EPR PERMIT APPLICATION SUPPORT DOCUMENT

Biomass UK No.4 Ltd
Plymouth EfW Facility
Plymouth

Prepared by:
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Date:
November 2022

Project Issue Number:
SOL_21_P024_COG

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VERSION CONTROL RECORD			
Contract/Proposal Number:		SOL_21_P024_COG	
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Issue	Description of Status	Date	Reviewer Initials
1	Updated Submission to EA	September 2023	SR

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Glossary of Terms

Term	Definition
Advanced Conversion Technology	A suite of technologies which have the capacity to convert solid waste materials into gas for the generation of renewable energy. Technologies include Pyrolysis, Gasification and Anaerobic Digestion. The technologies used to utilise renewable fuels or waste include: – Direct firing open cycle steam turbine systems, – Integrated gasification combined cycle turbine systems, – Integrated pyrolysis combined cycle turbine systems, – Anaerobically generated biogas fuel in reciprocating engine or gas turbine systems.
Air quality objective	Policy targets generally expressed as a maximum ambient concentration to be achieved, either without exception or with a permitted number of exceedances within a specific timescale (see also air quality standard).
Air quality standard	The concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects of each pollutant on human health including the effects on sensitive subgroups (see also air quality objective).
Ambient air	Outdoor air in the troposphere, excluding workplace air.
Annual mean	The average (mean) of the concentrations measured for each pollutant for one year. Usually this is for a calendar year, but some species are reported for the period April to March, known as a pollution year. This period avoids splitting winter season between 2 years, which is useful for pollutants that have higher concentrations during the winter months.
AQMA	Air Quality Management Area.
BAT	Best Available Techniques
BTEX	BTEX is an acronym that stands for benzene, toluene, ethylbenzene, and xylenes.[1] These compounds are some of the volatile organic compounds (VOCs) found in petroleum derivatives such as petrol (gasoline). Toluene, ethylbenzene, and xylenes have harmful effects on the central nervous system.
By-product	A by-product is a secondary product derived from a manufacturing process or chemical reaction. It is not the primary product or service being produced.
CFD	Computerised Fluid Dynamics
CHP	Combined Heat and Power Plant (CHP) integrates the production of usable heat and power (electricity), in one single, highly efficient process.
CHPQA	The CHPQA (Quality Assurance for Combined Heat and Power) programme is carried out on behalf of the Department for Business, Energy, and Industrial

	Strategy, in consultation with the Scottish Executive, the National Assembly for Wales, and the Northern Ireland Department of Enterprise, Trade and Investment.
CV	Calorific Value (expressed at MJ/kg).
DEFRA	Department for Environment, Food and Rural Affairs.
Dioxin	Dioxins and dioxin-like compounds, a diverse range of chemical compounds which are known to exhibit "dioxin-like" toxicity. In chemistry, a dioxin is a heterocyclic 6-membered ring, where 2 carbon atoms have been replaced by oxygen atoms.
Eutrophication	Eutrophication or more precisely hypertrophication, is the ecosystem response to the addition of artificial or natural substances, such as nitrates and phosphates, through fertilisers or sewage, to an aquatic system
Exceedance	A period where the concentration of a pollutant is greater than, or equal to, the appropriate air quality standard.
ELV	Emissions Limit Value (as defined by the EPR regulations and associated BAT reference documents).
EMS	Environmental Management System
EQS	Environmental Quality Standard
Fugitive emissions	Emissions arising from the passage of vehicles that do not arise from the exhaust system.
HVAC	HVAC (heating, ventilation, and air conditioning) is the technology of indoor and vehicular environmental comfort.
ISO14001	ISO 14000 is a family of standards related to environmental management that exists to help organizations (a) minimize how their operations (processes etc.) negatively affect the environment (i.e., cause adverse changes to air, water, or land); (b) comply with applicable laws, regulations, and other environmentally oriented requirements, and (c) continually improve in the above.
LAQM	Local Air Quality Management.
LOI	Loss on Ignition
MCERTS	EA approved scheme for monitoring and approval of sampling methods (**M**onitoring **Cert**ification **S**ystem)
Moving Inclined Grate	A type of waste combustion process by which the waste moves through the combustion chamber by a series of inclined moving grate bars (known as a moving grate system) and the waste is burned. The energy that is produced by this process can then be used to produce electricity or heat.
NO	Nitrogen monoxide, a.k.a. nitric oxide.
NO_2	Nitrogen dioxide.
NOx	Nitrogen oxides.
O_3	Ozone.
ORC	Organic Rankine Cycle - A closed thermodynamic cycle involving a working medium (thermal oil) which is pre-heated, then heated and vaporized through a heat

	exchanger with a thermal oil loop. The vapour is expanded in a turbine which drives an electric generator to generate electricity.
PAH	Polycyclic aromatic hydrocarbons (PAHs), also known as poly-aromatic hydrocarbons or polynuclear aromatic hydrocarbons, are potent atmospheric pollutants that consist of fused aromatic rings and do not contain heteroatoms or carry substituents. Naphthalene is the simplest example of a PAH. PAHs occur in oil, coal, and tar deposits, and are produced as by-products of fuel burning (whether fossil fuel or biomass). As a pollutant, they are of concern because some compounds have been identified as carcinogenic, mutagenic, and teratogenic.
Percentile	The percentage of results below a given value.
PLC	A Programmable Logic Controller, PLC or Programmable Controller is a digital computer used for automation of electromechanical processes, such as control of machinery.
PM_{10}	Particulate matter with an aerodynamic diameter of less than 10 micrometres.
PPB parts per billion	The concentration of a pollutant in the air in terms of volume ratio. A concentration of 1 ppb means that for every billion (10^9) units of air, there is one unit of pollutant present.
PPM parts per million	The concentration of a pollutant in the air in terms of volume ratio. A concentration of 1 ppm means that for every billion (10^6) units of air, there is one unit of pollutant present.
Pyrolysis	Pyrolysis is a thermochemical decomposition of organic material at elevated temperatures in the absence of oxygen.
Ratification (Monitoring)	Involves a critical review of all information relating to a data set, to amend or reject the data. When the data have been ratified, they represent the final data to be used (see also validation).
Reference Conditions	Reference conditions: temperature 273K, pressure 101.3kPa, 11% O_2 (except when burning waste oil only – 3%), dry gas
RDF	Refuse-derived fuel (RDF) or solid recovered fuel/ specified recovered fuel (SRF) is a fuel produced by shredding and dehydrating solid waste (MSW) with a Waste converter technology. RDF consists largely of combustible components of municipal waste such as plastics and biodegradable waste.
Renewable Energy	Renewable energy is generally defined as energy that comes from resources which are continually replenished on a human timescale such as sunlight, wind, rain, tides, waves, and geothermal heat. Renewable energy is also defined under the Renewable Energy Directive as comprising energy from the biomass fraction of waste.
ROC	Renewable Obligation Certificates

SCADA	SCADA (supervisory control and data acquisition) is a type of industrial control system (ICS). Industrial control systems are computer-controlled systems that monitor and control industrial processes.
SCR	Selective catalytic reduction (SCR) is a means of converting nitrogen oxides, also referred to as NOx with the aid of a catalyst into diatomic nitrogen, N_2, and water, H_2O. A gaseous reductant, typically anhydrous ammonia, aqueous ammonia, or urea is added to a stream of flue or exhaust gas and is adsorbed onto a catalyst.
SRF	SRF can be distinguished from RDF in the fact that it is produced to reach a standard such as CEN/343 ANAS.
Synthesis Gas (Syngas)	Syngas, or synthesis gas, is a fuel gas mixture consisting primarily of hydrogen, carbon monoxide, methane and very often some carbon dioxide. The name comes from its use as intermediates in creating synthetic natural gas (SNG) and for producing ammonia or methanol.
µg/m^3 micrograms per cubic metre	A measure of concentration in terms of mass per unit volume. A concentration of 1ug/m^3 means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.
UKAS	United Kingdom Accreditation Service.
Uncertainty	A measure, associated with the result of a measurement, which characterizes the range of values within which the true value is expected to lie. Uncertainty is usually expressed as the range within which the true value is expected to lie with a 95% probability, where standard statistical and other procedures have been used to evaluate this figure. Uncertainty is more clearly defined than the closely related parameter 'accuracy' and has replaced it on recent European legislation.
USA	Updating and Screening Assessment.
Validation (modelling)	Refers to the general comparison of modelled results against monitoring data carried out by model developers.
Validation (monitoring)	Screening monitoring data by visual examination to check for spurious and unusual measurements (see also ratification).
VSD	Adjustable speed drive (ASD) or variable-speed drive (VSD) describes equipment used to control the speed of machinery. Many industrial processes such as assembly lines must operate at different speeds for different products. Where process conditions demand adjustment of flow from a pump or fan, varying the speed of the drive may save energy compared with other techniques for flow control.

