Air Quality Impact Assessment to Support an application to vary an existing bespoke installation permit and add Grade A Wood Processing at Mill Farm, Stone Road, Chebsey, Stafford, ST21 6NX

On behalf of: Mill Farm Recycling Ltd

ETL956/2025

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Abbreviations

AAD	Ambient Air Quality Directive (2008/50/EC)
AcidDep	Acid deposition
AOD	Above Ordnance Datum
APIS	Air Pollution Information System
AQMA	Air Quality Management Area
AQIA	Air Quality Impact Assessment
AQS	Air Quality Standards
AQSR	Air Quality Standards Regulations 2010
AW	Ancient Woodland
BAT	Best Available Techniques
CLo	Critical load (deposition)
CO_2	Carbon dioxide
Defra	Department for the Environment, Food and Rural Affairs
EA	Environment Agency
EAL	Environmental Assessment Level
EC	European Commission
ELV	Emission Limit Value
EPR	Environmental Permitting Regulations
EPUK	Environmental Protection UK
ETL	Earthcare Technical Ltd
EU	European Union
GFS	Global Forecast System
IAQM	Institute of Air Quality Management
IED	Industrial Emissions Directive
kWe	Kilowatts electrical output
kWthi	Kilowatts thermal input
kWtho	Kilowatts thermal output
LAQM	Local Air Quality Management
LWS	Local wildlife site
MCPD	Medium Combustion Plant Directive
MWthi	Megawatts thermal input
MWtho	Megawatts thermal output
n/a	Not applicable
N	Nitrogen
NDep	Nutrient nitrogen deposition
NGR	National Grid Reference
NMVOC	Non-methane VOCs

NO	Nitrous oxide
O_2	Oxygen
PC	Process Contribution
PEC	Predicted environmental concentration
$PM_{2.5}$	Particulate matter less than 2.5 micrometres in diameter
PM_{10}	Particulate matter less than 10 micrometres in diameter
PVRV	Pressure and vacuum relief valve
SBC	Stafford Borough Council
SAC	Special Area of Conservation
SER	Staffordshire Ecological Record
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
TG	Technical Guidance
TVOC	Total gaseous and vaporous organic substances, expressed as total organic carbon
VOC	Volatile organic compounds

Executive Summary

This Air Quality Impact Assessment has been prepared by Earthcare Technical Ltd on behalf of Mill Farm Recycling Ltd in support of an application for the variation of a bespoke environmental permit (Ref: EPR/XP3198EF) at Mill Farm, Stone Road, Chebsey, Stafford, ST21 6NX, the 'Site.' The Site operates activities associated with green waste composting, and wood waste processing operations.

An H1 screening evaluation screened out emissions of particulate matter less than 2.5 micrometres in diameter ($PM_{2.5}$) and carbon monoxide from further assessment. Dispersion modelling has been undertaken to assess air quality impacts of the Site on human and ecological receptors due to those pollutants not screened out by H1:

- Particulate matter less than 10 micrometres in diameter (PM_{10})
- Formaldehyde
- Nitrogen dioxide (NO_2)
- Nitrogen oxides (NOx) (as NO_2) (ecological)

The assessment considers the potential for the operation of the point sources within the green line permit boundary to adversely impact upon human health and sensitive ecological receptors within the locale. The sources are A1-A4:

- A1: Milling Hall Haas dust extraction system
- A2: Bedding plant building Hass dust extraction system
- A3: Generator 1 serving wood processing equipment in Main building
- A4: Generator 2 serving Bedding plant building

Heat from three biomass boilers adjacent to the Site, not within the permit boundary, is used to dry wood products on Site. Dispersion of emissions from the three biomass boilers has been modelled to provide the best estimate of background concentrations.

The evaluation, based on detailed atmospheric dispersion modelling using ADMS 6, assesses the magnitude and significance of any potential short and long-term effects in relation to the air quality standards set in legislation and relevant evaluation criteria provided in guidance.

At modelled locations selected as representative of relevant human exposure, the long- and short-term predicted impacts of pollutants at receptors have been determined to be **not significant.**

Air quality impacts of predicted pollutant concentrations, rates of nutrient nitrogen and acid deposition at international, national and local designated conservation sites during the operational phase are determined to be **not significant.**

It is considered that the predicted impact of emissions to air are found not to be a constraint on the operation of the Site.

1 Introduction

1.1 Background

This Air Quality Impact Assessment (AQIA) has been prepared by Earthcare Technical Ltd (ETL) on behalf of Mill Farm Recycling Ltd in support of an application for the variation of a bespoke environmental permit (Ref: EPR/XP3198EF) at Mill Farm, Stone Road, Chebsey, Stafford, ST21 6NX, centred at SJ 85306 29458, hereafter referred to as the 'Site'. The Site operates activities associated with green waste composting, the sorting of wood materials, the chipping (shredding) and milling of Grade A wood, the drying of wood materials on drying floors and the storage of waste and the storage and blending of BS3882 soil and compost products.

An H1 screening evaluation was undertaken following the H1 methodology, set out in Environment Agency (EA) guidance[1] and using the EA H1 Assessment Tool spreadsheet (v9.2).[2] The H1 assessment concluded that the following pollutant-averaging times could not be screened out:

- Particulate matter less than 10 micrometres in diameter (PM_{10})
- Formaldehyde
- Nitrogen dioxide (NO_2)
- Nitrogen oxides (NOx) (as NO_2) (ecological)

Two pollutants were screened out by H1 from further consideration: particulate matter less than 2.5 micrometres in diameter ($PM_{2.5}$) and carbon monoxide (CO).

Pollutants that are not screened out by H1 need to be considered in an AQIA using detailed dispersion modelling. This AQIA has been undertaken to assess air quality impacts of the Site on human and ecological receptors.

1.2 Site description

Figure 1 shows the Site location and green line denoting the permit boundary, Figure 2 provides a more detailed view of the permit boundary including emission points. The Site comprises a lower yard for composting and material reception and an upper yard where the wood treatment activities are carried out within dedicated buildings and/or drying bays. The emissions to air, A1-A4, which are shown in Figure 2, are located in the upper yard. They are:

- A1: Milling Hall Haas dust extraction system
- A2: Bedding plant building Hass dust extraction system
- A3: Generator 1 serving wood processing equipment in the Main building
- A4: Generator 2 serving Bedding plant building

[1] Environment Agency and Department for Environment, Food & Rural Affairs, Air emissions risk assessment for your environmental permit, Available at: https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit [Accessed 24 July 2025]

[2] Atmospheric Dispersion Modelling Liaison Committee, H1 Risk Assessment Tool, Available at: https://admlc.com/h1-tool/ [Accessed 24 July 2025]

The Site lies in a semi-rural location, 263m south of the Stone Road, B5026, approximately 654m northwest of the village of Chebsey and 2.2km east of Eccleshall. The closest human receptor is Mill Farm farmhouse which lies 20m from the permit boundary. The next nearest receptor is The Vicarage / Vicarage Fields which lies 325m east south-east of the Site. It does not lie in an Air Quality Management Area (AQMA); there are no AQMAs in Stafford Borough Council (SBC) area.[3]

There are no Special Areas of Conservation (SACs) or Special Protection Areas (SPAs) within 10km of the Site and no Sites of Special Scientific Interest (SSSIs), National Nature Reserves (NNRs) or Local Nature Reserves (LNRs) within 2km. Midland Meres and Mosses Phase 3 Ramsar site lies 4.75km to the west of the Site; it is coincident with Cop Mere SSSI which has therefore also been considered in this assessment. There are five Local Wildlife Sites within 2km, two of which are also Ancient Woodland (AW).

1.3 Scope of this report

This AQIA assesses the impact on human and ecological receptors of emissions to air from operation of the Site on human and ecological receptors.

Emissions to air have been modelled in normal operation at the manufacturers' exhaust concentrations and from specified emission limit values (ELVs) if ELVs exist for the sources.

The ADMS 6[4] dispersion model has been used to calculate concentrations of the pollutants, from which dry deposition to sensitive conservation sites has been calculated.

While ELVs and the air quality standards for ecological receptors are specified for NOx, standards for human health are for nitrogen dioxide (NO_2) which is emitted as a by-product of combustion and is formed (and consumed) in chemical reactions including NOx and other species.

Predicted concentrations have been compared with relevant air quality standards (AQS) (limits, targets, objectives, and assessment levels) to assess their significance, considering background concentration data where relevant. There are no AQS for Total volatile organic compounds (TVOC) but there is an AQS for formaldehyde which is one of the compounds emitted. Formaldehyde emissions from the diesel generators have been modelled as a fraction of TVOC, as explained in Section E.5.3.

The pollutants considered in this AQIA are, therefore:

- Oxides of nitrogen (NOx)/nitrogen dioxide (NO_2)
- TVOCs as formaldehyde, and
- PM_{10}, particulate matter less than 10 micrometres in diameter.

Predicted deposition fluxes have been compared with critical loads for nutrient nitrogen deposition and acid deposition at sensitive conservation sites.

[3] Stafford Borough Council (2024) 2024 Air Quality Annual status Report (ASR), June 2024

[4] CERC, Environmental software, Available at: https://www.cerc.co.uk/environmental-software.html [Accessed 24 July 2025]

This report describes the: proposed processes on Site (Section 2); relevant legislation and guidance for industrial emissions, ambient air quality and modelling of emissions to air (Section 3); the assessment methodology used to model concentrations of pollutants (Section 4); assessment criteria including air quality limit values, objectives and Environmental Assessment Levels and significance criteria (Section 5); a baseline assessment of existing air concentrations and ground depositions (Section 6); and results of the dispersion modelling (Section 7); before Section 8 provides conclusions.

2 Process description and emissions to air

The Environmental Management System Manual[5] provides a description of the processes at the Site. Fugitive dust and odour emissions have been considered in the Environmental Management System Manual, and in the Dust and Emissions Management Plan (MIL-OD-10) and the Odour Management Plan (MIL-OD-06) respectively. This section provides a summary of the those processes relevant to identifying the stack emissions to air.

The wood waste activities undertaken are the transfer and treatment of non-hazardous waste wood namely:

- Storage of Grade A non-hazardous wood[6] on a concrete surface with sealed drainage
- Shredding, milling, chipping and screening of wood within dedicated buildings with dust abatement units
- Drying of wood products within dedicated drying bays
- Storage of wood products on an impermeable surface within a building, and
- Loading and dispatch of products.

Figure 3 shows the buildings in the upper yard of the Site.

The Grade A wood is stored until pre-shredding through a 125mm basket in the Komtech screening equipment building (building 13 in Figure 3). The timber is then stored in a clean area of the yard (storage bays 1a-1c in Figure 3) ready to be transported to the mill, the Main wood processing building (building 2 in Figure 3). In the Main wood processing building, the pre-shred wood is fed into the plant hopper which passes under a magnet before it is milled through a 40mm screen. The milled material then passes over another magnet and then enters an eddy current separator which removes all nonmagnetic metals. A chip screen separates the material into three particle sizes, three separated products. The three separate products are then moisture tested and dried on Drying floors (building 5a-5f in Figure 3), if required, to get the product below 25% moisture. Product is regularly moisture tested when on the drying floor and removed once under 25%. Product is then moved to clean product storage bays (buildings 10-12 in Figure 3) ready for loading and dispatch. Bedding material is dispatched from the Bedding plant building (building 6 in Figure 3).

There is a dedicated dust extraction unit (HAAS HZM1600) on the Main wood processing building (building 2 in Figure 3), which can treat up to 27,000m^3/h of air from the building. There is a single point source emission from this extraction, A1 in Figure 2, which exhausts horizontally. The maximum dust concentration as specified by HAAS who manufactured and installed the extraction unit is 3mg/m^3. The technical specification of the dust extraction unit is given in Appendix A. The unit is powered by a diesel generator, A3 in Figure 2, a Kohler SDMO V770C2

[5] ETL (2025) Mill Farm Recycling Limited, Green Waste Composting Facility and Grade A wood processing, Environmental Management System Manual Version 6, May 2025, MIL-OD-01

[6] Waste Wood Assessment Guidance for the UK Waste Wood Industry, Wood Recyclers' Association, Version 4, November 2024

(Appendix B). The dust extraction unit and diesel generator both operate for half the working week.

A second HAAS dust extraction unit serves the Bedding plant building (building 6 in Figure 3). It can treat up to 15,000m^3/h of air from the building; the system directs dust into a bag under the filter. There is a single point source emission from this extraction, A2 in Figure 2, which exhausts vertically downwards. The maximum dust concentration as specified by HAAS who manufactured and installed the extraction unit is 5mg/m^3. The technical specification of the dust extraction unit is given in Appendix C, supplemented by data supplied by CRJ Services.[7] The unit is powered by a diesel generator, A4 in Figure 2, also a Kohler SDMO V770C2 (Appendix B). The dust extraction unit and diesel generator both operate for half the working week.

Heat for the drying floors is provided by 3No. biomass boilers (Heizomat, RHK-AK), housed in building 21 of Figure 3, which lies outside the permit boundary. They were installed on Site in 2017 for the burning of clean biomass (non-waste wood) to produce heat for the direct heating of farm buildings and drying floors only; there is no associated power generation. Each boiler is 1MW but operated to 500kW. Appendix D shows the technical specification of the boilers and two emissions testing certificates from 2013 and 2016. MCPD ELVs do not apply to MCP using the gaseous products of combustion for direct heating, drying or other treatment of materials, as is the case for the biomass boilers.

The biomass boilers are not part of the permitted activities on Site. Emissions from the biomass boilers have been considered in this assessment for their impact on local background concentrations.

Table 1 gives a summary of the emission sources that have been modelled in this assessment.

Table 1 Modelled sources

Source	Emissions	Modelled operational profile	In permit?
A1 Dust extraction unit, building 2	Dust modelled as PM_{10}	Operates for half of operational hours, modelled as 0700-1700 on Monday and Tuesday, 0700-1200 on Wednesday	Yes
A2 Dust extraction unit, building 6	Dust modelled as PM_{10}	Operates for half of operational hours, 1200-1700 on Wednesday 0700-1700 on Thursday and Friday	Yes
A3 Diesel generator powering A1 A4 Diesel generator powering A2	PM_{10}, CO,* TVOC, NOx	A3, same hours as A1 A4, same hours as A2	Yes
3No. Biomass boilers	NOx, CO,* PM_{10}	Continuous	No
Notes: Actual operational hours are 0730-1700 but the ADMS model works on the basis of hourly inputs *CO not modelled as part of this assessment as it was screened out by H1, Section 1.1.			

[7] CRJ Services: 15,000m^3/h air volume; 6.735m to bottom edge of exhaust; downward-facing outlet; residual dust content < 5mg/m^3

3 Legislation and guidance

This section describes the legislation, policy, and guidance relevant to this assessment.

While the UK has left the European Union (EU), the EU Withdrawal Act 2018[8] brought all EU laws and regulations, made while the UK was a member of the EU, into UK law by creating a new category of UK law: EU retained law. Therefore, the EU Directives described in this section still apply in the UK.

3.1 Overview

Legislation, policy, and guidance relevant to this assessment is summarised in Table 2 and described further in Sections 3.2 and 3.3.

Table 2 Summary of legislation, policy and guidance

Short name	Name	Body	Scope
Legislation			
1995 Act	Environment Act 1995[9]	UK Parliament	Establishes the framework for managing air quality to achieve compliance with air quality objectives.
4th Daughter Directive	Directive 2004/107/EC[10]	European Commission, now EU	Sets limit values for arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air
AAD	Ambient Air Quality Directive 2008/50/EC[11]	EU	Ambient air quality, sets limit and target values
IED	Industrial Emissions Directive, 2010/75/EU[12]	EU	Industrial emissions
MCPD	Medium Combustion Plant Directive, EU/2015/2193[13]	EU	Emission limit values for pollutants from combustion plant greater than 1MWth and less than 50MWth
AQSR	Air Quality (Standards)	UK Parliament	Ambient air quality, standards for pollutant concentrations.

[8] UK Legislation, European Union (Withdrawal) Act 2018

[9] Environment Act 1995, 1995 Chapter 25, Part IV Air Quality

[10] DIRECTIVE 2004/107/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL, of 15 December 2004, relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air.

[11] DIRECTIVE 2008/50/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 21 May 2008 on ambient air quality and cleaner air for Europe comment on amendment

[12] DIRECTIVE 2010/75/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 24 November 2010 on industrial emissions (integrated pollution prevention and control)

[13] DIRECTIVE (EU) 2015/2193 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 25 November 2015 on the limitation of emissions of certain pollutants into the air from medium combustion plants.

Short name	Name	Body	Scope
	Regulations 2010[14] as amended in 2016[15]		Transposed EU limit values defined in AAD into law in England and Wales
EPR	Environmental Permitting Regulations 2018[16]	UK Parliament	Industrial emissions. Transposed IED into law in England and Wales
Guidance			
Defra permit guidance	Air emissions risk assessment for your environmental permit[17]	Department for Environment, Food & Rural Affairs and Environment Agency	How to undertake an air quality assessment for a permit
Waste Treatment BREF	BAT Reference Document Waste Treatment[18]	European IPPC Bureau,	Indicative BAT for waste treatment including Associated Emission Levels
Defra SWIP	Specified generators: dispersion modelling assessment[19]	Environment Agency and Natural Resources Wales	Includes reference for conversion of NOx to NO_2
AQTAG06	AQTAG06 Technical guidance on detailed modelling approach for an appropriate assessment for emissions to air[20]	Air Quality Advisory Group	Guidance on calculating deposition
LAQM.TG22	Local Air Quality Management, Technical Guidance (TG22)[21]	Department for Environment, Food & Rural Affairs and the Devolved Authorities	Includes general guidance on dispersion modelling

[14] Statutory Instrument: 2010 No. 1001, ENVIRONMENTAL PROTECTION, The Air Quality (Standards) Regulations 2010 comment on amendment

[15] The Air Quality Standards (Amendment) Regulations 2016, Statutory Instrument 2016 No, 1184, Made 6th December 2016

[16] The Environmental Permitting (England and Wales) (Amendment) Regulations 2018, Statutory Instrument 2010 No, 675

[17] Department for Environment, Food & Rural Affairs and Environment Agency, Air emissions risk assessment for your environmental permit, Available at: https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit [Accessed 24 July 2024].

[18] Best Available Techniques (BAT) Reference Document for Waste Treatment, European IPPC Bureau, 2018

[19] Environment Agency and Natural Resources Wales, Specified generators: dispersion modelling assessment, Available at: https://www.gov.uk/guidance/specified-generators-dispersion-modelling-assessment#nosubxsub-to-nosub2sub-conversion-ratios-to-use [Accessed 24 July 2024].

[20] Air Quality Advisory Group, 2014, AQTAG06 Technical guidance on detailed modelling approach for an appropriate assessment for emissions to air

[21] Department for Environment, Food & Rural Affairs and the Devolved Authorities, Local Air Quality Management Technical Guidance (TG22), May 2025

3.2 Legislation and policy

3.2.1 Environment Act

The Environment Act, which established the Environment Agency for England and Wales with functions including the control of pollution. Part IV of the Environment Act 1995 establishes the framework for managing air quality to achieve compliance with air quality objectives and for local air quality management (LAQM). Under LAQM local authorities (district councils) are required to monitor, review, assess and improve air quality in their areas; if exceedances are monitored or predicted, they must consider establishing an AQMA. Part IV requires the Secretary of State to prepare a National Air Quality Strategy.

3.2.2 Ambient Air Quality Directive and 4th Daughter Directive

The Ambient Air Quality Directive and 4th Daughter Directive contain **Limit Values** and **Target Values** with which the UK must comply. The Ambient Air Quality Directive also addresses common methods and criteria; information on ambient air quality to help combat air pollution and nuisance, to monitor long-term trends; and making information and pollution alerts available to the public.

3.2.3 Air Quality Standards Regulations

The Air Quality (Standards) Regulations 2010 is the instrument by which the Ambient Air Quality Direction and the 4th Daughter Directive were transposed into English law.

3.2.4 Industrial Emissions Directive

The IED is the main EU instrument by which pollutant emissions from industrial installations are regulated. It consolidated seven earlier directives including, in particular, the Integrated Pollution Prevention and Control Directive and the Waste Incineration Directive. It defines emissions limit values (ELVs) for some process-fuel combinations but there are no ELVs relevant to the Biogas upgrading stack.

3.2.5 Medium Combustion Plant Directive

The MCPD regulates emissions of SO_2, NOx and dust to air and requires monitoring of carbon monoxide (CO) emissions in order to reduce emissions and risks to human and ecological receptors. MCPD ELVs apply from 2025 or 2030 for existing plants, depending on their size.

The relevant ELVs for proposed engines using biogas, which have been used in this assessment, are those defined in Part 2 of Annex II of the MCPD.

3.2.6 Environmental Permitting Regulations

The Environmental Permitting (England and Wales) (Amendment) Regulations 2023 is the latest consolidated version of instrument by which the IED was transposed into national legislation.

3.3 Guidance

3.3.1 Air emissions risk assessment for your environmental permit

The webpage provides Department for Environment, Food & Rural Affairs and Environment Agency guidance on how to carry an air emissions risk assessment.[17] It includes guidance on the ecological receptors to be assessed, tests on significance on results, relevant air quality Limit Values (from the Ambient Air Directory), objectives from the National Air Quality Strategy and it lists short-term (hourly) and long-term (annual mean) **Environmental Assessment Levels (EALs)** for human health.

3.3.3 Specified generators: dispersion modelling assessment

The webpage provides Defra and Environment Agency guidance on how to do detailed air quality modelling for specified generators. This includes the use environmental standards for air, the use of NOx to NO_2 conversion ratios, and guidance on impact assessment.

3.3.4 Technical guidance on detailed modelling approach for an appropriate assessment for emissions to air

This document (AQTAG06) provides guidance on how to carry out a quantitative assessment (Stage 3 appropriate assessment) including guidance on calculating deposition for emissions to air in order to fulfil the requirements of the Habitats Regulations.

3.3.5 Local Air Quality Management, Technical Guidance

This technical guidance (LAQM.TG22) is published to support local authorities in carrying out their duties under the Environment Act 1995, which established the LAQM process. It provides guidance on monitoring and assessing air quality, action planning and reporting. While aimed at local authorities the advice in used more widely by those working in the field, and not just for LAQM.

4 Assessment Methodology

4.1 Introduction

The methodology comprised three main parts, establishment of the baseline, dispersion modelling to calculate concentration and deposition impacts, and assessment of significance, which are described in more detail in Sections 4 to 6 and encompasses the following points:

1. Baseline conditions assessment at the Site and the surrounding area:
   - AQMAs and designated conservation areas; background concentration and deposition (Section 6).
2. Modelling
   - Assessment of the likely changes in concentration and deposition due to emissions in normal operation from the sources listed in Section 2. The assessment was undertaken using the ADMS 6[4] dispersion model (Section 4.2).
   - The modelling assessment included an assessment of the sensitivity of model results and hence, the impacts, to changes in model input.
3. Assessment of significance. Sections 5.2 and 5.3 describe the significance criteria.

4.2 Modelling of air quality impacts

4.2.1 Model

The dispersion model used to predict ambient concentrations due to the stack emissions was ADMS 6 (version 6.0.0.1). The model is termed a 'new generation' model and is commonly used in the UK for planning applications and industrial permit applications to the Environment Agency (EA).

It requires as input: data on the source of emissions and the mass emission rates of each pollutant (Table 3 to Table 4), meteorological data and associated parameters, buildings data, terrain data, and receptor locations. Full details of the meteorological, buildings and receptor data and assumptions used to calculate emissions from the sources are described in Appendix E.

The outputs calculated by the model are the air concentrations of pollutants from the sources modelled for the relevant averaging times and statistics. The contribution from the modelled sources on the Site to air concentration and to deposition rates are referred to the Process Contribution (PC), which is then compared with the relevant AQS. When background concentrations or deposition rates are added to the PC, the totals are referred to as Predicted Environmental Concentration (PEC) and Predicted Environmental Deposition Rate (PEDR) respectively, which are also compared with the relevant AQS.

From air concentrations of NO_2 the deposition rate of nitrogen can be calculated and the acid deposition due to nitrogen.

4.2.2 Model scenarios

The sources within the permit boundary, A1-A4, have been modelled to determine the PC. Biomass boilers from the adjacent Site which provide heat to the drying floors have been

modelled to determine their contribution to the PEC, as they are expected to contribute significantly to the local background concentration and deposition. Their contribution to short-term background levels which reduces 'headroom' (Section 5.2.1) has been calculated as twice their long-term contribution, which is the usual method for background concentrations (Section E.5.1).

The modelled scenarios can be summarised as:

- **Modelled Long-term Scenario of Permit sources**
  - A1, A2, A3, A4 operating for half the operational hours (25 hours/week, i.e. 15% of the time annually).
- **Modelled Long-term Scenario of Permit sources and local background sources**, all sources
  - A1, A2, A3, A4 operating for half the operational hours plus the 3No. biomass boilers operating continuously.
- **Modelled Short-term Scenario of Permit sources**
  - A1, A2, A3, A4 operating for half the operational hours (25 hours/week, i.e., 15% of the time annually).

4.2.3 Model options and sensitivity

The model was run for each of the four years of meteorological data (2021-2024) for three combinations of model option scenarios:

- Flat terrain: no buildings and no terrain (hills)
- Buildings: with buildings and no terrain (hills)
- Terrain (hills): with buildings

Modelling buildings led to higher model prediction than for flat terrain. Modelling terrain as well buildings generally did not lead to a further increase or decrease in concentrations. The variation in model predictions due to meteorological data year is similar in magnitude to the impact of modelling buildings. Appendix F compares the results of the sensitivity test.

Results at the receptors were calculated as the maximum value at each receptor from these 12 models runs and are therefore worst-case values across all four years and the three model options scenarios. Use of four years' meteorological data in the modelling is to account for intra-annual variation.

4.2.4 Sources and emissions

The source geometry, parameters, ELVs, design emission limits and calculated emissions are given in Table 3 for the Dust extraction systems A1 and A2, and the Diesel generators A3 and A4. Table 4 summarises the input parameters for the biomass boilers.

ELVs are specified as TVOC for which there are no EALs. There is an EAL for formaldehyde, one component of TVOC. An AEA Technology report on the Speciation of UK emissions of non-

methane volatile organic compounds (2002)[22] reported on a series of VOC species profiles available for stationary combustion sources, covering a range of fuel types and scale of combustion. Diesel generators emit methane and non-methane VOCs (NMVOCs). The NMVOCs comprise: acetone (13.46%), butane (15.73%), formaldehyde (47.19%) and hexane (5.62%).[22] Formaldehyde is not only the greatest proportion of NMVOCs emitted, it is also the NMVOC with the most stringent EALs and therefore emissions of formaldehyde from the diesel generators have been modelled, assuming 47.19% of the TVOCs are formaldehyde. Note that use of 47.19% of TVOC is conservative as not all TVOC is non-methane VOC.

Formaldehyde is not emitted from the biomass boilers.[22] MCPD states that emissions of sulphur dioxide from combustion of 'woody biomass,' as in the case of Grade A wood, can be ignored, therefore the modelling has assumed zero emissions of sulphur dioxide from the biomass boilers.

The time-varying operation of sources A1-A4 shown in Table 1 has been modelled using an ADMS 6 *.fac* file.

Conversion of NOx model output to NO_2 is described in Section E.5.2.

Table 3 Dust extraction system and Diesel generator emission parameters

Parameter	Units	Dust extraction system, A1	Dust extraction system, A2	Diesel generators, A3, A4
Location	Easting, Northing	385277, 329627	385321, 329643	385251, 329588 385322, 329641
Electrical output PRP	kWe	n/a	n/a	560
Stack height	m	8.52	6.00	2.5
Internal diameter at exit	m	0.63	0.63	0.25
Volume flow rate (dry)	Nm^3/s	7.50	4.17	1.61
Volume flow rate (wet)	Am^3/s	7.50	4.17	4.55
Velocity	m/s	24.1 (0)[1]	13.4 (0)[2]	92.8
Temperature	°C	Ambient	Ambient	501
Emission concentration/ rate PM_{10}	-	3 mg/m^3 [3]	5 mg/m^3 [3]	0.02 g/kW.h
Emission rate TVOC	g/kW.h	n/a	n/a	0.09[4]
Emission rate NOx	g/kW.h	n/a	n/a	5.2[4]
Emission rate PM_{10}	g/s	0.0225	0.0208	0.003
Emission rate formaldehyde	g/s	n/a	n/a	0.007[5]
Emission rate NOx	g/s	n/a	n/a	0.800

Notes: n/a = not applicable
[1]Horizontal emission below roof height, modelled as 0m/s
[2]Vertical downwards emission below roof height, modelled as 0m/s
[3]Assumed at actual conditions
[4]Specification (Appendix B) gives HC+NOx = 5.29 g/kW/h, where HC is hydrocarbons, taken as TVOC
[5]Formaldehyde is 47.19% of the non-methane VOCs, Section E.5.3

[22]N R Passant (2002) Speciation of UK emissions of non-methane volatile organic compounds. Reference: AEAT/ENV/R/0545 Issue 1

Table 4 Biomass boiler emission parameters

Parameter	Units	Biomass boilers
Location	Easting, Northing	385283, 329609 385281, 329603 385278, 329596
Thermal output	kWtho	990[1]
Stack height	m	10
Internal diameter at exit	m	0.55
Volume flow rate (dry)	Nm^3/s	2.414 (13% O_2) 2.269 (6% O_2)
Volume flow rate (wet)	Am^3/s	3.564
Velocity	m/s	15[2]
Temperature	°C	130[3]
Emission rate PM_{10}	g/kW.h	0.108 (30g/GJ)
Exit concentration TVOC	g/kWh	0.043[4]
Emission rate NOx	g/kW.h	0.540 (150g/GJ)
Emission rate PM_{10}	g/s	0.015
Emission rate formaldehyde	g/s	nil[5]
Emission rate NOx	g/s	0.074

Notes: The efflux and pollutant data given are for each boiler

[1]Operating at 50% load: 495kWtho, for calculation of g/s

[2]Assumed value

[3]Supplied by Mill Farm Recycling Ltd from monitoring data at base of stack

[4]From EMEP/EEA Air pollutant emission inventory guidebook 2023, 1.A.4 Small Combustion 2023[23]

[5]Zero emissions of formaldehyde from combustion of wood, Section E.5.3

[23] EMEP/European Environment Agency (EEA) (2023) Air pollutant emission inventory guidebook 2023, 1.A.4 Small Combustion 2023, Available at: https://www.eea.europa.eu/en/analysis/publications/emep-eea-guidebook-2023 [Accessed 24 July 2025]

5 Assessment criteria

5.1 Air Quality Standards

European and national legislation, policy, and guidance, as described in Section 3, set various limit values, target values, objectives and environmental assessment levels (EALs) that may apply to human or ecological receptors. These will be collectively referred to throughout this report as air quality standards (AQS).

The AQS are defined with respect to an averaging time and a statistic. Annual mean AQS are an example of a long-term AQS, which is defined over a long period of time as the effects of the pollutant on human health or the environment are chronic, that is, due to long-term exposure. Pollutants may also have acute impacts, that is, the effects become apparent after short period of exposure to high values. For these pollutants short-term AQS are defined, for instance the 24-hour limit for PM_{10} is a maximum hourly average that must not be exceeded.

5.2 AQS for human health

Table 5 sets out the AQS for human health for the pollutants relevant to this assessment. The standards which apply at human receptor locations apply where people will be exposed to a pollutant for a period relevant to the standard such as at residential locations, hospitals, and schools for annual mean values. The human receptors modelled are shown in Figure 4.

Emissions are specified for TVOC for which there are no AQS; there is an AQS for formaldehyde, one component of TVOC.

Table 5 Air Quality Standards for human health

Substance	Emission period	Limit (average)	Standard	Exceedances[1]
Formaldehyde	30 minutes	100 µg/m^3	EAL	None
Formaldehyde	Annual	5 µg/m^3	EAL	None
Nitrogen dioxide	1-hour	200 µg/m^3	AAD Limit Value	Up to 18 1-hour periods
Nitrogen dioxide	Annual	40 µg/m^3	AAD Limit Value	None
PM_{10}	24-hour	50 µg/m^3	AAD Limit Value	Up to 35 times a year
PM_{10}	Annual	40 µg/m^3	AAD Limit Value	None
Notes: AQS taken from Defra/EA guidance[17] [1]number of times a year that you can exceed the limit				

5.2.1 Significance of results

Following the Defra/EA guidance,[17] a PC can be screened out from further assessment if:

- the short-term PC is less than 10% of the short-term environmental standard, and
- the long-term PC is less than 1% of the long-term environmental standard (if there is one).

The second stage of screening considers the PEC, the sum of the PC and background concentration. A further assessment is not needed if:

- the short-term PC is less than 20% of the 'headroom,' where headroom is defined as the short-term environmental standards minus twice the long-term background concentration, and
- the long-term PEC is less than 70% of the long-term environmental standards (if there is one).

5.3 AQS for sensitive conservation sites

The Defra/EA guidance[17] specifies that SACs, SPAs and Ramsar sites within 10km of the green line boundary should be considered and SSSIs, AWs, LWSs, LNRs and NNRs within 2 km should also be considered.

Data obtained from Staffordshire Ecological Record[24] and obtained from the Magic website[25] showed: there are no SACs or SPAs within 10km of the Site and no SSSIs, NNRs or LNRs within 2km. Midland Meres and Mosses Phase 3 Ramsar site lies 4.75km to the west of the Site; it is coincident with Cop Mere SSSI which has therefore also been considered in this assessment. There are five LWSs within 2km, two of which are also AW.

