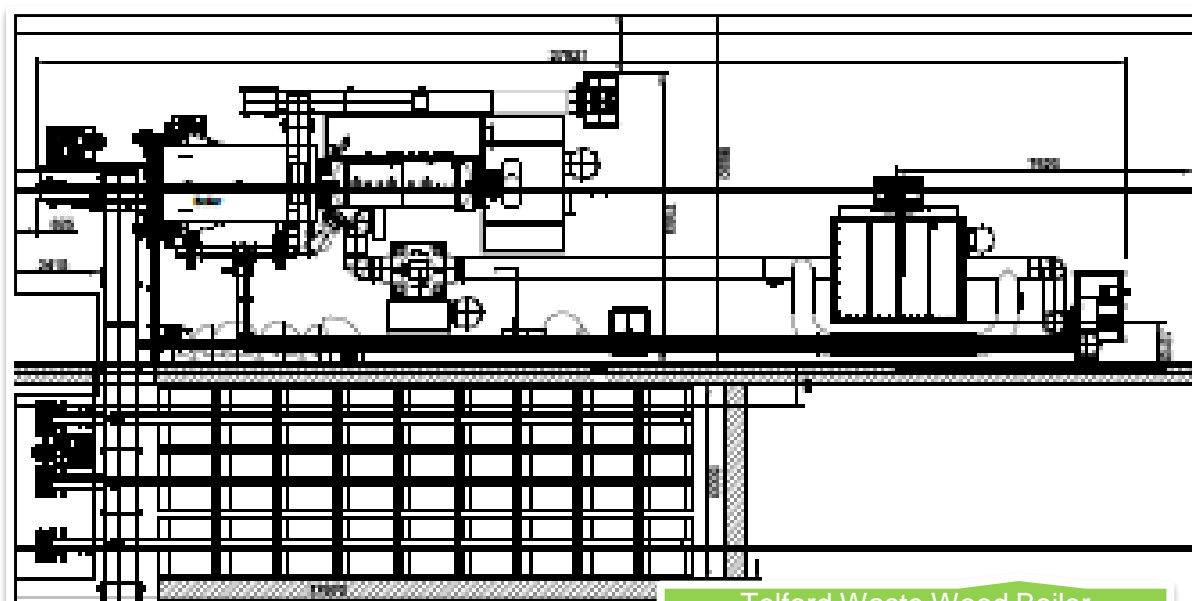


Emissions Management and Monitoring Plan

Issue 1.0

Produced for Sullivan Projects Ltd (c/o Besblock Ltd)

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Telford Waste Wood Boiler Development





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1.0 INTRODUCTION

This document sets out plans to manage and monitor the emissions resulting from waste wood boiler operations at Besblock Ltd (hereon referred to as Besblock), Telford. This plan reviews the potential emissions, management approaches for potential emissions, and the monitoring for emissions. It has been prepared in accordance with the following documents:

- The Environmental Permitting (England and Wales) Regulations 2016
- The Industrial Emissions Directive 2010

The Emissions Management and Monitoring Plan has been produced in conjunction with the following documents:

- Besblock-0 Non-Technical Summary
- Besblock-1 Management System
- Besblock-2 Process Flow Diagram
- Besblock-3 Environmental Risk Assessment
- Besblock-4 Air Quality Impact Assessment

The biomass boiler at Besblock is located in a building in the northern central portion of the site at Besblock Ltd, Halesfield 21, Telford, TF7 4NF. The Besblock site operates as a concrete block manufacturing site.

The biomass boiler installed at site is of 1650kW thermal capacity and requires 0.7 tonnes of Grade C waste wood per hour and the heat offtake is supplied to an oven used for concrete curing. The system involves a steam boiler with vertical combustion chamber. The boiler is operated in line with the requirements of the Industrial Emissions Directive (IED) and any permit requirements that are attached to the permit.

2.0 EMISSIONS ASSESSMENT AND MANAGEMENT

The technological specification of the waste wood boiler is presented in Table 1 below. The boiler is manufactured in accordance with

Table 1 - Biomass Boiler Technical Specification

Biomass Boiler Technical Information	
Make	Binder Herz
Model	Steam DK
Thermal Capacity	1650 kW
Efficiency	80%
Max. Rate of Fuel Consumption	715kg/hour
Control System	CVP control package
Feed System	Direct hydraulic infeed ram
Variable Heat Load	1200kW – 1650kW
Exhaust Gas Efflux Velocity	6.4m/s
Stack Height	15m

Table 2 below gives the emission rates of the boiler.