NON-TECHNICAL SUMMARY

Biomass UK No.4 Ltd (the '*Applicant'* or the *'Operator'*) is making a New Bespoke Installation Permit Application for the proposed operation of an energy from waste facility at their site at Belliver Way, Plymouth.

The Installation is located at Units 21-29, Belliver Way, Roborough, Plymouth, Devon, PL6 7BW (National Grid Reference: SX 49890 62378).

The site has been both previously operated and permitted by the previous plant owners and operators, Dartmoor Bio Power Limited (DBPL), under environmental permit number EPR/XP3134AW, using waste wood as a feedstock for gasification. Following DBPL entering into administration in 2018, the site was closed and permit duly surrendered by the Environment Agency (EA) on the behalf of the company.

Biomass No.4 (the 'Applicant') intends to upgrade the existing facility and make changes to the combustion technology and boiler to enable the plant to operate reliably on a wider range of fuels to include refuse derived fuels (RDF), Solid Recovered Fuels (SRF) as well as mixed (PAS111:2012- Grade A – C) non-hazardous waste wood feedstocks.

The Facility comprises a single-line incineration process, including a single thermal oil boiler serving an ORC turbine. The turbine is designed to generate a gross electrical output of 4.64 MWe of electricity. The plant has a corresponding parasitic load of approximately 0.75MWe resulting in a net electrical export of approximately 3.9 MWe.

The Facility will have the capacity to export up to approximately 10 MWth of heat, subject to configuration and available offtake partners.

The Installation has been designed with an annual throughput of approximately 50,000 tonnes per annum, assuming a design NCV of 10.11 MJ/kg. The design of the combustion system assumes an average throughput of 6.33 tph, assuming 7,900 hours annual availability. Allowing for seasonal availability and fuel variability the maximum permitted throughput of the plant will be 60,000 tpa.

The site operations will be permitted by the Environment Agency as a Waste Incineration and Co-Incineration Activity and will be operated in accordance with the Environmental Permitting Regulations 2016 (as amended) (ERR Regulations), Chapter IV of the Industrial Emissions Directive (IED), and the Waste Incineration BREF (C/2019/7987).

The Facility will consist of a combination of Schedule 1 installation activities (as defined in the Environmental Permitting Regulations) and directly associated activities including the following:

A single line Energy Recovery Centre (ERC) to recover energy from RDF, incorporating:

i) Fuel reception and storage areas;
ii) Reagent and raw material tanks and silos;
iii) Residue skips and storage areas;
iv) Water, auxiliary fuel, and air supply systems;

v) Single incineration line;
vi) Thermal oil boilers;
vii) Organic Rankine Cycle (ORC) turbine/generator set;
viii) facilities for the treatment of exhaust or flue gases;
ix) Air cooled condenser unit;
x) Flues with associated stacks; and
xi) Combustion control / SCADA systems for the control of plant, recording and monitoring conditions.
xii) Continuous Emissions Monitoring Systems (CEMs).

In addition to the following ancillary equipment/infrastructure:

i) Offices, control room and staff welfare facilities;
ii) Gatehouse, weighbridge(s), and landscaping;
iii) Drainage infrastructure;
iv) Lighting and CCTV;
v) External hard standing areas for vehicle manoeuvring/parking;
vi) Internal access roads and car parking;
vii) Grid transformer; and
viii) Foul water treatment plant.

The proposed process meets the definition of an Installation as defined by Section 5.1 *'Incineration and Co-Incineration of Waste'* paragraph A(1)(b) namely:

'The incineration of non-hazardous waste in a waste incineration plant or waste co-incineration plant with a capacity exceeding 3 tonnes per hour.'

Table 1 provides a breakdown of the Main Listed Activities and Directly Associated Activities as defined by Schedule 1 of the EPR Regulations.

Table 1: Scheduled and Directly Associated Activities			
Type of Activity	**Schedule 1 Activity**	**Description of Activity**	**Limits of Specified Activity**
Installation	Section 5.1 Part A(1) (b)	The incineration of non-hazardous waste in a waste incineration plant with a capacity of 3 tonnes per hour or more	From receipt of waste to treatment and emission of exhaust gas and disposal of any residues arising, including the storage of raw materials and waste products including incinerator bottom ash and air pollution control residues.
Directly Associated Activities (DAA)			
DAA	Energy Generation		Electrical energy generation and

		export using an ORC turbine, with the associated heat export and/or cooling.
DAA	Back Up Electrical Generator	For providing emergency electrical power to the plant in the event of supply interruption[1].

General Overview

Waste fuel feedstocks will be delivered directly to the internal reception area in either baled or loose form. HGV's will unload in the tipping area and a visual inspection will take place. The material is then thermally treated and incinerated to produce recovered heat that is used to generate electricity via a hot oil ORC turbine.

The rotating mechanical energy produced by the turbine is then be converted to electrical energy by the alternators for supplying to the national grid.

The plant will achieve a minimum net power output of 3.9 MWe (ISO conditions), for export to the National Grid. Net exports to the grid are estimated to be approximately 30,810 MWh/yr at design MCR and planned availability.

Raw Materials

Incoming waste feedstocks, site consumables and residues will be delivered and collected from site via road. All materials transferred and removed from site will pass across the site weighbridge.

All incoming fuels feedstocks will be delivered directly in to the waste reception all, and all other materials directly to the raw material and residue storage areas, respectively.

The Facility will also use consumables including sodium bicarbonate, activated carbon, urea, auxiliary fuel (gas or fuel oil as available), water treatment chemicals and various maintenance materials as required (oils, greases, insulants, antifreezes, welding, and firefighting gases etc).

The site reception area will have the capacity to store approximately 4 days of waste processing capacity under normal operating conditions.

The thermal oil system is a closed loop system and only requires replacement or refilling during major planned maintenance outages.

1 The emergency generator does not meet the definition of a Medium Combustion Plant on the basis that it will be operated for less than 50 hours per annum.

Combustion Systems

The combustion process utilises conventional moving grate technology to agitate the fuel bed to ensure complete combustion and controlled heat release. Ash is discharged at the end of the grate and collected and cooled.

The combustion chamber has been designed to ensure that the minimum temperature (850°C) and retention time requirements (2 seconds) of the IED Chapter IV are met, therefore ensuring the thermal destruction of dioxins, furans, PAHs, and other organic compounds.

Gas temperatures will be monitored and recorded using retractable probe systems at critical points. Audible and visible alarms will trigger in the control panel if the temperature starts to fall towards 850°C, with the auxiliary burners fired accordingly to maintain temperature. The combustion control system will regulate combustion conditions and control the boilers.

Primary combustion air is fed into zoned combustion chambers beneath the inclined grate, configured to optimise the distribution of air flow. Air flow is optimised as part of the combustion control system.

Secondary combustion air is preheated using a heat exchanger that recovers heat from the exhausted flue gas. Secondary combustion air is injected above the grate to improve the chemical reaction of the oxidation process and to ensure the complete combustion of the RDF.

Further 'tertiary' air can also be injected into the combustion chamber to assist in the oxidation of volatiles in the flue gases if required.

The combustion system is equipped with auxiliary burners for the pre-heating of the combustion chamber prior to operation on waste feedstocks. The auxiliary burners will typically operate for up to 16 hours during a start-up event and 1 hour during a shutdown event. It is anticipated that there will be around 2 start-ups per year per line due to planned maintenance activities. Interlocks will prevent the feed of waste fuels until the temperature within the combustion chamber has reached 850°C.

During normal operation, if the temperature falls below 850°C, the auxiliary burners will be initiated to maintain the temperature above this minimum. Air flow for combustion is controlled by the combustion control system and is based on measuring oxygen content in the flue gas and/or monitoring the energy demand of the boilers.

Emissions to Air

The emissions to air are abated and controlled through a multi-stage gas treatment and filtration systems to meet with recognised BAT and to ensure compliance with the stipulated Emissions Limit Values (ELV's). The gas treatment systems comprise the following stages;

- Flue Gas Recirculation;
- Selective non-catalytic reduction (SNCR);
- Sodium bicarbonate and activated carbon injection (dry system); and
- Ceramic filter impregnated with a catalyst.

Flue gases are controlled, modulated, and recirculated through the combustion bed to reduce NOx formation. The control and recirculation of the combustion gases is maintained and controlled through the continuous monitoring of oxygen within the primary combustion chamber and flue. The controlled reduction of oxygen within the recirculated gases increases the concentration of N2 and CO_2 and therefore lowers the flame temperature and corresponding flue-gas temperature, reducing the formation of NOx.