For modelling purposes, discrete ecological receptors, E1 to E6, were placed at locations in the conservation sites. Table 6 presents the sensitive conservation sites, receptors, and habitats in each area; Figure 5 shows the ecological receptor locations. Table 7 shows the AQS for concentrations at the conservation sites.

AQS for deposition flux of nutrient nitrogen (NDep) and acid deposition due to nitrogen (N) and sulphur (AcidDep) are referred to as critical loads (CLos). In Table 8 the CLos for NDep are given, and in Table 9 the CLos for AcidDep. Table 8 and Table 9 show the most sensitive habitats to deposition and whether sites were modelled as forest (woodland) or grass (non-woodland) for the calculation of deposition flux. AcidDep CLos are only available for the European and nationally designated sites, not for LWSs and AW.

Deposition to forest is more rapid than that to grass, but the CLo for forest are typically higher than those for grassland. The most conservative combination of deposition rate and CLo is given in Table 8 and has been modelled.

[24]Staffordshire Ecological Record (www.staffs-ecology.org.uk), data supplied 23 July 2025

[25]Natural England, MAGIC, Multi-Agency Geographic Information for the Countryside, Available at: https://magic.defra.gov.uk/ [Accessed: July 2025]

Table 6 Sensitive conservation sites

Receptor	Site	Designation	Description of habitat most sensitive to NH_3
E1	Midland Meres and Mosses Phase 2 Ramsar site/Cope Mere	Ramsar/SSSI	Ramsar: Nutrient-rich open water bodies (meres) with fringing habitats of reed swamp, fen, carr and damp pasture, and peatlands[26] SSSI: range of swamp, fen and carr communities. The site also includes areas of dry and marshy unimproved pasture and a fringe of dry woodland on the banks surrounding the mere.
E2	Fieldhouse Dingle/The Dingle	LWS/AW	Woodland: broadleaved, semi-natural / Woodland: mixed, plantation / Open water: standing water
E3	Drumble Wood	LWS, AW	Woodland: broadleaved, semi-natural / Woodland: broadleaved, plantation / Open water: eutrophic running water
E4	Chebsey Hollow	LWS	Grassland: marshy, lowland
E5	Meece Brook	LWS	Grassland: neutral, semi-improved / Woodland: broadleaved, semi-natural / Grassland: marsh/marshy grassland / Swamp / Open water: running water And others
E6	Yelds Rough	LWS	Woodland: coniferous, plantation / Open water: standing, eutrophic, small ponds / Open water: eutrophic running water
Notes: Data from SER[24] and Magic[25]			

Table 7 Environmental standards for protected conservation areas

Substance	Target	Emission period
Nitrogen oxide (expressed as nitrogen dioxide)[1]	30 µg/m^3	Annual
Nitrogen oxide (expressed as nitrogen dioxide)	75 µg/m^3 200 µg/m^3 for detailed assessments where the ozone is below the AOT40 critical level and sulphur dioxide is below the lower critical level of 10 µg/m^3	Daily
Nutrient nitrogen deposition	Depends on location, use www.apis.ac.uk[27]	Annual
Acidity deposition	Depends on location, use www.apis.ac.uk[18]	Annual
Notes: Environmental standards taken from Defra/EA guidance [1]30 µg/m^3 is an AAD Limit Value		

[26]Ramsar Sites Information Service, Available at: https://rsis.ramsar.org/ris/891 [Accessed 24 July 2025]

[27] UK Air Pollution Information System (APIS) (http://www.apis.ac.uk/) [Accessed 24 July 2025]

Table 8 Nutrient nitrogen deposition critical loads

Receptor	Site	Nitrogen critical load class	Critical load (kg/ha/yr)	Forest / Grass
E1	Midland Meres and Mosses Phase 2 Ramsar site/Cope Mere SSSI	Broadleaved deciduous woodland	10-15	forest
E2	Fieldhouse Dingle LWS/The Dingle AW	Acidophilous Quercus forest	10-15	forest
E3	Drumble Wood LWS, AW	Acidophilous Quercus forest	10-15	forest
E4	Chebsey Hollow LWS	Valley mires, poor fens and transition mires	5-15	grass
E5	Meece Brook LWS	Acidophilous Quercus forest	10-15	forest
E6	Yelds Rough LWS	Acidophilous Quercus forest	10-15	forest
Note: Values from www.apis.ac.uk[18] For the SSSIs APIS provides site-specific information on CLo. For LWSs, APIS provides habitat-specific information.				

Table 9 Acid deposition critical loads

Receptor	Site	Acidity critical load class	Critical loads (keq/ha/yr)			Forest / Grass
			CLminN	CLmaxN	CLmaxS	
E1	Midland Meres and Mosses Phase 2 Ramsar site/Cope Mere SSSI	Unmanaged Broadleaved/Coniferous Woodland	0.142	1.951	1.594	forest
Note: Values from www.apis.ac.uk[18] For the SSSIs APIS provides site-specific information on CLo. For LWSs and AW APIS does not provide values of CLos.						

5.3.1 Significance of results

For nationally designated sites, such as SSSIs, and European sites such as a Ramsar site, the guidance from the Environment Agency and Defra[17] is similar to that for human receptors (Section 5.2.1).

Further assessment is not required if:

- the short-term PC is less than 10% of the short-term environmental standard for protected conservation areas
- the long-term PC is less than 1% of the long-term environmental standard for protected conservation areas

If these are not met the PEC must be calculated and checked against the long-term standard. The PEC does not have to be calculated for short-term targets. If the long-term PC is greater than 1% and the PEC is less than 70% of the long-term environmental standard, the emissions are insignificant – there is no need to assess them any further.

If the short-term PC exceeds the screening criteria of 10%, or the PEC is greater than 70% of the long-term environmental standard, detailed modelling is required.

The guidance states that for locally designated sites such as LWS, impacts can be screened out as insignificant if the short-term and long-term PCs are less than 100% of the relevant AQS.

6 Background concentrations and deposition fluxes

6.1 Local authority air quality monitoring

The Site does not lie in an AQMA; there are no AQMAs in SBC area.[3] In 2023, the latest year for which ratified monitoring data is published in an Annual Status Report (ASR), SBC undertook no automatic (continuous) monitoring and undertook passive monitoring using diffusion tubes at 29 sites. Most of the sites are kerbside sites and even so, no exceedances of the annual mean AQS for NO_2 were measured.

The closest monitoring locations to the Site are the Kerbside and 'Other' locations in Stone, approximately 6km northeast of the Site. In 2023, they monitored between 15.1 $\mu g/m^3$ and 33.1 $\mu g/m^3$ annual mean NO_2. Concentrations at the receptors modelled are likely to be lower than the monitored values are none are kerbside; the only major road in the modelling domain is the B5026, Stone Road, whereas the monitoring locations in Stone are close to the A34, with one of the locations, (location 5) in the town centre.

In Section 6.2 these concentrations are compared with the Defra mapped background concentrations.

6.2 Defra modelled background concentrations

Defra provides projected maps of 2025 background concentrations of NOx, NO_2 and PM_{10} on a 1km x 1km gridded basis that have been projected from a reference year of 2021.[28]The maps have been used to determine 2025 background concentrations of NO_2 and PM_{10} at each of the human receptors which are shown in Table 10.

The 2025 Defra spatially varying background concentrations of NO_2 (4.4–4.6$\mu g/m^3$) are lower than those monitored values (Section 6.1) as expected as the monitored values are mostly at kerbside locations whereas the modelled receptors are not kerbside and are in a rural setting. The Defra mapped values have therefore been used for all pollutants at all receptors. Table 10 shows the background annual mean concentrations for human receptors used in this assessment.

There is no routine monitoring of formaldehyde concentrations across the UK by automatic or non-automatic monitoring networks, although it has been recommended.[29] Monitoring campaigns for formaldehyde have focussed on locations beside very busy roads, close to an industrial process known to release large amounts of formaldehyde and close to a coal-burning site, with some rural measurements.[30] Using data from the 2020 Air Quality Expert Group report, a value of 0.9$\mu g/m^3$ for annual mean rural background formaldehyde has been used.

[28] Defra, Background Maps, Available at: https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html [Accessed 17 July 2025].

[29] AIR QUALITY EXPERT GROUP (2020) Non-methane Volatile Organic Compounds in the UK, Prepared for: Department for Environment, Food and Rural Affairs; Scottish Government; Welsh Government; and Department of Agriculture, Environment and Rural Affairs in Northern Ireland

[30] NPL Report COEM S36 (2000) Bell W., Davies N., Butterfield D., Blakley K., Lancaster K., Quincey P. and Henderson M., Final Report on DETR contract EPG 1/3/155, A Pilot Study of Formaldehyde Monitoring in Ambient Air, July 2000

Table 10 2025 Annual mean background concentrations (µg/m^3)

ID	Annual mean concentration (µg/m^3)		
	NOx	NO_2	PM_{10}
H1	5.6	4.5	10.3
H2	5.6	4.5	10.3
H3	5.5	4.5	10.4
H4	5.5	4.5	10.4
H5	5.5	4.4	9.8
H6	5.5	4.5	10.4
H7	6.1	4.8	11.4
H8	5.5	4.5	10.4
H9	5.5	4.5	10.4
H10	5.5	4.4	9.8
H11	5.5	4.4	9.8
H12	5.5	4.4	10.6
H13	5.8	4.6	9.8
H14	5.5	4.5	10.4
H15	5.5	4.4	9.8
H16	5.8	4.6	9.8
H17	5.8	4.6	9.8

6.3 Background concentration and deposition at sensitive conservation sites

Background concentrations of NOx and deposition of NDep at all the ecological receptors have been obtained from APIS maps[27] and the APIS location search, both of which provide the data on a 1 km grid cell basis. The NDep, AcidSDep and AcidNDep values depend on whether the habitat is forest or grass as deposition rates vary according to the nature of the vegetation.

Table 8 and Table 9 show which receptors have been modelled as forest and which as grass; the appropriate value of background deposition (to forest or to grass) have been determined. The background values are the latest available, they are an average for the years 2020-2022 and are shown in Table 11.

Table 11 Background concentrations and deposition at ecological receptors

Receptor ID	NOx (µg/m^3)	NDep (kgN/ha/yr)	AcidSDep (keqS/ha/yr)	AcidNDep (keqN/ha/yr)
E1	5.70	40.00	0.15	2.86
E2	9.50	39.20	n/a	n/a
E3	9.20	38.90	n/a	n/a
E4	9.20	21.10	n/a	n/a
E5	9.20	39.40	n/a	n/a
E6	9.40	39.00	n/a	n/a
Note: Data from www.apis.ac.uk[27] for the period 2020-2022				

7 Impact assessment results

7.1 Operational impacts on human health

Predicted impacts of each pollutant at each human receptor are given in Appendix G. In this section the highest results are presented, that is, the impacts at the worst-case receptor. Impacts have been compared to the screening thresholds given in Section 5.2.1.

Table 12 shows the maximum annual mean (long-term i.e. annual mean) concentration and Table 13 shows the maximum predicted short-term impacts, from 1 hour to 24 hours. The predicted concentrations have been compared with the AQS. AQS are applicable at receptors where the public have access for the relevant time period. Long-term and short-term AQS apply at all the human receptors as they are all residential; some are workplaces as well.

7.1.1 Long-term AQS

The maximum long-term impacts for all pollutants are predicted at the closest residential receptor, H1, Mill Farm, which lies 20m east of the green line boundary. Impacts at the other receptors are at least an order of magnitude lower than at H1.

Maximum impacts of all pollutants do not exceed 1% (PC/AQS). Impacts can therefore be screened out as **not significant** and there is no need for further assessment.

Table 12 Results, long-term AQS

Pollutant	AQS (µg/m^3)	Background (µg/m^3)	PC (µg/m^3)	PC/AQS (%)	PEC (µg/m^3)	PEC/AQS (%)
NO_2	40	4.5	0.41	1%	5.17	13%
Formaldehyde	5	0.9	0.02	0%	0.92	18%
PM_{10}	40	10.3	0.24	1%	10.76	27%
Notes: Data on each row is for one receptor, the receptor at which the percentage of PC/AQS is greatest.						

7.1.2 Short-term AQS

Maximum impacts short-term for all pollutants are predicted at the closest residential receptor, H1, Mill Farm, which lies 20m east of the green line boundary. Impacts at the other receptors are at least an order of magnitude lower than at H1.

The maximum predicted PC/AQS is less than 10% for all pollutants.

Impacts at all short-term AQS can therefore be screened out as **not significant** and there is no need for further assessment.

Table 13 Results, short-term AQS

Pollutant	Statistic	AQS (µg/m^3)	PC (µg/m^3)	PC/ AQS (%)	Head-room (µg/m^3)	PC/ Head-room (%)
Averaging times ≤ 1 hour						
NO_2	99.79th 1h	200	13.1	7%	190.5	7%
Formaldehyde	100th 1h	100	1.0	1%	98.2	1%
Averaging times > 1 hour						
PM_{10}	98.08th 24h	50	1.4	3%	29.0	5%
Notes: Data on each row is for one receptor, the receptor at which the percentage of PC/AQS is greatest.						

7.2 Operational impacts on ecological receptors

Predicted impacts of each pollutant at each ecological receptor are given in Appendix H. In this section the highest results are presented, that is, the impacts at the worst-case receptor across all meteorological years, and the worst with and without buildings and terrain. Impacts have been compared to the screening thresholds given in Section 5.3.1, following the Defra/EA guidance.

7.2.1 Results at Ramsar/SSSI

Table 14 shows the predicted PCs at the Ramsar/SSSI. The long-term impacts do not exceed 1% of the relevant AQS and short-term impacts do not exceed 10%.

Table 16 and Table 17 show that the maximum NDep and AcidDep impacts. The predicted impacts are 0%.

Impacts at the Ramsar/SSSI can be screened out as **not significant**.

7.2.2 Results at LWS and AW

Table 15 shows the predicted PCs at the LWSs and AWs. The long-term and short-term impacts do not exceed 2%; they are therefore well below 100% of the relevant AQS.

Table 16 shows the maximum NDep impacts. Maximum impacts are predicted to be 0% of the relevant CLos. Maximum long-term and short-term concentration impacts and NDep are predicted at E5, Meece Brook LWS, which lies 755m to the northeast of the Site.

Impacts are well under 100% of the relevant AQS and CLo and can be screened out as **not significant**.

Table 14 Results at Ramsar/SSSI - long-term and short-term AQS, worst case impact

Pollutant	AQS (µg/m^3)	Averaging time	LT or ST AQS*	PC (µg/m^3)	PC/AQS (%)
NOx	30	Annual mean	LT	<0.1	0%
Pollutant	**AQS (µg/m^3)**	**Averaging time and statistic**	**LT or ST AQS***	**PC (µg/m^3)**	**PC/AQS (%)**
NOx	75	24-hour, 100th percentile	ST	0.1	0%
Notes: *LT= long-term, ST = short-term Data on each row is for one receptor, the receptor at which the percentage of PC/AQS is greatest.					

Table 15 Results at LWS - long-term and short-term AQS, worst case impact

Pollutant	AQS (µg/m^3)	Averaging time	LT or ST AQS*	PC (µg/m^3)	PC/AQS (%)
NOx	30	Annual mean	LT	0.1	0%
Pollutant	**AQS (µg/m^3)**	**Averaging time and statistic**	**LT or ST AQS***	**PC (µg/m^3)**	**PC/AQS (%)**
NOx	75	24-hour, 100th percentile	ST	2.2	3%
Notes: *LT= long-term, ST = short-term Data on each row is for one receptor, the receptor at which the percentage of PC/AQS is greatest.					

Table 16 Worst-case nutrient nitrogen deposition

Receptor	PC (kg/ha/y)	CLomin (ka/ha/y)	CLomax (ka/ha/y)	PC/CLomin (%)	PC/CLomax (%)
Ramsar/SSSI	<0.01	10	15	0%	0%
LWS, AW	0.02	10	15	0%	0%
Notes: Data on each row is for one receptor, the receptor at which the percentage of PC/CLo is greatest.					

Table 17 Worst-case acid deposition

Receptor	PC_S (keqN/ha/yr)	PC_N (keqN/ha/yr)	PC/CLo (%)[1]	Bgd/CLo (%)[1]	PEC/CLo (%)[1]
Ramsar/SSSI	n/a	4.30x10^{-5}	0.0%	154.3%	154.3%
Notes: Data on each row is for one receptor, the receptor at which the percentage of PC/CLo is greatest. [1]% PC of minimum critical load determined using the Critical Load Function tool, available at www.apis.co.uk[27]					

8 Conclusion

This AQIA has been prepared to support an application to the EA for the variation of a bespoke environmental permit (Ref: EPR/XP3198EF) at Mill Farm, Stone Road, Chebsey, Stafford, ST21 6NX. The Site operates activities associated with green waste composting, the sorting of wood materials, the chipping (shredding) and milling of Grade A wood, the drying of wood materials on drying floors and the storage of waste and the storage and blending of BS3882 soil and compost products.

The Site is not located within an Air Quality Management Area (AQMA). Impacts at 17 human receptors have been assessed; they are all residential locations and some are also workplaces.

There are no SACs or SPAs within 10km of the Site and no SSSIs, NNRs or LNRs within 2km. Midland Meres and Mosses Phase 3 Ramsar site lies 4.75km to the west of the Site; it is coincident with Cop Mere SSSI which has therefore also been considered in this assessment. There are five LWSs within 2km, two of which are also AW.

Baseline conditions of sensitive receptors, current background concentrations and deposition rates have been established.

Detailed modelling of operation of the Proposed Development has been carried out using the ADMS 6 dispersion model and numerical modelled meteorological data for the Site location. Conservative assumptions have been made throughout the assessment. The assessment has considered emissions from the four point sources on Site: two dust extraction units and the two diesel generators which power them. Emissions from three biomass boilers on an adjacent site, which provide heat to the drying floors, have been modelled explicitly to provide the best estimate of background concentrations.

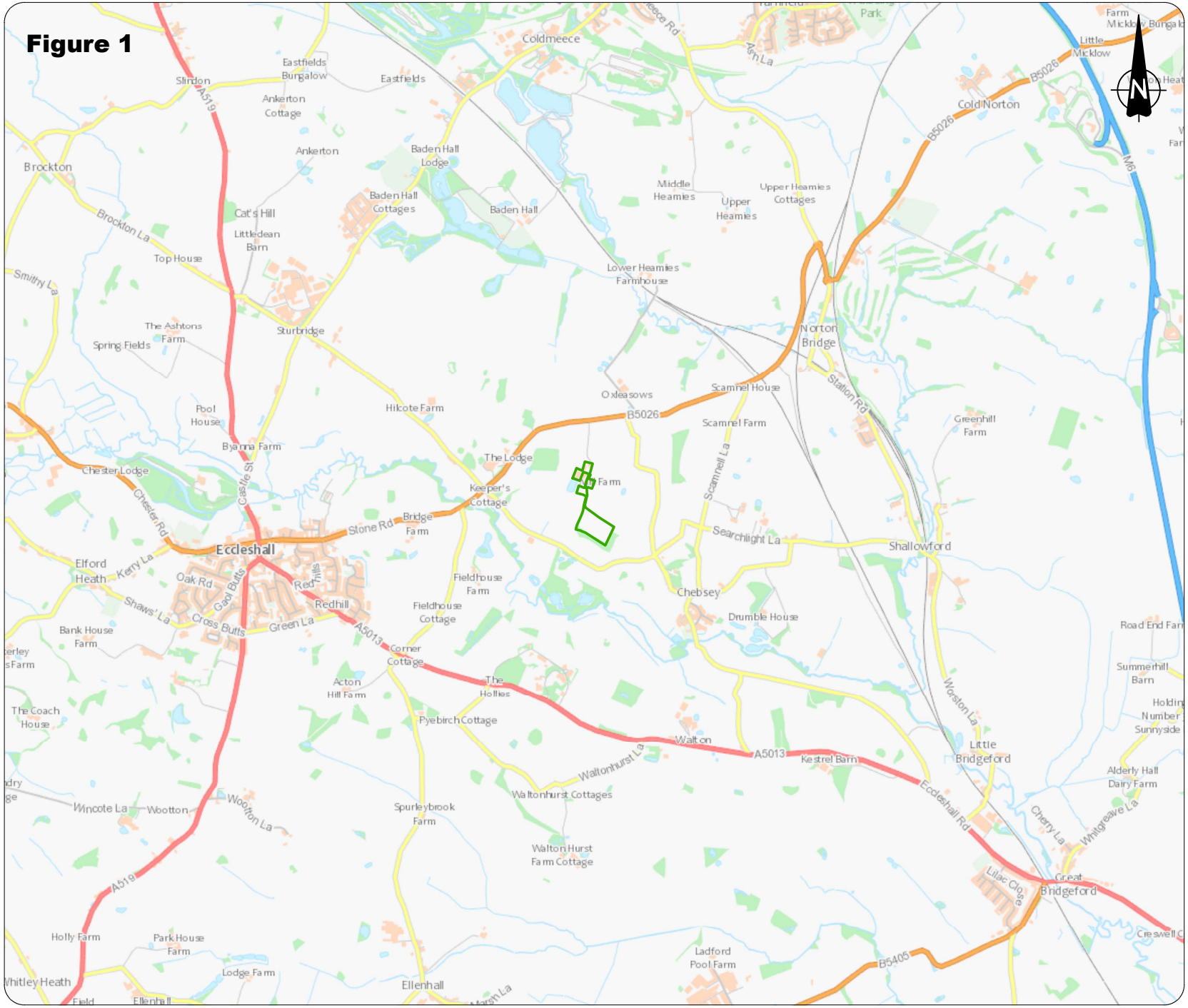
The assessment concluded that:

- For modelled locations selected as representative of relevant human exposure, the long- and short-term predicted impacts of pollutants at receptors has been determined to be **not significant.**
- Air quality impacts of predicted pollutant concentrations, rates of nutrient nitrogen and acid deposition at conservation areas (Ramsar, SSSI, AW, LWS) during the operational phase are determined to be **not significant.**

It is considered that the predicted impact of emissions to air are found not to be a constraint on the operation of the Site.

Figures

Figure 1



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REVISIONS

REV	DATE	DESCRIPTION	DWN	CHK	APP
-	19/06 2025	First Issue	JJ	ESP	ESP
A	28/07 2025	Second Issue	JJ	ESP	ESP

LEGEND

Permit boundary

0 250 500 750 1,000 1,250 m

Scale at A3: 1:25,000

Client
Mill Farm Recycling Limited

Project
ETL956/Permit Variation 2025

Title
Site Location Plan

Earthcare TECHNICAL
Manor Farm
Chalton
Waterlooville
Hants PO8 0BG
Tel: 02392 290488
enquiries@earthcaretechnical.co.uk
www.earthcaretechnical.co.uk

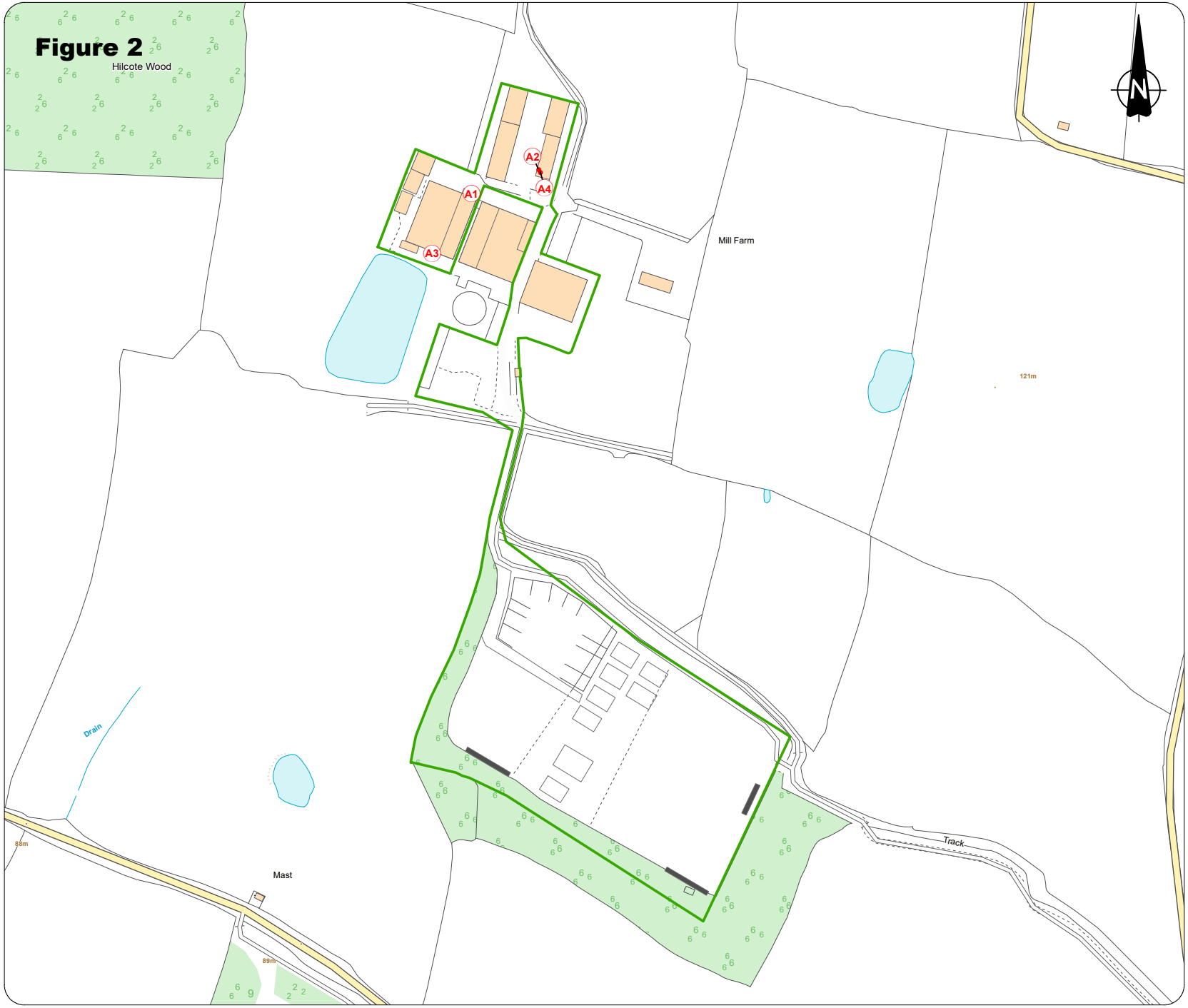
Drawn	Checked	Approved	Revision
JJ	ESP	ESP	REV A

Date	Scale	Sheet Size
July 2025	1:25,000	A3

Drawing Number	File Reference
ETL956/MIL/SL/EPR01	ETL956

Figure 2

Hilcote Wood



REVISIONS

REV	DATE	DESCRIPTION	DWN	CHK	APP
-	19/06 2025	First Issue	JJ	ESP	ESP
A	28/07 2025	Second Issue	JJ	ESP	ESP

LEGEND

- Permit boundary
- Emission point to air
- (E) Emission point to air

A1	Dust abatement plant for main wood processing builing
A2	Dust abatement plant for bedding plant
A3	Diesel generator 1 for main wood processing building
A4	Diesel generator 2 for bedding plant

0 25 50 75 100 125 m

Scale at A3: 1:2,500

Client: Mill Farm Recycling Limited

Project: ETL956/Permit Variation 2025

Title: Permit Boundary and Emission Point Plan

Earthcare TECHNICAL
Manor Farm
Chalton
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Hants PO8 0BG
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www.earthcaretechnical.co.uk

Drawn	Checked	Approved	Revision
JJ	ESP	ESP	REV A

Date	Scale	Sheet Size
July 2025	1:2,500	A3

Drawing Number	File Reference
ETL956/MIL/PBPEPP/EPR02	ETL956

Figure 3

ID	Description
1	Woodchip storage bays 3 no. (1a-1c inclusive)
2	Main wood processing building
3	Dust abatement plant for main wood processing building
4	Diesel generator for main wood processing
5a - 5f inc	Drying floor 1 - 6
6	Bedding plant building
7	Dust abatement plant for bedding plant
8	Diesel generator for bedding plant
9	Fuel tank for diesel generator
10	Product storage area 1 (7 No. bays)
11	Product storage area 2 (2 No. bays)
12	Product storage area 3 (4 No. bays)
13	Komtech screening equipment for compost
14	Fire quarantine area with curbed concrete wall (10m x 22m)
15	Topsoil and compost storage
16	Clean water storage lagoon - Source of fire water
17	Weighbridge with swipe card entry
18	Livestock housing
19	Car park
20	Offices and welfare
21	Housing for 3 no. non waste biomass boilers
22	Control unit container
23	Drainage collection sump and pump
24	Above ground water storage tank (1,500m³)

REVISIONS

REV	DATE	DESCRIPTION	DWN	CHK	APP
-	19/06 2025	First Issue	JJ	ESP	ESP
A	28/07 2025	Second Issue	JJ	ESP	ESP

LEGEND

Permit boundary

0 10 20 30 40 50 m

Scale at A3: 1:1,000

Client: Mill Farm Recycling Limited

Project: ETL956/Permit Variation 2025

Title: Site Layout - Upper Yard

Earthcare TECHNICAL

Manor Farm
Chalton
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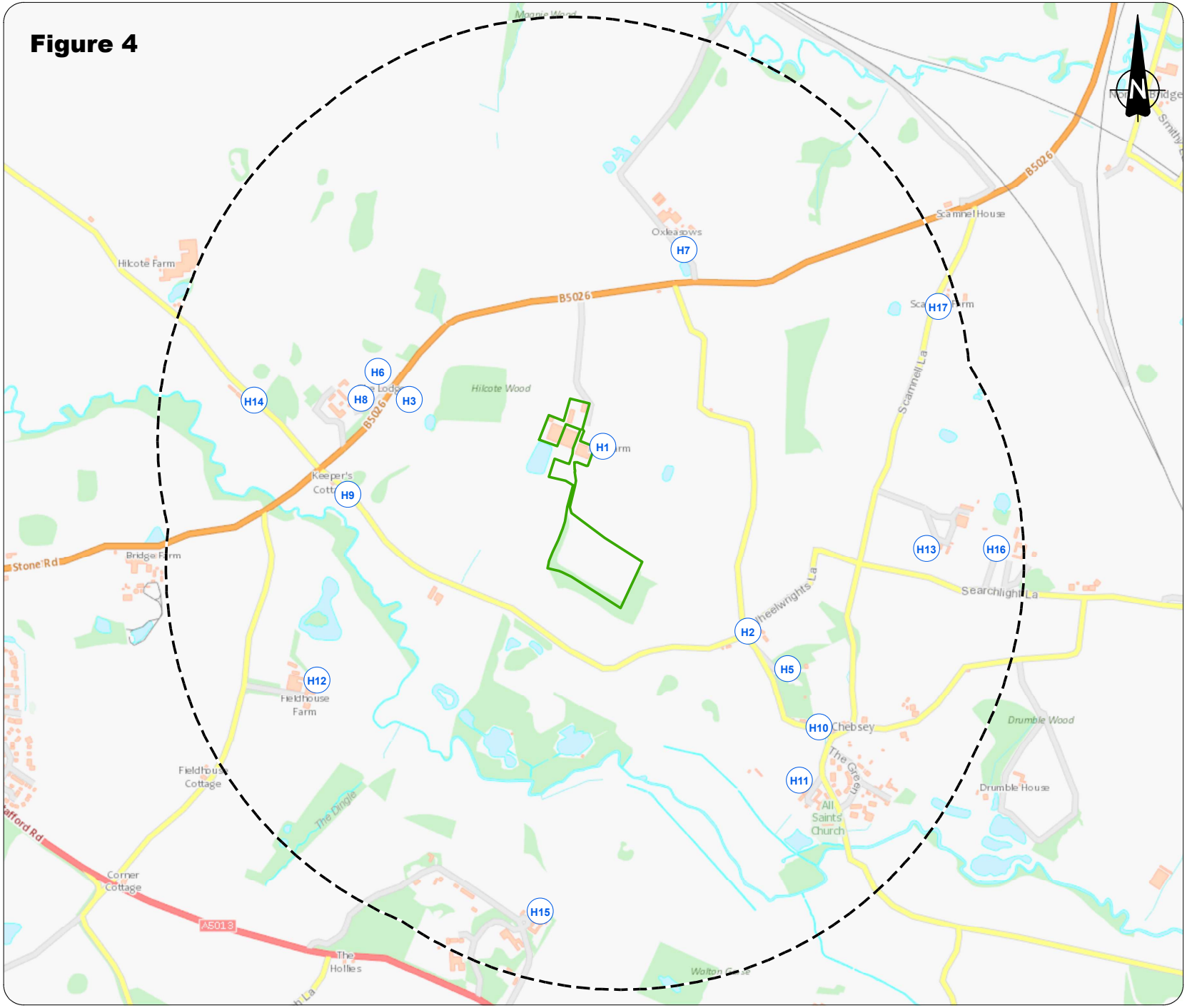
Drawn	Checked	Approved	Revision
JJ	ESP	ESP	REV A
Date: July 2025		Scale: 1:1,000	Sheet Size: A3
Drawing Number: ETL956MILSLPEPR04 Page 1 of 2			File Reference: ETL956

Figure 4



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REVISIONS

REV	DATE	DESCRIPTION	DWN	CHK	APP
-	19/06 2025	First Issue	JJ	ESP	ESP
A	28/07 2025	Second Issue	JJ	ESP	ESP

LEGEND

- Permit boundary
- 1km study area
- (H) Human receptors

0 100 200 300 400 500 m

Scale at A3: 1:10,000

Client: Mill Farm Recycling Limited

Project: ETL956/Permit Variation 2025

Title: Human Receptors (1km)

