little risk that the impact would exceed 10% of the AQAL and the magnitude of change is deemed to be negligible.

Annual mean VOCs impacts

8.4.32 For annual mean VOCs if it is assumed that the entire VOC emissions consist of only benzene, the process contribution at the point of maximum impact is 1.80% of the AQAL. The detailed receptor results (Table 19 in Appendix 8-3) shows that the maximum impact at a receptor is 1.17% of the AQAL. When the baseline concentration of 0.39 µg/m^3 is included, the PEC at the point of maximum impact and at all receptor locations is well below 75% of the AQAL. Therefore, the magnitude of

change is described as negligible, as the maximum impact is less than 5.5% of the AQAL and the PEC is less than 75% of the AQAL. Figure 8.6 shows the spatial distribution of emissions. This is extremely conservative as it assumes that the VOC emissions consist of only benzene.

8.4.33 If it is assumed that the entire VOC emissions consist of only 1,3-butadiene, the process contribution at the point of maximum impact is 4.01% of the AQAL. The detailed receptor results (Table 20 in Appendix 8-3) shows that the maximum impact at a receptor is 2.60% of the AQAL. When the baseline concentration of 0.16 µg/m³ is included, the PEC at the point of maximum impact and at all receptor locations is well below 75% of the AQAL. Therefore, the magnitude of change is described as negligible, as the maximum impact is less than 5.5% of the AQAL and the PEC is less than 75% of the AQAL. Figure 8.7 shows the spatial distribution of emissions. This is extremely conservative as it assumes that the VOC emissions consist of only 1,3-butadiene.

Annual mean cadmium

8.4.34 For annual mean cadmium, the process contribution at the point of maximum impact is 3.61% of the AQAL. The detailed receptor results (Table 21 in Appendix 8-3 shows that the maximum impact at a receptor is 2.34% of the AQAL. When the baseline concentration of 0.57 ng/m³ is included, the PEC at the point of maximum impact and at all receptor locations is well below 75% of the AQAL. Therefore, the magnitude of change is described as negligible, as the maximum impact is less than 5.5% of the AQAL and the PEC is less than 75% of the AQAL. This is extremely conservative as it assumes that the entire cadmium and thallium emissions consist of only cadmium. As detailed in Appendix 8-3 monitoring from facilities processing a similar fuel has indicated that average recorded concentration of cadmium and thallium is 8% of the limit. Figure 8.8 shows the spatial distribution of emissions for the following scenarios:

- Screening - assumes emissions of cadmium at 100% of the ELV for cadmium and thallium
- Worst-case - assumes emissions of cadmium at 50% of the ELV for cadmium and thallium
- Typical - assumes emissions of cadmium at 8% of the ELV for cadmium and thallium

Annual mean heavy metals

8.4.35 The Environment Agency's metals screening guidance has been followed as detailed in Appendix 8-3 This has shown that if it is assumed that the Proposed Development will perform no worse than a currently permitted facility, the predicted process contribution is below 1% of the annual mean AQAL and 10% of the 1-hour AQAL for all metals, with the exception of annual mean arsenic and nickel impacts. However, the PECs for arsenic and nickel are well below 100% of the AQAL and so the impacts can be screened out and the significance of effect of process emissions of metals on human health is considered negligible.

Dioxins and dioxin-like PCBs

8.4.36 A human health risk assessment has been undertaken (see Appendix 8-4). This considers the impact of dioxins and dioxins-like PCBs which have the potential to accumulate in the food chain. This has shown that the impact of the Proposed Development on human health due to the accumulation of dioxins and dioxins-like PCBs in the environment is predicted to be negligible.

Summary of Process Emissions Impacts on Human Health

8.4.37 The assessment of process emissions has drawn the following conclusions:

- The process contribution for most pollutants can be described as negligible irrespective of baseline concentration at the point of maximum impact. However, further analysis has been needed for annual mean impacts of nitrogen dioxide, VOCs and cadmium, and short-term sulphur dioxide impacts.
- When the baseline concentrations are taken into account the magnitude of change of annual mean concentrations is negligible at all areas of relevant exposure. This includes consideration of the in-combination impact of process and road traffic emissions.
- Further analysis of the short-term sulphur dioxide impacts concludes that there is little risk that impacts would be greater than 10% of the AQAL and therefore the magnitude of change is negligible.
- The magnitude of change of nitrogen dioxide emissions in the AQMA can be described as negligible. This includes consideration of the in combination impact of process and road traffic emissions.