The further reduction and abatement of oxides of nitrogen (NOx) is achieved through the use of SNCR system comprising a bank of nozzles installed at different places in the primary combustion chamber that injects a urea-based solution into the hot flue gases above the flame. The SNCR process will chemically reduce the NOx to nitrogen, carbon dioxide and water.

Sodium bicarbonate and powdered activated carbon (PAC) is injected into the hot flue gases downstream of the primary combustion chamber and boiler to abate and neutralise acidic gases (chlorides, fluorides, and sulphur compounds), heavy metals and any dioxins and furans.

The activated carbon abates emissions of volatile metals (mercury), organic compounds and dioxins and furans. The sodium bicarbonate and activated carbon will be stored in separate silos adjacent to the flue gas treatment system. Dosing rates will be adjusted as required depending on upstream acid gas concentration measurements taken by the continuous emissions monitoring system (CEMS).

Hot gas filtration is achieved through the use of impregnated ceramic filter candles for the removal of particulates and residual NOx. The ceramic filter media has a wide tolerance to elevated flue temperatures and provides a lower fire risk than conventional filter bags materials.

The resulting residues from flue gas treatment including particulates, reaction products and unreacted reagent solids are collectively known as Air Pollution Control residues (APCr). These will be collected and stored in dedicated sealed skips.

The cleaned flue gas will be monitored for pollutants and discharged to atmosphere via the stacks.

A Continuous Emission Monitoring System (CEMS) will be installed to monitor concentrations of the following pollutants in the flue gas:

- Total Particulate Matter (TPM);
- Sulphur dioxide (SO_2);
- Hydrogen chloride (HCl);
- Carbon monoxide (CO);
- Oxides of nitrogen (Nitric Oxide NO, Nitrogen Dioxide NO_2 & Nitrous Oxide, N_2O);
- Ammonia; and
- VOCs expressed as total organic carbon.

In addition, periodic sampling and measurement will be carried out for:

- Hydrogen fluoride;
- Group 3 heavy metals: antimony (Sb), arsenic (As), lead (Pb), chromium (Cr), cobalt (Co), copper (Cu), manganese (Mn), nickel (Ni), vanadium (V);

- Cadmium (Cd) and thallium (Tl);
- Mercury (Hg);
- Dioxins and furans;
- Dioxin-like PCBs; and
- PAHs.

The Continuous Emission Monitoring System (CEMS) will be MCERTS approved and fitted with a back-up CEMS to ensure uninterrupted operation in the event of a CEMs failure or breakdown.

All emissions to atmosphere will be via the sites 35m high stack (Authorised Emission Point A1).

All combustion products / flue gases comfortably meet the stipulated Emission Limit Values (ELVs) required under the sector BREF.

Odour

All waste unloading and pre-treatment takes place internally within the fuel reception area.

Due to the design of the building structure and the fully enclosed fuel handling activities, there is little potential for offsite odour emissions and impacts to arise from these activities onsite.

Primary combustion air will be drawn from the fuel storage and reception areas using an induced draft (ID) fan to maintain negative pressure in this area. The extracted air will be fed into the combustion chambers beneath the grates, divided into series of 'zones' for better distribution of air flow. Air flow will be controlled and adapted depending on the energy demand of the boilers, to optimise the combustion process.

Entry to the reception and fuel handling building is controlled via automated roller shutter doors, with proximity sensors to minimise air escapes. Vehicles reverse up to the building and discharge fuel directly into the bulk fuel store and then emptied using their walking floor trailer. The vehicles will only discharge the fuel when the roller shutter doors are closed.

Escape of odorous air from the fuel reception area is minimised through by maintaining the building at slight negative pressure and through the control and minimisation of door opening.

No other aspects of the facility are considered to have the potential to create or release odour.

Noise and Vibration

The site is in a predominantly industrial area in the Belliver Way Industrial Estate which is not considered to be a sensitive location with respect to noise. The closest sensitive receptors are located approximately 160m to the east / south east of the site at Lady Fern Way (off Tamerton Road) and 500m north (Haxter Wood Chase).

The site has been designed with a number of noise mitigation measures in place to minimise noise breakout and residential disturbance.

An Environmental Noise Assessment has been undertaken in accordance with BS 4142:2014+A1:2019 and EA horizontal noise guidance and preliminary noise model constructed using CADNA_A noise modelling software.

The conclusion of the assessment and the noise modelling concludes that facility will not have a significant impact on any of the identified sensitive receptors.

Emissions to Controlled Water

There will be no direct process emissions to Controlled Water arising from the Installation.

Uncontaminated surface water will release directly to the local storm water drainage system and will be protected where necessary, through the installation and use of a Stage 1 Surface Water Interceptor.

The principal sources of surface water run off as follows:

- Surface run-off from the main external yard, roads, and access areas, which will go to an interceptor prior to being released to the storm drainage system.
- Uncontaminated roof water which will be directly routed to the storm water drainage system with additional protection.

These contributions join before leaving the installation as one combined release (W1).

Emissions to Sewer

Beyond the release of treated domestic effluent, there are no site discharges to sewer arising from the installation.

All process waters used within the ash cooling and quench are retained within the wet ash exports and therefore not discharged.

All flue gas emissions treatment and control systems have been designed to utilise dry powder reagents and do not involve the use of process liquors, scrubber effluents or any other liquid systems.

The ORC systems utilise oils as opposed to steam boilers, so as such there are no boiler condensate blowdowns/discharges, boiler feed water plant / RO discharges or other liquid effluents.

All domestic effluent (toilets, showers, sinks etc) are discharged into a central effluent collection tank before discharge in addition as a domestic effluent prior to Sewer via S1.

Emissions to Land

There will be no emissions to land arising from the Installation.

Waste Management

There are two principal types of solid by-products produced from the operation of the facility. These are: Bottom Ash; and APC Residue (Air Pollution Control (APC) residues).

Bottom ash is quenched and stored within sealed skips in the external yard via a conveyor, prior to export offsite for recovery purposes.

Impact on the Environment

All impacts to air arising from the Installation under both normal and 'other than normal' operating conditions have been modelled using ADMS 5.2 atmospheric dispersion modelling software, utilising hourly average meteorological data sets for the Plymouth Mount Batten measurement station, which is located approximately 10.2 km to the south of the site. Spatially variable terrain and surface roughness files were also included within the assessment.

The air quality impact assessment considered the air impact to all identified residential, sensitive habitat and ecological receptors.

The results of the assessment were considered in the context of Air Quality Standards (AQS) objective values and relevant Environmental Assessment Levels (EALs) recommended by the Environment Agency, as well as the joint guidance of Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM).

For the purpose of the detailed dispersion model and AQA it has been assumed that the plant operates continually and at full output throughout the year. The models were therefore run to calculate the annual average process contributions from the plant for all 8,760 hours (or 8,784 hours) of the year, and hence provide a worst-case assessment.

The results confirmed that, when discharging via the proposed 35 m high chimney, the contribution of most pollutants will have an insignificant impact on air quality in the surrounding area. Where contributions were not immediately screened as insignificant, the predicted environmental concentrations were confirmed to remain within 70 % of the Air Quality Standard or Environmental Assessment Level and hence were screened at the secondary assessment stage.

Consideration of impacts at discrete sensitive receptors predicted that, although most are insignificant, the annual average concentrations of NOx as NO_2, VOC, Cadmium, and PAH were not immediately screened at some of the nearest human health receptors. However, all screen as insignificant during the secondary assessment.

Contributions to the Critical Loads assigned to all local sensitive ecological receptors were also screened as insignificant. Levels of nutrient Nitrogen deposition at all sites equates to less than 1 % of the site-specific Critical Load and contributions of acid deposition to the South Dartmoor Woods SAC and the Dartmoor SAC also remain within 1 % of the site-specific Critical Loads.

Neither the Plymouth Sound and Estuaries SAC, nor the Tamar Estuaries Complex SPA are sensitive to acid

deposition.

Process contributions to acid deposition at local nature sites remain within 100 % of the environmental standard, and therefore screen as insignificant in accordance with the assessment criteria for such sites.

Short-term impacts are less easily defined due to the lack of directly comparable assessment levels. However, even when applying an overly conservative assessment, considering the worst-case results of shorter-term (half-hourly) emissions against longer-term (hourly) assessment levels the environmental concentration of the majority of pollutants do not exceed the most appropriate assessment level.

It is the conclusion of the modelling that the Installation is unlikely to have a significant impact at any of the receptor locations examined and is unlikely to have a significant impact on the environment.

All the air emissions from the Installation have been risk assessed against their potential impact on human health. The results of the assessment are that the proposed installation will not present any risk to human health.