Table 2 – Known Emission Rates of Biomass Boiler

Emission Type	Emission Rate (g/s)
PM10	0.01918
NO _x (as NO ₂)	0.23014
CO	0.09589
SO ₂	0.27565

2.1 Point Source Emissions

Table 4 details the Environmental Risk Assessment for point source emissions resulting from waste wood boiler operations at Besblock (taken from *Besblock-3 Environmental Risk Assessment*). The Risk Assessment identifies possible emissions directly arising from the waste wood boiler, such as via the stack or vents. The magnitude of the risks are reviewed and risk management procedures are detailed for each risk, resulting in an assessment of the residual risk, which is given a rating.

Note: C = Consequence P = Probability M = Magnitude

Table 3 - Environmental Risk Assessment

Pollutant Model			Judgement				Action	
Source	Pathway	Receptor	P	C	M	Justification of Magnitude	Risk Management	Residual Risk
Odour & visible plumes - inadequate combustion or poor plume dispersion.	Aerial dispersion.	Local Residents	Med	Med	Med	Med – Incomplete combustion or poor plume dispersion may result in odorous, black smoke released from chimney.	<ul style="list-style-type: none"> • Optimum temperature and oxygen conditions to ensure complete combustion, remotely automated by boiler through CVP control package. • The moisture content of the fuel must be within the range the boiler can accept. In particular, fuel with a moisture content greater than that which the boiler can accept will produce black, odorous smoke. • Regular servicing and cleaning of the boiler by a trained operative as per the manufacturer's instructions. 	Low

Emissions – Air pollutants	Aerial dispersion	Local sensitive receptors	Med	Med	Med	<p>Med – Results from combustion of wood fuels.</p> <p>Boiler has measures in place to limit release of PM10 and NOx.</p> <p>Incomplete combustion causes risk of elevated emissions e.g. during start-up and shut down.</p>	<ul style="list-style-type: none"> • Detailed air quality modelling has been undertaken as part of this permit application. The results indicate the baseline air quality around the proposed installation is within European Limit Values and UK objectives. • The biomass boiler and stack shall be associated with written maintenance schedule and in accordance with the manufacturer’s instructions. The biomass boiler shall be serviced at the frequencies agreed in the maintenance contract by a trained service engineer. • Staff operating and maintaining the boiler shall receive appropriate training and instructions from the boiler manufacturer. • Staff shall be aware of how to identify and mitigate elevated or abnormal pollution emissions. • The fuel shall be stored in a building to prevent contamination. • Good quality feedwater to ensure impurities do not lead to sediment or corrosion, thereby reducing boiler efficiency. • The biomass boiler stack height shall be sufficient to prevent emissions influencing ground-level air pollution concentrations. • The biomass boiler shall be serviced at regular intervals, as per manufacturer/supplier instruction. • Continuous infeed of fuel to limit elevated emissions during start-up and shut down. 	Low
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Pollutant Model			Judgement				Action	
Source	Pathway	Receptor	P	C	M	Justification of Magnitude	Risk Management	Residual Risk
Emissions from boiler particulate matter – (PM10)	Aerial dispersion	Staff and local residents	Med	Med	Low	Low - The biomass boiler on site has a maximum emission rate for PM10 of 0.01918g/s	<ul style="list-style-type: none"> Boiler fitted with multi-cyclone dust collector. Optimum ratio of temperature, air and turbulence in boiler operations controlled by CVP control package. Appropriate stack height to allow for dispersion. Continual ash removal and routine maintenance can ensure optimum performance and reduce ash entrainment as this increases PM emissions. 	Low
Emissions from boilers – NO _x	Aerial dispersion	Staff and local residents	Med	Med	Med	Med – There is potential for workers to be regularly exposed to NO _x . The biomass boiler on site has a maximum emission rate for NO _x of 0.23014g/s.	<ul style="list-style-type: none"> Boiler fitted with a selective non-catalytic reduction de-NO_x system with urea dosing. An advanced combustion control 'step combustion' to minimise NO_x production. Optimum ratio of temperature, air and turbulence in boiler operations, controlled by trained operatives and CVP control package. Appropriate stack height to allow for dispersion. Optimum moisture content, managed by boiler operatives via moisture monitoring. Biomass fuel has a low nitrogen content. Regular servicing of the boiler by a trained operative as per the manufacturer's instructions. 	Low