- The impact of most metals on human health can be screened out as insignificant irrespective of baseline concentration. However, further analysis has been needed for the impacts of arsenic, and nickel. When baseline concentrations are taken into account, the PEC is well below the AQAL and the impacts can be screened out. Therefore, the effect of process emissions of metals on human health is considered negligible.

8.4.38 Using professional judgement, based on the conservatism in the process emissions modelling assumptions, the overall process emissions associated with the operation of the Proposed Development is predicted to have a 'negligible' and 'not significant' effect on human health.

Impact of Process Emissions on Ecology

8.4.39 Full detailed results tables are provided in Appendix 8-3 showing the impact of process emissions at the identified ecological sites. As shown, the impact is less than 1% of the long-term and less than 10% of the short-term critical level and loads and can be screened out as insignificant for all sites with the exception of Picket and Clanger Wood SSSI. At this site the impacts of the following are greater than the screening criteria:

- Annual mean oxides of nitrogen emissions
- Annual mean ammonia emissions;
- Nitrogen deposition on woodland habitats; and
- Acid deposition on woodland habitats

8.4.40 Further analysis has been undertaken to determine the significance of the impact on Pickett and Clanger Wood SSSI. This analysis is provided in Appendix 8-5 (Ecological Interpretation of Air Quality Assessment.

Plume grounding

8.4.41 The plume visibility modelling can be used to predict the number of visible plumes grounding. This has shown that a visible plume is not predicted to ground under any meteorological condition. This is due to the relatively high temperature of the release ensuring the plume remains buoyant and disperses effectively in the atmosphere.

Operational Phase Dust and Odour Emissions

8.4.42 The IAQM (2018) guidance sets out a methodology for estimation of the effect of odour on a receptor, taking into account the risk of odour exposure (which is a function of the source odour potential and pathway effectiveness) and receptor sensitivity.

8.4.43 The aspects of the Proposed Development likely to give rise to dust and odour are the delivery and unloading of waste. The closest receptor to the Site boundary is Westbury Dairies. It is also the closest receptor to the Tipping Hall where any potential odour would originate. Westbury Dairies is located approximately 53 m from the Tipping Hall. As a place of work, this is considered to be a medium sensitivity receptor. However, as a conservative approach as it has been identified that the potential for odour to taint the milk during the drying process has been raised this has been assessed as a high sensitive receptor.

8.4.44 The odour source potential is considered to be 'small' as the planned odour containment and mitigation measures embedded in the design of the Proposed Development as set out previously are intended to prevent an unacceptable level of odour beyond the Site boundary. In the event of an unplanned shut-down, the combustion process would not be using air extracted from the odourous areas of the building as combustion air. However, the air would be transferred to the odour abatement system and vent to atmosphere via the dedicated stack. Therefore, the odour source potential would remain small.

8.4.45 The risk of odour from the proposed processes at distances greater than 500 m from the source is minimal as odour would dissipate with distance from the source. If odours were to be released from the Proposed Development these would originate from the Tipping Hall. Under calm conditions odour would remain close to this area whereas during turbulent conditions odour would be moved away from the area and dissipate.

8.4.46 The wind roses from Lyneham for 2015 to 2019 (Figure 3 of Appendix 8-3) have been reviewed. There is a distinct peak in frequency of winds from the south west, with a secondary peak in winds from the north-east, winds from other directions occurring with a relatively uniform low frequency. When considering wind direction,

receptors located downwind of the peak in wind direction frequency (to the north-east) have the most effective odour pathway. Receptors not located downwind of the peak wind direction have an ineffective pathway.

8.4.47 Excluding Westbury Dairies (OR13), all identified receptors are over 170 m from the Tipping Hall, as shown on Figure 8.2.

8.4.48 The effectiveness of the pathway from the source to each receptor has been considered using the criteria in Table 8.6.