1. INTRODUCTION

This document has been prepared on behalf of Biomass UK No.4 Ltd (the '*Applicant*' or the '*Operator*' hereafter) by Sol Environment Ltd and provides supporting evidence as required by Environmental Permit Application Forms A, B2, B3, and F1 as issued by the Environment Agency (EA).

Biomass UK No.4 Ltd (the '*Applicant*' or the *'Operator'*) is making a New Bespoke Installation Permit Application for the proposed operation of an energy from waste facility at their site at Belliver Way, Plymouth.

The Installation is located at Units 21-29, Belliver Way, Roborough, Plymouth, Devon, PL6 7BW (National Grid Reference: SX 49890 62378).

The site has been both previously operated and permitted by the previous plant owners and operators, Dartmoor Bio Power Limited (DBPL), under environmental permit number EPR/XP3134AW, using waste wood as a feedstock for gasification. Following DBPL entering into administration in 2018, the site was closed and permit duly surrendered by the Environment Agency (EA) on the behalf of the company.

Biomass No.4 intends to upgrade the existing facility and make changes to the combustion technology and boiler to enable the plant to operate reliably on a wider range of fuels to include refuse derived fuels (RDF), Solid Recovered Fuels (SRF) as well as mixed (PAS111:2012 Grade A – C) non-hazardous waste wood feedstocks.

The Facility will have the capacity to export up to approximately 10 MWth of heat, subject to configuration and available offtake partners.

The Installation has been designed with an annual throughput of approximately 50,000 tonnes per annum, assuming a design NCV of 10.11 MJ/kg. The design of the combustion system assumes an average throughput of 6.33 tph, assuming 7,900 hours annual availability.

Allowing for seasonal availability and fuel variability the maximum permitted throughput of the plant will be 60,000 tpa. The predominant feedstock for the site will be Refuse Derived Fuel.

The Facility comprises a single-line incineration process, including a thermal oil boiler serving an ORC turbine. The turbine is designed to generate a gross electrical output of 4.64 MWe of electricity (ISO conditions). The plant has a corresponding parasitic load of approximately 0.75MWe resulting in a net electrical export of approximately 3.9 MWe.

All incoming fuel feedstocks will be delivered directly into the internal reception area in loose form, inspected and then transferred through the use of mechanical shovel to the walking floor storage bunkers. Any non-forming waste materials will be rejected and removed off site and returned to the supplier, as necessary. The reception areas, storage bunkers and associated facilities are all protected through the use of fire detection and suppression systems which have been designed to meet the requirements of the EA Fire Prevention Plan (FPP) guidance. All odours generated by the management and storage of waste are extracted and thermally destroyed within the site combustion systems in line with the Sector BAT requirements for odour control

The site operations will be permitted by the Environment Agency as a Waste Incineration and Co-Incineration Activity and will be operated in accordance with the Environmental Permitting Regulations 2016 (as amended) (ERR Regulations), Chapter IV of the Industrial Emissions Directive (IED), and the Waste Incineration BREF (C/2019/7987).

The Installation will make an important contribution to regional waste management and local renewable energy generation and will provide a single treatment facility for waste wood and RDF materials that would otherwise be destined for landfill, incineration, or foreign export.

The proposed process meets the definition of an Installation as defined by Section 5.1 *'Incineration and Co-Incineration of Waste'* paragraph A(1)(b) namely:

'The incineration of non-hazardous waste in a waste incineration plant or waste co-incineration plant with a capacity exceeding 3 tonnes per hour.'

The remainder of this application support document is structured accordingly:

- Section 2: Provides a detailed planning history of the site and associated activities;
- Sections 3 and 4 4: Provide specific details and process descriptions associated with the New Bespoke Installation Permit Application;
- Section 5: Provides specific details associated with the site management and operations;
- Section 6: Provides specific nature and detailed description of the emissions to air, water emissions and waste associated with the Installation;
- Section 7: Provides details of all environmental monitoring associated with the Installation;
- Section 8: Provides a BAT description of the proposed technology and provides a comparison against the applicable guidance and emission limit values for the Installation; and
- Section 9: Provides an Environmental Impact and Assessment of the Installation against the requirements of the Habitats Directive.

All technical appendices associated with the Installation are included within the technical annexes and comprise the following:

- Annex A: Site Plans;
- Annex B: EMS Summary;
- Annex C: Site Condition Report (SCR);
- Annex D: Fire Prevention Plan (FPP);
- Annex E: Environmental Risk Assessment;
- Annex F: Odour Management Plan (OMP);
- Annex G: CHP – Ready Assessment;
- Annex H: Air Quality Assessment (AQA) and Human Health Risk Assessment (HHRA);
- Annex I: Noise Impact Assessment;;
- Annex J: Global Warming Potential (GWP);
- Annex K: Technical Competence; and
- Annex L: Previous Permit.

The location of the Installation and site boundary is provided overleaf in Figure 1.1. The site layout is provided in Figure 1.2, a simple process flow diagram is provided in Figure 1.3.

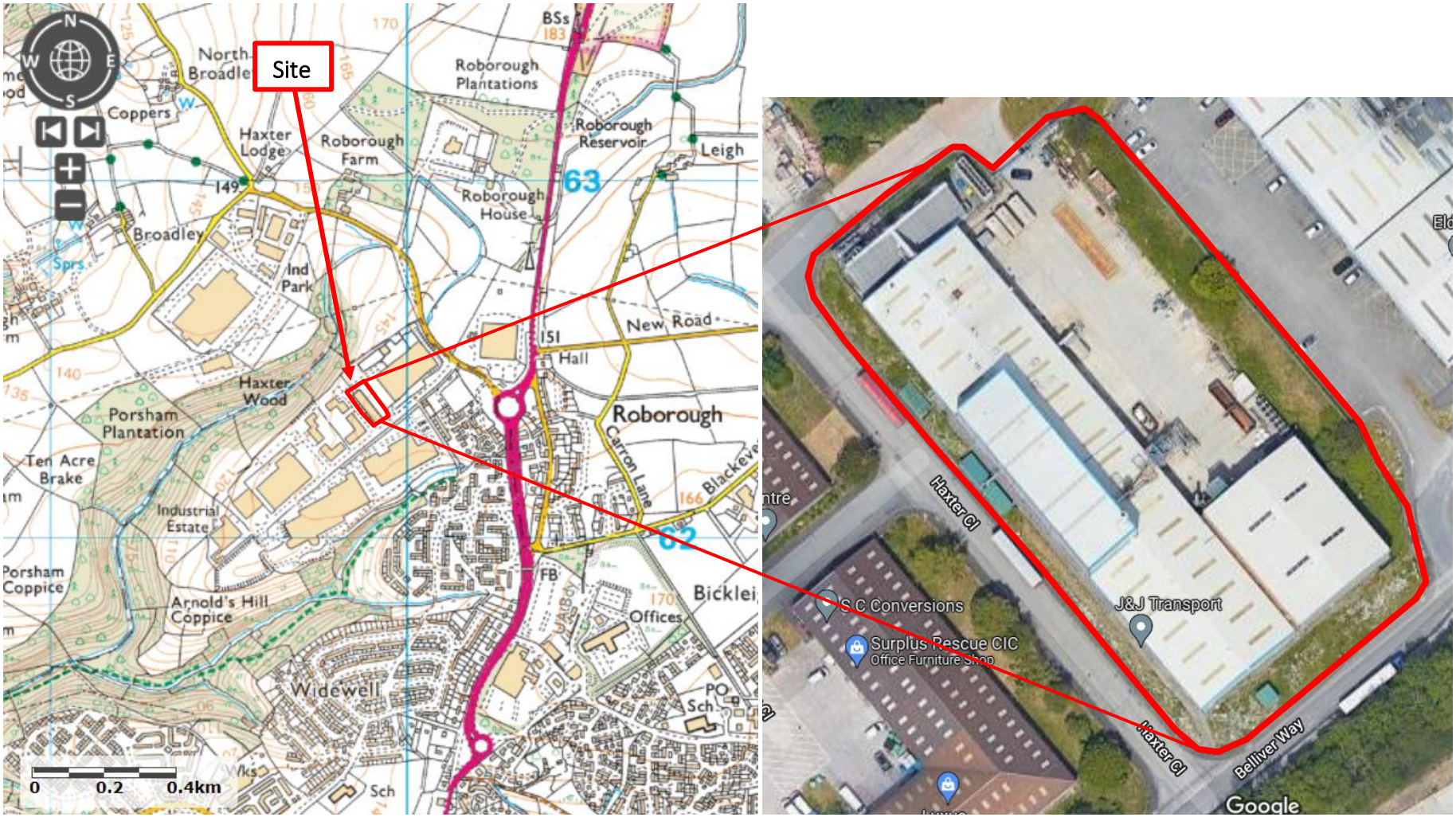

Figure 1.1: Site Location and red line installation boundary.