Pollutant Model			Judgement				Action	
Source	Pathway	Receptor	P	C	M	Justification of Magnitude	Risk Management	Residual Risk
Emissions from boilers – CO	Aerial dispersion	Staff and local residents	Low	Low	Low	Low - The biomass boilers on site operates efficiently and has a maximum emission rate for CO of 0.09589g/s.	<ul style="list-style-type: none"> • Optimum ratio of temperature, air and turbulence in boiler operations, controlled by trained operatives and CVP control package. • Appropriate stack height to allow for dispersion. • Optimum moisture content, managed by boiler operatives via moisture monitoring. • Regular servicing of the boiler by a trained operative as per the manufacturer's instructions. 	Low
Emissions from boilers – TOCs	Aerial dispersion	Staff and local residents	Low	Med	Med	Med - Combustion of wood fuel could release TOCs into the atmosphere.	<ul style="list-style-type: none"> • Optimum ratio of temperature, air and turbulence in boiler operations, controlled by trained operatives and CVP control package. • Optimum moisture content, managed by boiler operatives via moisture monitoring. • Regular servicing of the boiler by a trained operative as per the manufacturer's instructions. 	Low

Pollutant Model			Judgement				Action	
Source	Pathway	Receptor	P	C	M	Justification of Magnitude	Risk Management	Residual Risk
Emissions from boilers – Sulphur Dioxide	Aerial dispersion	Staff and local residents.	Med	Med	Med	Med - Harmful effects of sulphur compounds are primarily reflected in the low temp corrosion of the boiler.	<ul style="list-style-type: none"> • Optimum temperature and oxygen conditions to ensure complete combustion, remotely automated by boiler through CVP control package. • Using fuels with low sulphur content. • Regular servicing of the boiler by a trained operative as per the manufacturer's instructions. 	Low
Emissions from boilers – HCl and HF	Aerial dispersion	Staff and local residents	Low	Med	Med	Med - Combustion of treated wood may result in release of heavy metals, dioxins, or furans, should waste acceptance procedures be inadequate.	<ul style="list-style-type: none"> • Suppliers are informed that the site will not accept any wood that is lower quality than Grade C. • Pre-acceptance procedures to mitigate non-conforming materials entering the waste stream. • Loads inspected for contamination upon arrival on site and such material rejected. 	Low

Pollutant Model			Judgement				Action	
Source	Pathway	Receptor	P	C	M	Justification of Magnitude	Risk Management	Residual Risk
Emissions from boilers – heavy metals, dioxins, furans.	Aerial dispersion	Staff and local residents	Low	Med	Med	Med - Combustion of treated wood may result in release of heavy metals, dioxins, or furans, should waste acceptance procedures be inadequate.	<ul style="list-style-type: none"> Suppliers are informed that the site will not accept any wood that is lower quality than Grade C. Pre-acceptance procedures to mitigate non-conforming materials entering the waste stream. Loads inspected for contamination upon arrival on site and such material rejected. 	Low
P = Possibility C = Consequence M = Magnitude								

The point source emission Environmental Risk Assessment identified 5 possible medium-magnitude risks:

- General emissions
- Polyaromatic hydrocarbon (PAHs) emissions from boiler
- Heavy metal, dioxin and furan emissions from boiler
- Sulphur compound (Sulphur Trioxide) emissions from boiler
- Odour and visible plumes due to inadequate combustion or poor plume dispersion

Risk abatement measures have been identified for the possible medium magnitude risks. With these mitigation measures in place the residual risk rating is reduced to low for each of these risks.

The point source emission Environmental Risk Assessment identified 2 possible low-magnitude risks:

- Particulate matter emissions (PM10/2.5) from boiler
- NO_x emissions from boiler

Risk abatement measures have been identified to ensure that these sources of emissions remain low risk.

2.2 Fugitive emissions

No risk of fugitive emissions was identified.

2.3 Potential Environmental Impacts

An air quality impact assessment (AQIA) has been conducted to model the potential impacts of emissions from this boiler. See accompanying document: *Besblock-4 Air Quality Impact Assessment*.

3.0 MONITORING

The following approach is detailed for emissions monitoring based on the relevant guidance and statutory requirements.

Besblock shall inform the local authority at least 7 days prior to any monitoring to determine compliance with the emission limit values. Besblock shall inform the local authority of the provisional time and date of the monitoring event, the pollutants to be tested and the methods which will be used. Besblock will periodically review the standards associated with emissions monitoring to ensure the best available techniques are applied.