Earthcare TECHNICAL

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Chalton
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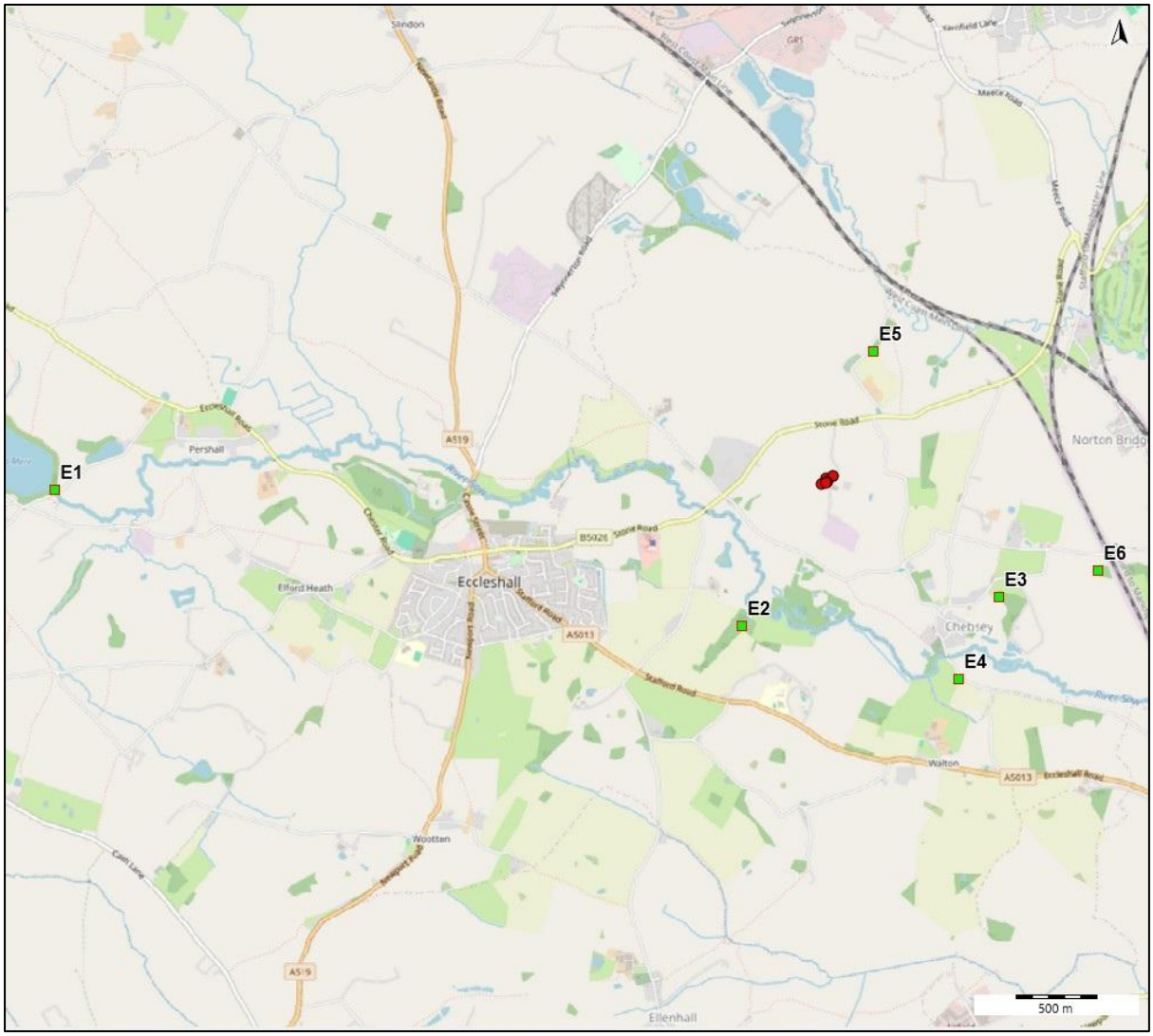
Drawn	Checked	Approved	Revision
JJ	ESP	ESP	REV A

Date	Scale	Sheet Size
July 2025	1:10,000	A3

Drawing Number	File Reference
ETL956/MIL/HR/EPR06	ETL956

Figure 5 Ecological receptors



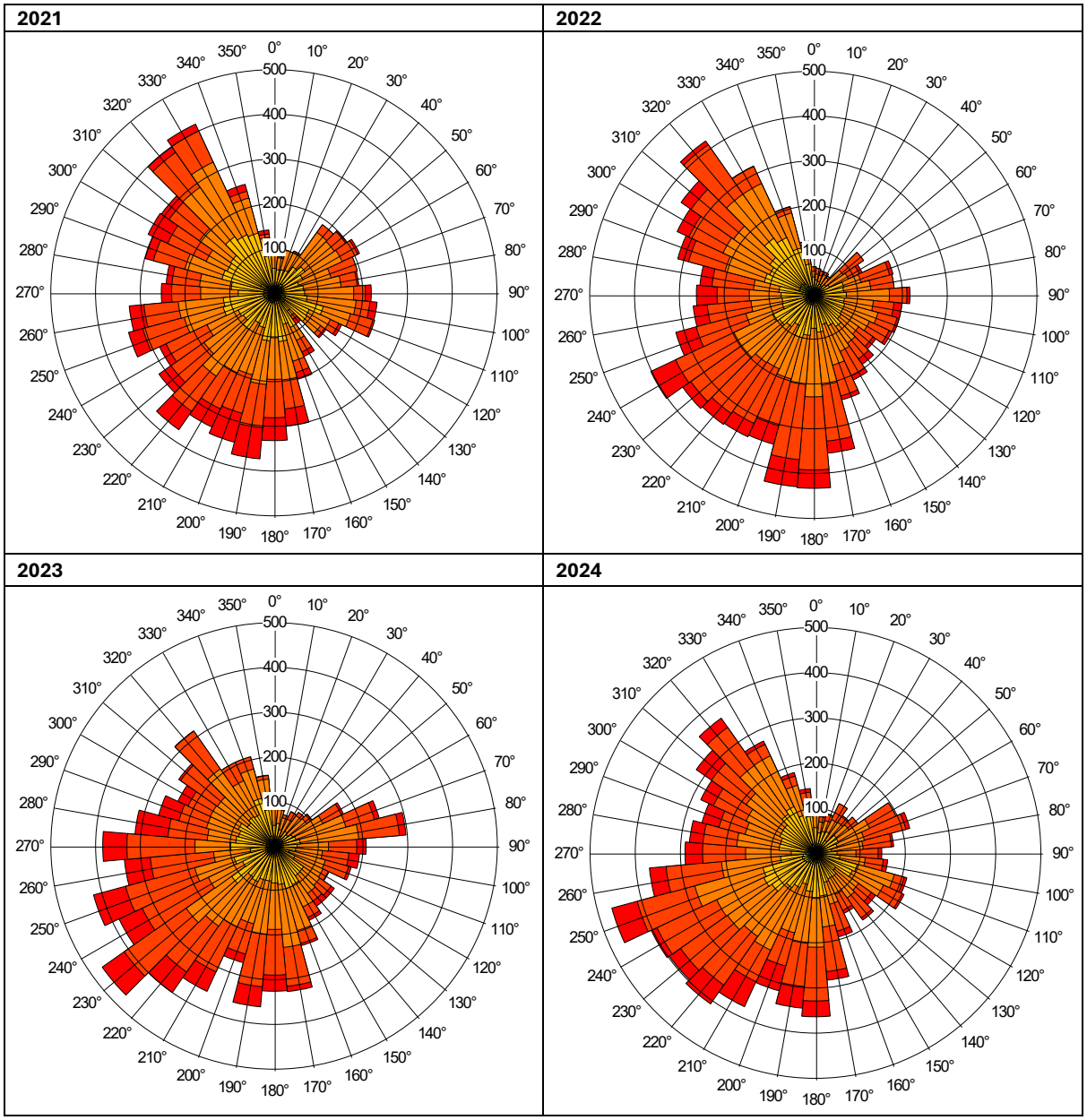
Background image ©OpenStreetMap contributors www.openstreetmap.org/copyright

Legend

Point sources

Ecological receptors

Figure 6 GFS meteorological data (52.864°, -2.219°), windroses 2021-2024



Scale

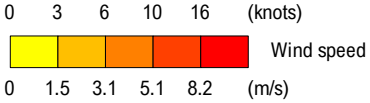
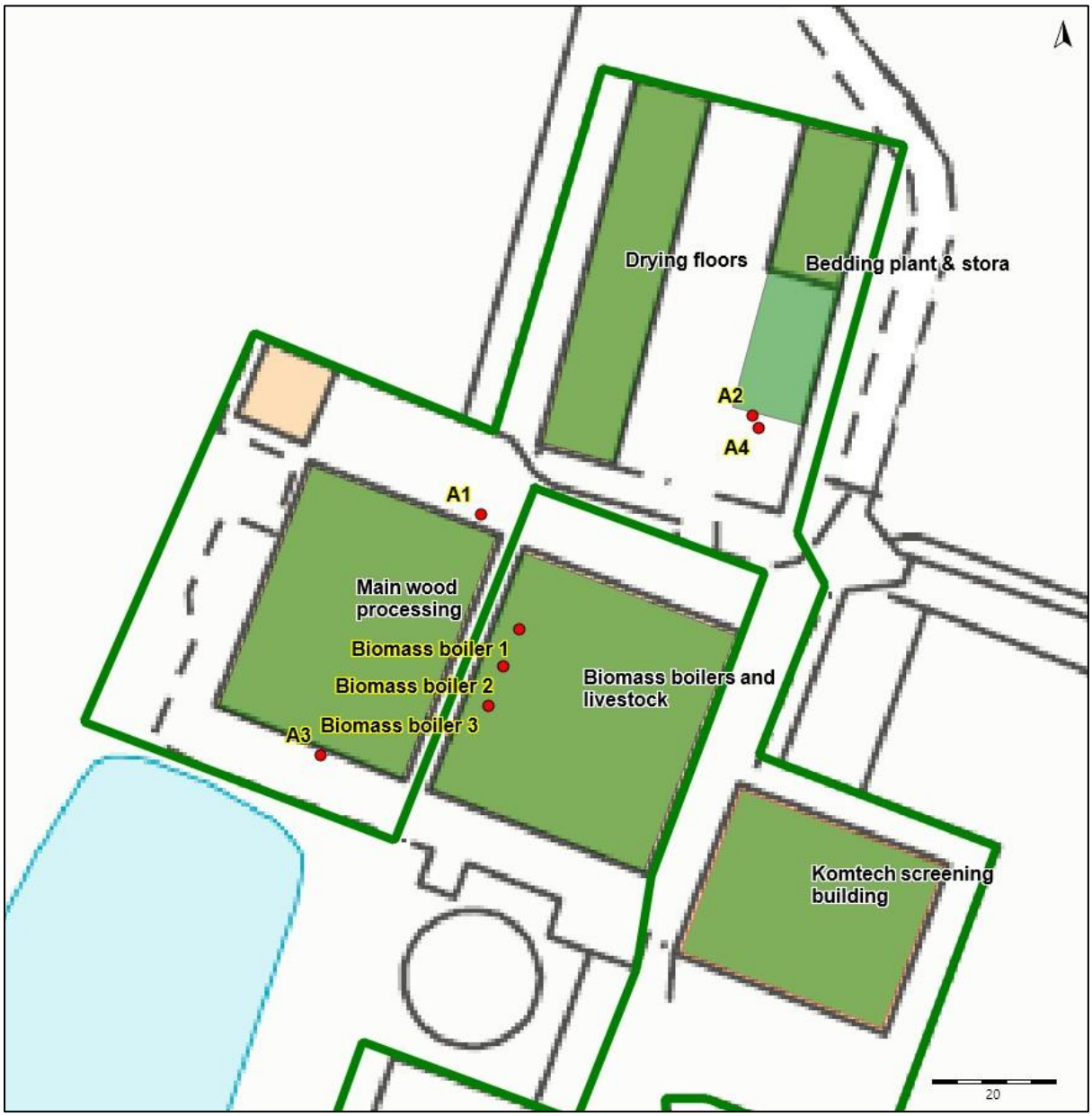
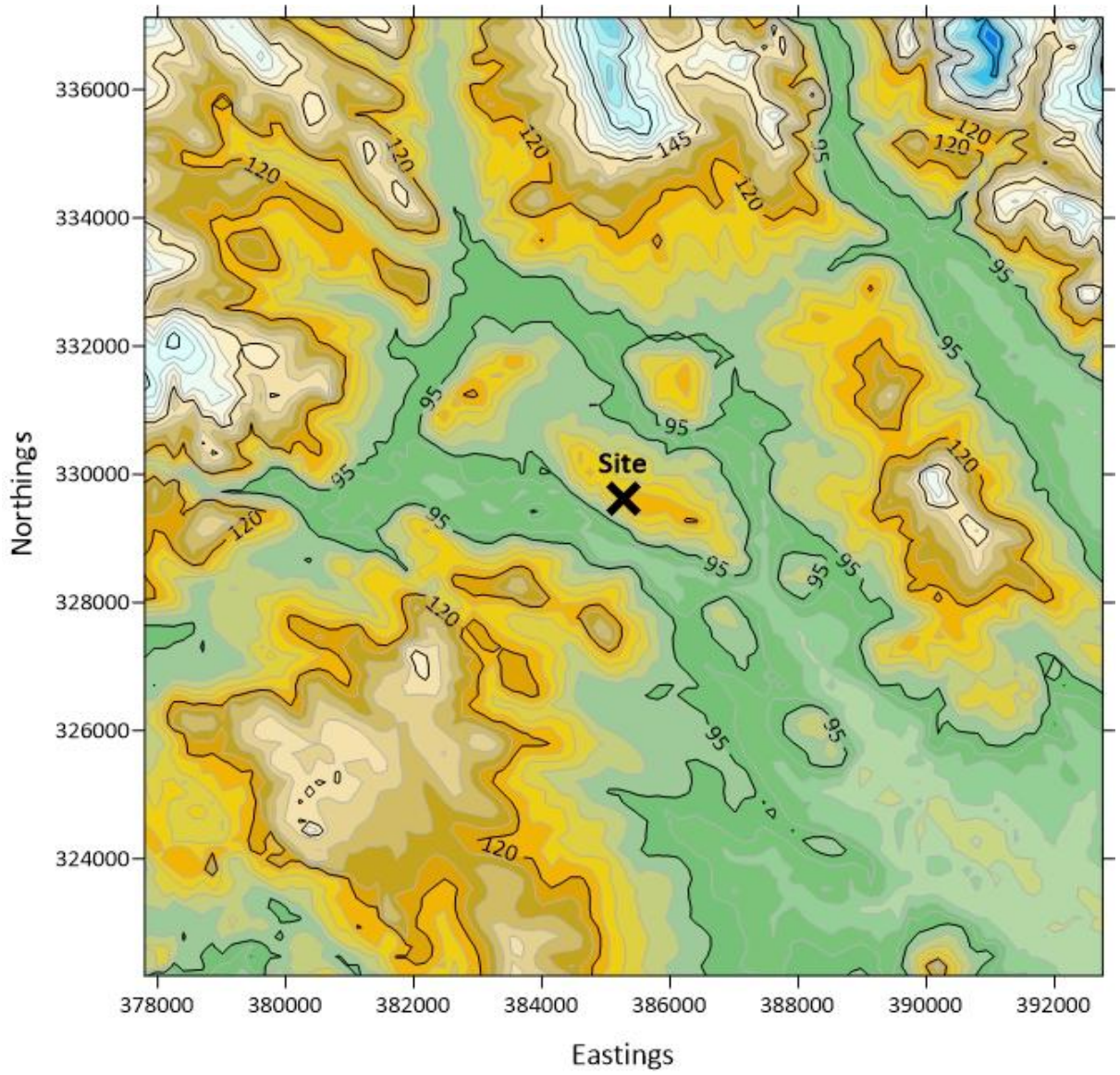


Figure 7 Modelled point sources, buildings and green line boundary

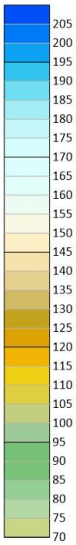


Legend

Figure 8 Terrain data and Site



Elevation (m)



Appendix A Technical specification: Dust extraction system for Main wood processing building (A1)

HAAS
Recycling-Systems
Holzzerkleinerungs- und Fördertechnik GmbH

RJT Ainsworth: HAAS Wood Storage & Processing Facility

Filter Unit – Dust Extraction System
Volume / capacity 27.000 m³/h

Project basics

job description:	central dust suppression
process:	waste wood processing
characteristics of dust:	fine and dry
raw gas concentration:	max. 25 g/m³
kind of operation:	multi-shift operation
volume flow:	27.000m³/h
installation filter:	outdoor
sound level:	max. 85 dB(A)
way of disposal:	rotary valve 1,5 m above floor level
clean-air guidance:	exhaust air tune above roof, approx. 12 m
residual dust content:	< 3 mg/m³

Bag filter system, type RTFAE-240S--JET FS

Filter surface:	243 m²
Air-to-cloth ratio:	111 m³/m²/h (27.000 m³/h)
No. of bag filters:	121 pcs
Length of bag filters:	4.000 mm

Compressor ?

Technical data:

- Filter media PE, 550 g/m², oil- and water repellent
- Filter bags NW 160 mm with internal filter cages, galvanized
- Pressure air pulse cleaning for providing continuous operation of the filter, incl. filter control (pressure or time dependant control) with control unit (output 4...20 mA)
- Pressure air tanks and jet lances with nozzles for low consumption of pressure air during the cleaning process
- Filter housing made of galvanized steel sheet S= 3mm and static verification of pressure resistance
- Certified pressure relief panels (ATEX) incl. pressure relief channel to front, max. length 1.000 mm
- Material hopper with inside large screw-conveyor (NW 400) incl. gear motor and bearings as well as connection to rotary valve
- Large raw gas section as a large expansion room for air calming
- Discharge air connection nozzle according to local necessity
- Filter base frame in welded hot-dip galvanized steel-construction incl. dry extinguishing pipe according to DIN EN 12 779
- dimensions: approx. 2.816 x 2.816 x 10.285 mm
- Ground clearing upper edge FFB to UK rotary valve 1.500 mm

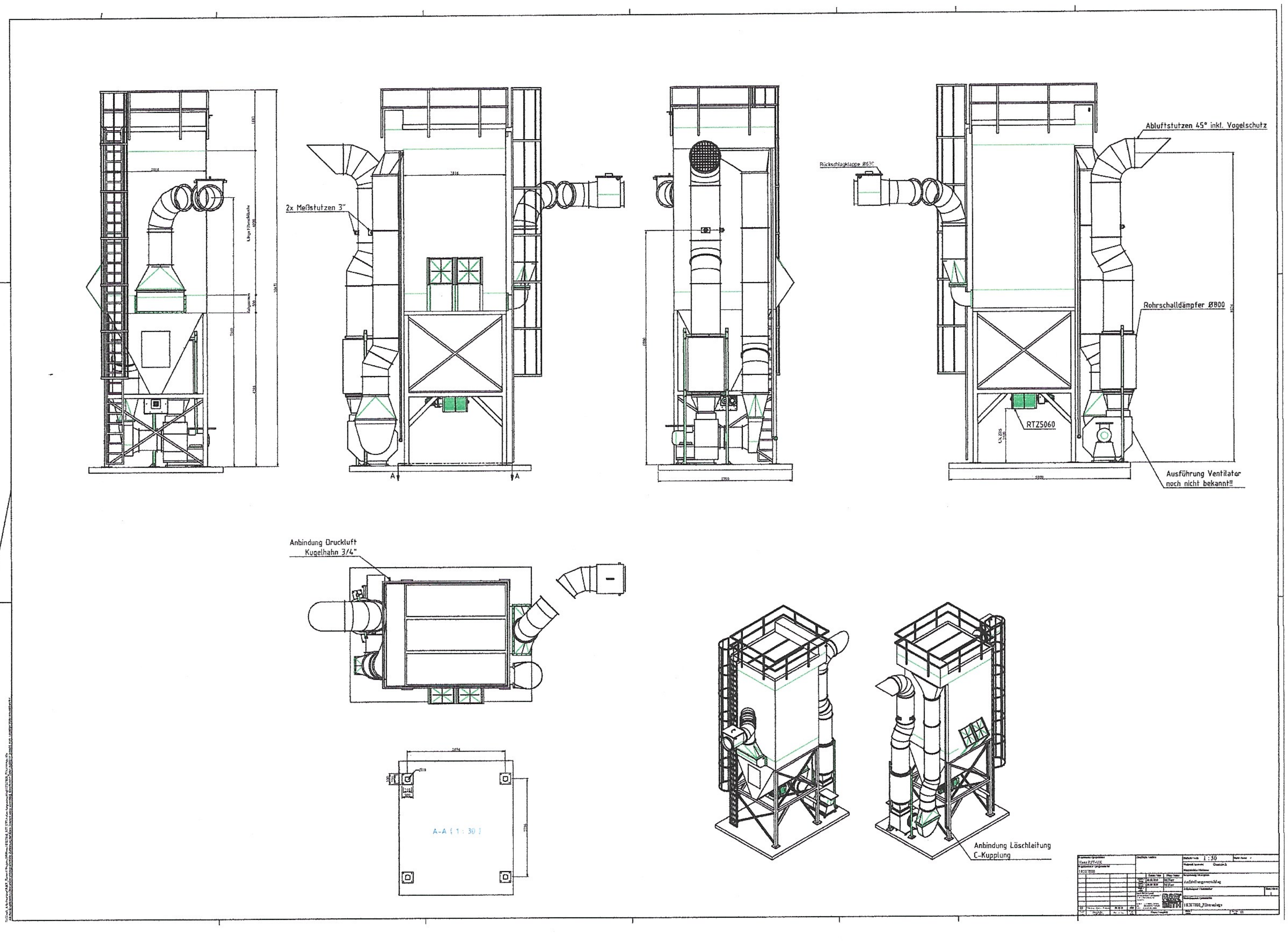
Rotary valve, Type RTZ5050ATEX-S-SEW
zone 20/22
gear box product SEW: 1,5 kW
inlet 500x500; outlet 350x500
CE type examination according to regulation 94/9/EG
as a protection system for explosion decoupling in potentially explosive areas
(pressure-shock-proof and flame-propagation-proof up to 0.4 bar)

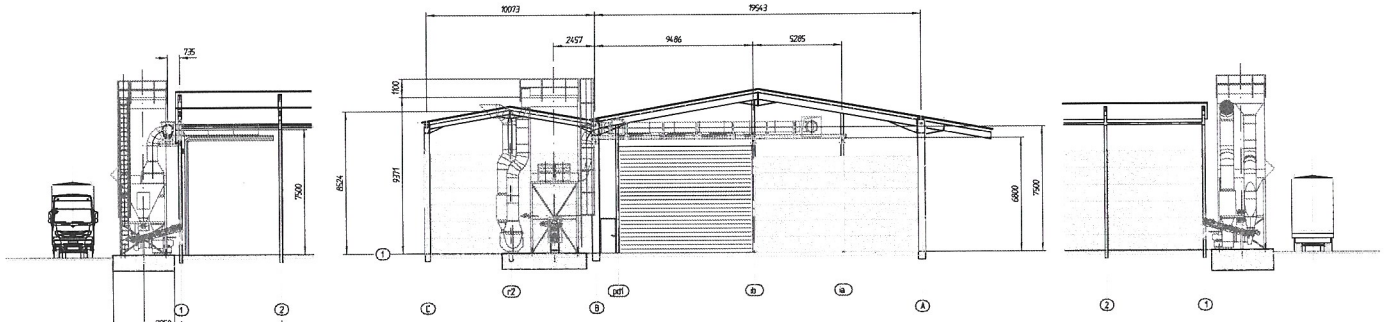
Non-return valve; Type RSK 630
Ø 630 mm with EC type examination according to 94/9/EC

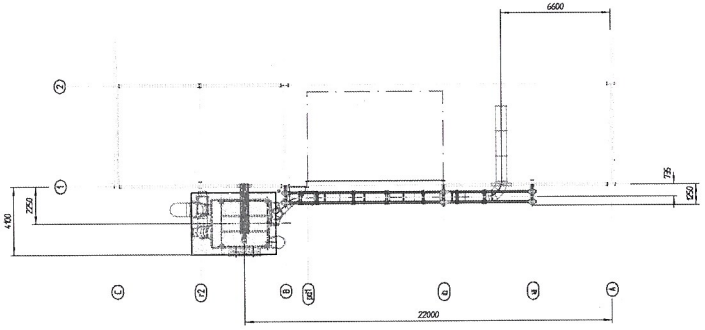
High performance - radial – ventilator

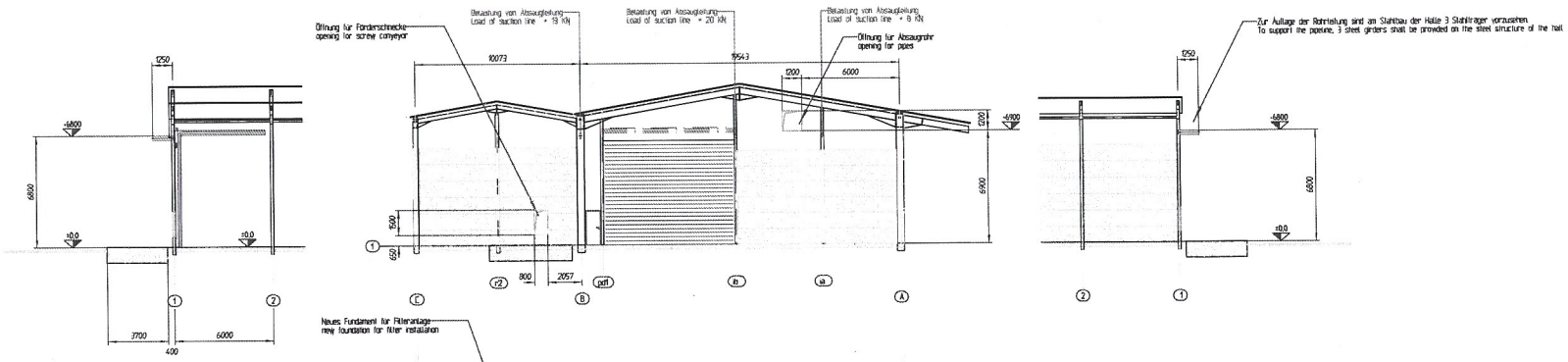
volume flow:	27.000 m3/h
total pressure increase:	3.500 Pa
drive motor:	37 kW

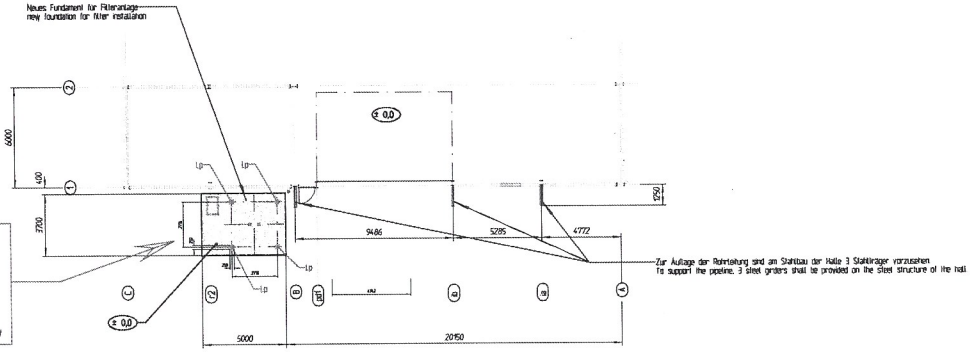
- nominal rotation speed: 1.480 rpm
- sound pressure level in 1 m 85 dB(A)
- welded housing
- welded impeller, with hub hove static and dynamic DIN 1940 G6,3
- inspection drain
- inspection cover
- rubber vibration damper
- motor (IE3)


2x Meßstutzen 3"
Rückschlagklappe Ø630
Abluftstutzen 45° inkl. Vogelschutz
Rohrschalldämpfer Ø800
RTZ5060
Ausführung Ventilator
noch nicht bekannt!!
Anbindung Druckluft
Kugelhahn 3/4"
A-A (1 : 30)
Anbindung Löschleitung
C-Kupplung
1 : 30









Fundamentlasten Filteranlage
foundation loads filter installation

Belastungen je Fusspunkt
Loads per foot point

Up =

Druck / pressure load = max. 72 KN
Zug / tensile load = max. -32 KN

Horizontal / horizontal load X/Y = max. 22 KN / 22 KN

Index	Änderung	Datum	Name
a			
b			
c			
d			
e			
f			
g			
h			

HAAS Recycling Systems

Alle nicht tolerierten Maßangaben nach ISO 2768-1 m

ATEX Zone 20 / 21 / 22

nicht ATEX

	Datum	Name
Gezeichnet:	27.05.	Kanz
Gepr.		
Genehmigt		

Maßstab 1:100

Benennung: Filter installation

Project: RJT - Ainsworth

Zeichnungs-Nr.: AF 33517-997-C0

Index: -

Format: A0

Blatt 1 / 1

Ersatz für: xxx

Ersetzt durch: xxx

SHARPS REDMORE

ACOUSTIC CONSULTANTS • Established 1990

Reference: Mill Farm, Chebsey
Project No: 1112359
Date: 7th June 2019

Technical Note

Re: Dust Extract Plant. Serving Milling Hall. Sound Level Assessment.

Introduction

1. An application has been submitted to Staffordshire County Council[1] by Wardell Armstrong, on behalf of Mill farm, for a new Pre-Shredding Facility. The new facility would be at the location of a previously permitted, but not fully built, Anaerobic Digester (AD) building on Mill Farm.

2. A decision on the Pre-Shredding facility has been postponed, pending submission by the Applicant, of an assessment of sound from a recently installed Dust Extract Plant at the (Replacement) Milling Hall. The Dust Extract Plant is itself the subject of a planning application (retrospective) to Stafford Borough Council. Staffordshire County Council wish the contribution of sound from the Dust Extract Plant to be included in the assessment of sound of the proposed Pre-Shredding Facility.

3. The likely levels of sound associated with the proposed Pre-Shredding plant were reported by Sharps Redmore[2] in the Technical Note dated 28th March 2019. (Copy attached for ease of reference). That particular Note was additional to one dated 31st October 2018.

4. The October 2018 Note examined Pre-Shredding operational sound, inclusive of the Milling Building, to the bungalow on Stone Road some 400m west of the Milling Building. It did not include the Dust Extract Plant. Accordingly, this is now added.

5. The March 2019 Note examined Pre-Shredding, Milling and Composting sound levels in the context of Field House Farm, some 940m south of the Milling Building. It did not include the Dust Extract Plant. Accordingly, this is now added.

6. In the preparation of sound level assessments on these topics to date, Sharps Redmore has relied on its submissions of 9th April 2018, 5th October 2017 and 20th May 2015. These have each been reviewed by the planning authorities and to be succinct, they are not appended to this current Technical Note.

---

[1] Staffordshire County Council. App.n ref: S.18/12/467W
Extension of time to determine the waste planning application.
[2] Sharps Redmore. 28th March 2019. Project No. 1112359. Technical Note.

7. The following sections of this Technical Note consider Dust Extract Fan sound to the bungalow on Stone Road and the farm house at Field House Farm. Firstly however, the Dust Extract Fan system and sound details are summarised.

Dust Extract Fan

8. The image inserted beneath is courtesy of the Applicant. The 'tower' unit comprises a fan (at low level, on the ground), a filter housing (rectangular tall section) and ductwork. The fan exhausts filtered air to atmosphere from the duct which rises vertically to roof ridge level. This duct incorporates an attenuator. (The slightly 'fattened' section of circular duct at the base of the duct). The exhaust points horizontally, to the east. The Milling Hall access door is to the right of the equipment. The background view is to the south-west.

9. The Applicant has been provided with information which indicates the following:

- Sound power level to outlet, 105 dB, excluding attenuator.
- Sound power level from fan casing, 96 dB.
- Attenuator, sound reduction of 11 dB.

Table 13

Cumulative Levels

Stone Road Bungalow

Contribution	Value
Dust Extract Fan. (This Technical Note, Table 12)	33 dB $L_{Aeq,1hr,free\text{-}field}$
Milling Hall Plant. (SR Tech Note, 31st October 2018)	36 dB $L_{Aeq,1hr,free\text{-}field}$
Tractor & Trailer movements (SR Tech Note, 31st October 2018)	31 dB $L_{Aeq,1hr,free\text{-}field}$
Pre-Shred Building. (SR Tech Note, 31st October 2018)	38 dB $L_{Aeq,1hr,free\text{-}field}$
Combined Level	41 dB $L_{Aeq,1hr,free\text{-}field}$
Rating Level. (No character-corrections*)	41 dB $L_{Ar,1hr,free\text{-}field}$
Permitted Level. (Background +5 dB)	43 dB to 47 dB
Is permitted Level expected to be satisfactorily met?	Yes

*No, because the source values are below the existing ambient and/or are of a character typical of a farming environment

14. The combined level at 41 dB is the same as expected without the Dust Extract Plant.

Receptor: Field House Farm

15. The dwelling on the farm is approximately 970 metres from the Dust Extract Plant. The fan itself is fully shielded by the Milling Hall and adjacent farm buildings. The exhaust duct termination is orientated approximately 120° away from Field House Farm.