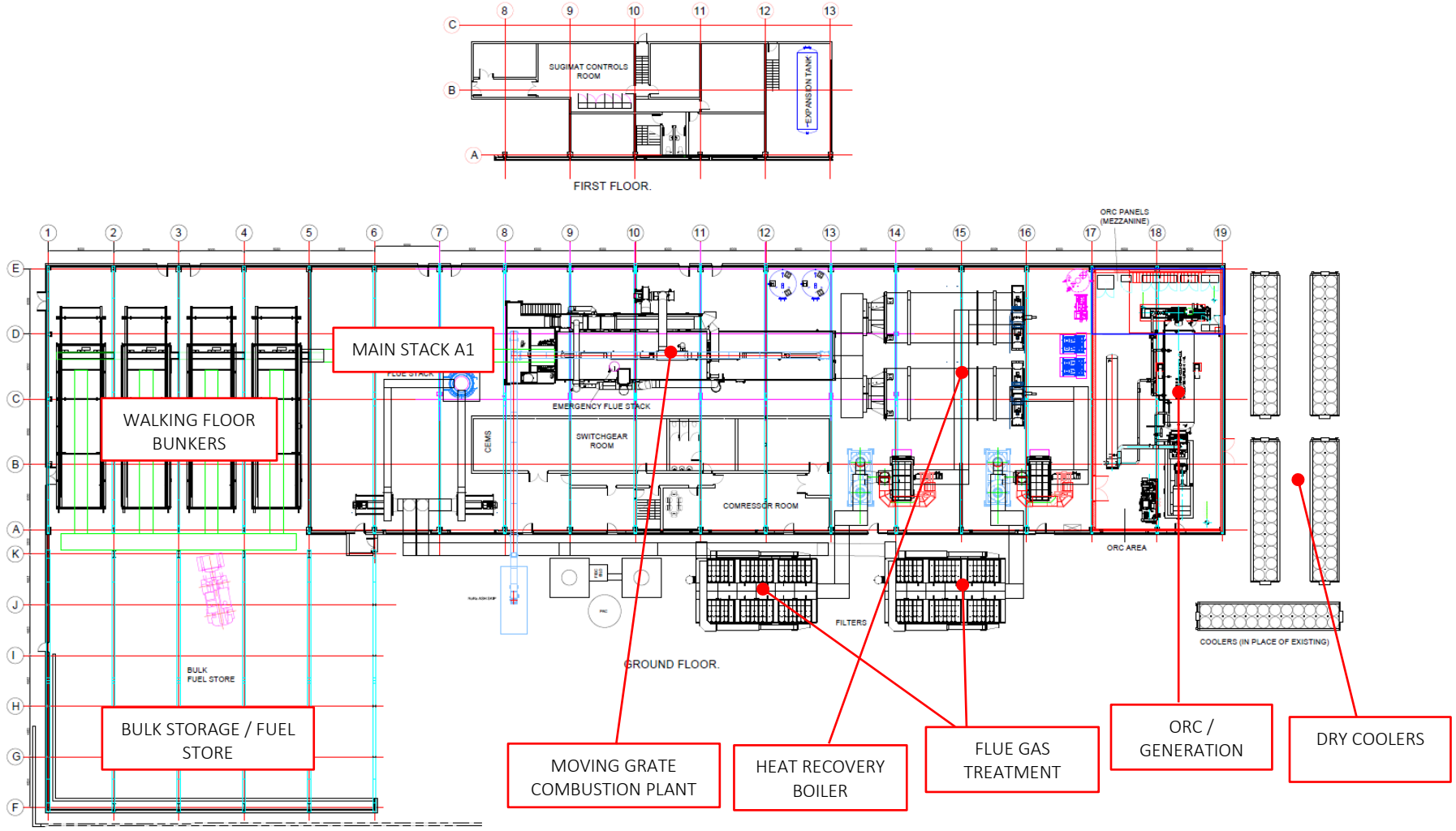

Figure 1.2: General site layout.

2. PLANNING STATUS

The Applicant has an extant planning permission at the site for development and proposed changes to the site. Details pertaining to all known planning permissions are provided in Table 2.1 below.

Table 2.1: Planning History

Reference	Description	Status	Date Granted
21/01495/FUL	Extension to part of existing building, increase in existing stack height and erection of new vent stack.	Granted	21/01/22
20/01541/EXUS	Establish existing use as energy recovery facility.	Issue lawful certificate	23/12/20
17/01854/CDC	Compliance with conditions 1, 2 & 3 of application 15/00745/FUL.	N/A	N/A
15/00745/FUL	Increase in height to existing building and relocation of the stack.	Granted	28/05/15
15/00604/AMD	Non-material minor amendment: Increase in height to existing building and relocation of the stack for application 11/00496/FUL.	Refused	22/04/15
12/01516/FUL	External plant associated with Timber Resource Recovery Centre. Including air cooled condensing unit, oil cooling unit, enclosure for gas services, extension to existing enclosure for electrical services, plant room enclosure and char bagging area.	Granted	03/09/12
12/01496/AMD	Non-material minor amendment to 11/00496/FUL	Agreed	23/10/12
11/00496/FUL	Alteration and extension to existing building including new chimney to facilitate use as a timber resource recovery centre.	Granted	29/07/11
10/01306/ESR10	Screening Opinion.	Environment Assessment R10	20/09/10
09/00454/FUL	Alterations to existing building to incorporate chimney to facilitate use as a timber recycling facility that creates renewable energy.	Granted	02/06/09
08/00117/FUL	Alterations and extension to industrial unit to facilitate timber recycling facility that creates renewable energy.	Granted	11/07/08
07/01410/FUL	Provision of new access and amendments to existing access and car parking arrangements (amendments to previous approved application 07/00048 & 05/01714).	Granted	07/11/07
07/00048/FUL	Construction of additional industrial units, alterations, and extension to existing units, and alterations to parking and turning areas.	Granted	12/04/07
05/01719/FUL	Change of use to be enable premises to be used for B1/B2 and B8 uses (business, general industrial, storage/distribution).	Granted	07/12/05
05/00716/FUL	Alterations, extension, and subdivision of premises to smaller industrial units, and extension to car parking area.	Granted	01/07/05
99/01334/FUL	Replacement roof covering and installation of new plant.	Granted	23/12/99
91/01620/FUL	Provision of automatic car wash facility.	Granted	29/11/91
79/03016/FUL	Widening of public highway.	Granted	21/12/79
75/00006/FUL	Historic record with no textual data. Spatial data exists. Record created September 2017.	N/A	N/A

3. PROPOSED ACTIVITIES

3.1 Type of Permit

The Applicant is making an application for a Bespoke Installation Permit for the proposed operation of a single line waste to energy incineration plant.

The Facility will consist of a combination of Schedule 1 installation activities (as defined in the Environmental Permitting Regulations) and directly associated which meet the definition of an Installation as defined by Section 5.1 *'Incineration and Co-Incineration of Waste'* paragraph A(1)(b) namely:

'The incineration of non-hazardous waste in a waste incineration plant or waste co-incineration plant with a capacity exceeding 3 tonnes per hour.'

Table 3.1 provides a breakdown of the Main Listed Activities and Directly Associated Activities as defined by Schedule 1 of the EPR Regulations.

Table 3.1: Scheduled and Directly Associated Activities			
Schedule 1 Activity	Description of Activity	Limits of Specified Activity	Specified Waste Management Operation
Section 5.1 Part A(1) (b)	The incineration of non-hazardous waste in a waste incineration plant with a capacity of 3 tonnes per hour or more	From receipt of waste to treatment and emission of exhaust gas and disposal of any residues arising, including the storage of raw materials and waste products including incinerator bottom ash and air pollution control residues.	R1: Use principally as a fuel or other means to generate electricity. R13: Storage of waste pending the R1 operations
Directly Associated Activities (DAA)			
Energy Generation	Electrical energy generation and export using an ORC turbine, with the associated heat export and/or cooling.		
Back Up Electrical Generator	For providing emergency electrical power to the plant in the event of supply interruption[2].		

The technical guidance notes used in the preparation of this application document are:

- EPR – Incineration of waste (reference EPR 5.01);
- EPR – Recovery and disposal of hazardous and non-hazardous waste (reference EPR 5.06); and
- EPR – Control and monitor emissions for your environmental permit; and
- Waste Incineration BREF/BAT (C/2019/7987).

2 The emergency generator does not meet the definition of a Medium Combustion Plant on the basis that it will be operated for less than 50 hours per annum.

The key issues identified within these guidance documents and the relevant Best Available Techniques have been built into the site operation procedures that will form the management systems for the site.