3.1 Point Source Emissions Monitoring

A monitoring schedule for point source emissions has been developed in accordance with *Annex VI of the Industrial Emissions Directive*. Table 4 details the monitoring approach.

Table 4 - Point Source Emissions Monitoring Plan

Substance	Emission Limit Value (expressed at 273K, 101.3kPa, Dry and at 11% O ₂)	Monitoring Type	Monitoring Frequency
Total particulate matter	10 mg/m ³ (Daily)	Continuous Emissions Monitoring	Continuous
	30 mg/m ³ (Half-hourly)		
Total Organic Compounds (TOC)	10 mg/m ³ (Daily)	Continuous Emissions Monitoring	Continuous
	20 mg/m ³ (Half-hourly)		
Hydrogen Chloride (HCl)	10 mg/m ³ (Daily)	Continuous Emissions Monitoring	Continuous
	60 mg/m ³ (Half-hourly)		
Hydrogen Fluoride (HF)	1 mg/m ³ (Daily)	Continuous Emissions Monitoring	Continuous
	4 mg/m ³ (Half-hourly)		
Sulphur Dioxide (SO ₂)	50 mg/m ³ (Daily)	Continuous Emissions Monitoring	Continuous
	200 mg/m ³ (Half-hourly)		
Oxides of nitrogen (NO _x)	200 mg/m ³ (Daily)	Continuous Emissions Monitoring	Continuous
	400 mg/m ³ (Half-hourly)		
Carbon Monoxide (CO)	50 mg/m ³ (Daily)	Continuous Emissions Monitoring	Continuous
	100 mg/m ³ (Half-hourly)		
	150 mg/m ³ (10 minute)		
Cadmium (Cd)	0.05 mg/m ³ (30mins – 8hrs)	Manual extractive testing	Quarterly for the first year of operation followed by 6-monthly
Thallium (Tl)		Manual extractive testing	Quarterly for the first year of operation followed by 6-monthly
Mercury (Hg)	0.05 mg/m ³ (30mins – 8hrs)	Manual extractive testing	Quarterly for the first year of

			operation followed by 6-monthly
Antimony (Sb)	0.5 mg/m ³ (30mins – 8hrs)	Manual extractive testing	Quarterly for the first year of operation followed by 6-monthly
Arsenic (As)		Manual extractive testing	Quarterly for the first year of operation followed by 6-monthly
Lead (Pb)		Manual extractive testing	Quarterly for the first year of operation followed by 6-monthly
Chromium (Cr)		Manual extractive testing	Quarterly for the first year of operation followed by 6-monthly
Cobalt (Co)		Manual extractive testing	Quarterly for the first year of operation followed by 6-monthly
Manganese (Mn)		Manual extractive testing	Quarterly for the first year of operation followed by 6-monthly
Nickel (Ni)		Manual extractive testing	Quarterly for the first year of operation followed by 6-monthly
Vanadium (V)		Manual extractive testing	Quarterly for the first year of operation followed by 6-monthly
Dioxins and Furans	0.1 mg/m ³ (6hrs – 8hrs)	Manual extractive testing	Quarterly for the first year of operation followed by 6-monthly
Oxygen	N/A	Continuous Emissions Monitoring	Continuous
Temperature	N/A	Continuous Emissions Monitoring	Continuous
Pressure	N/A	Continuous Emissions Monitoring	Continuous
Water Vapour	N/A	Continuous Emissions Monitoring	Continuous

3.2 Fugitive Emissions Monitoring

Not applicable, no risk of fugitive emissions identified.

3.3 Continuous Emissions Monitoring

Continuous emissions monitoring of the specified pollutants in Table 4 above shall take place. The quality assurance of these automated measuring systems and the reference measurement methods to calibrate them shall be carried out according to CEN-standards. If CEN-standards are unavailable, ISO, national or other international standards which ensure the provision of data of an equivalent scientific quality shall apply. Automated measuring systems shall be subject to control by means of parallel measurement with the reference methods at least once per year. Continuous measurement of the water vapour content of the stack gas is not required if the sample waste gas is dried before the emissions are analysed.

Telford and Wrekin Local Authority may decide not to require continuous measurements for HCl, HF and SO₂ if it can be proved that the emissions of these pollutants can under no circumstances be higher than the prescribed emission limit values. Telford and Wrekin Local Authority may decide not to require continuous measurements for NO_x if it can be proved on the basis of information on the quality of the waste concerned, the technologies used and the results of the monitoring of emissions that the emissions of NO_x can under no circumstances be higher than the prescribed emission limit value. In these instances, periodic measurements would be required quarterly for the first year of operation followed by every 6-months thereafter.