16. Table 16 sets out the calculation steps of the Dust Extract Plant to the Field House Farm dwelling.

Table 16

Dust Extract Fan. Prediction to Field House Farm dwelling

Calculation Steps	Value	
Fan source	Outlet	Casing
L_{WA} given by the supplier	105 dB	96 dB
Exhaust side attenuator	-11 dB	n/a
Exhaust terminal directivity, 120°	-3 dB	n/a
Shielding by Mill Farm buildings	n/a	-15 dB
Adjust for 970m distance	-71 dB	-68 dB
Adjust for air & ground absorption, plus downwind enhancement	-2 dB	+2 dB
$L_{Aeq,1hr,free\text{-}field\ each}$	18 dB	15 dB
$L_{Aeq,1hr,free\text{-}field,}$ combined = 20 dB		

10. These values are used to calculate the sound level at the two receptors. The emission values are not unusual for this type of plant and are not 'high'. In context, they would be similar to the level of a lorry or tractor engine on 'idle/tide-over.' Given the above, the calculations are kept brief and robust. By robust, Sharps Redmore means that not every attenuating mechanism during sound propagation has been included. Accordingly, the reality would likely be for levels lower than forecast.

Receptor: Stone Road

11. This bungalow is approximately 440m from the Dust Extract Plant, the exhaust duct termination of which is orientated almost 180° away. The intervening land is mostly open agricultural land. It rises to a gentle crest at the woodland area, the effects of which would be to attenuate sound from the plant. For simplicity, only modest account is taken of these attenuating mechanisms.

12. Table 12 sets out the calculation steps of Dust Extract Plant sound to the Stone Road bungalow receptor.

Table 12
Dust Extract Fan. Prediction to Stone Road bungalow

Calculation steps	Value	
Fan source	Outlet	Casing
L_{WA} given by supplier	105 dB	96 dB
Exhaust duct losses	Ignore	n/a
Exhaust side attenuator	-11 dB	n/a
Exhaust terminal directivity, 180°	-6 dB	n/a
Adjust for 440m distance	-64 dB	-61 dB
Adjust for air and ground absorption, plus downwind enhancement	-1 dB	-3 dB
$L_{Aeq,1hr,free\text{-}field\ each}$	23 dB	32 dB
$L_{Aeq,1hr,free\text{-}field}$, combined = 33 dB		

13. Table 13 takes this 33 dB L_{Aeq} value and adds the previously-derived sound levels for the Milling Hall, the Pre-Shred Building and Tractor movements. These are then compared with the permitted level at this location of between 43 dB and 47 dB (rating level). The sources of information are referenced appropriately.

17. The Sharps Redmore Technical Note dated 28th March 2019 examined the sound contributions to Field House Farm comprising the Pre-Shred Building, Vehicle movements, Milling and occasional compost Turning. That combination was reported as:

- 36 dB $L_{Aeq,1hr,free\text{-}field}$, excluding occasional Turning
- 41 dB $L_{Aeq,1hr,free\text{-}field}$, including occasional Turning

18. In the context of the 36 dB to 41 dB L_{Aeq} range, as above, a level of 20 dB L_{Aeq} from the Dust Extract Plant would not be additive. Accordingly, the 45 dB $L_{Aeq,1hr,free\text{-}field}$ sound level limit relevant to Field House Farm would remain satisfactorily met.

Conclusions

19. The Dust Extract Plant is positioned and orientated well and an attenuator is incorporated on the exhaust side. The analysis and findings summarised in this Technical Note indicates the fan sound levels reaching Stone Road and Field House Farm would not add to the Mill Farm activity levels previously assessed. They would remain satisfactory in the context of the sound level limit values at the receptors.

Dean E Barke MSc MIOA

Attachment: Technical Note dated 28th March 2019

SHARPS REDMORE

ACOUSTIC CONSULTANTS • Established 1990

Reference: Mill Farm Chebsey
Project No: 1112359
Date: 28th March 2019

Technical Note

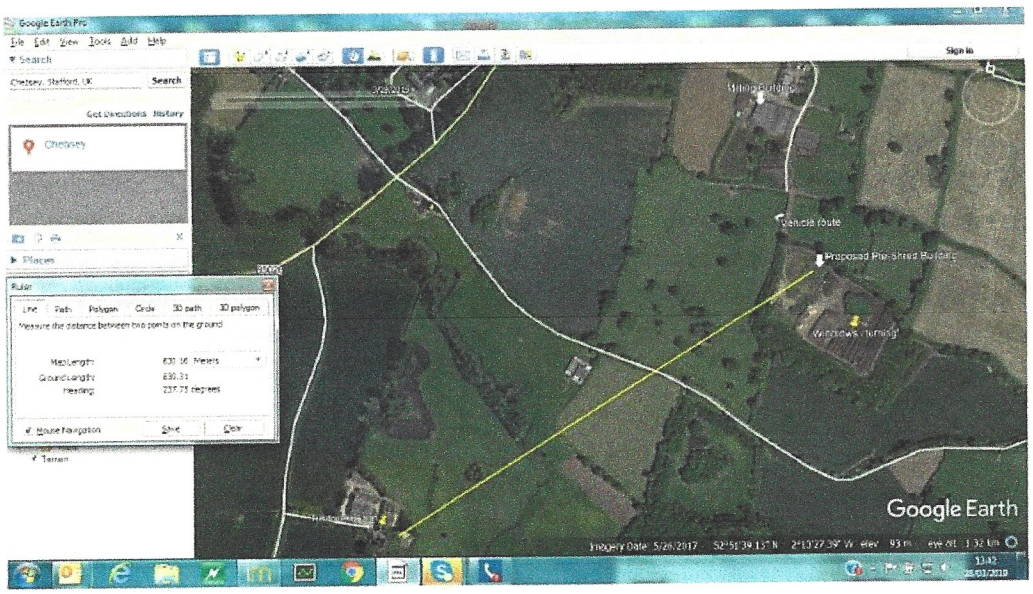
Re: Proposed Building for the Pre-Shredding of Wood Waste.
Additional Information on Likely Sound Emissions.

Introduction

1 An application has been submitted by Wardell Armstrong (on behalf of Mill Farm), to Staffordshire County Council, reference S.18/12/467W. The Application seeks permission for the former (part-built) Anaerobic Digester (AD) building to be demolished and a new building constructed in its place for the Pre-Shredding of wood waste.

2 A statement on sound emissions[1] accompanied the planning submissions. That Statement examined the likely effect on the closest and most directly-in-line property on Stone Road. A satisfactory outcome was forecast.

3 Staffordshire County Council have now requested an additional receptor be considered, that being Field House Farm. The dwelling at Field House Farm lies approximately 850 metres to the south-west of the proposed Pre-Shred building, as illustrated on the image beneath.



[1] Sharps Redmore. 31st October 2018. Technical Note
Project N°1112359

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Regional Locations South England (Head Office), North England, Wales, Scotland

4 In considering the Field House Farm receptor, the cumulative effect (of sound) from Milling operations is to be taken into account. Milling operations are permitted in a building among others at the northern part of Mill Farm as high-lighted on the image inserted at paragraph 3 above. The Milling building is approximately 950 metres from the Field House Farm dwelling.

The Pre-Shredding

5 The site plan attached as Attachment 1 to this Technical Note shows the proposed Shredder Building and its elevations. The 'west elevation' shows the access door position. A loading shovel (or similar) would travel back and forth between the shredder in the building and the stockpile of wood waste to be held on the concrete storage pad.

6 Although the access door would have a roller-shutter fitting, that would be for closing and securing the building at the end of working. It would not be opened and closed for every movement of the shovel. Such doors are not sufficiently fast-acting to respond to vehicle movements and accordingly, Sharps Redmore have examined the sound emissions on the basis of the door remaining fully open all of the time during Pre-Shred machine operations.

7 Previous assessments by Sharps Redmore have developed a sound emission value for the door aperture of 105 dB L_{WA}'. (L_{WA}' – the apparent sound power level).

Vehicle Movements

8 Sharps Redmore understand there would be, on average, 12-off vehicle (tractor and trailer) movements per hour between the Pre-Shred facility and the Milling Hall. These have previously been modelled (to the Stone Road bungalow receptor) at a sound output of 104 dB (L_{WA}') and haul speed equivalent to completing 1-off movement/journey in one minute.

Milling

9 The sound levels measured and adopted for the plant within and on the outside of the Milling building have been reported[2] by Sharps Redmore as 61 dB $L_{Aeq,t}$ at 40m. That value included a proportion of sound from the north elevation loading door aperture. That contribution would not feature in the sound propagation to Field House Farm given its orientation and shielding by the Milling building itself. However, in the interests of simplicity and resilience, the same value is used in the forecast of sound propagating to Field House Farm.

[2] Sharps Redmore. 9th April 2018. Report. Project No. 1112359.

Sound Level Prediction and Assessment

10 A cumulative sound level prediction is made to the dwelling at Field House Farm using the output values presented above. In addition to these day-to-day operations, account is also taken of the occasional 'turning' of the windrows on the composting pad. (See this area at Attachment 1). Sharps Redmore have measured this process on an occasion in the past and found it to be 71 dB $L_{Aeq,t}$ at a distance of 25m.

11 Table 11 sets out the calculations and assessment for the key proposed, permitted and occasional operations. The not-to-exceed value for Mill Farm operations reaching Field House Farm is 45 dB $L_{Aeq,1hr,free\text{-}field}$.

Table 11

Sound Level Prediction and Assessment

To Field House Farm dwelling

Calculation Steps	Activity			
	Pre-Shred	Vehicles	Milling	Turning (Occasional)
Prediction				
Source value, as derived from site	105 dB L_{WA}'	104 dB L_{WA}'	61 dB $L_{Aeq,t}$	71 dB $L_{Aeq,t}$
Source value distance	n/a	n/a	40m	25m
Assessment time period 't'	1-hour	1-hour	1-hour	1-hour
Distance to receptor, adopt	830m	850m	940m	850m
Adjust for distance*	-66 dB	-69 dB	-30 dB	-31 dB
Adjust for barrier, southern boundary	-3 dB	Ignore	Not applicable	Ignore
Adjust for absorption	-3 dB	-3 dB	-4 dB	-3 dB
Adjust for light breeze, NE	+2 dB	+2 dB	+2 dB	+2 dB
Adjust for 1 minute vehicle movements	n/a	-18 dB	n/a	n/a
Adjust for 12-off movements**	n/a	+11 dB	n/a	n/a
Estimated $L_{Aeq,1hr,free\text{-}field}$	35 dB	27 dB	29 dB	39 dB
Total of Three = 36 dB	✓	✓	✓	X
Total of Four = 39 dB	✓	✓	✓	✓
Assessment				
Limit = 45 dB				
Limit achieved ? = Yes				
Conclude = Satisfactory				
*including 'soft' ground attenuation				
**per hour on average				

12 The expectation is for the 45 dB $L_{Aeq,1hr,free\text{-}field}$ limit for Mill Farm site operations to be satisfactorily achieved at the Field House Farm dwelling receptor point.

Dean E Barke MSc. MIOA

Attachments: 1. Site Layout and Elevation drawings

Appendix B Technical specification: Diesel generators, Kohler SDMO V770C2, (A3, A4)

V770C2

Engine ref.	TWD1645GE
Alternator ref.	KH02850T
Performance class	G3

GENERAL CHARACTERISTICS

Frequency (Hz)	50 Hz
Voltage (V)	400/230
Standard Control Panel	APM403
Optional control panel	APM802
Optional Control Panel	M80
Optional control panel	NA

POWER

Voltage	ESP		PRP		Standby Amps
	kWe	kVA	kWe	kVA	
415/240	616	770	560	700	1071
400/230	616	770	560	700	1111
380/220	616	770	560	700	1170
240 TRI	616	770	560	700	1852
230 TRI	616	770	560	700	1933
220 TRI	616	770	560	700	2021

DIMENSIONS COMPACT VERSION

Length (mm)	3470
Width (mm)	1630
Height (mm)	2048
Dry weight (kg)	4270
Tank capacity (L)	610

DIMENSIONS SOUNDPROOFED VERSION

Type soundproofing	M230
Length (mm)	5023
Width (mm)	1630
Height (mm)	2672
Dry weight (kg)	5790
Tank capacity (L)	610
Acoustic pressure level @1m in dB(A)	85
Sound power level guaranteed (Lwa)	105
Acoustic pressure level @7m in dB(A)	75

DESCRIPTIVE

- Electronic governor
- Mechanically welded chassis with antivibration suspension
- Main line circuit breaker
- Radiator for core temperature of 48/50°C max with mechanical fan
- Protective grille for fan and rotating parts (CE option)
- 9 dB(A) silencer supplied separately
- Charger DC starting battery with electrolyte
- 24 V charge alternator and starter
- Delivered with oil and coolant -30°C
- Manual for use and installation

POWER DEFINITION

PRP : Prime Power is available for an unlimited number of annual operating hours in variable load applications, in accordance with ISO 8528-1. ESP : The standby power rating is applicable for supplying emergency power in variable load applications in accordance with ISO 8528-1. Overload is not allowed.

TERMS OF USE

According to the standard, the nominal power assigned by the genset is given for 25°C Air Intlet Temperature, of a barometric pressure of 100 kPA (100 m A.S.L), and 30 % relative humidity. For particular conditions in your installation, refer to the derating table.

ASSOCIATED UNCERTAINTY

For the generating sets used indoor, where the acoustic pressure levels depends on the installation conditions, it is not possible to specify the ambient noise level in the exploitation and maintenance instructions . You will also find in our exploitation and maintenance instructions a warning concerning the air noise dangers and the need to implement appropriated preventive measures.

V770C2

ENGINE CHARACTERISTICS

GENERAL ENGINE DATA

Engine brand	VOLVO
Engine ref.	TWD1645GE
Air inlet system	Turbo
Cylinders configuration	L
Number of cylinders	6
Displacement (L)	16,12
Charge Air coolant	Air/Water DC
Bore (mm) x Stroke (mm)	144 x 165
Compression ratio	16.8 : 1
Speed (RPM)	1500
Pistons speed (m/s)	8,25
Maximum stand-by power at rated RPM (kW)	675
Frequency regulation, steady state (%)	
BMEP @ PRP 50 Hz (bar)	30,40
Governor type	Electronic

COOLING SYSTEM

Radiator & Engine capacity (L)	151
Fan power (kW)	21
Fan air flow w/o restriction (m3/s)	
Available restriction on air flow (mm H2O)	
Type of coolant	Glycol-Ethylene

EMISSIONS

Emission PM (g/kW.h)	0,02
Emission CO (g/kW.h)	0,28
Emission HC+NOx (g/kWh)	5,29
Emission HC (g/kW.h)	0,09

EXHAUST

Exhaust gas temperature @ ESP 50Hz (°C)	501
Exhaust gas flow @ ESP 50Hz (L/s)	1767
Max. exhaust back pressure (mm H2O)	1000

FUEL

Consumption @ 100% load ESP (L/h)	157,20
Consumption @ 100% PRP load (L/h)	143,70
Consumption @ 75% PRP load (L/h)	107,70
Consumption @ 50% PRP load (L/h)	73,60
Maximum fuel pump flow (L/h)	177

OIL

Oil system capacity including filters (L)	48
Min. oil pressure (bar)	
Max. oil pressure (bar)	5
Oil consumption 100% ESP 50Hz (L/h)	0,11
Oil sump capacity (L)	42

HEAT BALANCE

Heat rejection to exhaust (kW)	473
Radiated heat to ambiant (kW)	26
Heat rejection to coolant HT (kW)	259

AIR INTAKE

Max. intake restriction (mm H2O)	500
Intake air flow (L/s)	725,50

V770C2

ALTERNATOR CHARACTERISTICS

GENERAL DATA

Alternator ref.	KH02850T
Number of Phase	Three phase
Power factor (Cos Phi)	0,80
Altitude (m)	0 à 1000
Overspeed (rpm)	2250
Number of pole	4
Capacity for maintaining short circuit at 3 In for 10 s	Yes
Insulation class	H
T° class (H/125°), continuous 40°C	H / 125°K
T° class (H/163°C), standby 27°C	H / 163°K
Total Harmonic Distortion in no-load DHT (%)	<4
AVR Regulation	Yes
Total Harmonic Distortion, on linear load DHT (%)	<4
Wave form : NEMA=TIF	<50
Wave form : CEI=FHT	<2
Number of bearing	Single Bearing
Coupling	Direct
Voltage regulation at established rating (+/- %)	0,50
Recovery time (Delta U = 20% transcient) (ms)	500
Indication of protection	IP 23
Technology	Brushless

OTHER DATA

Continuous Nominal Rating 40°C (kVA)	730
Standby Rating 27°C (kVA)	810
Efficiencies 100% of load (%)	94,30
Air flow (m3/s)	1
Short circuit ratio (Kcc)	0,4210
Direct axis synchro reactance unsaturated (Xd) (%)	294
Quadra axis synchro reactance unsaturated (Xq) (%)	150
Open circuit time constant (T'do) (ms)	2074
Direct axis transcient reactance saturated (X'd) (%)	14,20
Short circuit transcient time constant (T'd) (ms)	100
Direct axis subtranscient reactance saturated (X"d) (%)	11,30
Subtranscient time constant (T"d) (ms)	10
Quadra axis subtranscient reactance saturated (X"q) (%)	12,80
Subtranscient time constant (T"q) (ms)	10
Zero sequence reactance unsaturated (Xo) (%)	0,50
Negative sequence reactance saturated (X2) (%)	12,10
Armature time constant (Ta) (ms)	15
No load excitation current (io) (A)	1,11
Full load excitation current (ic) (A)	4,13
Full load excitation voltage (uc) (V)	46,90
Engine start (Delta U = 20% perm. or 30% trans.) (kVA)	1439,30
Transcient dip (4/4 load) - PF : 0,8 AR (%)	10
No load losses (W)	10302,59
Heat rejection (W)	35232,60
Unbalanced load acceptance ratio (%)	60

DIMENSIONS

Dimensions soundproofed version

Type soundproofing	M230
Length (mm)	5023
Width (mm)	1630
Height (mm)	2672
Dry weight (kg)	5790
Tank capacity (L)	610
Acoustic pressure level @1m in dB(A)	85
Sound power level guaranteed (Lwa)	105
Acoustic pressure level @7m in dB(A)	75

Dimensions DW soundproofed version

Type soundproofing	M230 DW
Length (mm)	5083
Width (mm)	1690
Height (mm)	2932
Dry weight (kg)	6380

Dimensions DW compact version

Type soundproofing	
Length (mm)	5083
Width (mm)	1630
Height (mm)	2310
Dry weight (kg)	4890
Tank capacity (L)	1950
Acoustic pressure level @1m in dB(A)	
Sound power level guaranteed (Lwa)	
Acoustic pressure level @7m in dB(A)	

Tank capacity (L)	1950
Acoustic pressure level @1m in dB(A)	85
Sound power level guaranteed (Lwa)	105
Acoustic pressure level @7m in dB(A)	75

V770C2

CONTROL PANEL

APM403, basic generating set and power plant control

The APM403 is a versatile control unit which allows operation in manual or automatic mode
Measurements : voltage and current
kW/kWh/kVA power meters
Standard specifications: Voltmeter, Frequency meter.
Optional : Battery ammeter.
J1939 CAN ECU engine control
Alarms and faults: Oil pressure, Coolant temperature, Overspeed, Start-up failure, alternator min/max, Emergency stop button.
Engine parameters: Fuel level, hour counter, battery voltage.
Optional (standard at 24V): Oil pressure, water temperature.
Event log/ Management of the last 300 genset events.
Mains and genset protection
Clock management
USB connections, USB Host and PC,
Communications : RS485 INTERFACE
ModBUS protocol /SNMP
Optional : Ethernet, GPRS, remote control, 3G, 4G, Websupervisor, SMS, E-mails

APM802 dedicated to power plant management

The new APM802 command/control system is specifically designed for operating and monitoring power plants for markets including hospitals, data centres, banks, the oil and gas sector, industries, IPP, rental and mining.
This unit is available as standard on all generating sets from 275 Kva designed for coupling. It is optional on the rest of our range.
The Human Machine Interface, designed in collaboration with a company specialising in interface design, facilitates operations with a large 100% touch screen. The pre-configured system for power plant applications features a brand new customisation function which complies with the international standard IEC 61131-3. New communication functions (PLC and regulation), improve the high level of equipment availability in the installation.

Advantages:
Dedicated to power plant management.
Specially researched ergonomics.
High level of equipment availability.
Modularity and long service life guaranteed.
Making it easy to extend the installation

For more information, please refer to the sales documentation.

M80, transfer of information

The M80 is a dual-function control unit. It can be used as a basic terminal block for connecting a control box and as an instrument panel with a direct read facility, with displays giving a global view of your generating set's basic parameters.

Offers the following functions:

Engine parameters: tachometer, working hours counter, coolant temperature indicator, oil pressure indicator, emergency stop button, customer connection terminal block, CE.

Basic terminal block

The control unit can be used as a basic terminal block for connecting a control box.

Offers the following functions:

emergency stop button, customer connection terminal block, CE.

Appendix C Technical specification: Dust extraction system for Bedding plant building (A2)

HAAS Wood Chip Handling System

Infeed material:	Grade A wood
Input:	ca. 0-40 mm wood chips (P40)
Capacity:	ca. 85-90 m³/h (11-13 t/h)
Final product:	0-5 mm (ca. 40%)
	5-10 mm (ca. 40%)
	+ 10 mm (ca. 20%)

Quotation consisting of:

Pos 100 1 pc. **HAAS Dosing Hopper**
for the storage of the incoming wood chips and feeding of the processing line.

Capacity:	ca. 41 m³
Drive:	ca. 2,2 kW
Width:	ca. 2.100 mm
Length:	ca. 8.000 mm
Height:	ca. 2.500 mm
Belt quality:	plate belt
Carrier height:	ca. 50 mm
Carrier distance:	ca. 500 mm

Incl. chain belt conveyor
Incl. 8 sturdy supports under the bunker belt incl. adjustable feet to to compensate for local conditions
Incl. chain oiler, automatic oiling by pressure oiler
Incl. dosing drum; 2,2 kW
Incl. reversing option to unload the bunker

Pos 200 1 pc. **HAAS Belt Conveyor**
Type HTB 1.400 x 12.400 – covered –
For the transport of the material from the Dosing Hopper Pos. 100 to the following customer supplied Morbark Hammermill Pos. 300.

Conveyor width:	ca. 1.400 mm
Conveyor length:	ca. 12.400 mm
Power:	ca. 7,5 kW

Incl. scraper
Incl. dust extraction hood

Pos 300 1 pc. **Morbark Hammermill – customer supplied –**
To reduce the grain size of the grade A wood chips to sub 10 mm.

Pos 310 1 pc. **Support for the Morbark Hammermill – customer supplied –**

The customer is providing the Morbark Hammermill 1500V incl. switch and control cabinet.
Incl. dust extraction hood

Pos 400 1 pc. **HAAS Chain Conveyor**
Type HKF 1.000 x 13.100
For collecting of the fines < 10 mm under the Morbark Hammermill Pos. 300 and further transport to the following Flat Screen Pos. 500.
Conveyor width: ca. 1.000 mm
Conveyor length: ca. 13.100 mm
Lower bow: ca. 45°
Power: ca. 5,5 kW
Capacity: max. 85-95 m³/h
Incl. dust extraction hood

Pos 500 1 pc. **HAAS Flat Screen**
Type HPS 100 – customer supplied –
to receive the material from Chain Conveyor Pos. 400 and separate into following fractions:
Fraction 1: > 10 mm
Fraction 2: 5-10 mm
Fraction 3: < 5 mm
Active screen deck length: ca. 5.220 mm
Active screen deck width: ca. 2.000 mm
Active screen area: ca. 10,3 m³
Power: ca. 7,5 kW

Installation on a concrete foundation to be provided by the customer

Pos 510 1 pc. **HAAS Maintenance Platform**
Suitable for Flat Screen Pos. 500
Maintenance Platform with railing
Incl. stairs with hand rail

Pos 520 1 pc. **New Infeed and Outfeed chute for customer supplied Flat Screen HPS 100 Pos 500**

Pos 530 3 pc. **Exchange Screen Decks**
Suitable for Flat Screen Pos. 500 to produce the specified grain sizes.

Pos 600 1 pc. **HAAS Chain Conveyor**

Type HKF 650 x 17.800
For the transportation of the material 0-5 mm to the following Conveyor Pos. 700.

Conveyor width:	ca. 650 mm
Conveyor length:	ca. 17.800 mm
Lower bow:	ca. 50°
Upper bow:	ca. 50°
Power:	ca. 7,5 kW
Capacity:	max. 55-60 m³/h

No supports included. It is assumed that the conveyor is suspended from the bunker walls and customer supplied steel beams.

Pos 700 1 pc. **HAAS Chain Conveyor**
Type HKF 650 x 9.100
For the transportation of the material 0-5 mm to pile.

Conveyor width:	ca. 650 mm
Conveyor length:	ca. 9.100 mm
Power:	ca. 4,0 kW
Capacity:	max. 55-60 m³/h

Completely open at the bottom to distribute the material in the storage bay.
No supports included. It is assumed that the conveyor is suspended from the bunker walls and customer supplied steel beams.

Pos 800 1 pc. **HAAS Chain Conveyor**
Type HKF 650 x 11.800
For the transportation of the material 5-10 mm to the following Conveyor Pos. 900.

Conveyor width:	ca. 650 mm
Conveyor length:	ca. 11.800 mm
Lower bow:	ca. 50°
Upper bow:	ca. 25°
Power:	ca. 5,5 kW
Capacity:	max. 55-60 m³/h

No supports included. It is assumed that the conveyor is suspended from the bunker walls and customer supplied steel beams.

Pos 900 1 pc. **HAAS Chain Conveyor**
Type HRKF 650 x 9.100
For the transportation of the material 5-10 mm to pile.

Conveyor width:	ca. 650 mm
Conveyor length:	ca. 9.100 mm
Power:	ca. 4,0 kW

Capacity: max. 55-60 m³/h
Completely open at the bottom to distribute the material in the storage bay.
No supports included. It is assumed that the conveyor is suspended from the bunker walls and customer supplied steel beams.

Pos 1.000 1 pc. **HAAS Filter System**

Filter
Filter area: 200 m²
Filter surface load: 100 m³/m²/h
Filter bags: 100 pc., length 4.000 mm
Filter housing: galvanized steel sheet
Incl. ducting to approx. **4 extraction points:** 1x infeed conveyor Pos. 200, 2x under customer supplied mill, 1x outfeed conveyor Pos. 400
Incl. inspection door, ladder, standing platform acc. to DIN
Incl. compressor
Rotary valve
Power: 1,5 kW
Explosion diverter
For the explosion isolation from the filter to the crude gas main, incl. burst disc
Clean-air fan
Air volume: ca. 15.000 m³/h*
Power: ca. 30,0 kW
Sound insulation cabinet
For the fan
Clean gas pipe
Between filter, fan and air duct
Suspension at the slap
Incl. switch board
Sensors are included
Incl. support structure
Incl. suitable compressor
Without walkway

Discharging in customer supplied big bag under the filter

* **Based on the assumption that max. 12,500 m³ air/hour is required for the extraction of the hammer mill. A definite design of the filter system can be done only after confirmation of the displaced air of the hammer mill.**

Pos 1.100 1 pc. **10' Shipping Container**
Incl. window
Incl. additional extrance door
Incl. electrical installations
Incl. steel support, staircase with hand rail

Pos 1.200 1 pc. **HAAS Switch & Control Board**
For the automatic adjusting of the HAAS elements indicated here above
Including star-triangle control for the main motor and overload control for the transporting elements.
Mounted in a control cabinet.
Without cabling from the main motors to the cabinet.

The wiring diagram of the Morbark 1500V Hammermill needs to be provided by the customer.

Pos 1.300 1 pc. **Electrical cabling**
of above-mentioned Haas parts on site

Pos 1.400 1 pc. **HAAS Mounting of installations & Start-Up**
At disposal from Haas: 1 supervisor, 1 mounting engineer, including preparation, voyage, mounting time (The mounting time is calculated with 7 weeks, 5 days per week, 8 hours per day). Main condition for this calculated time: a freely accessible site, free hall columns for the welding of the steel bedding, etc.)

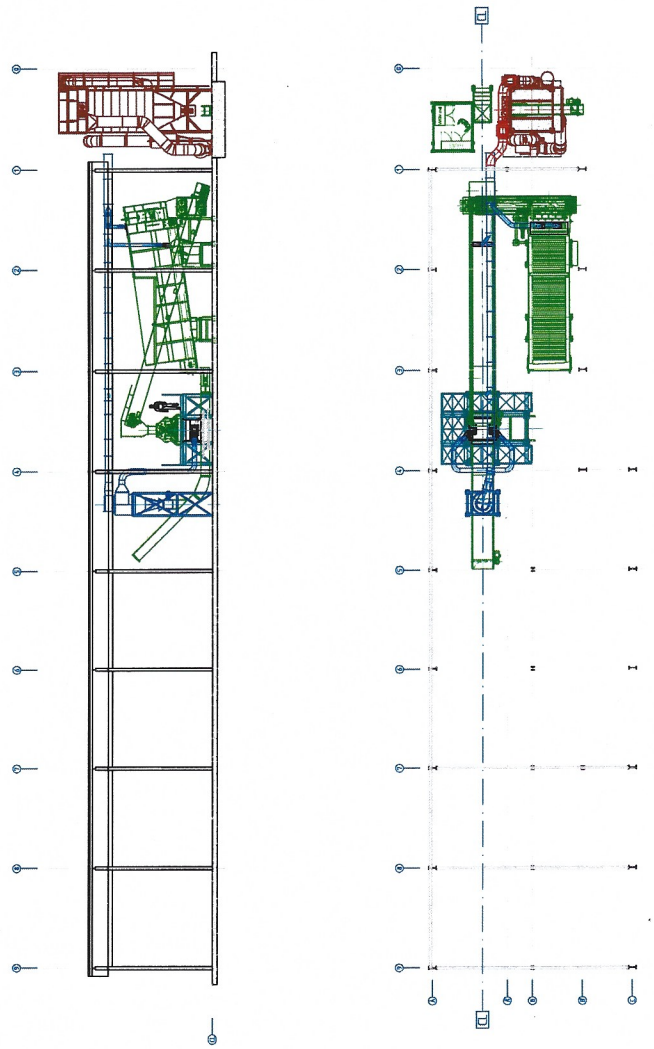
At disposal from the customer:
- **Lifting devices, like forklift, crane etc.**
- All measures like earth removal, concrete foundations, building works, sealing, static of foundation and building, platform, building techniques, intermediate transports, eventually necessary steel bedding, large surface sheeting if not mentioned.
- Servicing cabins, catwalks, stairs, railings, if not mentioned.
- Necessary current
- Coverings and safety devices if necessary or requested on site
- All steel beddings and foundations have to be prepared and ready before the beginning of the mounting of the installation.
- One of the assemblers should have good acknowledge in welding

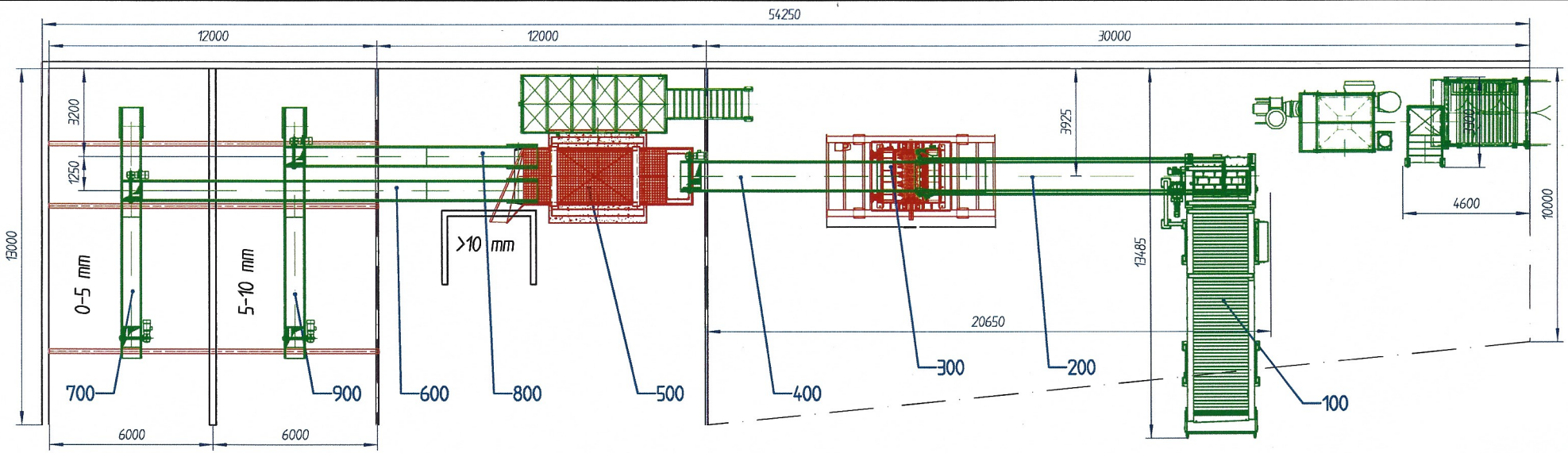
techniques.
- Large surface sheeting
- Complete electrical control of the installation elements, if not mentioned
- Complete electronic cabling and electrical installation on site
- If the mounting duration should be longer for reasons that are not in Haas fault or responsibility, Haas will invoice the dead time after the end of the mounting. Ready electrical installation is the condition for immediate setting into service after mounting. Waiting time or a second voyage is not included in the quotation and will be invoiced if requested.