3.2 Installation Boundary

All proposed operations will be contained within the site ownership boundary. A figure showing the proposed building configuration and Installation boundary has been provided in Section 1, Figures 1.1 and 1.2. This boundary remains the same as previously permitted for the DBPL.

A Site Condition Report that provides a baseline conceptual model for the site has been completed and included within *Annex C – Site Condition Report* of this document.

Although the site has not undergone any significant change in terms of environmental risk and/or potential contaminative materials, there are no new potential contamination risk to the environment beyond those that were originally permitted. Notwithstanding the above, a new Site Condition Report that aligns with EA Horizontal Guidance H5 has been prepared and submitted as part of this submission.

The Site Condition Report neither indicates that the existing site presents a significant contamination risk, nor does it identify any aspect of the new Installation that presents a potential risk to the environment.

All aspects of the Installation had been designed in accordance with the EA's best practice and guidance at the time of construction.

3.3 Infrastructure and Design

The facility is an existing structure constructed in its entirety including all drainage, foundation works, steel structure and structural slabs, intermediate floors, stairs, external clad walls, roof system, glazing and external doors.

The facility will consist of the following:

- Fuel Reception Hall;
- Fuel Handling System;
- Single line Moving Grate Combustion System;
- Flue Gas Cleaning System comprising SNCR, optional SCR, reagent injection, and bag or ceramic filtration;
- Oil Boiler and interconnected oil-based ORC Turbine and Generator Set;
- Ash Handling and Storage Systems;
- A 35m high exhaust stack; and
- Continuous Emissions Monitoring Systems.

Although the fundamental design of the plant will remain as per the previous Permitted Installation, the conversion of the plant to operate on RDF has necessitated a number of discrete changes in the plant layout and design, namely:

- Possible raising the roof height of the reception hall to 18.5m (there is planning approved for this extension by the previous site holders but it has not been confirmed if this will be required for operation);

- Increasing the height of the stack to 35m, and;
- Erection of new 16m high vent stack with a 1.2m diameter.

Details of the key areas of site infrastructure are provided within the sections below.

Site Drainage

The Facility is designed as a 'zero-discharge' process. Process areas will have contained drainage, with process effluents re-used within the ash quench. Process drainage may include grated drains in process areas to collect process effluents prior to re-use. Therefore, there will be no discharge off-site of process effluents.

All activities on site take place within the main building. There is no external storage or processing that takes place external to the main building.

The building provides both secondary and tertiary containment. Any spillages, leaks or incidents arising within the building will be effectively contained and captured within the footprint of the main building.

Uncontaminated clean surface water runoff captured from roof drainage and external roadways / car parking areas will be discharged to the existing surface water drainage system (W1).

The roof area is used for rainwater recovery and rainwater is reclaimed as part of a sustainable drainage system (SUDS).

The site is served by an existing surface water drainage system which comprises a network of gullies, pipework and holding chambers. There will be no direct process emissions to controlled water arising from the Installation. All above ground drainage been designed in accordance with BS EN 12056.

A Class 2 oil/petrol interceptor will treat surface water prior to discharge. An isolation valve will also be in place to prohibit surface water discharge from the site if required.

In the event of a significant site fire, the facility has been designed to fully contain any firewater run-off. In the event of a fire within the fuel bunker systems, any water from the suppression system will be contained within the bunkers. In the event of a fire within the waste offloading area, the slab and floor areas are designed such that all firewater will be contained within the building.

The building will have a bunding system to stop any potentially contaminated firewater escaping which will be finalised during detailed design. The firewater collected will be tankered off site for disposal.

Auxiliary Fuel and Reagent Loading and Storage Areas

All storage tanks will be installed with secondary containment and be designed to comply with the necessary standards and pollution prevention guidance.

All storage tanks associated with the process are detailed within Table 3.4.

The tanker offloading area at the site will be constructed from an impermeable concrete hardstanding, to create an impermeable layer to the underlying ground and prevent contamination in the event of a spill/leak from the tanker. Sealed construction joints (water stop joints) will be installed between each concrete slab

to ensure the integrity of the hardstanding, reducing the risk for contamination of the underlying ground/groundwater.

The tanker offloading area will be constructed in accordance with the requirements of CIRIA 736 and in accordance with recognised standard *'Eurocode 2 – Design of Concrete Structures – Part 3: Liquid retaining and containment structures'.*

Quality assurance checks will be undertaken during construction to confirm the integrity of the hardstanding (and drainage systems). A regular preventative maintenance scheme will ensure the integrity of the tanker offloading area is maintained throughout the lifetime of the Facility.

Preventative maintenance will include for periodically emptying any sumps in the tanker unloading area and undertaking visual inspections of the concrete or other material from which the sumps are constructed. Visual inspections of the hardstanding will also be undertaken. In the event that the visual inspection identifies that the integrity of the sumps or hardstanding has been compromised, additional pressure tests, leak tests and material thickness checks would be undertaken.

The tanker offloading area will have contained drainage which will ensure that any fugitive emissions are contained to ensure:

- Designed to be impermeable and resistant to the liquids collected within them.
- Subject to regular visual inspection, with any contents removed accordingly after checking for contamination.
- Should any concerns regarding the integrity of sumps be raised following programmed visual inspection or maintenance, this will be extended to water testing.

Sub-surface tanks and sumps, where identified appropriate following detailed design, will be designed with leak detection systems. Preventative maintenance will be implemented for all subsurface structures. This could include (if appropriate) pressure tests, leak tests, material thickness checks, CCTV etc.

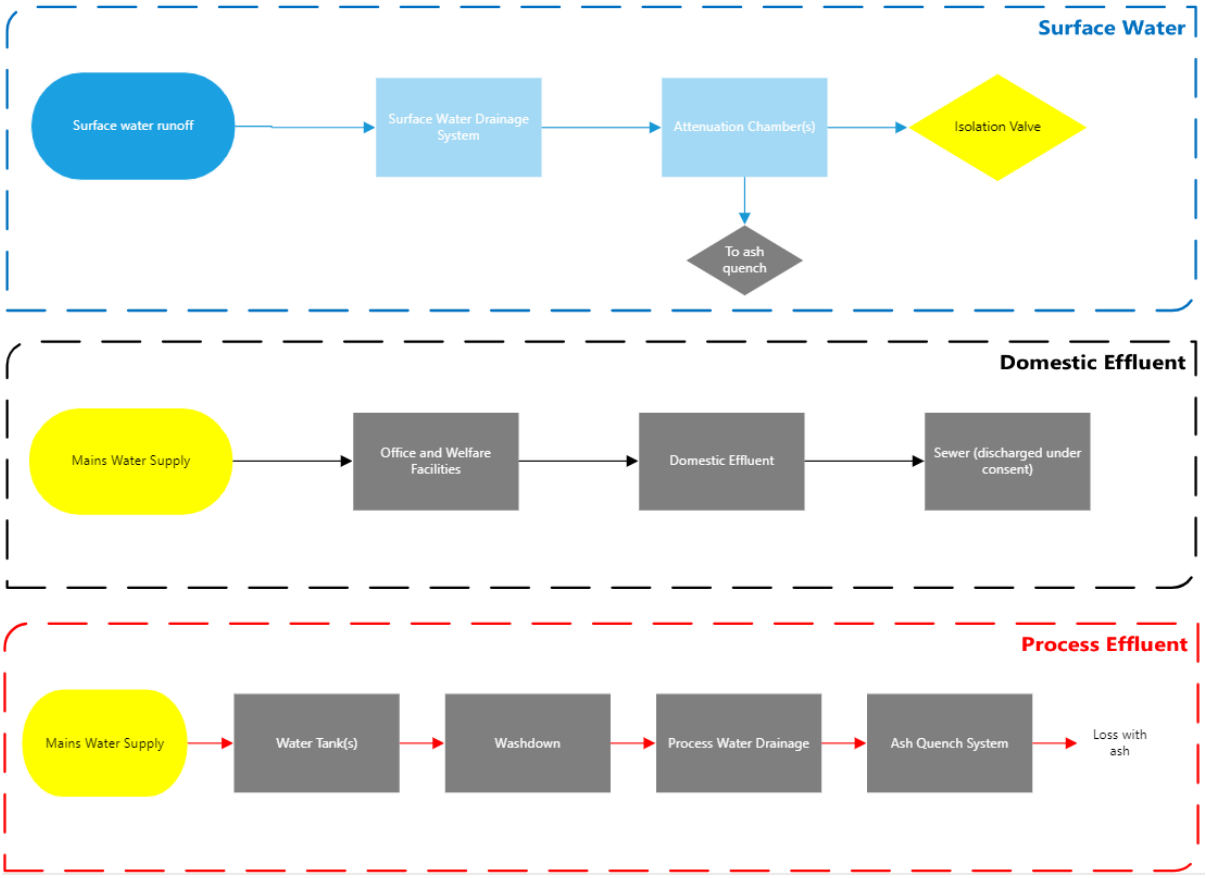

Figure 3.1: Water Flow

Please see Site Drainage Plan in *Annex A* of this document and Fire Prevention Plan in *Annex D* for site drainage layouts.