- OR1 to OR4 are located over 180 m from the source of odour (the Tipping Hall). This is down-wind of the peak in wind directions, but the receptor is at a far enough distance that odour would have dissipated by this point. There will also be some screening provided by the rest of the building. Therefore, the pathway effectiveness to OR1 to OR4 is considered to be 'ineffective'.
- OR5 to OR8 are over 170 m from the source of odour (the Tipping Hall) and winds do not frequently blow in this direction. There will also be some screening provided by the rest of the building for OR5 and OR6. Therefore, the pathway effectiveness to OR5 to OR8 is considered to be 'ineffective'.
- OR9 to OR11 are located over 230 m from the source of odour (the Tipping Hall). This is down-wind of the secondary peak in wind directions, but the receptors are at a far enough distance that odour would have dissipated by this point. Therefore, the pathway effectiveness to OR9 to OR11 is considered to be 'ineffective'
- OR12 is located over 290 m from the source of odour (the Tipping Hall) and winds do not frequently blow in this direction. Therefore, the pathway effectiveness to OR12 is considered to be 'ineffective'
- OR13 is located adjacent to the Site and only 20 m from the potential source of odour (the Tipping Hall). Although mitigation measures should control odour, and winds do not frequently blow in the direction of the receptor, because of its close proximity, the pathway effectiveness to OR13 is 'highly effective'.

8.4.49 Using the criteria in Table 8.8 and Table 8.9, the likely magnitude of odour effects at the receptors considered has been determined as detailed in the following table based on a 'large' odour source potential as a conservative assumption.

Table 8.18: Likely Magnitude of Odour Effects at Receptors

Receptor		Pathway effectiveness	Risk of odour exposure	Likely magnitude of effect
OR1	Oakfield Business Centre	Ineffective	Negligible Risk	Negligible
OR2	23 Storridge Road	Ineffective	Negligible Risk	Negligible
OR3	Savencia Fromage & Dairy UK	Ineffective	Negligible Risk	Negligible
OR4	Brook Lane 1 (Residential)	Ineffective	Negligible Risk	Negligible
OR5	Brook Lane 2 (Trading)	Ineffective	Negligible Risk	Negligible
OR6	Brook Lane 3 (Trading)	Ineffective	Negligible Risk	Negligible
OR7	Brook Lane 4(Trading)	Ineffective	Negligible Risk	Negligible
OR8	Brook Lane 5 (Residential)	Ineffective	Negligible Risk	Negligible
OR9	Brook Drove 1 (Farm)	Ineffective	Negligible Risk	Negligible
OR10	Brook Drove 2 (Residential)	Ineffective	Negligible Risk	Negligible
OR11	Biss Brook Footpath 1	Ineffective	Negligible Risk	Negligible
OR12	Biss Brook Footpath 2	Ineffective	Negligible Risk	Negligible
OR13	Westbury Dairies	Highly effective	Low Risk	Slight Adverse

8.4.50 The likely odour effect under the worst case scenario is ‘negligible’ at receptors with the exception of the Westbury Dairies (OR13), where the effect would be slight adverse.

8.4.51 The IAQM 2018 odour guidance states that ‘where the overall effect is greater than ‘slight adverse’, the effect is likely to be considered significant. Therefore, as the effect at any receptor location is not greater than ‘slight adverse’, the odour effect of the operation of the Proposed Development is not significant.

8.4.52 In order to assess the impact of fugitive dust from the operational phase of the Proposed Development the principals of the approach used to determine construction phase dust impacts have been applied.

8.4.53 A review of the proposals has shown that, during the operational phase, the most significant sources of fugitive dust would arise from the delivery and unloading of waste to the Proposed Development. Noting that the Environmental Permit would ensure any fugitive dust would be controlled to ensure there is no impact beyond the installation Site boundary, the likelihood of significant dust arisings during the operational phase is minimal.

8.4.54 Based on the inherent mitigation the dust emission magnitude of fugitive dust is deemed to be 'small'. All high sensitive receptors are over 200 m from the Tipping Hall and all medium receptors are over 50 m from the Tipping Hall. Baseline PM_{10} concentrations are less than 24 µg/m^3. Therefore, the sensitivity of the area is deemed to be 'low'. The risk of dust impacts during the operational phase is deemed to be 'negligible' as the magnitude of dust emissions is 'small' and the sensitivity of the area is 'low'.