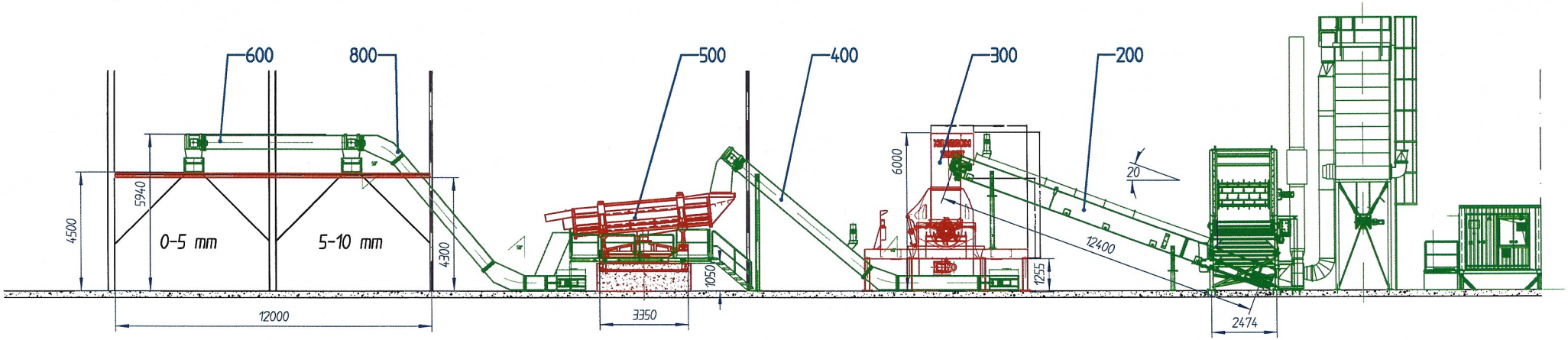
Pos	1.500	1 pc.	**Transport cost** Transport of Pos. 100 – 1.100 To DAP RJT & AR Ainsworth, Mill Farm, Stone Road, ST21 6NX Chebsey

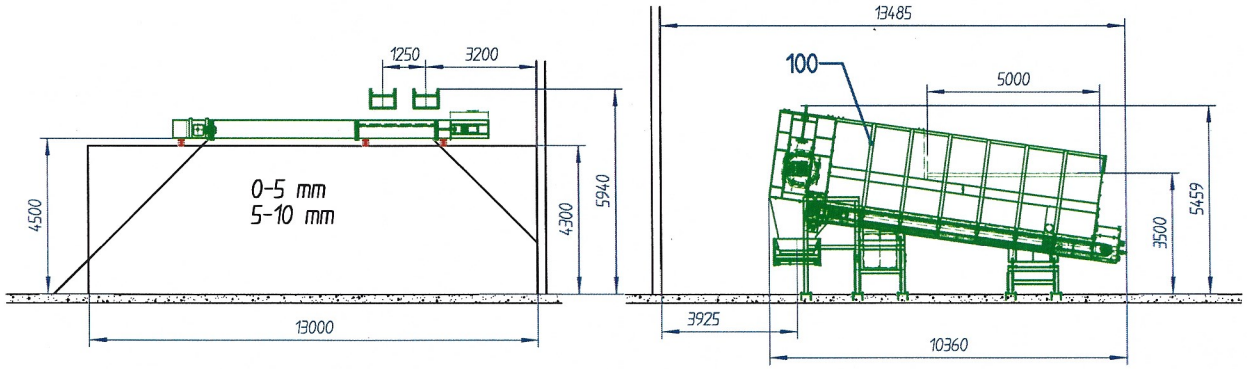
Total net Price of above mentioned pos 100 – 1.500

Without Pos. 300, 310, 500 **£795,000.00**









Rev.	Änderung	Datum	Name	Rev.	Änderung	Datum	Name
03	Nach HPS 2 HRKFs	26.01.23	RR	06			
02	Bunker gedreht / Anlage eingefügt	19.01.23	RR	05	HRKF auf HKF geändert / Bunker angepasst	24.05.23	RR
01		31.03.	PS	04	Filteranlage, Bühne HPS hinzu	23.02.23	Hirsch

dxf: | Abmessung: | Werkstoff: | Norm:

HAAS Recycling-Systeme

	Datum	Name
2022	Datum	Name
Entwurf		
Gez.	18.01.	R.Rech
Gepr.		

Massstab: 1: 100 | ges. Gew.

Bezeichnung | Blatt 1 / 1

Planungsvorschlag

CRJ - Ainsworth - 1500 Vmill

Alle nicht tolerierten Mass-angaben nach ISO 2768-1 m

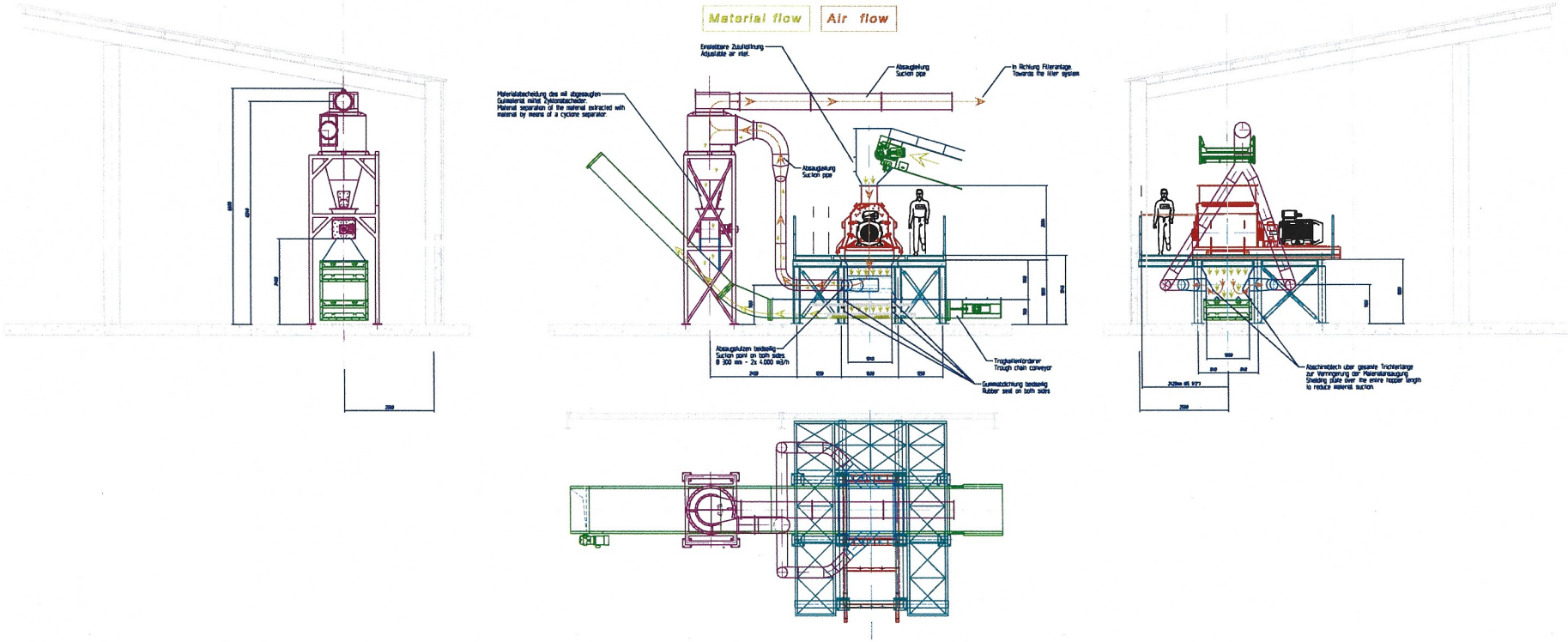
☐ ATEX: Zone ☐ kein ATEX

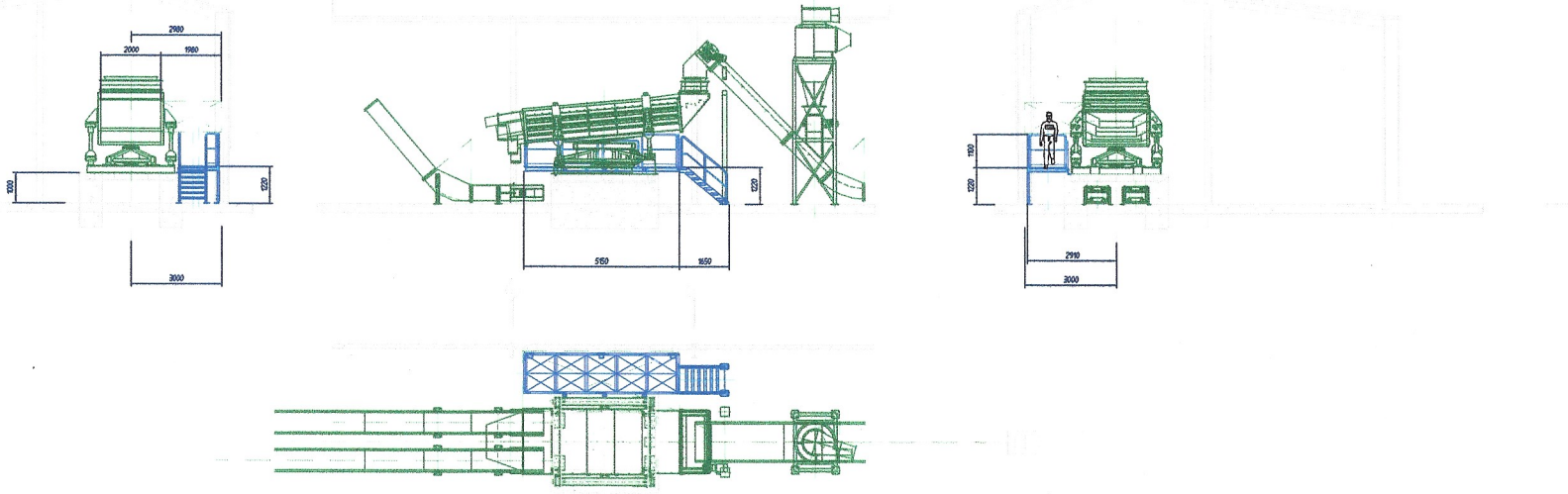
☐ 1/20 ☐ 2/21 ☐ 3/22

Artikel -Nr.:

Zeichnungs-Nr.: ANG-05649-3204-C2 | Rev. 05 | Format A2

(Ursprung) : xxx | (Ers.f.) xxx | (Ers.d.) xxx


Material flow
Air flow
Einstellbare Zuluftöffnung
Adjustable air inlet
Absaugleitung
Suction pipe
In Richtung Filteranlage
Towards the filter system
Materialabscheidung des mit abgesaugten Gutmaterial mittel Zyklonabscheider.
Material separation of the material extracted with material by means of a cyclone separator.
Absaugleitung
Suction pipe
Absaugstutzen beidseitig
Suction pipe on both sides
Ø 300 mm - 2x 4.000 m3/h
Trogkettenförderer
Trough chain conveyor
Gummiabdichtung beidseitig
Rubber seal on both sides
Abschirmblech über gesamte Trichterlänge
zur Verringerung der Materialansaugung
Shielding plate over the entire hopper length
to reduce material suction

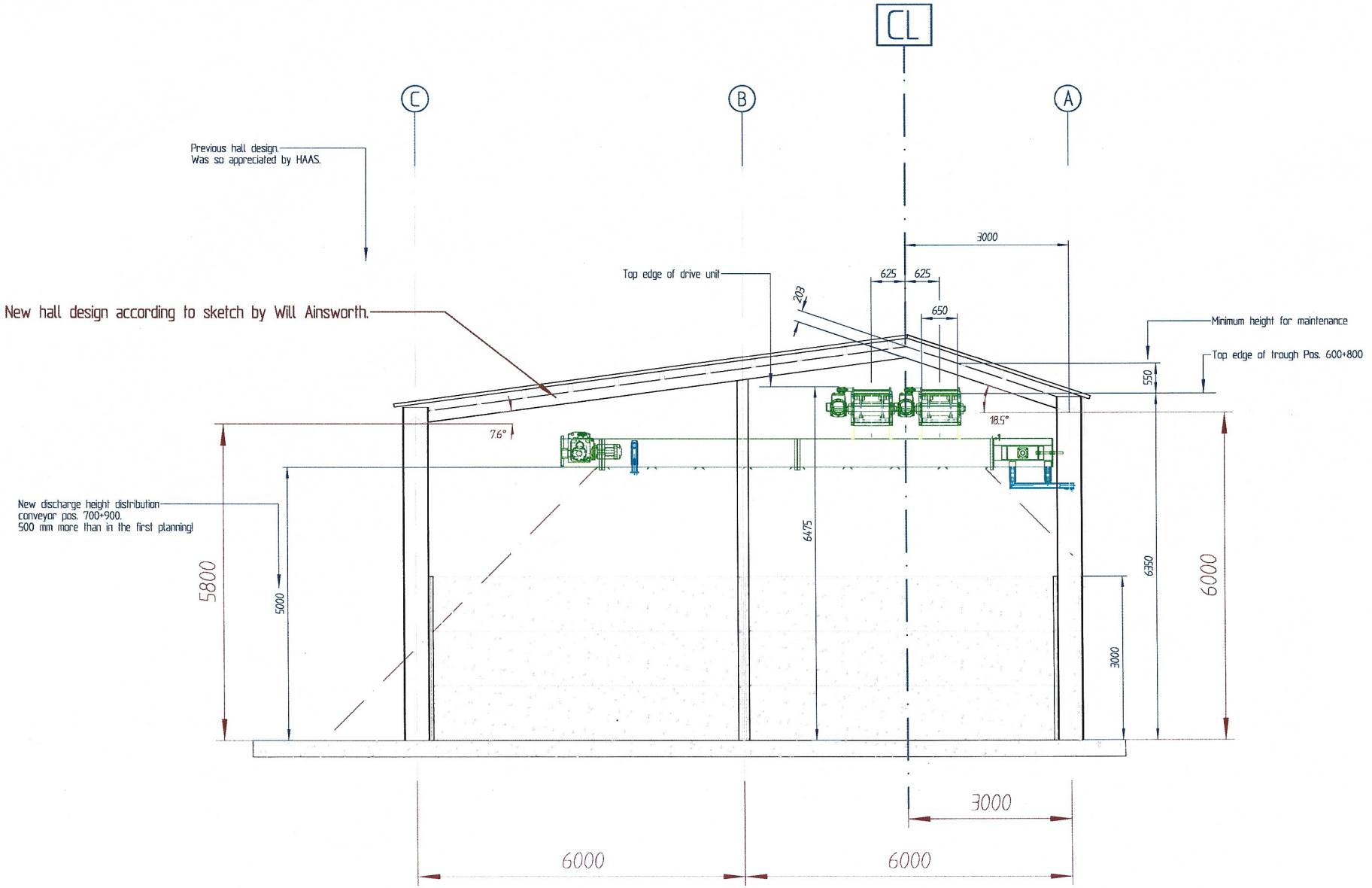


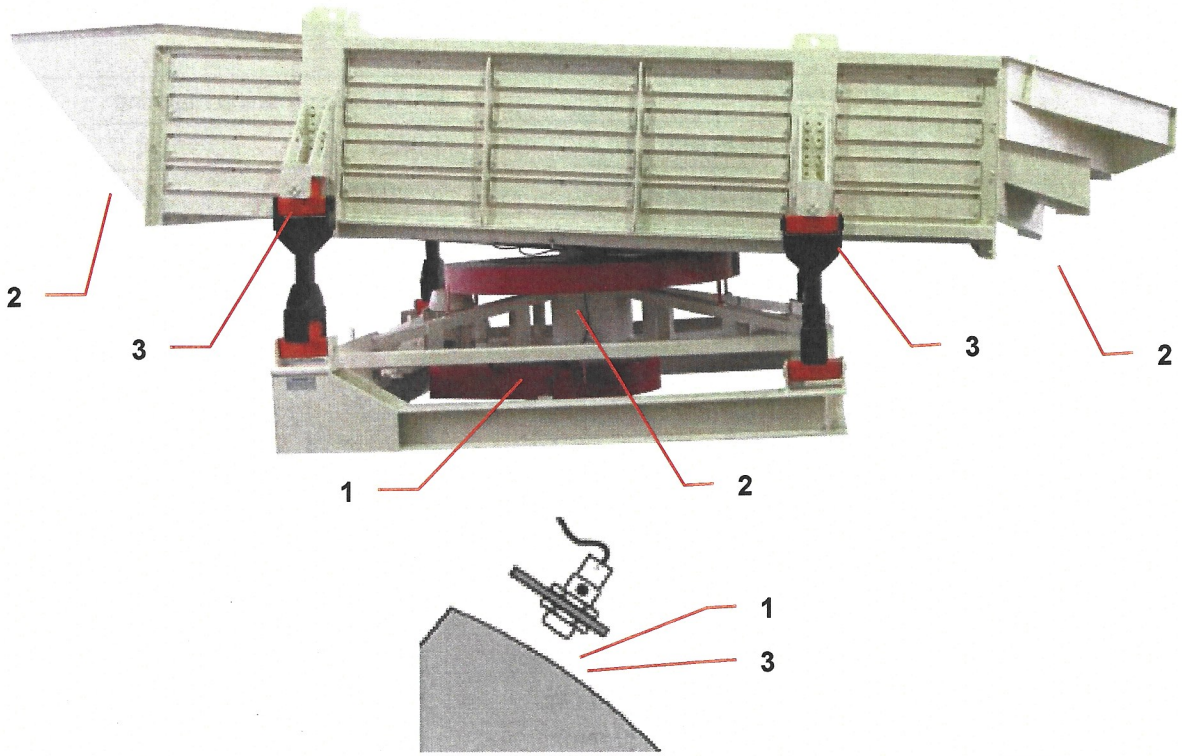
HAAS
Recycling-Systems

33917-510
- Quotation Plan : Maintanance Platform HPS

27.09.2023 - J. Forst

29/9/23


CL
C
B
A
Previous hall design.
Was so appreciated by HAAS.
New hall design according to sketch by Will Ainsworth.
Top edge of drive unit
3000
625
625
650
203
Minimum height for maintenance
Top edge of trough Pos. 600+800
550
18.5°
7.6°
New discharge height distribution
conveyor pos. 700+900.
500 mm more than in the first planning!
5800
5000
6475
6350
6000
3000
3000
6000
6000



Legend:	
1 = Entanglement hazard	2 = Collision hazard
3 = Crushing hazard	

3.9 Residual risks

⚠ DANGER

Hazards when using the machine without guards and safety devices!

Extremely serious and possibly fatal injuries may result.

- Ensure the all safety devices and guards are in place when using the machine.
- Perform repairs only in compliance with all of the relevant safety instructions.
- Use anti-fall guards in the case of sub-floor fitting.

4 Technical data

4.1 Machine type key

HPS 100	HAAS flat screening machine
Screen width in mm / in:	1 982 / 78.03
Screen length in mm / in:	5 220 / 205.51

4.2 Characteristic data of the machine

4.2.1 Functional data

- Screen surface per level (m^2 / ft^2): 10.3 / 110.9
- Number of screen levels (qty): 3

4.2.2 Drive

- Type: Electric motor with V-belt drive
- Rated motor power (kW / HP): 7.5 / 10.06
- Nominal motor current (A): 14.8 / 8.6
- Motor speed (min^{-1} / rpm): 1 450 / 1 450
- Motor voltage (V): 400 / 690
- Mains frequency (Hz): 50
- Protection category (IP): 55
- Number of V-belts (Z = qty): 5
- Belt profile (P): SPA
- Effective V-belt length (L_w = mm / in): 3 550 / 139.8
- Output speed (1/min / rpm): 965 / 965
- Test force per V-belt (F = N / ozf): 50 / 179.85
- Depth of impression (first installation) (E_a = mm / in): 31.60 / 1.244
- Depth of impression (E_a = mm / in): 34.38 / 1.354
- Additional length (first installation) per 1,000 mm (39.4 in) belt length (mm / in): 1.82 / 0.072
- Additional length per 1,000 mm (39.4 in) belt length (mm / in): 1.19 / 0.047
- Frequency (first installation) (Hz): 22.55
- Frequency (Hz): 19.78
- Motor temperature sensor: no ☐
  yes ☒
  PTC ☒ or Pt 100 ☐

Appendix D Technical specification: Biomass boilers, Heizomat, RHK-AK and emissions certificates (2013, 2016)

Heizomat®

UL/CSA Operating instructions

for Heizomat special boilers

RHK - AK, RHK - AK P, RHK - AK PZ

in conjunction with the Heizomat wood chip, pellet and chip boiler system

ENERGY IN BALANCE WITH NATURE

Inhalt

1 Foreword

Dear Customer,

Congratulations on the purchase of your new HEIZOMAT boiler system for wood chips, pellets or chips and thank you for your confidence in us.

You have chosen a product which has been produced with great care and which will offer you a very high level of comfort when heating with wood.

The boiler system is tested in accordance with DIN EN 303-5.

In the event of a fault with your HEIZOMAT system, please refer to this operating manual and the operating manual for the Heizocontrol control unit.
It contains a lot of useful instructions and tips on how to resolve any faults. Keep this manual for future reference.

If you are unable to rectify the fault, please contact the service department of your supplier and the factory service department.

Our emergency service is available on weekends and public holidays. The current mobile phone number for the emergency service is stated in the voice mail message.

For customers outside Germany please contact your local dealer or importer.

During the summer and winter company holidays, our office is also staffed by an emergency service team during working hours.
If the answering machine is also activated during this time, please leave a message. This is regularly monitored.
You will receive a callback as soon as possible.

You can also request our service online at
www.heizomat.de.

HEIZOMAT - Gerätebau + Energiesysteme GmbH
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D-91710 Gunzenhausen
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Fax: +49 (0)9836 / 97 97 - 97
Web: www.heizomat.de
Email: info@heizomat.de
service@heizomat.de

These operating instructions are valid for the following boiler series:

RHK - AK xxxx
RHK - AK xxxx P
RHK - AK xxxx PZ

xxxx: Type
P: Electric filter
Z: Cyclone

RHK - AK 30
RHK - AK 50
RHK - AK 60
RHK - AK 75
RHK - AK 99
RHK - AK 100
RHK - AK 101
RHK - AK 150
RHK - AK 199
RHK - AK 200
RHK - AK 300
RHK - AK 400
RHK - AK 500
RHK - AK 600
RHK - AK 800
RHK - AK 1000

Where applicable, other country-specific versions are possible.

Every HEIZOMAT boiler system is put together and built on a customer-specific basis. For this reason, the type and number of installed components varies.
An overview of the installed components and the item numbers can be found in the boiler documents or in the wiring diagram of the "Heizocontrol (TP20, ET100 or ET200) control cabinet.

Information about the control system and further troubleshooting can be found in the additional “Heizocontrol” operating manual version ET 100, ET200 or TP 20.

The specifications in the technical data sheets must be observed.

2 Safety

2.1 Potential dangers due to the system

The HEIZOMAT boiler system is equipped with the necessary protective measures.
It has been subjected to a safety test and acceptance in accordance with DIN EN 303-5.
If incorrectly used or misused there are dangers to:

- life and limb of the operator
- the system and other material assets of the operator
- the proper functioning of the system

All persons involved in the installation, commissioning, operation, maintenance and installation of the system must

- be appropriately qualified,
- strictly observe these operating instructions,
- have received an induction

Attention: Insufficient flue draught or poorly maintained boiler system poses a significant risk of deflagration!

The boiler system must be installed on a non combustible floor. The clearances to combustible materials must be observed according to the regional regulations.

Generally regional guidelines for safety and fire protection with regard to heating rooms, fuel store, etc. must be observed and, if necessary, confirmed with the local authorities.

Disposal of Ashes:
Ashes should be placed in a metal container with a tight-fitting lid. The closed container of ashes should be placed on a non-combustible floor or on the ground, well away from all combustible materials, pending final disposal. If the ashes are disposed of by burial in soil or otherwise locally dispersed, they should be retained in the closed container until all cinders have thoroughly cooled.

2.2 Safety instructions and tips

The following symbols are used in these operating instructions:

IMPORTANT!

Indicates application tips and other useful information

ATTENTION!

Indicates the existence of risks
Damage to property can occur if the information is not observed

WARNING!

Indicates a potentially dangerous situation
Failure to observe the instruction may result in injury.

DANGER!

Indicates imminent danger
If this instruction is ignored there is a risk of death and serious injury.

2.3 Intended use

- This heating system is exclusively for the automatic combustion of untreated wood chips, pellets and wood chips up to a max. size 30-65 mm (P45 in accordance with DIN EN ISO 17225-4 or DIN plus pellets in accordance with DIN EN 17225-2).
  See "8.3 Suitable fuels" on page 23

- In emergency operation, small quantities of wood can be fed into the boiler via the combustion chamber door.
  When heating manually, pay attention to the boiler temperature (maximum 95 °C) and ensure heat transfer!

DANGER!

- No flammable liquids may be added to the system.
- Do not use chemicals or liquids for ignition!
- The system may only be operated with untreated wood.
- Do not incinerate waste, petrol, naphtha, (engine) oil or other unsuitable materials!
- For wood processing plants, the fuel specifications of the 2nd level of the 1st BImSchV (Federal Emissions Control Act)
- Unauthorised modifications to the discharger, the conveyor device, the controller box or the boiler system are not permitted and will void the warranty. Excluded are the electrical connections required by the water-side installation, which are provided in the Heizomat controller box.

IMPORTANT!

If the device is modified, either mechanically or electrically/electronically, the EC directive conformity and therefore the CE identification is void.
Important: The maintenance work specified in the operating and maintenance instructions must be strictly observed! (see "7 Maintenance" on page 21)

2.4 Emissions

When used correctly, the HEIZOMAT systems fall below the required emission limit values of the 2nd level of the 1st BImSchV (Federal Emissions Control Act) of January 2015 (20 mg/m3 dust, 400 mg/m3 CO with 13% residual oxygen in each case).
The fuel A1, M30, P45 in accordance with DIN EN ISO 17225-4 or DIN plus in accordance with DIN EN 17225-2 is to be used.
If lower fuel quality is used (e.g. wood too hard, wood too dry/too moist/too high a fine proportion, etc.), less energy is contained or can be implemented less efficiently.
Flue gas values cannot be guaranteed.

2.5 Hazard sources

DANGER!

- Before carrying out any work on the system, it must be disconnected from the power supply and secured against unauthorised reconnection. All cover plates, enclosures and protection devices must always remain in situ, except during maintenance and servicing when the system is disconnected from the power supply.

- Allow the combustion chamber to cool down to 20 °C before carrying out any work in the boiler. Risk of burns!

- Please remember that automatic protective devices can no longer work if you remove parts of the system with tools. There is a high risk of injury. This does not mean that all hazardous movements are protected in such a way that they do not pose a danger. In order to ensure functionality, conveyor systems in the fuel store, for example, must be accessible. In such cases, lockable access points must be installed by the customer, locked during operation of the system and secured against unauthorised opening.

ATTENTION!

- No operation without electrical power

ATTENTION!

- Do not store fuel or combustable materials in the boiler room

- For safety keep fire chamber and ash doors tightly closed

IMPORTANT!

- Refer to owner`s manual
- This unit may be connected to an existing boiler system
- Water quality to be observed according to manual and requirements

WARNING!

- Danger - to avoid injury from moving parts, shut off the boiler before removing/opening this cover/door

WARNING!

- Hot water outlet

- Cold water inlet

DANGER!

- Crush hazard
- Keep hands clear while machine is operating.
- Turn power off and secure main disconnect with padlock before servicing

- Rotating blade hazard
- Keep hands clear while machine is operating. Turn power off and secure main disconnect with padlock before servicing.

- Hazardous voltages
- 480 Volts inside the panel. OPENING and ACCESS only for qualified authorized persons. Shut off power and secure main disconnect with padlock before doing any repair or maintenance work on the machine.

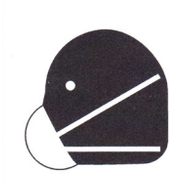
WARNING!

- Crush hazard
- Keep hands clear while machine is operating. Turn power off and secure main disconnect with padlock before servicing.

WARNING!

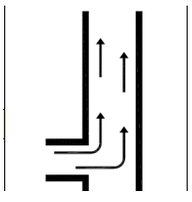
- Arc flash and electrical shock hazard
- Appropriate PPE required. Failure to comply can result in death or injury refer to NFPA 70 E.

ATTENTION!



- Dust hazard
  Wear appropriate dust mask when emptying the ash bin.

- Chimney draft
- Burn hazard
- Do NOT touch during operation.
- Allow to cool before servicing.
- Keep children away.
- Risk of fire



- Chimney draft
- Maximum draft marked on nameplateDischarger

2.5.1 Discharger

Agitator

DANGER!

- Switch off the system at the main switch before entering the fuel store and ensure unauthorised switching on does not occur.

- Do not reach under or look under the pressure cover. The agitator could cause serious injury.
- The telescopic agitator arm is pre-tensioned with tension springs. If the telescopic arm exits the fuel in the fuel store into a free space, its speed increases considerably. The swinging arm can cause serious injury.
- Do not reach into the open auger or chain channel without tools!
  A rotating auger or running chain discharging system will cause severe injuries!

  Suitable aid for removing foreign substances: Wooden batten

Drop-in shaft

DANGER!

- Never reach into the open drop-in shaft!

- Fingers or hands can be cut off if the discharging auger or discharging chain starts up unintentionally!
- Before removing foreign bodies or removing material jams, the system must be switched off at the main switch and secured against being switched on again!
- Never use hard tools such as iron rods or screwdrivers to remove them!
  Risk of injury if the tool slips!

Rotary valve

- When installed, the rotary valve poses no danger.
- In the event of material jams or compressions, it may be necessary to remove the rotary valve.

DANGER!

- Before removing the rotary valve, the system must be switched off at the main switch and secured against unauthorised activation.
- Never reach into the rotary valve from above or below. The fingers or hand can be cut off.
- Foreign bodies must be removed with an auxiliary tool (e.g. wooden batten).

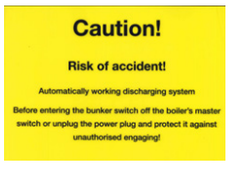
WARNING!

- Moving chain. Do not reach behind the cover!
- Risk of injury!

2.5.2 Fuel store filling

DANGER!

- *Attention*: Automatically starting fuel store discharge. ***Risk of accident*** – Before entering the fuel store, switch off the wood chip combustion using the main switch or pull out the mains plug and secure it against unauthorised activation. (See attached label. Please be sure to attach it to the entrance area of the fuel store!)



- *Attention*: ***Danger to life!*** Ensure sufficient fresh air supply before entering the fuel store.
  Risk of suffocation! Toxic gases may have formed in the fuel store.
- A cavity may have formed in the fuel store. There is a significant risk of ***collapse*** and ***spillage*** or ***suffocation***!
- The fuel store must be secured in such a way that it is only possible to enter the fuel store when the boiler system is switched off. A switch-off function can be connected in the Heizomat control to switch off the conveyor system when access is open. See circuit diagram.
- In addition, the fuel store must be secured in such a way that it is not possible to fall into it.
  For open pits, a fence must be installed at the edge of the pit. It must not be possible to use the fence as a ladder! Other security measures are also possible if they serve the same purpose.
- It is forbidden to enter the fuel store during filling!
- When filling with pellets, heavy CO (carbon monoxide) formation in the fuel store can occur. *Attention:* ***Risk of suffocation!*** Ensure good and adequate ventilation before entering the fuel store. At least ten times air exchange is required before entering the pellet store. Please refer to VDI 3461 for more information.
- Do not inhale wood dust. Wear face mask if necessary!
- Risk of harmful mould!
- Please observe the applicable accident prevention regulations. Your employers' liability insurance association will be happy to advise you on this.

2.5.3 Boiler

DANGER!

- The fire and ash chamber doors may only be opened when the system is at a standstill, otherwise always keep them closed. Caution, there is a risk of burns when touching the operating handle and by knocking out the flame.
- Make sure that the door seals are in good condition. Replace defective seals.
- Do not reach into the ash auger. Risk of crushing.
- Do not reach behind the guards during operation.
- The register cleaning augers may only be removed by persons authorised by the factory. Risk of crushing due to rotating gears.
- Do not reach into the opening of the hot combustion chamber. There is a significant risk of burns, as temperatures of up to 1000 °C and more are possible during load operation.
- Do not touch the flue pipe during load operation. Risk of burns. Insulation of the flue pipe with min. 30 mm rock wool is recommended.
- Hot Surfaces – Keep children away. – Do not touch during operation.
- Maximum draft marked on nameplate.
- Risk of Fire – Do not operate with flue draft exceeding maximum draft marked on nameplate.

WARNING!

- The ash bin may only be emptied when the system is at a standstill.

2.6 Authorised operators

IMPORTANT!

- The HEIZOMAT system may only be adjusted by trained and authorised personnel.
- The HEIZOMAT system may only be operated by authorised persons.
- The owner must instruct the operator on the system.
- The owner must make these operating instructions accessible to the operator and ensure that the operator has understood them.
- This device may be used by children over the age of 8 and by people with reduced physical, sensory or mental skills or a lack of experience or knowledge, provided that they are supervised or have been instructed on how to use the device safely, and are fully aware of the consequent dangers. Children must not play with the device. Cleaning and user maintenance must not be performed by children without supervision.

2.7 Behaviour in an emergency

IMPORTANT!

- In the event of an emergency, disconnect the system from the power grid immediately.

2.8 Behaviour in the event of a flue fire

In the event of a fire, the following measures should be taken:

- Switch the boiler to “Maintenance with RGG” by pressing the red OFF button once.
- **Notify the firefighters!**
- Do not extinguish the flue with water. Monitor components around the entire flue.
- Contact chimney sweep regarding safety of flue.
- If necessary: Replace flue system.
- Do not put the system back into operation until the flue system has been approved by the chimney sweep or respective local authority.

3 Preparatory work

3.1 Structural measures

- The boiler room must not also be the fuel store.
- The deashing must not be in or run through the fuel store.

3.2 Electrical installation

IMPORTANT!

- Before filling the fuel store for the first time, check that there is a correct power connection.