Roadways and External Areas

An internal roadway system has been designed to give safe access to all areas of the site.

Segregated pedestrian walkways and car parking areas have been provided to allow for safe access and egress of all personnel at site.

3.4 Process Description

The Applicant proposes to employ a conventional moving grate technology coupled to a heat recovery boiler and oil based ORC generation system.

The principal components of the process comprise the following:

- *Waste Acceptance and Reception:* Refuse Derived Fuel (RDF) will be delivered to the Reception Hall. Waste is delivered and unloaded in the internal tipping area where a visual inspection will take place. The delivered RDF feedstocks will then be transferred to one of the internal storage bunkers. RDF is typically processed and used within 4 days of arrival onsite.
- *Reagent and raw material tanks and silos;* The Facility will receive deliveries of RDF by road. The Facility will also use consumables including sodium bicarbonate, activated carbon, urea, auxiliary fuel (mains gas or fuel oil depending on availability), water treatment chemicals and various maintenance materials as required (oils, greases, insulants, antifreezes, welding, and firefighting gases etc).
- *Residue Handling & Storage;* The initial handling and quenching of the IBA at the Facility will be undertaken in an enclosed building. In addition, any overflow from the ash quench will be contained in the process effluent drainage system, reused, and hence will not be released off-site. All Air Pollution Control Residues (APCR) is stored within sealed, fully contained skips
- *Combustion Process;* The combustion process will utilise a conventional moving grate technology which will agitate the fuel bed to promote a good burnout of the RDF and a uniform heat release. The moving grates will enable the RDF to be moved from the feed inlet along the grate to the ash discharge. The combustion chambers will be designed to ensure that the exhaust gases are raised to a minimum temperature of 850°C, with a minimum of 2 seconds flue gas residence time.
- *Start-up Burner*: Auxiliary start-up burners are mounted to the grate combustion system to maintain temperature and to enable start-up and shut down.
- *Heat Recovery;* The boiler contains the organic working medium (thermal oil) is pre-heated in a regenerator, then heated and vaporized through a heat exchanger with a thermal oil loop.
- *Organic Rankine Cycle (ORC) turbine/generator set;* The vapour is expanded in a turbine which drives an electric generator to generate electricity. Once the vapour has passed through the turbine, it passes through the regenerator that is used to initially pre-heat the organic working medium, increasing the overall efficiency of the process through internal heat recovery.
- *Air Pollution Control and Flue Gas Cleaning;* The abatement of oxides of nitrogen (NOx) will be achieved by careful control of combustion air, including flue gas recirculation, and an SNCR system. Sodium bicarbonate and powdered activated carbon (PAC) will be injected into the flue gases in a reaction chamber following the boiler to abate acidic gases, heavy metals and any remaining dioxins and furans.

In addition, the site includes the following ancillary equipment/infrastructure:

- Offices, control room and staff welfare facilities;
- Gatehouse, weighbridge(s), and landscaping;

- Drainage infrastructure;
- Lighting and CCTV;
- External hard standing areas for vehicle manoeuvring/parking;
- Internal access roads and car parking;
- Grid transformer; and
- Foul water treatment plant.

More detailed equipment and process specifications have been included within Section 4. See simplified site schematic in Figure 3.1 overleaf.

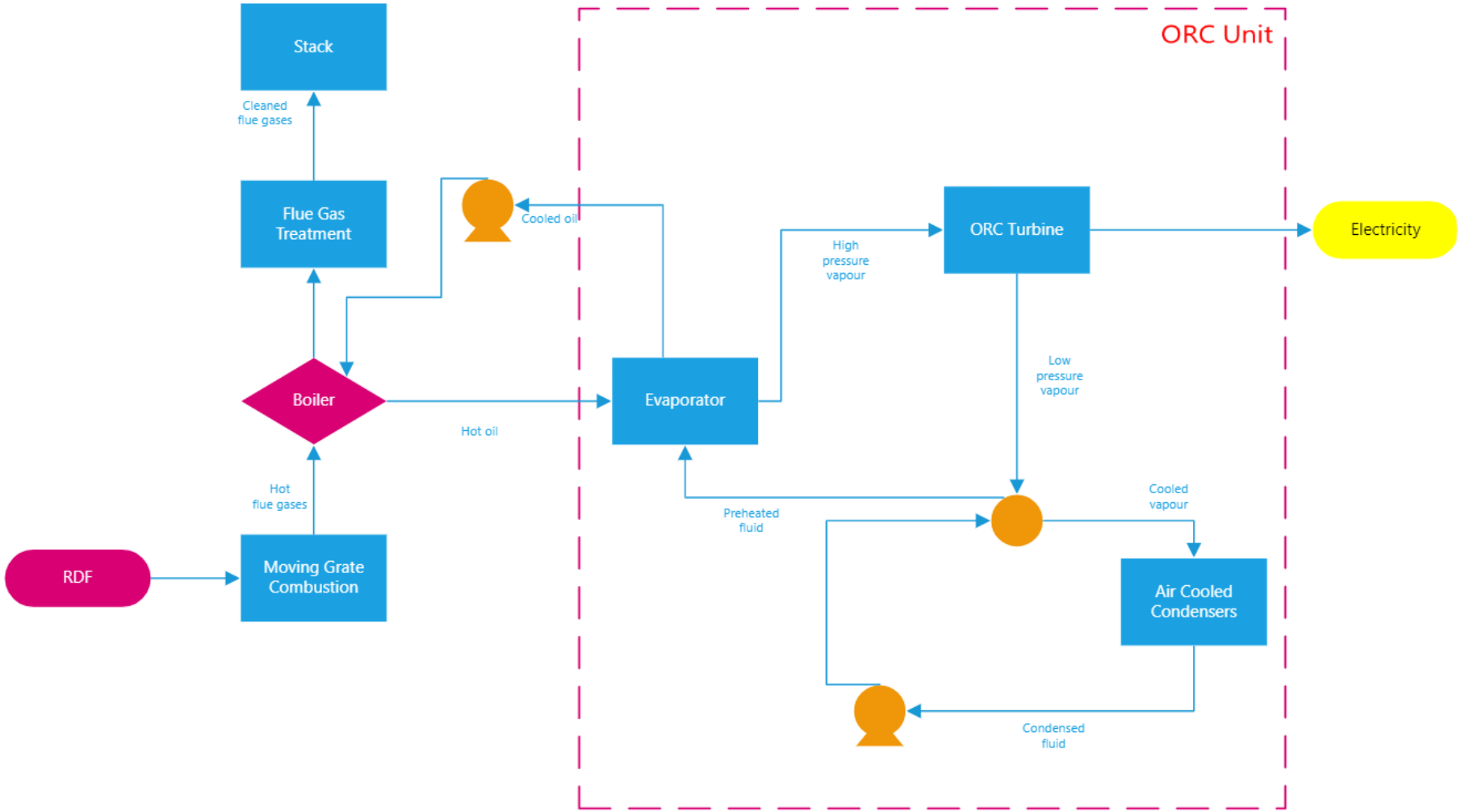

Figure 3.2: Process Schematic

3.5 Raw Materials

Waste Feedstocks

The Installation will typically accept approximately 50,000 tonnes of waste derived fuel feedstocks3. Prior to processing, all fuel accepted on site will be subjected to stringent waste acceptance criteria in accordance with the site environmental management plan and associated procedures.

The Installation has been designed to accept non-hazardous waste wood and RDF fuel feedstocks in accordance with stringent site waste acceptance procedures and agreed specification.

All waste will be obliged to meet the specification provided in Table 3.2.