Telford and Wrekin Local Authority may decide to only require one measurement every two years for heavy metals and one measurement per year for dioxins and furans in the following cases:

- the emissions resulting from incineration of waste are under all circumstances below 50% of the emission limit values;
- the waste to be incinerated consists only of sorted combustible fractions of non-hazardous waste not suitable for recycling and presenting certain characteristics, and which is further specified with relation to the following point; and,
- the operator can prove on the basis of information on the quality of the waste concerned and monitoring of the emissions that the emissions are under all circumstances significantly below the emission limit values for heavy metals and dioxins and furans.

3.4 Assessment of Compliance with Emission Limit Values

The emission limit values for air shall be regarded as being complied with if:

- None of the appropriate average values exceed any of the emission limit values set out in Table 4 above with the exception of Carbon Monoxide;
- For Carbon Monoxide, at least 97% of the daily average values over the year do not exceed the emission limit value in Table 4 above and at least 95% of all 10-minute averages taken in any 24-hour period or all of the half-hourly averages taken in taken in the same period do not exceed the emission limit values in Table 4; and,
- The half-hourly averages and the 10-minute averages shall be determined within the effective operating time from the measured values after having subtracted the value of the corresponding confidence interval. The daily values shall be determined from those validated average values. To obtain a valid daily average value, no more than five half-

hourly average values in any day shall be discarded due to malfunction or maintenance of the CEMS. No more than 10 daily average values per year shall be discarded due to malfunction or maintenance of the CEMS.

3.5 Visible Emissions

Besblock shall mitigate the risk of visible emissions from the waste wood boiler on site. The site manager shall conduct a visual inspection daily to assess the level of visible emissions and on a monthly basis a record shall be made. Under normal operating conditions, the combustion process in the boiler should not produce visible emissions. During the start-up and shut down of the boiler the site manager shall assess the visible emissions against the Ringelmann Chart to ensure the emissions are compliant and don't exceed Ringelmann Shade 1, as outlined in BS 2742:2009.

Other than water vapour, the boiler should not release other persistent visible emissions or droplets.

If a persistent problem with visible emissions is identified through inspections, Besblock shall perform visual checks of the emissions daily, recording the time, location, weather conditions and the observations of emissions made during the check. Once the source of the emissions has been determined, Besblock shall take corrective action without delay.

3.6 Records and Reporting

Records will be retained of all tests, inspections and monitoring. These records will be kept in the site office at Besblock and will be retained for a three-year minimum period. The records will be available for the local authority to inspect.

Results of periodic emissions monitoring shall be forwarded to the local authority within 8 weeks of completing the sampling.

3.7 Adverse Monitoring Results and Corrective Action

Any adverse results identified in the data from monitoring activity, both continuous and periodic, shall be thoroughly investigated by Besblock without delay. Besblock shall:

- Identify the cause of the adverse emissions and take corrective action;
- Record the nature and severity of the problem;
- Record the remedial action taken;
- Conduct additional monitoring as easily as possible to demonstrate compliance; and,
- Inform the local authority of the remedial action taken and the new monitoring results.

3.8 Staff Training

All relevant site operatives shall receive training in how to mitigate the release of emissions.

3.9 Waste Wood Boiler Maintenance

Besblock shall retain a comprehensive maintenance contract with Myriad to mitigate the release of point source emissions. Preventative maintenance shall be scheduled with Myriad at intervals, to meet the manufacturers recommendations. It is currently expected that this boiler will require 3 major service visits and 6 interim service visits per year. A schedule of

daily and weekly maintenance tasks will be carried out once site operatives have undergone training.

4.0 EMISSION COMPLAINTS

Besblock shall implement necessary measures in response to a complaint or concern raised by interested parties, including operatives, customers, clients and regulatory authorities, regarding emissions or any other negative impacts resulting from waste wood boiler operations.

Besblock shall record the following information:

- Name and contact details of the person who raised the complaint or concern;
- Specific subject(s) of the concern or complaint;
- Source of the complaint;
- Date and time the complaint was communicated and to whom it was communicated;
- Nature and date(s) of any actions or inspections undertaken, and who carried them out;
- Nature and date of any response to the person who expressed the concern or complaint; and
- Name of the person who responded to the complaint.

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