3.2.1 Systems up to 100 kW

FI switch Type A with 300 mA
Fuse: C 16A
Connection: CEE plug 16 A

3.2.2 Systems from 150 kW - 800 kW

FI switch Type A with 300 mA
Fuse: C 32 A
Connection: Fixed connection

3.2.3 Systems over 800 kW

FI switch Type B with 300 mA
Fuse: C 40 A
Connection: Fixed connection

3.2.4 Direction of rotation motors

Check the direction of rotation of all gear motors, observing the auger winding and direction arrows on the gears.

- Attached rotation direction arrows always refer to the direction of rotation of the drive gear.

3.3 Agitator - discharger

DANGER!

Pay attention to the Hazard source "Discharger" on page 9!

- The walls in the fuel store should be as smooth as possible to avoid arching. Under no circumstances must there be any internals or obstacles in the fuel store that impede the automatic flow of material.
- It must be ensured that there are no foreign bodies in the fuel store.
- If the agitator arm touches the wall, the area on the wall must be covered with horizontal hardwood boards so that the agitator arm cannot scratch the wall. The boards should be 20 cm longer than the stripped wall piece. The fastening and the boards should not be able to get caught with the agitator arm.
- **Attention!**: Do not install an intermediate floor between the floor and the agitator arm.
- The outer part of the agitator arm must not touch the floor, it should be at least 1 cm above the floor.
- If necessary, lift and re-attach the gear.box.
  See also diagram under "2.1 Potential dangers due to the system" on page 5
- The agitator arm must not get caught at any point.

3.4 Water side installation

The heating system must be filled with water according to VDI 2035.

(see "10.3 Water side connection thermal discharge safety device" on page 31 and "9.8 Important information for you and your heating engineer" on page 27)

3.5 Chimney and chimney connection

The chimney must be approved for the fuel wood in accordance with "EN 13384-1 Combustion technology calculation of chimney dimensions".
(see "9.4 Chimney and chimney connection" on page 26

Country-specific deviations within and outside the EU must be complied with in consultation with the plant.

The chimney specifications for our boiler are: ULC S629 / UL 103 HT

Solid fuel boiler flue systems must be regularly checked and, if necessary, as (shiny) soot, creosote (tar deposits) and ash can accumulate. A small, intense fire is preferable to a large, smoldering one to reduce the amount of creosote buildup.
For fuels with water content above 30%, check for creosote formation at first weekly, later on as relevant.

3.6 Supply air opening

For the proper operation of the HEIZOMAT system, an air inlet opening in the heating room must be created from the outside. For details, see "9.3 Supply air opening" on page 26 .

3.7 Filling the fuel store

DANGER!

Pay attention to the Hazard source "Discharger" on page 9!

Suitable fuels:
Woodchips in accordance with **DIN EN ISO 17225-4, A1, M30, P45**
Pellets DIN plus in accordance with **DIN EN 17225-2**
(see "8.3 Suitable fuels" on page 23)

- When there is ca. 50 cm fuel above the agitator, start the system at the controller box.
  Run the discharger in manual mode until the agitator arms have folded in. (Running time max. 5 minutes)
- Due to the risk of cavities above the agitator arm, the maximum filling height of the bunker must be observed.

Max. filling height = diameter of agitator x 1.5

4 Commissioning

4.1 Instructions for initial heating of the system

IMPORTANT!

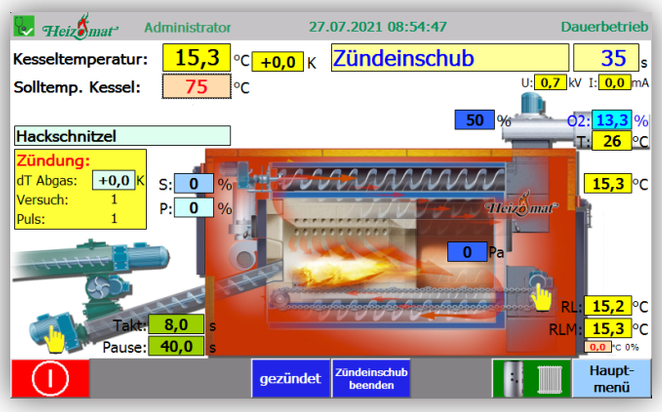
The refractory concrete of the fireclay lining still contains a lot of moisture. For this reason, it must always be dried by briefly heating it twice. Between the two start-up phases, the system must be cooled for approx. 2 hours.

Non-observance of this procedure can result in cracks and chipping on the fireclay lining, which are not covered by the warranty in the event of damage.

ATTENTION!

The system may only be switched on once the direction of rotation of the motors has been checked, the flue has been completely set up and the system has been filled with water in accordance with VDI 2035.

Since the initial filling of the system does not define how much fuel is already present in the discharger, in the infeed and in the combustion chamber, it must be checked whether material is already present in the combustion chamber before switching on.
If there is sufficient material, the fuel supply can be interrupted immediately after switching on the system by pressing the “Stop ignition infeed” button on the touch panel.



The fuel quantity is sufficient if the side primary air openings are covered with fuel. The hot air of the ignition equipment is blown onto the fuel through these openings.

The fuel quantity can also be checked through the sight glass of the ash door:
The fuel quantity is sufficient if the feed auger is no longer visible through the fuel.
If there is not enough material after the infeed has been inserted, material can be added later by pressing the button on the infeed motor.

DANGER!

Do not fill too much material into the combustion chamber, otherwise there is an acute risk of deflagration!

After the infeed has finished, the ignition equipment is preheated in the “Preheating” operating state.
The fuel is then ignited in the “ignition process” operating status.
The ignition process should not take longer than 10 minutes for dry wood chips.
During the ignition process, the combustion chamber door must no longer be opened, danger of deflagration!
By increasing the flue gas temperature, the control unit detects whether the ignition process has been successfully carried out and switches to the “Firebed formation" or “Load operation" status upon successful ignition.

After 15 minutes of load operation, the system must be switched off again by pressing the button once, operating status "Maintenance with FGB". The flue gas blower continues to run in this operating status and the burner is emptied.

After approx. 2 hours, the ignition process must be repeated and the system switched off again after 15 minutes in load operation.

The system must only be operated in underpressure, if necessary increase the flue gas blower output.

DANGER!

There is a risk of deflagration if there is insufficient flue draught!

4.2 Reheating the system

When the boiler is switched off, it can be activated by switching on the main switch on the controller box.
When the boot process is finished and the normal main screen with the boiler is visible, the green start button needs to be pressed for min. 3 seconds.
Then the control checks the current state of the boiler through its sensors and starts the ignition process, respectively continues the needed process depending on the current status of the boiler (when some residual heat and embers is left for example it might not be necessary to ignite again).

DANGER!

There is a risk of deflagration if there is insufficient flue draught!

4.2.1 Operation modes

4.2.1.1 Continuous mode

If the boiler temperature falls more than 4°C below its set temperature, the system switches from stand by to load operation.
The first time after switching on, the ignition process is started before.
When the boiler temperature reaches its set temperature, the load operation is reduced. If the temperature continues to rise more than 4°C above the set temp., the system goes into "Stand by". The residual embers is used for the restart.

During "Stand by" small amounts of fuel is added in regular intervals so that the fire is kept alive. .
(see Heizocontrol manual)

4.2.1.2 Ignition mode

IMPORTANT!

In ignition mode, it must be ensured that dry flammable wood chips with a water content between 20% and 30% or pellets are used.
In ignition mode it must be insured, that the fuel is flammable.
The heating continues until the set boiler temperature is exceeded by 4°C. Then the system goes into the "Ignition mode break" and the fire goes out.
If the boiler temperature falls 4°C below its set temperature, the ignition process starts. After ignition the system goes into load operation or firebed forming.

If the system is equipped with a buffer tank, the control can be set so that the system does not ignite again until the buffer undercuts a certain temperature (more information in the manual for the controller boxes).

4.2.1.3 DWT - mode (domestic water tank mode)

This operation mode is effectively a time-controlled ignition mode.
(see Heizocontrol manual)

5 Malfunctions and possible causes

IMPORTANT!

Before carrying out any work on the HEIZOMAT system, the system must be switched off at the main switch and secured against inadvertent restarting!

The control unit detects many errors. These are displayed in a message window.
See also the “Heizocontrol” operating manual (e.g. version ET 100, ET200 or TP20).

Other possible faults that are not indicated on the touch panel or on the display:

	Malfunction:	possible causes:	Solutions:
1	System cannot be switched on at the switch	No power connection available 400 V – 5-pin	Have the power connection established by a qualified electrician
		Main fuse in the control cabinet or in the building power distribution board is defective	Disconnect main fuse again or replace fuse
2	System is switched on, check lamp lights up, Heizocontrol does not indicate a fault, but the system does not transport	Microfuse in the control unit is defective	Replace the microfuse
		Control unit is defective	Replace the defective control unit
3	Controller and blower are running, motors do not carry material	Boiler has reached temperature, Blower lag has been started	None required
4	Discharge auger is running loudly	Auger couplings without grease	Lubricate coupling
		Too coarse material in bunker	Use smaller wood chips
5	Fire goes out	Combustion chamber and heat exchanger heavily soiled	Clean heat exchanger and combustion chamber. Remove and empty the air nozzles
		Stand by break set too long	Shorten stand by break
		No wood chips or too wet wood chips in the bunker	Fill in dry fuel (20 - 30% water content)

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	Malfunction:	possible causes:	Solutions:
5	Fire goes out	Boiler overheated, safety thermostat tripped	Allow the boiler temperature to cool down to 60°C. Then unlock the safety thermo-stat by pressing the button
		No material feed due to insufficient material in the bunker or cavities	Fill bunker or bring cavity to collapse. **ATTENTION**: Danger of accident! Use tools. Never enter the fuel bunker.
6	Infeed auger is squeaking, material jam in the infeed channel	Infeed burner bearing is running dry or is defective	Lubricate or replace bearing
		Motor runs on two phases	Electrical Check supply line and motor
		Charcoal tar has formed at the end of the infeed burner and is blocking the channel	Switch off the system and remove the wood tar with a large screw-driver
7	Motor of the infeed auger blocked	Worn infeed auger, Ø in combustion chamber smaller than on drive side	Replace or weld infeed auger
8	Glossy soot in the heating register or in the flue pipe	Boiler temperature set too low, at least 70°C	Set boiler temp. to min. 70°C, also in summer for domestic water heating
		Fuel ist too moist	Fill dry fuel into the fuel store
		Blower setting incorrect	See “No smoke-free combustion” position on page 19
9	Whistling noises in rotary valve	Chip has become trapped in rotary valve and is being pulled through during rotation	Manual operation: • Allow only the infeed and rotary valve to run empty. • **ATTENTION**: Do not reach into the rotary valve! • Use auxiliary equipment • Disconnect the system from the power supply beforehand

	Malfunction:	possible causes:	Solutions:
10	Deashing produces too little ash from the combustion chamber	The cycle and break times for deashing are set incorrectly	Deashing break 3 - 60 minutes, set working time to at least 2 - 3 seconds. The optimum deashing setting is indicated by a powdery ash in the ash bin. Unburned parts mean too long or too frequent a run time for deashing.
	Deashing transports unburned wood chips into the ash bin		
11	System has too little or no power. Boiler does not reach desired temperature.	Insufficient fuel in combustion chamber	Shorten the infeed break until a firebed is present (approx. up to the centre of the combustion chamber). For systems from 100 kW, the primary air nozzles must be completely covered with wood chips, pellets or chips.
		Clogged primary air supply	Clean the primary air casting blocks; the combustion chamber must be cooled down for this purpose
		Power consumption is too high	Install boiler with higher output or reduce output
		Fuel too moist	Fill the fuel store with drier wood chips, max. 30% water content in wood chips.
			Increase primary air slightly, open baffle plate(s) at the blower(s). If necessary reduce secondary air slightly (not in general).
		Flue draught too low	see fault, underpressure too low
12	Rotary valve squeaks	Impurities in the housing slow down the impeller Rust deposits in die-cast housing	Open the drop-in shaft cover, apply engine oil to the impeller of the valve from above. To do so, apply a generous amount of clean engine oil to the cutting edge of the ZRS using a radiator brush. Brush the inside of the side walls with oil until the impurities come loose. An oil film must run down the inside of the shaft.

	Malfunction:	possible causes:	Solutions:
12	Rotary valve squeaks	Over pressure in combustion chamber	Reduce primary blower performance
13	Slag stones in the combustion chamber	Contaminated fuel Low ash melting point fuel such as branch/flywood or other biomass fuels	If necessary, loosen the slag flakes daily with tools and remove the slag. Do not damage the fireclay with the tool. **ATTENTION:** Risk of burns! Allow combustion chamber to cool down **ATTENTION:** Risk of crushing! Disconnect the system from the power supply
14	Deashing not working	Foreign bodies in the conveyor system Thermal sensor triggers motor protection	Clean foreign bodies and ash from the de-ashing system.
		Ash conveyor plate in combustion chamber worn	Switch off the system, allow the combustion chamber to cool down and repair or replace the defective ash conveyor plate. Remove foreign bodies from the combustion chamber.
		Deashing is switched off	Switch on the deashing on the control unit

	Malfunction:	possible causes:	Solutions:
15	Glossy soot in the heating register or in the flue pipe	Primary air - Feeder clogged	Clean the primary air nozzles
		Blower setting incorrect	For **moist** fuel: • more primary air • less secondary air For **very dry** fuel: • less primary air • more secondary air
		Dirty wood chips are burned	Only fill in clean natural wood chips.
		Waste is burned	The HEIZOMAT system is not a waste incineration system! See"2.3 Intended use" on page 6.

	Malfunction:	possible causes:	Solutions:
16	No smoke-free combustion	Primary air - Feeder clogged	Clean the primary air nozzles
		Blower setting incorrect	For **very dry** fuel: • less primary air • more secondary air for **moist** material: • more primary air • less secondary air
		Dirty wood chips are burned	Only fill in clean natural wood chips
		Waste is burned	The HEIZOMAT system is not a waste incineration system! See "2.3 Intended use" on page 6.
17	Boiler emits smoke from boiler body	Flue draught too low	Flue draught too low (see fault 18)
		Transfer in the heating registers from 2nd to 3rd / 4th to 5th draught is clogged with soot depending on the boiler type.	Stop the system and disconnect it from the power supply. Contact your Heizomat - service
		FGB set too low	Increase flue gas blower output!
		Flue pipe manifold dirty	Clean the flue gas manifold and flue pipes when the system is switched off

	Malfunction:	possible causes:	Solutions:
18	too little underpressure	the Heizomat boiler is not the only one connected to the flue pipe	Disconnect other users from the flue and seal the connections tightly
		Cleaning doors are open	Tightly close and seal the cleaning doors in the flue
		Too low flue height	Raise flue Retrofitting the flue gas blower Increase the blower output of the flue gas blower
		Flue draws in false air	Seal the flue pipe connection to the flue with heat-resistant sili-cone or aluminium adhesive tape (test with lighter)
		Flue pipe contaminated	Clean the flue pipe and bends
		Register pipes contaminated	Clean the register pipes
		Check flue for soot	Have the flue cleaned by the chimney sweep

6 Decommissioning

To decommission the system, switch off the system at the control panel and then allow it to cool down. (see control system instructions) Thoroughly clean the boiler before a longer downtime and leave the combustion chamber doors open as far as possible during this time. This will cause the boiler to dry out.

7 Maintenance

7.1 Service contract

We recommend a service contract, carried out by our factory customer service or a certified specialist company, for the long-term reliable operation of your boiler system.

7.2 Maintenance work

Daily:

- Check combustion chamber for foreign bodies and slag.

Every two to four weeks:

- Check deashing:
  Excessive accumulation of ash => run ash removal to continuous operation or remove ash with hand tool.
  Unburned parts => too long deashing operating time

- Empty ash bin
  Natural ash is generally not waste, but can be returned to the forest as a valuable fertiliser.
  Have examined beforehand in accordance with DüMV (fertiliser reguation) or BioAbfV (bio-waste regulation).

WARNING!

Switch off boiler! Do not reach into auger!

IMPORTANT!

Ashes from flue gas or cyclone have a higher heavy metal content and may need to be disposed of separately (please observe the regional regulations).

No substances other than ash may be added to the ash containers. The ash system must be kept as airtight as possible.

Further maintenance information can be found in the maintenance plan RHK - AK / AK P on page 29 / 30.

7.3 Flue cleaning by the chimney sweep

- If a flue is to be cleaned, switch off the system at least one hour in advance so that the flue can cool down.

- Please pay particular attention to bends in the flue pipe. Often, a larger amount of dust remains here when cleaning the flue pipe.

- After cleaning, the system can be put back into operation (see"4.2 Reheating the system" on page 14).

7.4 Flue gas measurement by the master chimney sweep

You received “Instructions for flue gas measurement of a HEIZOMAT system by the chimney sweep” upon delivery of the system (see "10.9 Notes" on page 38). These instructions belong to the boiler and must be presented to the chimney sweep.
The measurement must be carried out according to our specifications.

3-4 days before metering

IMPORTANT!

Cleaning must take place in good time before the measurement so that there is no fly ash in the exhaust => incorrect measurement results!

- Thoroughly clean the boiler and flue pipe up to the measurement port.

- Cleaning the electric filter insert (see Heizoclean EF185 installation and operating instructions)

- Do not empty the ash container so that no false air is sucked in through the ash conveyor channel during the measurement.

- Check the fuel in the wood chip system.

Correct installation of the measuring port

The measurement port for flue gas measurement by the chimney sweep must be set at least 2 flue pipe diameters (preferably 3 or more) after the last bend or flue gas fan in the direction of the flue. Diameter of bore approx. 12 to 13

mm.
When using electrostatic filters or electric filters, please observe the information on the type plate of the electrostatic filter or electric filter.

The closer the bore is to the bend or flue gas blower, the easier it is to falsify the dust values during flue gas measurement, since these faults always result in more dust in the flue gas than in a long straight flue pipe section.

The measurement port must be in front of a secondary air device (e. flue draught regulator).

When using an electrostatic filter or a electric filter in the flue pipe, the distance to the measuring port must be at least one metre. The master chimney sweep must also use a measuring device suitable for electric filters. See information on the type plate.

On the day of metering

- Ensure sufficient heat absorption:

  In systems with buffers, this should be able to absorb as much heat energy as possible so that the boiler does not reduce the output or switch off during the measurement. For systems without buffers, this can be achieved by reducing the set boiler temperature by 15 °C two hours in advance.

Just before the measurement

To make a proper measurement, the following points must be observed.

- Connect as many consumers as possible (turn on radiators, charge hot water boiler).
- Increase set boiler temperature or switch on buffer charging by increasing the switch-on temperature in systems with buffer.
- Switch off the ash removal!
- Press the chimney sweep button (if present).
- Always heat up the system to full load or 100% (min. 5-10 min.) until a firebed has formed, at least up to 10 cm below the combustion chamber door.
- Check for a bright flame in the combustion chamber. A dark flame can be brightened or primary air can be reduced (lower blower) by adding secondary air (upper blower). A residual oxygen level of 9 to 10% is required for the measurement.
- Please make sure that the electric filter is in operation.

Start metering when all points are fulfilled.

- The system must not be switched off or put in Stand by mode during the measurement.
- This falsifies the measurement result.

After metering

- If necessary, turn back the consumers and set the boiler temperature to the normal operating temperature.
- Switch on the deashing again.
- Deactivate the chimney sweep button, if present.

8 Heating with wood

8.1 Instructions and recommendations

- Wood is stored solar energy that is released when it is burned.
- Combustion of 1 litre of heating oil releases 2.9 kg of fossil carbon dioxide, even in a modern oil heater, and 1.9 kg in 1 m³ of natural gas.
- Biofuels such as wood are CO2-neutral and do not pollute the atmosphere with carbon dioxide such as fossil fuels (e. oil, gas and coal).
- Wood contains only small amounts of sulphur, which means that there is almost no sulphur dioxide pollution of the environment.
- Wood is a renewable raw material, and the harvesting of wood cares for the forest.
- Domestic fuel is generated decentrally, no energy-consuming transport is required.

8.2 What is the calorific value of wood?

Type of Wood	Heating value kWh/kg	Weight per rm of logs (kg)	Heating oil amount to be replaced theoretically (l/rm)
Oak	4,2	550	230
Beech	4,0	500	200
Birch	4,3	450	194
Spruce	4,5	350	157
Pine	4,4	450	198

(1 rm = 1rm³ of stacked wood)

Depending on the fuel, the boiler performance can vary widely. The water content and the condition of a biomass fuel can considerably reduce the maximum boiler output.

8.3 Suitable fuels

Due to the extremely strict limit values of the 2nd level of the 1st BImSchV (Federal Emissions Control Act), Heizomat recommends that high fuel quality is stipulated when commissioning the system.

- **Wood chips in accordance with DIN EN ISO 17225-4: 2021-06**
  Quality class A1, particle size P45, maximum water content M30

  This means: Ash content ≤ 1%, water content between 20% and 30%, particle size 30-65 mm. Chemically untreated, untreated spruce or pine chippings from solid trees without roots and very little bark.
- **Wood pellets according to DIN EN ISO 17225-2: 2014**
  Quality class A1
- **Wood pellets according to ENplus**:
  Quality class ENplus-A1
- **Wood pellets according to DIN EN 303-5: 2012**
  Biomass in untreated condition C1

ATTENTION!

Attention: Unsuitable fuels can cause corrosion of the boiler/unit, which is not covered by the warranty.

8.4 Emission Limit Values for Wood Boilers in Germany

(Requirements of other countries and, if applicable, subsidy requirements must be complied with)

Wood can be burnt in modern boilers in a low-emission and environmentally friendly manner. Thereby the specified limit values in the German Federal Im-mission Protection Ordinance must be adhered to. Excerpts from the Ordinance for Small and Medium-Sized Boilers –
German Federal Immission Protection Ordinance of the Federal German Parlia-ment, Federal Government Regulation

Section 1 General regulations §3 Fuels

(1) In boilers in accordance with § 1, the following fuels may be used: ...

4. natural pieces of wood including adherent bark, in particular, in the form of logs and chips and brushwood and cones,

5. natural wood not in pieces, in particular in the forms sawdust, chips and sanding dust and bark,

5a. compacted shapes made from natural wood in the form of wood briquettes in accordance with DIN 51731, version dated October 1996, or in the form of wood pellets in accordance with the technical fuel requirements of the DIN-plus-certification programme "Wood Pellets for Use in Small Boilers in accordance with DIN 51731-HP5", version dated August 2007 and other wood briquettes or wood pellets made from natural wood or equal quality,

6. painted, varnished or coated wood as well as residues resulting therefrom, provided that no wood preservatives have been applied or as a result of a treatment and coatings do not contain any halogen-organic compounds or heavy metals,

7. plywood, chipboards, fiberboards or otherwise bonded wood and residues resulting from them, in as far as no wood protection agents were applied or contain as a consequence of treatment and coatings halogen organic links or heavy metals, ...

(3) The fuels named in para. 1, number 4 to 8 and number 13 may only be used in boilers, if its moisture content is under 25 percent referring to the dry or dried weights of the fuel. Sentence 1 does not apply for automatically loaded boilers, which are suitable according to the manufacturer specifications for fuels with higher moisture content levels.

(4) Compacted shapes made from fuels in accordance with para.1, numbers 5a to 8 and number 13 may not be pro-duced using binding agents. Excepted herefrom are bind-ing agents made from starch, vegetable stearin, treacle and cellulose fibres.

Selection 2 Boilers for solid fuels §4 General requirements

1) Boilers for solid fuels may only be operated, if they are in a proper technical condition. They may only be operated with fuels in accordance with § 3, para. 1, for the use of which the unit is suitable in accordance with the specifications of the manufacturer. Set-up and operation are to be conform to the specifications of the manufacturer.

(2) Emission restrictions refer to a volume content of oxygen in the emission of 13 percent.

§5 Boilers with a Nominal Heat Performance of 4 Kilowatts or more

1) Boilers for solid fuels with a nominal heat performance of 4 Kilowatts or more, excepted herefrom single room boilers, are to be so set up and operated that the mass concentrations as per Annex 2 do not exceed the following emission limit values for dust and carbon monoxide:

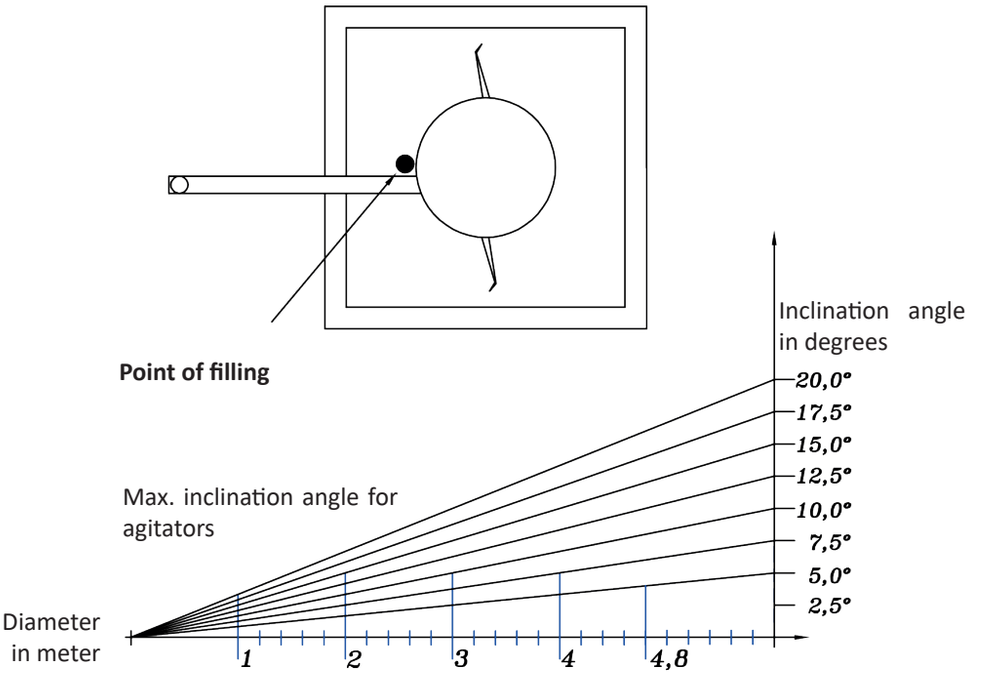
	Fuel in accordance with § 3, para 1	Nominal Heat Performance (Kilowatt)	Dust (g/m³)	CO (g/m³)
Stage 2: Units set up after 31.12.2014 in Germany.	Number 1 to 5a	≥ 4	0,02	0,4
	Number 6 to 7	≥ 30 ≤ 500	0,02	0,4
		> 500	0,02	0,3

2)) The fuels named in § 3, para. 1, Numbers 6 und 7 may only be used in boilers with a nominal heat performance of 30 Kilowatts or more and only in wood pro-cessing plants.

9 General information

9.1 Discharger for wood chips in fuel store

- Due to the way the discharger system works, the area shortly after the open auger trough (clockwise) always becomes empty a little earlier than the other areas.
- When filling the bunker, it must be ensured that the complete clearance circle of the extended telescopic agitator arm is always filled with wood chips or chips.
- Single-sided filling can cause damage to the telescopic agitator arm and the discharger gear.
- When filling the bunker with a fan or suction, the chute must be directed to the centre of the discharger. If necessary, mount the deflect plate on the ejector.
- In order to avoid condensation on the ceiling of the fuel store, we recommend two diagonally mounted supply air openings directly below the fuel store ceiling. At least 200 mm in diameter and with a grille to protect against vermin.



Agitators in the diameter of 5.0 to 7.0 meters must be installed horizontally.

9.2 Boiler

- The HEIZOMAT HSK-RA / RHK-AK series are specially developed for heating wood chips and wood shavings.
- Operation with pellets in DINplus (in accordance with DIN EN 303-5 Class C1) quality is possible.
- Normal heating operation is performed by automatic feeding.
- Manual additional heating with log wood is possible without changing the system, but only in small quantities of wood at a time (emergency operation!). It must be ensured that the boiler temperature does not rise above 95 °C.
  Please note "2.3 Intended use" on page 6.
- Overloading of the combustion chamber with fuel is prevented by the fill level monitor function and the safety temperature limiter (STB) when operating correctly.
- Ashes from flue gas or cyclone have a higher heavy metal content and may need to be disposed of separately (please observe the regional regulations)
  No substances other than ash should be added to the ash containers. The ash system must be kept as airtight as possible.
  Setting guidelines can be found in the Heizocontrol ET 100/ET 200/TP 20 operating instructions.
- The pipeline and its components must be designed in such a way that no excessive pressure is created in any part of the boiler or system (if necessary heat exchanger/ pressure reducer, etc.).
- A hot water circulation loop that would dissipate at least 10% of the estimated rated heat output of the solid fuel boiler in the event that circulation is reduced because of an electrical power failure. This loop (safety heat exchanger) shall be such that it can only be made inoperative by a deliberate manual action. The design parameters for sizing this loop shall be a minimum pipe diameter of 18 mm (0.75 in), a room ambient temperature of 18 °C (65°F), and a mean water temperature of 82 °C (180°F). An automatically fuelled boiler shall be exempt from this requirement if the maximum fuel load in the combustion area at any time is less than 20% of the total boiler input. This loop is to be positioned above the boiler and should include features that promote matural thermal circulation of the water.
- **The boiler can't be operated during a power failure.**

9.3 Supply air opening

For Heizomat combustion systems up to max. 50 kW nominal heat, an opening leading to the open air with a clear cross-section of at least 150 cm² or a maximum of two openings of 75 cm² each must be installed.

For systems with a rated output of more than 50 kW, the cross-section must be at least 150 cm² and 2 cm² more for each kilowatt exceeding 50 kW.
If the supply air opening is fitted with a grille, the cross-section must be enlarged accordingly.

- Other blowers in the heating chamber and fuel store must not negatively affect the function and safety of the system, e.g. by generating a vacuum.

9.4 Chimney and chimney connection

IMPORTANT!

- The chimney to be used must provide the chimney draught specified in the technical data. If this is not possible, a flue gas blower must be retrofitted accordingly and a tensile measurement carried out if necessary.
- The flue pipe length must not exceed 1/3 of the effective chimney height.
- Decorative attachments at the end of the chimney must not be used; they significantly slow down the flue gas flow and lead to poor combustion.
- The flue pipe from the boiler to the chimney should always rise slightly. This promotes chimney draughts.
- All connecting parts and pipe parts must be cleanly connected and sealed.
- The flue pipe end must not reach into the vertical fireclay pipe, as this reduces the diameter in the chimney.
- The chimney must be approved for the fuel wood in accordance with “EN 13384-1 Combustion technology calculation of flue dimensions” or, if necessary, comply with VDI 3781 Sheet 4. Country-specific deviations within and outside the EU must be complied with in consultation with the factory.
- It is recommended to insulate the flue pipes between the boiler and the chimney connection.

- With regard to distances to flammable parts, we refer to the FeuVO (fire code regulation) of the respective countries. Your chimney sweep will be happy to advise you.
- At flue gas temperatures of less than 160 K above room temperature, a condensate-resistant flue gas system must be installed.
- The unit is not to be connected to a chimney flue serving another appliance.

9.5 Chimney calculation

Extracts from the Small and Medium Boiler Systems Regulation – 1. BImSchV (Federal Emissions Control Act)

Section 5
Common regulations
§19 flue gas discharge conditions for Germany (requirements of other countries must be observed in consultation with the factory)

(1) The chimney outlet openings of boiler systems for solid fuels constructed or substantially modified from 22 March 2010 must...
1. For roof pitches up to and including 20 degrees, protrude the ridge by at least 40 cm or be at least 1 m from the roof surface, or protrude the ridge by at least 40 cm for roof pitches of more than 20 degrees, or have a horizontal distance from the roof surface of at least 2.3 m.
2. in the case of boiler systems with a total heat output of up to 50 kW within a radius of 15 m, the top edges of ventilation openings, windows or doors exceed by at least 1 m; the radius increases by 2 m for each additional 50 kW started up to a maximum of 40 m.

9.6 Disposal of the system

Dismantling or disposing of machines and systems requires the highest precision and safety. It must be carried out by qualified personnel.
For reused substances in a recycling process, the manufacturer declines any responsibility for possible personal injury and property damage if these parts are used for a purpose other than the original one.

9.7 Residual risk assessment

9.7.1 Hazard prevention

- All rotating parts of the Heizomat wood chip / pellet boiler system are covered by protective and safety devices. The conveyor elements of the feeding system are freely accessible for functional reasons. Personnel must never approach these parts during operation!
- Risk of death!
- The safety distance must be observed!

9.7.2 Residual risk

- Operating personnel can become injured if safety equipment is put out of operation, modified or dismantled.

DANGER!

- There is a significant risk to life and limb!
- The safety distance must be observed!
- It is forbidden to start the device if the protection devices are defective or missing!

9.8 Important information for you and your heating engineer

- The boiler temperature for solid fuel boilers should not be below 70 °C.
- The installation of the safety devices and the installation on the water side must be carried out in accordance with DIN-EN 12828. The necessary components must be provided and installed by the customer.
- All safety devices must be maintained regularly and in accordance with the manufacturer's specifications.
- The maximum boiler temperature is 95°C, which is secured by a safety temperature limiter (STL) on the boiler. Is a pipe system or a pipe system used that is designed for a max. temperature is not suitable above 95°C, a corresponding safety device must be installed on site.

- Only the devices, hydraulic components or fault or warning messages listed in the enclosed supplements may be connected to the Heizomat control cabinet. Modification of the control cabinet or additional installations voids the warranty.

- Unless otherwise specified by Heizomat, the maximum operating pressure is 3 bar.