8.4.55 The operational phase fugitive emissions of dust and odour associated with the operation of the Proposed Development are predicted to have a negligible and not significant effect**.**

Bio-aerosols

8.4.56 The previous applications for the site considered the risk of bioaerosol generation and the potential to affect the existing air filtration system at Westbury Dairies. The ES for the 2019 Permission included an assessment of the potential release of bio-aerosols. The 2008 planning application for the Northarce RRC including the MBT had required this due to concerns raised by Westbury Dairies and it was therefore echoed in the ES Scoping received from Wiltshire Council in Nov 2014.

8.4.57 This application is seeking permission for advanced thermal treatment plant using moving grate technology. The Facility will accept residual household waste and C&I wastes which generally has a low organic content. Waste will be delivered and unloaded within the tipping hall which would be kept under negative pressure. The air from the tipping hall would be used as combustion air in the Facility. Any bioaerosols in the extracted air would be removed during the incineration process prior to release via the main stack. Therefore, the potential for bioaerosols to be in the waste is low and there is little risk of any releases during normal operations. The risk of bioaerosol release when the Facility is offline during planning maintenance is low as the level of waste in the bunker would be managed to ensure waste would not be left in the bunker for long periods. In addition, the secondary odour abatement system would act to mitigate and disperse any low residual levels In the event of an unplanned shut-down where the Facility cannot be re-started the secondary odour abatement system would be in operation and any waste would be removed for processing at an alternative facility. These measures would be detailed in the

Environmental Permit application. Therefore, the potential for bioaerosol releases from the Facility is negligible and not significant.

Cumulative Effects

8.4.58 No cumulative schemes have been identified as requiring assessment. Therefore, there is no potential for cumulative effects.

8.5 Mitigation

Construction Phase Mitigation Measures

8.5.1 The construction dust assessment has identified that the risk of the Site causing dust impacts from earthworks and construction is low. However, there is a high risk of impacts from trackout during the period of peak construction.

8.5.2 Appropriate mitigation measures to minimise any impacts as a result of trackout, as highly recommended in the IAQM guidance for a high risk site, are listed here:

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
- Record all inspections of haul routes and any subsequent action in a site log book.
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
- Access gates to be located at least 10 m from receptors where possible.

8.5.3 Further highly recommended mitigation measures for all sites from the IAQM guidance are listed here:

- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.
- Display the name and contact details of person(s) account-able for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.
- Display the head or regional office contact information.
- Develop and implement a Dust Management Plan (DMP).
- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
- Make the complaints log available to the local authority when asked.
- Record any exceptional incidents that cause dust and/or air emissions, either on- or off- site, and the action taken to resolve the situation in the log book.
- Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to visually monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100 m of site boundary, with cleaning to be provided if necessary.
- Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.
- Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
- Fully enclose site or specific operations where there is a high potential for dust production and the site is actives for an extensive period.
- Avoid site runoff of water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.

- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.
- Cover, seed or fence stockpiles to prevent wind whipping.
- Ensure all vehicles switch off engines when stationary - no idling vehicles.
- Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.
- Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on un-surfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
- Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).
- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
- Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.
- Avoid bonfires and burning of waste materials.

Operational Phase Mitigation Measures

8.5.4 In relation to operational impacts, no additional mitigation is required beyond that imbedded into the design and required by legislation, that will be regulated by the Environment Agency under an Environmental Permit.

8.6 Residual Effects and Conclusions

8.6.1 Mitigation measures have been recommended to control construction phase dust impacts in line with the IAQM guidance. With the implementation of these measures any residual effects are deemed to be not significant. No further mitigation measures, beyond those included for in the design of the Facility and legislation, have been recommended.

8.6.2 In conclusion, the Proposed Development is not predicted to give rise to significant environmental effects on air quality, human health and odour in the local area either during the construction or operational phases

8.6.3 Generally, the impact of process emissions is less than the previously consented scheme due to the reduction in the ELVs associated with the implementation of the Waste Incineration BREF. The 2018 ES concluded that the impact of the Proposed Development would be not significant – i.e. the same as this assessment for the revised scheme.