- The temperature spread between supply and return should be between 15 and 20 K. The return temperature must not be below 55°C. As a basic principle, a return flow increase with mixer must be installed.

- If a Heizomat system controller or system manager is supplied, the connection diagrams supplied must be used. If the heating circuit controller is supplied by the customer, the hydraulic connection must be carried out as described by the manufacturer.

- All hydraulic system components and the additional safety devices must be dimensioned and installed by the heating engineer.

- The specifications of VDI 2035 must be observed when filling and refilling.

- The recognised rules of technology as well as the currently valid preliminary steps of the respective federal state must be observed.

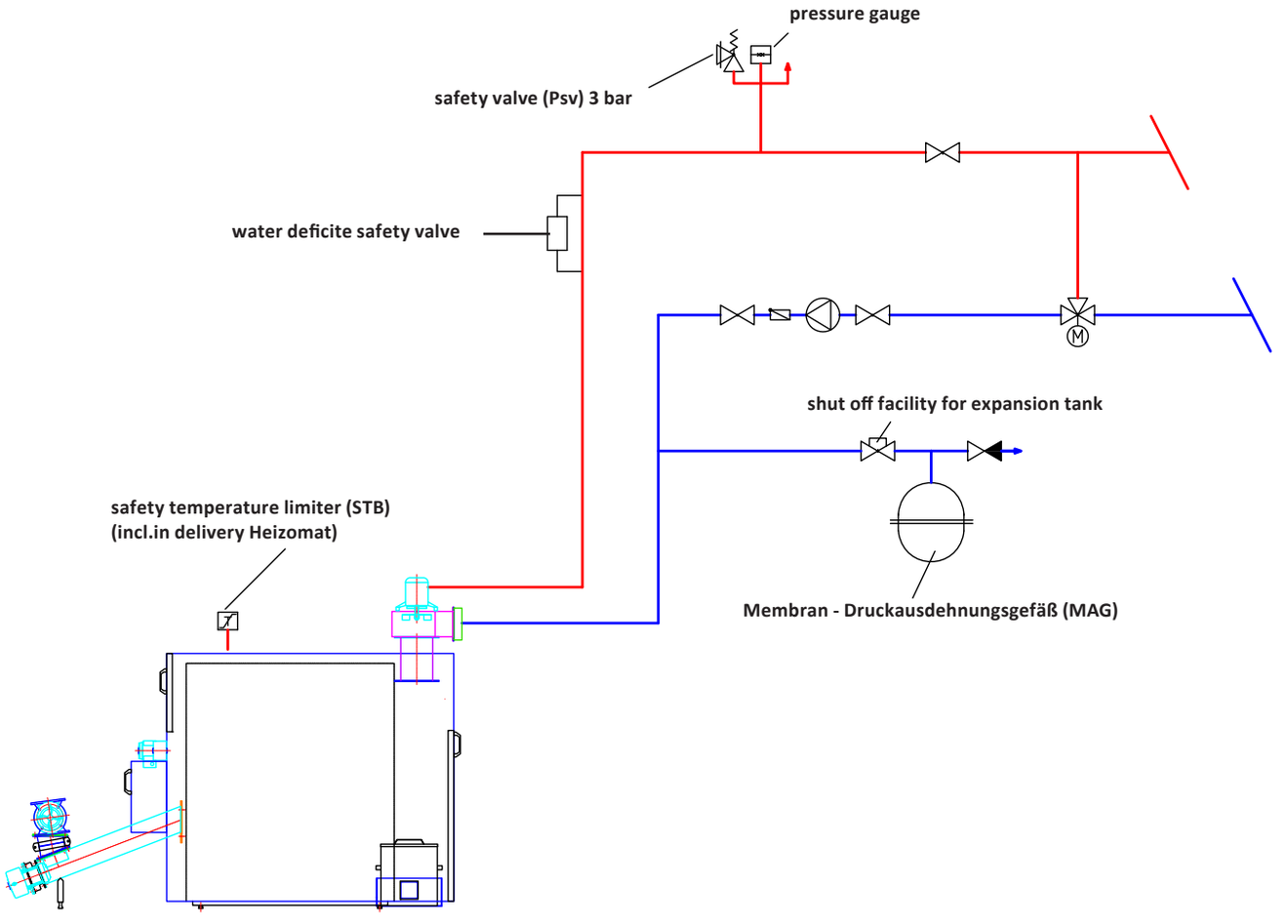
- When connecting the system, in particular the sprinkler valve, the drinking water regulation must be observed.

- A facility for dissipating excess heat must be maintained and checked annually by an expert and the safety heat exchanger must not be used as an operational water heat exchanger under any circumstances.

10 Attachment

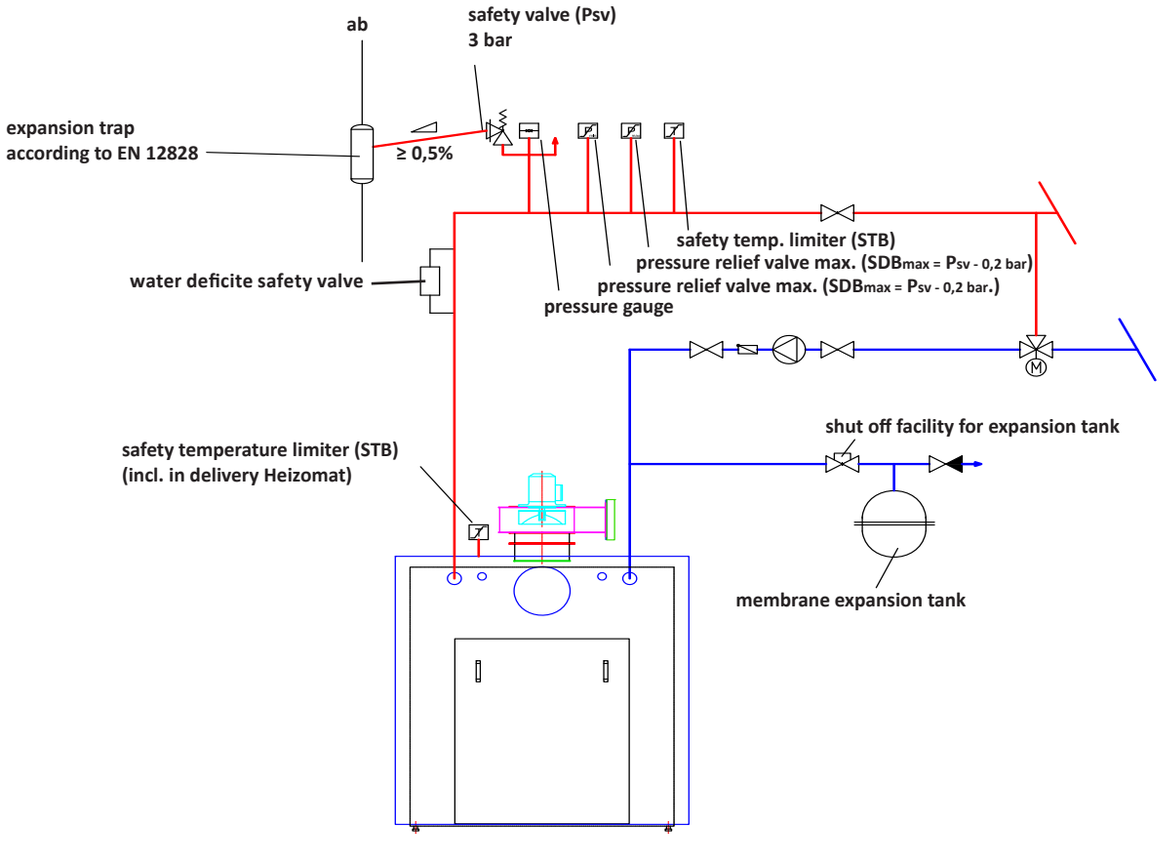
10.1 Safety equipment in accordance with DIN-EN 12828

Directly heated $Q_N \leq 300kW$ / $t_R \leq 105°C$

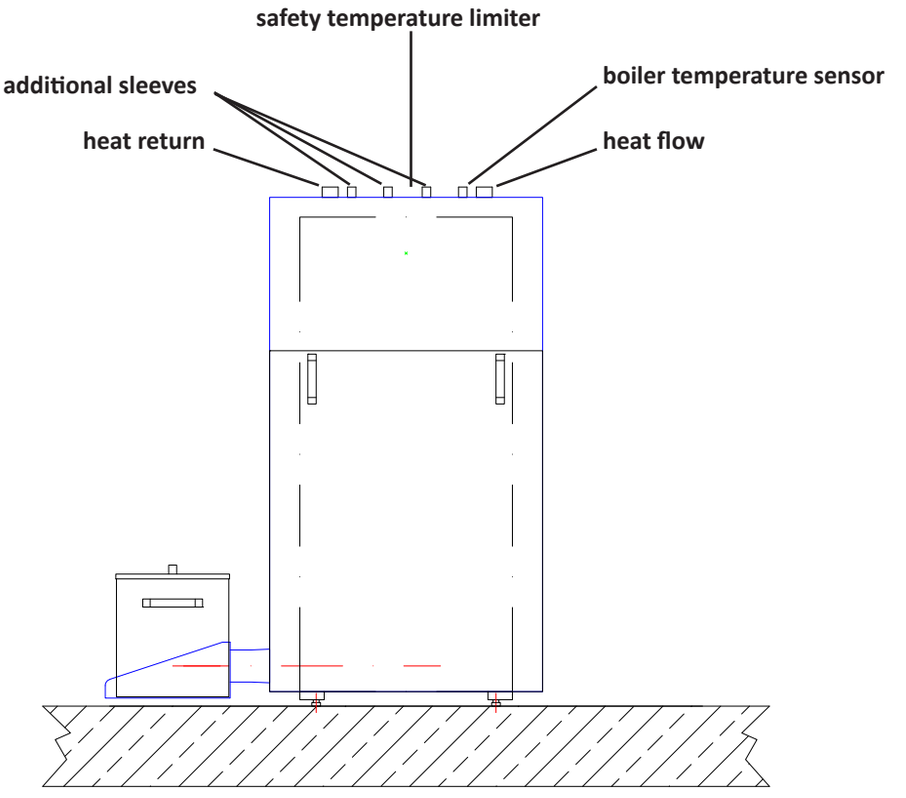


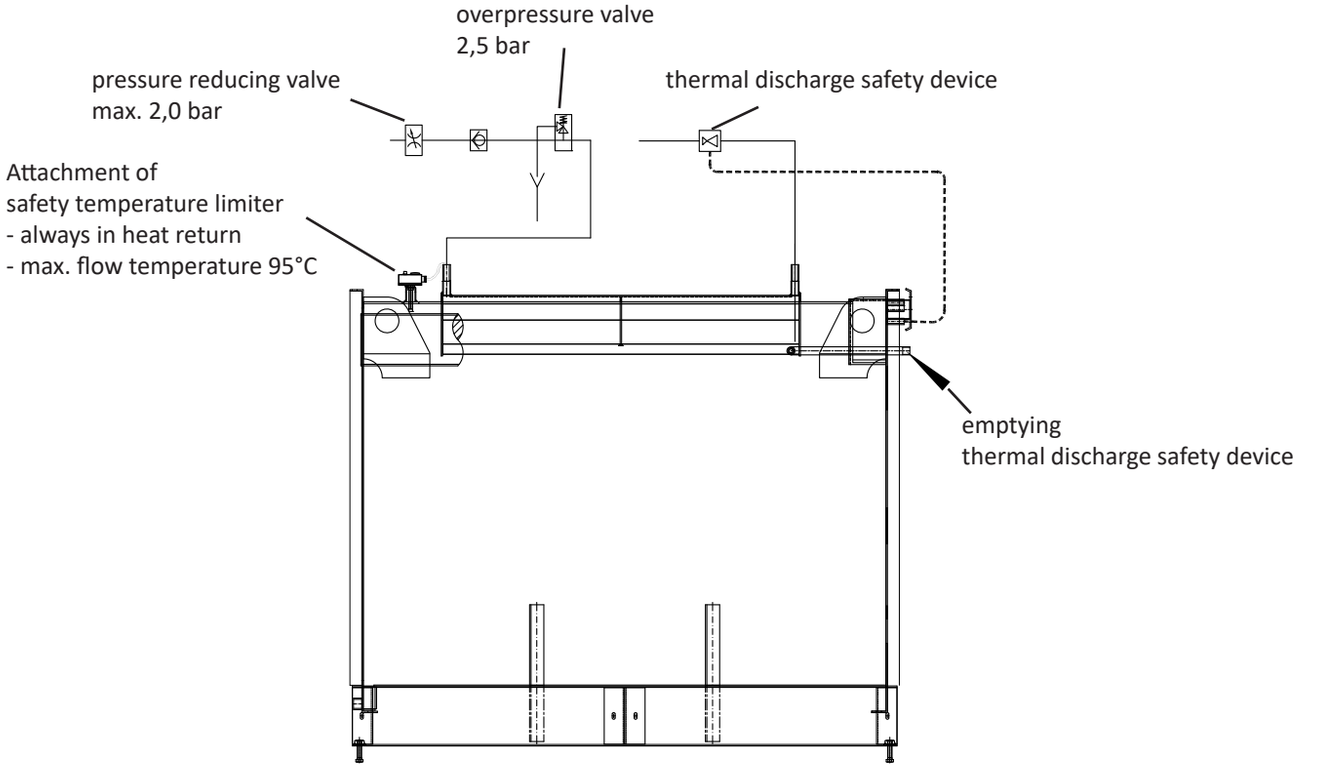
10.2 Safety equipment in accordance with DIN-EN 12828

Directly heated Q_N w> 300kW / t_R ≤ 105°C



10.3 Water side connection thermal discharge safety device





With automatic feeding, a safety heat exchanger is needed from a flow temperature of 80°C!

RHK-AK Maintenance

Heizomat

ENERGY IN BALANCE WITH NATURE
www.heizomat.de • info@heizomat.de

Regular service and maintenance and cleanliness in the boiler room enhances operating safety, the smooth functioning of your Heizomat heating unit and the pleasure derived from your investment.
Detailed maintenance information can be found in the annex of the operating instructions.
Avoid wet fuel. Water does not burn.
Particular attention should be paid to dry fuel for low output. Optimally wood chips burn with a water content of 20 %.
Too dry wood with less than 15 % water content is similarly not advantageous.

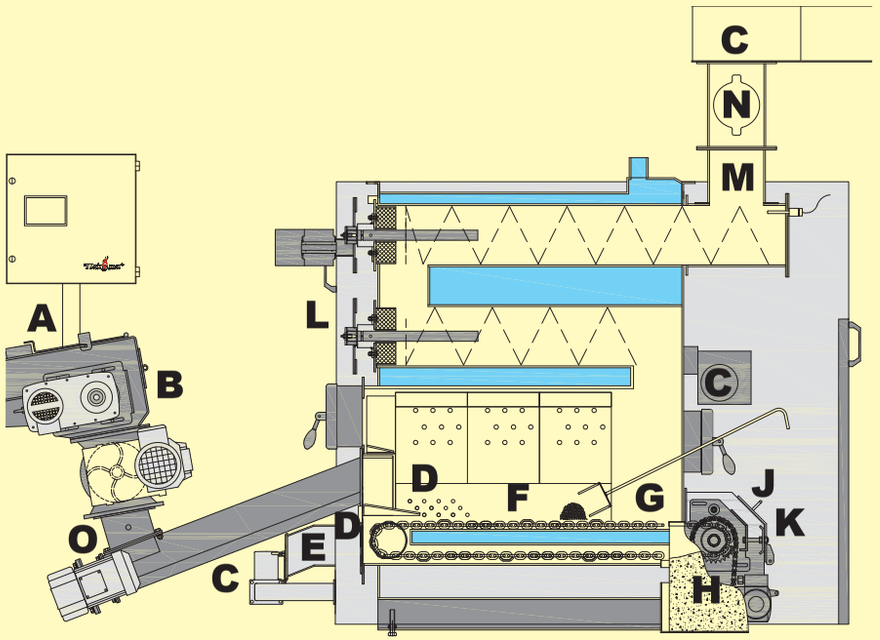
Caution!

When filling the storage room, the unit must be switched on for a dumping height of about 0.5 m above the agitator and covey for about 5 minutes. Never remove foreign bodies by hand from the transport system.
Basically use tools. Risk of injury.

Before working on the unit, disconnect control from the power supply!

A	Clean the discharging channels	as required
*	Grease the discharging coupling, open lid	2 a year
*	Grease the flange bearings on chain discharging system	
B*	Re-tension the discharging chain	as required
C	Clean the blowers, depending on the type of boiler at the front or back end	1 a year
D	Clean the primary air inlet with vacuum cleaner	2 a year
E	Ash and clinker to be emptied, therefore open flap	as required
F	Clean out foreign bodies (stones, nails...), remove clinker with manual tool	as required
G	By using „manual operation de-ashing“ the combustion chamber and downstream dust settling chamber can be emptied Caution! Do not put your hand in, risk of injury!	as required
H	Empty the ash bin	when about 3/4 filled
J	Grease the drive shafts for de-ashing chain and cross de-ashing	as required
K	Check the tension of the de-ashing chain and adjust if required The chain must sag!	2 a year
L	Grease the de-ashing augers of the heat exchanger including the gear tooth flanks and the drive chain, via the grease nipple respectively directly.Then check the function (briefly start „register cleaning“ in „manual operation“)	4 a year
M	Clean the flue gas collector and the flue tube/chimney from ash deposits, at least 1 week before in case of a flue gas measurement Beware! Don‘t damage temperature- and lambda sensor!	as required
	Clean thermowell for flue gas temperature sensor	2 a year
N*	Check and clean the electric filter and flue gas pipe regularly Surfaces have to be clean for 100 % filter effect	as required
O	Clean the sensor and opposite reflection surface	as required

* optional equipment



Customer Number:

VG- Number:

PM-88-030-00022 V05 - Stand 06/2021

Maintenance RHK-AK (P)

ENERGY IN BALANCE WITH NATURE

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Regular service and maintenance and cleanliness in the boiler room enhances operating safety, the smooth functioning of your Heizomat heating unit and the pleasure derived from your investment. Detailed maintenance information can be found in the annex of the operating instructions.
Avoid wet fuel. Water does not burn.
Particular attention should be paid to dry fuel for low output. Optimally wood chips burn with a water content of 20 %.
Too dry wood with less than 15 % water content is similarly not advantageous.

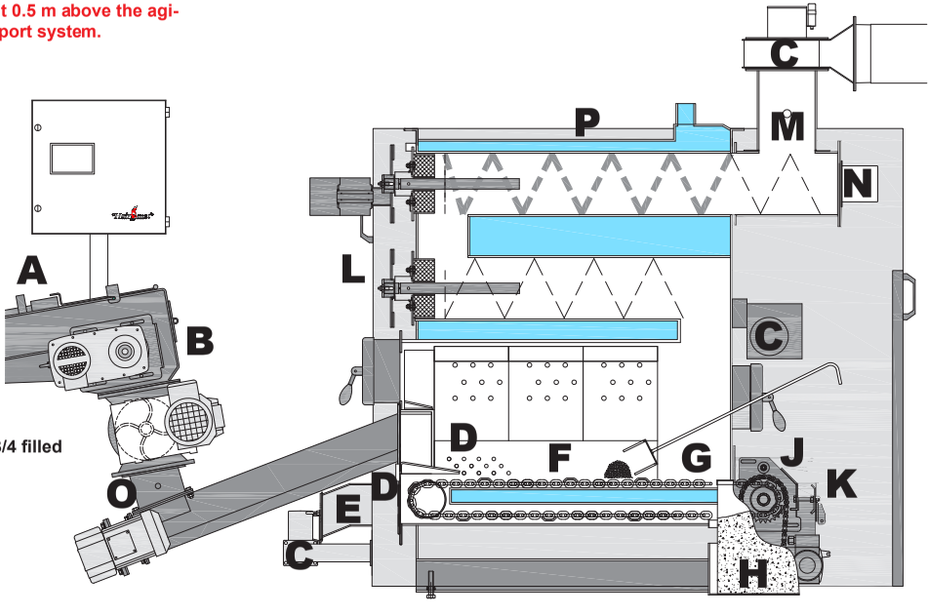
Caution!

When filling the storage room, the unit must be switched on for a dumping height of about 0.5 m above the agitator and covey for about 5 minutes. Never remove foreign bodies by hand from the transport system.
Basically use tools. Risk of injury.

Before working on the unit, disconnect control from the power supply!

	Clean the complete unit of deposits, dust and objects	as required
A	Clean the discharging channels	as required
*	Grease the discharging coupling, open lid	2 a year
*	Grease the flange bearings on chain discharging system	
B*	Re-tension the discharging chain	as required
C	Clean the blowers, depending on the type of boiler at the front or back end	1 a year
D	Clean the primary air inlet with vacuum cleaner	2 a year
E	Ash and clinker to be emptied, therefore open cleaning opening / remove inspection cover	as required
F	Clean out foreign bodies (stones, nails...), remove clinker with manual tool	as required
G	By using „manual operation de-ashing“ the combustion chamber and downstream dust settling chamber can be emptied Caution! Do not put your hand in, risk of injury!	as required
H	Empty the ash bin (please wear suitable mouth and nose protection)	when about 3/4 filled
J	Grease the drive shafts for de-ashing chain and cross de-ashing	as required
K	Check the tension of the de-ashing chain and adjust if required The chain must sag!	2 a year
L	Grease the de-ashing augers of the heat exchanger including the gear tooth flanks and the drive chain, via the grease nipple respectively directly. Then check the function (briefly start „register cleaning“ in „manual operation“)	4 a year
M	Clean the flue gas collector and the flue tube/chimney from ash deposits, at least 1 week before in case of a flue gas measurement Beware! Don‘t damage temperature- and lambda sensor! Clean thermowell for flue gas temperature sensor	as required 2 a year
N*	Check and clean the electric filter (Number depending on boiler size) Surfaces have to be clean for 100 % filter effect	as required
O	Clean the sensor and opposite reflection surface	as required
P	Clean underpressure hose	4 a year

* optional equipment



Customer Number:

VG-Number:

PM-88-030-00222 V07 - 09/2023

10.6 Instructions for flue gas measurement

Instructions for flue gas measurement on a HEIZOMAT-system through chimney sweep or authorities

Attach to the boiler system and provide for the measurement.

In order to carry out a correct measurement, the points mentioned must be observed:

1. On the day of the measurement ***about 2 hours before***, boiler temperature to be set about 15 °C lower than the normal operating temperature.
2. Check whether the flue gas pipe was cleaned thoroughly up to the heat registers, clean thoroughly at least 4 days before measurement.
   It is to be ensured that no dust that is adhering on the flue gas pipe, but only exhaust air is sucked into the measurement device during the combustion process. Otherwise, the measurement results will be falsified!
3. All heat consumers, radiators, hot water boiler to be turned up fully.
4. For the measurement activate the firing by selecting the "Chimney sweep button full load".
5. Let the unit heat up (at least 5 – 10 mins) until a bed of embers has formed at least up to the middle of the combustion chamber. For more than 100 kW boiler output, the embers should cover the whole grating.
6. Check whether a light-coloured flame burns in the combustion chamber.
   By adding secondary air (upper blower) a dark-coloured flame can be made lighter or reduce primary air (lower blower). Residual oxygen of 9 to 10 % is required for the measurement. If the residual oxygen of 9-10% is not reached, reduce secondary air or increase primary air.
7. When all points have been completed, the measurement can be started.
   The unit may not be switched off during the measurement or go into stand by mode. The measurement would be distorted.
8. After the measurement the heat consumers (see point 3.) to be turned back as required and the boiler temperature to be set to the normal operating temperature, respectively press again the chimney sweep button. This returns to the original operation mode. .
9. When cleaning the chimney, switch off the system 1 hour beforehand so that the flue pipe is cold enough.

It is essential to avoid too wet fuel. Water doesn't burn!

The correct water content for wood chips in a HEIZOMAT system should be 15 to 30%. Too dry is also negative.

10.7 Service department booklet

Here you can enter the Heizomat customer service visits on!		Comment:
Customer service visit on:		
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Customer service visit on:		

10.8 Service work on the system

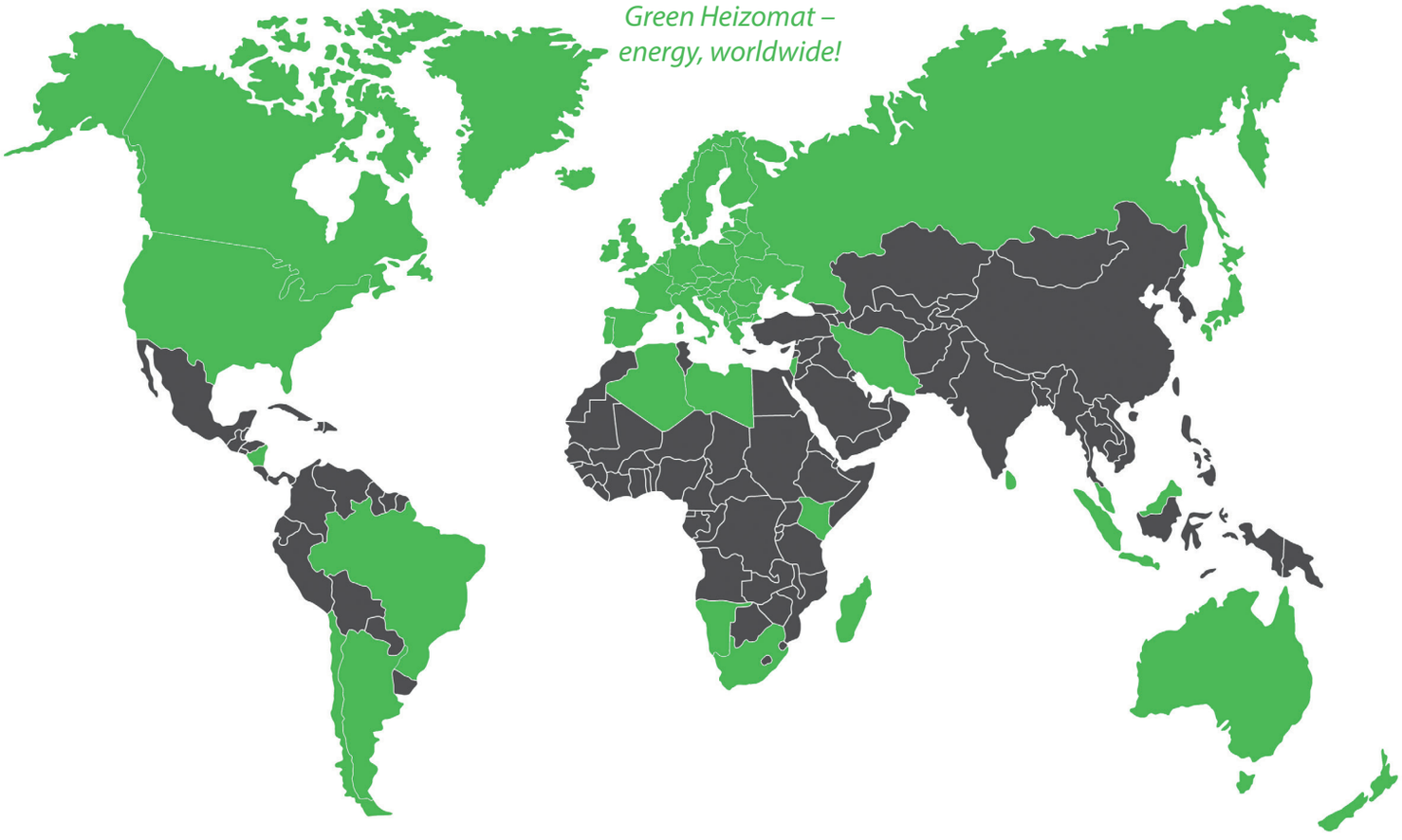
DANGER!

ATTENTION: Before working on the unit, disconnect control from the power supply!

Date of work carried out:					
Signature :					
Feeding:					
Clean the discharging channels*					
Grease the discharging coupling*					
Grease the flange bearings on chain discharging system*					
Re-tension the discharging chain*					
Clean the sensor and opposite reflection surface					
Airflow system:					
Clean the blowers					
Clean the primary air inlet incl. air tubes					
Clean the underpressure hose by unplugging it from the underpressure device and blowing through it					
De-ashing:					
Remove ash and slag from the redirection					
Remove tar deposits at the end of the insertion channel with a tool					
Clean the combustion chamber from foreign bodies and slag					
Empty the ash bin					
Grease the drive shafts for de-ashing chain and cross de-ashing					
Check the tension of the de-ashing chain and adjust if required (The chain must sag)					
Grease the heat exchanger cleaning					
Clean the flue gas collector and the flue tube/chimney from ash deposits					
Clean the thermowell flue gas temperature sensor					
Electric filter					
Check and clean the electric filter and flue gas pipe regularly					
* - optional equipment					

10.9 Notes

Green Heizomat –
energy, worldwide!



We have been operating an active heat transition with approx. 400 employees and over 35 000 customers worldwide since 1982. - You, too, can be a part of it!

We reserve the right to make technical changes for the purpose of continuous further development.
Dimensions and weights are approximate!

Heizomat®

Our partner:

Gerätebau + Energiesysteme GmbH
Maicha 21 • D-91710 Gunzenhausen
Tel.: +49 (0) 9836 97 97 - 0
Fax: +49 (0) 9836 97 97 - 97
info@heizomat.de • www.heizomat.de

Automatic heating with the world's most CO_2-neutral fuels!

PM-88-006-00004• V02 • 06/2023

Renewable Heat Incentive Emissions Certificate

Monitoring Organisation:	*EMCo Air Quality Consultants Ltd*
Address:	Unit 3, Church Farm Church Road Eversley,Hook Hampshire, RG27 0PX United Kingdom
Certificate Authorised By:	*Dr A W Stanley* — *Principal Consultant*
MCERTS Registration Number:	03 189
Date of Certification	23-Dec-13
Certificate Reference	2013-HZm-01-990
Laboratory accredited to EN 17025 2005 Initial Registration: United Kingdom Accreditation Service since:	Mar-04
Current Registration EN 17025	May-13
	2346

Plant Model Tested	**RHK-AK 1000**
Plant Capacity	**990 kW**
Manufacturer of plant Tested:	*Heizomat GmbH*
Manufacturer Address:	Maicha 21 91710 Gunzenhausen Deutscheland

Was the plant a manually stoked natural draught plant (without induced draught)? No

Plant was tested: 12-Dec-13 and the plant was fuelled by chipped wood of moisture content 30%

Based on the testing performed this RHi certificate covers the fuels listed below that can be used in compliance with the emission limits of 30 and 150 grams per Gigajoule net heat input for particulate matter and oxides of nitrogen respectively.

Chipped wood B1 (EN 303-5) up to 35% moisture
Compressed wood C1 (EN 303-5) up to 12% moisture

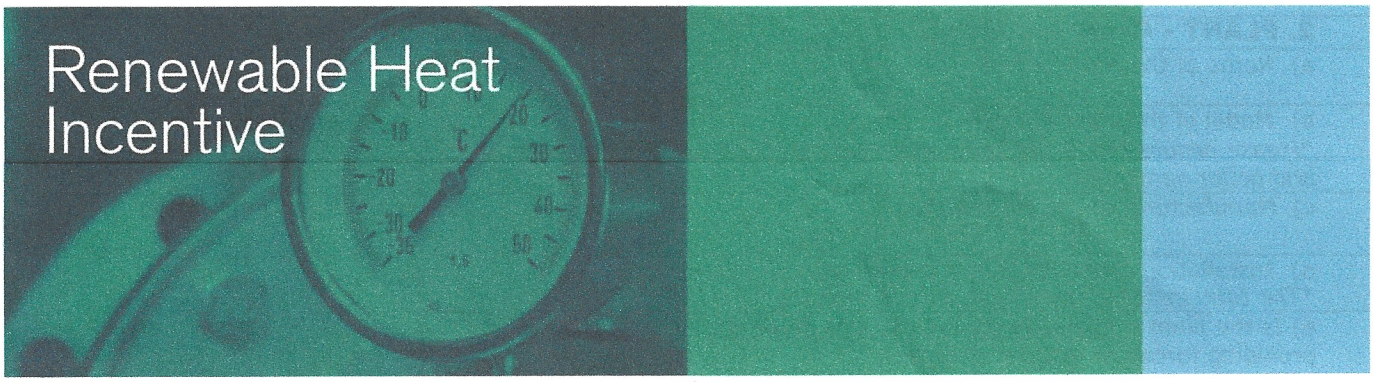
Testing for particulates under EN13284-1 was the average of three tests of 30 minutes duration was below the emission limit of 30 gGj^{-1}	**13.7**
The value for NOx emissions measured to EN 14792 was generated across the three particulate test periods was below the emission limit of 150 gGj^{-1}	**54.1**
During **ALL** of the test the plant was operational at ≥ than 85% of its rated value.	

All plants covered with the type-testing range of plants to which this certificate applies are listed below:

RHK-AK 500	**RHK-AK 850**
RHK-AK 650	

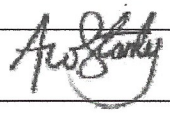
EMCo Air Quality Consultants Ltd
Unit 3, Church Farm, Church Road, Eversley, Hook, Hampshire RG27 0PX
T: 0118 9734077 F: 0118 9734079 M: 07785 990336 E: sales@emcoairquality.co.uk
A registered Company in England and Wales No: 3118183 VAT No: 641933242

ofgem e-serve Making a positive difference for energy consumers



In order to accredit any biomass boiler or stove applications received for the domestic or non-domestic Renewable Heat Incentive (RHI) schemes, Ofgem must be satisfied that a valid emissions certificate exists for the specific model in the application (or alternatively for the non-domestic RHI, an environmental permit for the site). This template incorporates all information required to demonstrate that the tested plant meets the air quality requirements of the RHI. It must be fully completed and issued by a testing laboratory in order to be a valid certificate.

Emissions Certificate

1. TEST HOUSE	
a) Name and address of the testing laboratory that has carried out the required tests and issued this certificate * **if different, include details of both*	**EMCo Air Quality Consultants Ltd** Unit 3, Church Farm, Church Road Eversley, Hants, RG27 0PX **Environmental Compliance Limited** Unit G1, Main Avenue Treforest Industrial Estate Pontypridd, CF37 5BF
b) Name and signature of the person authorised by the testing laboratory to issue the certificate	Name: Dr A W Stanley Signature: 
c) Date of issue of this certificate, together with certificate reference number for this certificate **Please see Note A*	Date: *25 April 2016* Certificate reference number: **2016-ETs-03** Reference number of original test report on which this certificate is based: **(P2614)2016-ETs-03**
d) If the testing laboratory that has carried out the required tests is accredited to BS EN ISO/IEC 17025:2005, date of accreditation and accreditation number *(if testing conducted on or after 24 September 2013, the testing laboratory **must be** BS EN ISO/IEC 17025:2005 accredited at the time of testing)*	Date Laboratory accredited to EN 17025 2005: Initial Registration: United Kingdom Accreditation Service since: **January 2004** Current Registration: EN 17025: Issue 031 **21 December 2015** Accreditation number: **2499**

2. PLANT - *Please see Note B*	
a) Name of the plant tested	Heizomat Biomass Boiler
b) Model of the plant tested* **Please ensure this is the same as in the manufacturer's documentation and boiler nameplate*	RHK-RK-1000
c) Manufacturer of the plant tested	Heizomat GmBh
d) Installation capacity* of the **tested** plant in kilowatts (kW) **The total installed peak heat output capacity*	990
e) Is the plant a manually stoked, natural draught plant? (without a fan providing forced or induced draught)	NO
f) (i) Date the plant was tested* (ii) Please confirm that NOx and PM have been tested on the same occasion **This is in reference to the emissions testing for PM and NOx, not any wider range of tests. A specific date is required. Please provide the date of test performed at ≥85% of the installation capacity. If more than one model has been tested or testing has been conducted on different dates for different fuels, please list each date with details.*	**18 Nov 2015** During **ALL** of the tests the plant was operational at ≥ than 85% of its rated value.
g) Please list all the plants in the type-testing range* of the tested plants to which the certificate applies, if any.[1] Please include the **installation capacity** of each model. **This must follow the ratio rules:* *If the smallest plant in the range is 500kW or less, the largest plant in the range can't be more than double the smallest.* *If the smallest plant in the range is over 500kW, the largest plant in the range can't be more than 500kW greater than the smallest.*	All plants covered with the type-testing range of plants to which this certificate applies are listed below: ***RHK-AK-654*** ***RHK-AK-854*** ***RHK-AK-1000***

3. FUELS	
a) Types of fuels used when testing *(where relevant, this should include how the fuel has been processed and based if relevant on classifications from EN14961 or EN303-5. eg. wood pellets/compressed wood, wood chip. We don't expect broader categories such as 'beech', 'wood'.)*	***Grade B & C Recycled Wood Chip***
b) Based on the testing, list the range of fuels that can be used in compliance with the emission limits of 30 grams per gigajoule (g/GJ) net heat input for particulate matter (PM), and 150 g/GJ net heat input for oxides of nitrogen (NOx) *(where relevant, this should include how the fuel has been processed and based if relevant on classifications from EN14961 or EN303-5. eg. wood pellets/compressed wood, wood chips. We don't expect broader categories such as 'beech', 'wood')*	**Grade B & C Recycled Wood Chipped to G50 Spec**
c)Moisture content of the fuel used during testing	**Less than 30%**
d) Maximum allowable moisture content* of fuel that can be used with the certified plant(s) that ensures RHI emission limits are not exceeded. **This value may be obtained from ranges specified in EN 303-5 based on the fuel type(s) tested.*	**Range between 15% to 30%**

[1] The type-testing approach enables testing laboratories to provide assurance that all boilers in a given range meet the air quality requirements, without needing to specifically test each boiler.

4. TESTS	
Confirm which requirements the emissions of NOx and PM have been tested in accordance with. **Either 4a or 4b must be confirmed to be a valid RHI certificate.**	
a) **Was the testing carried out in accordance* with all of the provisions relevant to emissions of PM and NOx in either BS EN 303-5:1999 or BS EN 303-5:2012?**[2] **It is **not** a requirement that the tested plant must be within the scope of one of these standards, as long as the test lab can confirm that **all of the relevant provisions** were followed appropriately*	**No**
b) **Was the testing carried out in accordance with all of the following requirements?** (i) - EN 14792:2005 in respect of NOx emissions - EN 13284-1:2002 or ISO 9096:2003 in respect of PM emissions[3] (ii) emissions of PM represent the average of at least three measurements of emissions of PM, each of at least 30 minutes duration (iii) the value for NOx emissions is derived from the average of measurements made throughout the PM emission tests.	**(i) Yes** **(ii) Yes** **(iii) Yes**
c) Please confirm the plant was tested at ≥85% of the installation capacity of the plant.	**Yes**
d) Please confirm the test shows that emissions from the plant were no greater than 30 g/GJ PM and 150 g/GJ NOx.	**Yes**
e) Measured* emissions of PM in **g/GJ** net heat input **This average value should be from the test confirmed in 4c* *Results from partial load tests are not required.* *This value must be in the specified units.*	**3.85**
f) Measured* emissions of NOx in **g/GJ** net heat input **This average value should be from the test confirmed in 4c.* *Results from partial load tests are not required.* *This value must be in the specified units.*	**49.03**

Note A: If details from a previously issued certificate or an original test report are being transferred to this RHI emission certificate template, please note that this document must be **issued by the testing laboratory** as a separate certificate. The issue date and certificate reference number should be in relation to *this* certificate produced using the RHI template, not the issue date and reference number of the original certificate or test report.

Note B: If you are including multiple tested plants on one certificate, please ensure that all sections are completed for each tested plant, and are laid out such that it is clear which details relate to which tested plant. If a type-testing range is included as well, please show clearly which type-testing range relates to which tested plant(s), following the type-testing range ratio rules outlined in 2g.

[2] BS EN303-5:1999 and 2012 explain what should be measured and when.
[3] These standards explain how to make the PM and NOx measurements.

Appendix E Model and model set-up

E.1 Meteorology and associated parameters

E.1.1 Hourly meteorological data

The model uses hourly data of surface meteorology parameters that are typically measured at a synoptic station or are generated by a numerical model. In this assessment, four years' meteorological data were obtained for the period 2021-2024 for the area surrounding the Site location (Latitude 52.864°, Longitude -2.219°), from a Numerical Weather Prediction system known as the Global Forecast System (GFS).

The GFS is a spectral model, and data are archived at a horizontal resolution of 0.5 degrees longitude, or approximately 50 km over the UK (latterly 0.25 degrees, or approximately 25 km). The GFS resolution captures major topographical features and the broad-scale characteristics of the weather over the UK. The use of NWP data has advantages over traditional meteorological records as:

- Calm periods in traditional records may be over-represented.
- Traditional records may include local deviations from the broad-scale wind flow that would not necessarily be representative of the site being modelled
- Information on the state of the atmosphere above ground level which would otherwise be estimated by the meteorological pre-processor may be included explicitly.

Figure 6 shows windroses for each year of data. The predominant wind direction is northwesterly with other significant contributions from winds from the south to the west southwest. The data were used with the dispersion model's calms option with default values.

Table 18 shows the number of lines of usable meteorological data each year with and without calms option. Without the calms options the lowest percentage of usable lines was 99.76% and with the calms option, 100%.

Defra's LAQM TG22[21] contains cautionary guidance on use of data with less than 85% usable data in calculating for comparison with short-term AQS. The minimum values of usable data were far above this threshold.

Table 18 Meteorological station data for calm conditions

Year of data	Number of hours with calm conditions (modelled as calm)	Number of hours with inadequate data (excluding calms)	Hours used without calms option (%)	Hours used with calms option (%)
2021	13	0	99.85%	100%
2022	21	0	99.76%	100%
2023	14	0	99.84%	100%
2024	4	0	99.95%	100%
Notes: Meteorological parameters supplied are: wind speed, wind direction, near-ground air temperature, cloud cover				

E.1.2 Meteorological parameters

The dispersion model uses various meteorological parameters to represent the area at the meteorological station and the site of the Site. The key parameters that have been defined are the surface roughness and minimum Monin-Obuhkov length which are defined at the site of the meteorological data measurement and the Site.

- Surface roughness: this is related to land-use and the height of obstacles on the ground which give rise to mechanically generated turbulence; and
- Minimum Monin-Obuhkov length: this is used to model the extent to which the urban heat island effect limits the most stable atmospheric conditions. Heat released from the urban area prevents the atmospheric boundary layer becoming very stable.

Table 19 shows the values of the parameters that can be selected in the model from a drop-down menu. Other, intermediate, values can be entered directly. The values selected for the meteorological data site and the Site are given in Table 20. A value of 10m for minimum Monin-Obuhkov length reflects the semi-rural nature of the immediate surrounding area with the built-up areas of Eccleshall, Stone and Stafford within 10km; the value of 0.3m for surface roughness at the dispersion site reflects areas of woodland in the vicinity of the Site, the value of 0.5m for the wider area reflects the presence of towns.

The dispersion model sets a higher value of minimum turbulence when modelling terrain, therefore, a value of 0.01m/s was set in the additional input file (*.aai*) so that the value used when modelling terrain would be the same as that calculated by the model for flat terrain as a function of Monin-Obuhkov length (ADMS 6 User Guide, Section 4.15.3[4]).

Table 19 Dispersion model meteorological parameter values

Surface roughness	
Descriptor	**Value (m)**
Large urban areas	1.5
Cities, woodland	1.0
Parkland, open suburbia	0.5
Agricultural areas (max)	0.3
Agricultural areas (min)	0.2
Root crops	0.1
Open grassland	0.02
Short grass	0.005
Sea	0.0001

Minimum Monin-Obuhkov length	
Descriptor	**Value (m)**
Large conurbations >1million	100m
Cities and large towns	30m
Mixed urban/industrial	30m
Rural areas (max) [1]	20m
Small towns < 50,000	10m
Rural areas (min)[1]	2m

Table 20 Meteorological site and Site met parameters

Parameter	Meteorological data site	Site
Surface roughness	0.3m	0.5m
Minimum Monin-Obhukov length	10m	10m

E.2 Buildings

The presence of buildings close to an emission point can affect the dispersion from a source, bringing the plume centreline down towards the ground in the lee of a building and entraining pollutant into the cavity (or, recirculation) region in the lee of a building. In the cavity, concentrations are assumed to be uniform, and it may be a region of high concentrations depending on the amount of pollutant entrained. The presence of buildings may increase or decrease concentrations at a location compared with the no buildings scenario.

The dispersion model allows up to 25 buildings to be included as input and the model combines the relevant input buildings into one effective building; the effective building is calculated for each line of meteorological data. Buildings can only be circular or rectangular in cross-section, so the buildings entered are simplified geometries. Buildings less than one third of the height of the stack will be ignored by the dispersion model. Smaller Site structures have been neglected as their effect will be limited compared with the larger structures: digesters, buildings. The building height entered into the model is the height to the ridge.

Table 21 shows the (simplified) parameters of the buildings on Site used as input to the model; they are shown in Figure 7. In the dispersion model, for each stack a 'main' building must be specified; the option to allow the dispersion model to automatically select the main building for each source was selected.

Table 21 Modelled buildings

Building name	Building number (Figure 3)	Building centre X	Building centre Y	Height to ridge (m)	Length/ Diameter (m)	Width (m)	Orienta-tion (°)
Komtech screening building	13	385331	329563	7	35	28	201
Bedding plant and product storage	6 & 11	385294	329595	7.5	37	41	201
Drying floors	5a-5f & 12	385257	329610	9.77	32	42	201
Main wood processing	2 & 10	385301	329666	7.5	12	60.5	195
Biomass boilers and livestock	21 & 18	385330	329666	7.5	12	47	195
Notes: Buildings with circular cross-section, such as the digesters, do not have a width and orientation specified							

E.3 Terrain

The effect of terrain is not usually modelled when terrain gradients in the modelled domain are below the 1:10 threshold usually applied. However, when using numerical weather data, it is recommended to consider the dispersion model predictions with and without terrain.

The elevation of the Site is approximately 116m Above Ordnance Datum (AOD) at the upper year. Land rises to approximately 220m 9km to the northeast of the Site; 170m 6km to the north; and 145m 9km to the west. Figure 8 shows the terrain data modelled.

E.4 Receptors

The impact of stack emissions at relevant human and ecological receptors has been modelled. A relevant receptor is defined in Defra's LAQM TG22[21] as:

> '*A location representative of human (or ecological) exposure to a pollutant, over a time period relevant to the objective that is being assessed against, where the Air Quality Strategy objectives are considered to apply*.'

E.3.1 Human receptors

For long-term AQS the relevant receptors are residences (including care homes), schools and hospitals. For short-term AQS additional receptors may also need to be considered: outdoor spaces such as balconies, gardens, leisure sites and public space where human populations may spend the relevant time period. As most short-term AQS allow for a number of exceedances per annum, the human exposure may need to be repeated in order to be relevant. Workplaces are usually excluded from consideration as air quality in workplaces is covered by Health and Safety legislation.[31]

Table 22 shows the locations and type of the receptors selected to be representative of the relevant human receptors. All the receptors have been modelled at a height of 1.5m, representative of inhalation height (nose level) at ground level. Their locations are shown in Figure 4.

Table 22 Human receptors

ID	Location	Type	NGR X	NGR Y	Distance from green line boundary (m)	Direction from green line boundary
H1	Mill Farm (owned by Operator)	Residential	385400	329571	20	east
H2	The Vicarage / Vicarage Fields	Residential	385762	329087	325	east southeast
H3	Stokes	Residential	384875	329694	370	west
H4	The Lodge	Residential	384815	329724	435	west

[31] Health and Safety Executive EH40/2005 Workplace Exposure Limits (Fourth Edition 2020)

ID	Location	Type	NGR X	NGR Y	Distance from green line boundary (m)	Direction from green line boundary
H5	The Old Vicarage	Residential	385866	328989	460	east southeast
H6	The Grange	Residential	384793	329746	460	northwest
H7	Oxleasows Farm	Residential and workplace	385594	330087	475	northeast
H8	Hilcote Hall (previously a care home, now flats)	Residential	384749	329697	490	northwest
H9	Keepers Cottage	Residential	384714	329446	520	west
H10	Chebsey Village	Residential	385948	328836	610	southeast
H11	Mill Court Farm	Residential	385897	328697	650	southeast
H12	Fieldhouse Farm	Residential and workplace	384633	328959	720	southwest
H13	Manor Farm	Residential and workplace	386230	329304	745	east
H14	The Leas	Residential	384468	329692	760	northwest
H15	Walton Hall Academy	School	385218	328354	835	southwest
H16	Rodgeley Lodge Farm	Residential and workplace	386413	329304	930	east
H17	Scamnel Farm	Residential and workplace	386261	329938	930	northeast

E.3.2 Ecological receptors

The Defra/EA guidance[21] specifies that SACs, SPAs and Ramsar site within 10 km should be considered and SSSIs, AWs, LWSs, Local Nature Reserves and National Nature Reserves within 2 km should also be considered.

There are no SACs or SPAs within 10km of the Site and no SSSIs, NNRs or LNRs within 2km. Midland Meres and Mosses Phase 3 Ramsar site lies 4.75km to the west of the Site; it is coincident with Cop Mere SSSI which has therefore also been considered in this assessment. There are five LWSs within 2km, two of which are also AW.

Ecological receptors were placed in the designated areas at the nearest locations to the Site and additional locations. Table 6 in Section 5.3 lists the sensitive conservation sites identified within the specified distance, their designation and main habitat. Table 23 lists the ecological receptors modelled which are illustrated in Figure 5. All the ecological receptors have been modelled at a height of 1.5m.

Table 23 Ecological receptors

ID	Location	Designation	NGR X	NGR Y	Distance and direction from green line boundary	
					Distance (m)	Direction
E1	Midland Meres and Mosses Phase 2 Ramsar site/Cope Mere	Ramsar/SSSI	380496	329556	4,750	west
E2	Fieldhouse Dingle/The Dingle	LWS/AW	384754	328712	760	southwest
E3	Drumble Wood	LWS, AW	386350	328888	960	southeast
E4	Chebsey Hollow	LWS	386102	328380	1,000	southeast
E5	Meece Brook	LWS	385573	330416	755	northeast
E6	Yelds Rough	LWS	386962	329053	1,665	east

E.5 Post-processing

E.5.1 Use of background data

Considering long-term AQS, it is a straightforward matter to add the annual mean contribution from the source, (annual mean PC) to the annual mean background concentration to predict the total concentration (annual mean PEC). The annual mean backgrounds are those given in Section 6.2. In addition, the three biomass boilers on the adjacent site were modelled to determine their contribution to annual mean background. As they are relatively large sources of emissions, located close to the sources on Site and close to the receptors, it is important to model their local contribution to background concentration rather than just use 1km^2 gridded averages.

For comparison with short-term AQS the addition of background is not so straightforward. The dispersion model allows for the calculation of percentiles from hourly background and process concentrations, but hourly background concentrations are not commonly available, and not for all pollutants. The approach used was that described in the Defra/EA guidance:[17]

> '*When you calculate background concentration, you can assume that the short-term background concentration of a substance is twice its long-term concentration*.'

This has been used for all for short-term AQS for averaging times for 1 hour to 24 hours, doubling the gridded backgrounds (Section 6.2) and the three biomass boilers.

E.5.2 Conversion of NOx to NO_2

The dispersion model includes a NOx chemistry model, but the conversion of primary NOx emissions to NO_2 is usually undertaken as a post-processing step for both planning and industrial permitting applications. For primary NO_2 to NO_x ratios of 10% or less, which is likely to be the case for the stack emissions, the EA and Natural Resources Wales[28] recommend use of the following conversion ratios:

- 35% for short term assessment
- 70% for long term assessment.

These ratios have been used in main part of this assessment for all receptors except H1, Mill Farm.

An EA technical note on 'Diesel generator short-term NO_2 impact assessment'[32] describes how the conversion of emitted NOx, a combination of nitrous oxide (NO) and NO_2, requires the presence of ozone and time (distance). Combustion emissions, not just from diesel-fired plant, are usually composed of less than 10% NO. the EA technical note concludes that for typical generators a conversion rate of 15% Nox to NO_2 should be used for receptors up to 500m from the source.

A conversion rate of 15% has been used for short-term and long-term emissions from the diesel generators and the biomass boilers at the closest receptor, H1, Mill Farm, which lies approximately 100m from the closest stack. It has been used in calculating the long-term impact of these sources at H1 as the long-term impact of those sources is the sum of the hourly averages from these sources only, no other sources.

E.5.3 Conversion of TVOC to formaldehyde

Emissions are specified as TVOC for which there are no AQS. There is an AQS for formaldehyde, one component of TVOC. An AEA Technology report on the Speciation of UK emissions of non-methane volatile organic compounds (2002)[22] reported on a series of VOC species profiles available for stationary combustion sources, covering a range of fuel types and scale of combustion. Diesel generators emit methane and non-methane VOCs (NMVOCs). The NMVOCs comprise: acetone (13.46%), butane (15.73%), formaldehyde (47.19%) and hexane (5.62%).[22] Formaldehyde is not only the greatest proportion of NMVOCs emitted, it is also the NMVOC with the most stringent EALs. Note that assuming of 47.19% of TVOC is formaldehyde is a conservative assumption as not all TVOC is non-methane VOC.

Formaldehyde is not emitted from the biomass boilers.[22]

E.4.4 Deposition to ecological receptors

The dispersion model includes the ability to calculate the deposition flux rate (deposition) of pollutants, but the EA recommends deposition be calculated as a post-processing step in order to give conservative estimates of both ground level concentration and deposition, by assuming no loss of pollutant from air concentration to ground deposition.

Deposition may be 'dry' or 'wet'. Dry deposition of gases occurs due to diffusive motions and removal at surfaces, primarily the ground. It is characterised by a deposition velocity that depends on the pollutant and the nature of the surface. Table 24 gives the deposition velocities for grassland and forest for the pollutant included in this assessment (NO_2) which are the values recommended by AQTAG 06.[20] The values for grassland, which are lower than those for forest, have been used to represent deposition at all receptors.

[32] Environment Agency, Air Quality Modelling & Assessment Unit (2016) Diesel generator short-term NO_2 impact assessment, Ref: AQMAU-C1457-RP01, 1 November 2016

Wet deposition occurs when precipitation washes pollutants out of the air. Some pollutants have a low solubility, and in addition, wet deposition is considered to be of limited importance close to the source. Wet deposition has been neglected.

Table 24 Dry deposition velocities

Pollutant	Deposition velocity (m/s)	
	Grassland	Forest
NO_2	0.0015	0.003

Deposition (µg/m^2/s) is calculated by multiplying the near ground air concentration (µg/m^3) by deposition velocity. Ecological receptors are sensitive to deposition of nitrogen (nutrient nitrogen) and to deposition of acid species including nitrogen (N), sulphur and hydrogen chloride. There are no emissions of sulphur dioxide nor hydrogen chloride from the sources modelled in this assessment and therefore these pollutants have been neglected.

To convert from deposition of a pollutant to deposition of a species, the conversion factor given in Table 25 was used. Nutrient nitrogen deposition is calculated as the total deposition of N in kg/ha/year, due to NO_2. To convert from deposition of N to equivalent acidification units, a measure of how acidifying the chemical species can be, (keq/ha/year), the conversion factor given in Table 26 was used.

Table 25 Conversion factors for deposition of species N

Pollutant	Species deposited	Conversion factor from deposition of pollutant (µg/m^2/s) to deposition of species (kg/ha/year)
NO_2	N	96

Table 26 Conversion factors from deposition of species to deposition of acid equivalent

Species	Conversion factor from deposition of species (kg/ha/year) to deposition of equivalent acidification units (keq/ha/year)
N	0.071428

Appendix F Results of sensitivity tests

The impact of buildings, terrain and meteorological data year have been assessed. The seven cases modelled, A-G, are shown in Table 27. They are for the impacts of the sources within the permit boundary: A1-A4.

Results of the sensitivity tests were the maximum concentration predicted at any human receptor and any ecological receptor. For each AQS, the predicted maximum was divided by (normalised) the AQS value, or if the AQS is expressed as a number of exceedances of threshold value, by the threshold value. These normalised values have been expressed as a percentage and are shown in Table 28. The comparison is expressed this way to show the relative importance of the change in terms of exceedance of the AQS. If all the results are a very small percentage of the AQS, the variation in results is unlikely to affect the conclusions of the study.

For human and ecological receptors, comparing the results for tests A, B and C, it can be seen that modelling buildings led to higher model prediction than for flat terrain. Modelling terrain as well buildings generally did not lead to a further increase or decrease in concentrations. Comparing the results for tests A, D, E and F shows that the variation due to meteorological data year is similar in magnitude to the impact of modelling buildings.

Table 27 Sensitivity tests

Sensitivity test	Flat/Buildings/Terrain model options	Meteorological data year
A	Flat	2021
B	Buildings	2021
C	Terrain & buildings	2021
A	Flat	2021
D	Flat	2022
E	Flat	2023
F	Flat	2024

Table 28 Sensitivity tests: results as a percentage of the AQS or threshold

Pollutant	Long-term (LT) or Short-term (ST)	Value, EAL or threshold, (mg/m^3)	A	B	C	A	D	E	F
Human receptors									
Formaldehyde	LT	5	0%	0%	0%	0%	0%	0%	0%
Formaldehyde	ST (A1, A3)	100	0%	1%	1%	0%	0%	0%	0%
Formaldehyde	ST (A2, A4)	100	1%	1%	1%	1%	1%	1%	1%
NO_2	LT	40	3%	4%	4%	3%	3%	4%	3%
NO_2	ST (A1, A3)	200	8%	11%	11%	8%	7%	8%	7%
NO_2	ST (A2, A4)	200	12%	13%	13%	12%	12%	12%	11%
PM_{10}	LT	40	0%	0%	0%	0%	1%	0%	0%
PM_{10}	ST (A1, A3)	50	2%	2%	1%	2%	2%	2%	1%
PM_{10}	ST (A2, A4)	50	2%	2%	2%	2%	3%	3%	2%
Ecological receptors									
NOx	LT	30	0%	0%	0%	0%	0%	0%	0%
NOx	ST (A1, A3)	75	2%	2%	2%	2%	1%	1%	1%
NOx	ST (A2, A4)	75	2%	2%	2%	2%	2%	2%	2%

Appendix G Human receptor results

G.1 Long-term AQS

Table 29 Long-term results: NO_2

ID	Comparison with annual mean AQS: 40 µg/m³				
	Background (µg/m³)	PC (µg/m³)	PC/AQS (%)	PEC (µg/m³)	PEC/AQS (%)
H1	4.5	0.41	1%	5.17	13%
H2	4.5	0.12	0%	4.73	12%
H3	4.5	0.13	0%	4.73	12%
H4	4.5	0.10	0%	4.67	12%
H5	4.4	0.09	0%	4.60	11%
H6	4.5	0.09	0%	4.65	12%
H7	4.8	0.16	0%	5.15	13%
H8	4.5	0.09	0%	4.64	12%
H9	4.5	0.08	0%	4.63	12%
H10	4.4	0.06	0%	4.56	11%
H11	4.4	0.05	0%	4.55	11%
H12	4.4	0.04	0%	4.49	11%
H13	4.6	0.05	0%	4.75	12%
H14	4.5	0.04	0%	4.55	11%
H15	4.4	0.02	0%	4.46	11%
H16	4.6	0.04	0%	4.72	12%
H17	4.6	0.07	0%	4.78	12%

Table 30 Long-term results: PM_{10}

ID	Comparison with annual mean AQS: 40 µg/m³				
	Background (µg/m³)	PC (µg/m³)	PC/AQS (%)	PEC (µg/m³)	PEC/AQS (%)
H1	10.3	0.24	1%	10.76	27%
H2	10.3	0.01	0%	10.30	26%
H3	10.4	0.01	0%	10.41	26%
H4	10.4	0.01	0%	10.40	26%
H5	9.8	0.01	0%	9.85	25%
H6	10.4	0.01	0%	10.39	26%
H7	11.4	0.01	0%	11.43	29%
H8	10.4	0.01	0%	10.39	26%
H9	10.4	0.01	0%	10.39	26%
H10	9.8	0.01	0%	9.84	25%
H11	9.8	0.00	0%	9.84	25%
H12	10.6	0.00	0%	10.57	26%
H13	9.8	0.00	0%	9.84	25%
H14	10.4	0.00	0%	10.37	26%
H15	9.8	0.00	0%	9.82	25%
H16	9.8	0.00	0%	9.83	25%
H17	9.8	0.01	0%	9.84	25%

Table 31 Long-term results: Formaldehyde

ID	Comparison with annual mean AQS: 5 µg/m³				
	Background (µg/m³)	PC (µg/m³)	PC/AQS (%)	PEC (µg/m³)	PEC/AQS (%)
H1	0.90	0.02	0%	0.92	18%
H2	0.90	0.00	0%	0.90	18%
H3	0.90	0.00	0%	0.90	18%
H4	0.90	0.00	0%	0.90	18%
H5	0.90	0.00	0%	0.90	18%
H6	0.90	0.00	0%	0.90	18%
H7	0.90	0.00	0%	0.90	18%
H8	0.90	0.00	0%	0.90	18%
H9	0.90	0.00	0%	0.90	18%
H10	0.90	0.00	0%	0.90	18%
H11	0.90	0.00	0%	0.90	18%
H12	0.90	0.00	0%	0.90	18%
H13	0.90	0.00	0%	0.90	18%
H14	0.90	0.00	0%	0.90	18%
H15	0.90	0.00	0%	0.90	18%
H16	0.90	0.00	0%	0.90	18%
H17	0.90	0.00	0%	0.90	18%

G.2 Short-term AQS

Table 32 Short-term results, 1-hour NO_2

ID	99.79th percentile 1-hour threshold: 200 µg/m³				
	Background (µg/m³)	PC (µg/m³)	PC/AQS (%)	Headroom (µg/m³)	PC/Headroom (%)
H1	9.0	13.1	7%	190.5	7%
H2	9.0	1.9	1%	190.9	1%
H3	8.9	4.1	2%	191.0	2%
H4	8.9	3.3	2%	191.0	2%
H5	8.9	1.4	1%	191.1	1%
H6	8.9	3.1	2%	191.0	2%
H7	9.7	2.9	1%	190.2	2%
H8	8.9	2.5	1%	191.0	1%
H9	8.9	2.2	1%	191.0	1%
H10	8.9	1.1	1%	191.1	1%
H11	8.9	0.9	0%	191.1	0%
H12	8.8	1.1	1%	191.1	1%
H13	9.3	1.0	1%	190.7	1%
H14	8.9	1.3	1%	191.0	1%
H15	8.9	0.6	0%	191.1	0%
H16	9.3	0.8	0%	190.7	0%
H17	9.3	1.3	1%	190.6	1%
Notes: Significance criteria: Defra/EA guidance, Section 5.2.1 of this report					

Table 33 Short-term results, 24-hour PM_{10}

ID	98.08th percentile 24-hour threshold: 50 µg/m³				
	Background (µg/m³)	PC (µg/m³)	PC/AQS (%)	Headroom (µg/m³)	PC/Headroom (%)
H1	20.5	1.4	3%	29.0	5%
H2	20.5	0.1	0%	29.4	0%
H3	20.7	0.1	0%	29.2	0%
H4	20.7	0.1	0%	29.2	0%
H5	19.6	0.0	0%	30.3	0%
H6	20.7	0.1	0%	29.2	0%
H7	22.7	0.1	0%	27.2	0%
H8	20.7	0.1	0%	29.2	0%
H9	20.7	0.1	0%	29.2	0%
H10	19.6	0.0	0%	30.3	0%
H11	19.6	0.0	0%	30.3	0%
H12	21.1	0.0	0%	28.9	0%
H13	19.6	0.0	0%	30.3	0%
H14	20.7	0.0	0%	29.3	0%
H15	19.6	0.0	0%	30.4	0%
H16	19.6	0.0	0%	30.3	0%
H17	19.6	0.0	0%	30.3	0%
Notes: Significance criteria: Defra/EA guidance, Section 5.2.1 of this report					

Table 34 Short-term results, 30 minutes formaldehyde

ID	100th percentile 30 minutes threshold: 100 µg/m³				
	Background (µg/m³)	PC (µg/m³)	PC/AQS (%)	Headroom (µg/m³)	PC/Headroom (%)
H1	1.80	0.95	1%	98.2	1%
H2	1.80	0.14	0%	98.2	0%
H3	1.80	0.17	0%	98.2	0%
H4	1.80	0.17	0%	98.2	0%
H5	1.80	0.13	0%	98.2	0%
H6	1.80	0.18	0%	98.2	0%
H7	1.80	0.15	0%	98.2	0%
H8	1.80	0.12	0%	98.2	0%
H9	1.80	0.15	0%	98.2	0%
H10	1.80	0.12	0%	98.2	0%
H11	1.80	0.08	0%	98.2	0%
H12	1.80	0.07	0%	98.2	0%
H13	1.80	0.15	0%	98.2	0%
H14	1.80	0.10	0%	98.2	0%
H15	1.80	0.10	0%	98.2	0%
H16	1.80	0.11	0%	98.2	0%
H17	1.80	0.12	0%	98.2	0%
Notes: Significance criteria: Defra/EA guidance, Section 5.2.1 of this report					

Appendix H Ecological receptor results

H.1 Long-term AQS

Table 35 Long-term results: NO_x

ID	Annual mean: 30 µg/m³	
	PC (µg/m³)	PC/AQS (%)
E1	<0.01	0%
E2	0.03	0%
E3	0.06	0%
E4	0.04	0%
E5	0.10	0%
E6	0.03	0%
Notes: Significance criteria: Defra/EA guidance, Section 5.3.1 of this report		

H.2 Short-term AQS

Table 36 Short-term results: NOx

ID	100th percentile, 24-hour: 75µg/m³	
	PC (µg/m³)	PC/AQS (%)
E1	0.1	0%
E2	0.9	1%
E3	1.1	2%
E4	0.7	1%
E5	2.2	3%
E6	0.8	1%
Notes: Significance criteria: Defra/EA guidance, Section 5.3.1 of this report		

H.3 Nutrient nitrogen deposition

Table 37 Nutrient nitrogen deposition

ID	PC (kg/ha/y)	CLomin (ka/ha/y)	CLomax (ka/ha/y)	PC/CLomin (%)	PC/CLomax (%)
E1	<0.01	10	15	0.0%	0.0%
E2	0.01	10	15	0.1%	0.0%
E3	0.01	10	15	0.1%	0.1%
E4	0.01	5	15	0.1%	0.0%
E5	0.02	10	15	0.2%	0.1%
E6	0.01	10	15	0.1%	0.0%
Notes: Significance criteria: Defra/EA guidance, Section 5.3.1 of this report					

H.4 Acid Deposition

Table 38 Acid deposition

Receptor	PC_S (keqN/ha/yr)	PC_N (keqN/ha/yr)	PC/CLo (%)[1]	Bgd/CLo (%)[1]	PEC/CLo (%)[1]
E1	n/a	0.00005	0.0	154.3	154.3
Notes: Significance criteria: Defra/EA guidance, Section 5.3.1 of this report [1]Calculated using the APIS critical load function tool[27]					