Table 3.2: RDF Fuel Specification[4]

Component	Unit	Upper Limit for daily ave	Limit for half hourly ave	*Comment*
Sulphur (S)	wt%	0.63	1.26	-
Nitrogen (N)	wt%	0.55	1.10	-
Lead (Pb)	mg/kg	180	180	-
Chlorine (Cl)	wt%	0.41	0.82	-
Zinc (Zn)	mg/kg	360	360	-
Sodium (Na) and Potassium (K)	mg/kg	2200	4000	-
Fluoride (F)	wt%	0.028	0.051	-
Mercury (Hg)	mg/kg	2.2	4.0	-
Each dimension	mm	150	-	*300m in one plane*
Ferrous metal content	wt%	0.5	-	*Limit for any feedstock load*
Non-ferrous metal content	wt%	0.5	-	*Limit for any feedstock load*
Glass/stones/aggregates	wt%	5	5	
Fines (<5mm)	Mm	10	10	
Bulk density (loose)	kg/m^3	150-500	150-500	*Feedstock Supply*
Moisture	%wt	25%	-	*Typically, 20 – 30% and less than 40%*

[3] The Installation has been designed with an annual throughput of approximately 50,000 tonnes per annum, assuming a design NCV of 10.11 MJ/kg. The design of the combustion system assumes an average throughput of 6.33 tph, assuming 7,900 hours annual availability. Allowing for seasonal availability and fuel variability the maximum permitted throughput of the plant will be 60,000 tpa.

[4] All quoted units are on an as received (AR) basis.

Ash Content	%wt	20%		*Max 25%*
Net CV	MJ/kg	Range 10 - 14		

A detailed list of European Waste Catalogue (EWC) codes of wastes that will be accepted by the Installation is provided in Table 3.3 below.

Table 3.3: Proposed Feedstock EWC Codes and Types	
Waste Code	Description
02	**AGRICULTURE/HUNTING/FISHING/FOOD PROCESSING**
02 01	**agriculture, horticulture, aquaculture, forestry, hunting and fishing**
02 01 03	plant tissue waste
02 01 04	waste plastics (except packaging)
02 06	**baking and confectionery industry**
02 06 01	materials unsuitable for consumption or processing
03	**WOOD/PAPER/CARD PROCESSING**
03 01	**wood processing and the production of panels and furniture**
03 01 01	waste bark & cork
03 01 05	sawdust, shavings, cuttings, wood, particle board & veneer other than those mentioned in 03 01 04
03 03	**pulp, paper and cardboard production and processing**
03 03 07	mechanically separated rejects from pulping of wastepaper & cardboard
03 03 08	wastes from sorting of paper & cardboard destined for recycling
15	**PACKAGING, ABSORBENTS, WIPING CLOTHS, AND FILTERS**
15 01	**packaging (including separately collected municipal packaging waste)**
15 01 01	paper & cardboard packaging
15 01 03	wooden packaging
15 01 05	composite packaging
15 01 09	textile packaging
17	**CONSTRUCTION AND DEMOLITION WASTE**
17 02	**wood, glass, and plastic**
17 02 01	wood
19	**MATERIALS FROM WASTE AND WATER TREATMENT**
19 12	**mechanical treatment of waste (for example sorting, crushing, compacting, pelletising) not otherwise specified**
19 12 01	paper & cardboard
19 12 04	plastic & rubber
19 12 07	wood other than that mentioned in 19 12 06
19 12 08	textiles
19 12 10	combustible waste (refuse derived fuel)
19 12 12	other wastes (including mixtures of materials) from mechanical treatment of wastes other than those mentioned in 19 12 11*
20	**MUNICIPAL WASTES AND SIMILAR MATERIALS FROM COMMERCE AND INDUSTRY**
20 01	**separately collected fractions (except 15 01)**
20 01 01	paper & cardboard
20 01 11	textiles
20 01 38	wood other than that mentioned in 20 01 37

20 01 39	plastics
20 01 99	other fractions not otherwise specified (hygiene waste collected from domestic facilities that is not classified as clinical waste)
20 02	**garden and park wastes (including cemetery waste)**
20 02 01	biodegradable waste
20 03	other municipal wastes
20 03 01	mixed municipal wastes
20 03 02	wastes from markets
20 03 03	street cleaning residues
20 03 07	bulky waste

Despite the wide range of EWC codes listed in Table 3.3, the majority of the waste received and processed at the Facility will be RDF (EWC 19 12 10). RDF feedstocks, by their nature have been shredded and pre-processed to remove recyclates to achieve a relatively consistent material. Although it is accepted that there will be both periodic and seasonal variation in the moisture content and CV of the fuel, the Facility has been designed to be able to operate across a range of CVs.

Furthermore, the storage and blending of material within the walking floor bunkers further homogenises the wastes to ensure that the plant is always able to operates within its warranted performance range.

The inclusion of a number of additional EWC codes with Table 4.2 allows for the plant to accept combustible waste feedstocks that have been contaminated or otherwise unsuitable for recycling or biological treatment. These materials may include waste rejected from materials recycling facilities, biological treatment facilities or waste transfer stations, hygiene wastes that do not require any additional handling or storage to prevent infection, or some form of WEEE waste residues (shredder remnants etc) that cannot be further processed. In all cases the feedstocks will need to comply with the specification provided by Table 4.1.

Notwithstanding the EWC's codes stipulated in Table 4.2, RDF shall not be accepted at the site which does not meet the fuel specification or has any of the following characteristics:

- Hazardous wastes;
- Radioactive wastes;
- Consisting solely or mainly of dusts, powders, loose fibres, or liquids;
- Defined as Infectious;
- Drummed waste; or
- Malodourous wastes.

Process Consumables

The main raw materials anticipated to be stored at the Facility are presented in Table 3.4. The quantities and storage capacities should be considered indicative and will be subject to continuous review and process efficiency optimisation.

The thermal oil cycle is a closed loop and will be subject to period shutdowns and maintenance. The total oil use of the thermal oil system is considered to be small, so therefore has not been included in Table 3.4 overleaf.

Table 3.4: Raw Materials Summary			
Material	Indicative consumption per annum	Location and nature of storage	Fate
Feedstock	Typically, 50,000 tonnes per annum. Delivered on a 'just in time' basis.	Internally within reception hall (1000 t capacity)	Thermally converted to ash. Ash is transferred off site for disposal/ recovery elsewhere.
Lubricating oil for turbine	10,000 litres	Stored internally within sealed containers	Consumed within machinery. Waste oil transferred off site for disposal.
Diesel (if required as auxiliary fuel))	32,500 litres (stored in single 20,000 litre storage tank)	Stored externally in a storage tank within a bund	Consumed within machinery. No waste product. Air emissions to atmosphere.
Urea	177 tonnes (stored in 2 30,000 litre tanks)	Diluted and stored internally within a storage tank within a bund	Used in selective catalytic reduction. No waste product.
Sodium Bicarbonate	808 tonnes (stored in 2 x 8000 litre silos)	Stored internally within sealed containers	Used in plant abatement. Waste product (APCR) transferred off site for disposal.
Activated Carbon	25 tonnes (stored in 2 1000 litre silos)	Stored internally within sealed containers	Used in plant abatement. Waste product (APCR) transferred off site for disposal.
CEMs Gases	• M-99-T2-35226 (O_2 / C_3H_8 / N_2) X50 • SO_2 / CO / NO / N_2 • NH_3 / N_2	Stored internally within sealed containers	Used to calibrate plant CEMs. No waste product.

Various other materials may be used in small quantities for the operation and maintenance of the Facility.

These could include, but not be limited to, the following:

- Maintenance oils (hydrocarbon and silicone based), greases, insulants;
- Isolation media within electrical switchgear;
- Refrigerant gases for the air conditioning plant;
- Glycol/antifreeze for cooling;
- Ignition, test, and calibration gases (M-99-T2-35226 (O_2 / C_3H_8 / N_2) X50, SO_2 / CO / NO / N_2NH_3 / N_2;
- Oxyacetylene, TIG, MIG welding gases; and
- CO_2, foam, and other fire-extinguishing agents.

These will be supplied to standard specifications offered by main suppliers. All chemicals will be handled in accordance with COSHH Regulations as part of quality assurance procedures and full product data sheets will be available on-site.

Periodic reviews of all materials used will be made in the light of new products and developments.

Any significant change of material, where it may have an impact on the environment, will not be made without firstly assessing the impact and seeking approval from the EA.

Reagent Storage and Unloading

Urea solution will be delivered in sealed HGV tankers and off-loaded directly via pump into a dedicated bulk urea storage tank, with secondary containment. The urea storage tank will be designed and constructed to ISO standards and fitted with secondary containment that provides and equivalent containment volume of 110% of the tank's capacity.

All filling pipework and connections will be fitted within the perimeter protection of the containment area. The urea tank, in line with all chemical storage tanks at the facility will be fitted with level gauges, high tank level sensors and alarms.

All tanks will be designed in line with EA and HSE best practice guidance.

The delivery of urea will be supervised by site operatives trained in unloading practices. Regular inspection of the unloading equipment will be undertaken.

Sodium bicarbonate and activated carbon storage and handling

The sodium bicarbonate and activated carbon will be delivered to site in bulk by HGV and transferred pneumatically into the relevant separate stainless steel storage silo. All silos are fitted with dust abatement comprising a fabric filter and return vent to ensure full containment during loading and unloading exercises.

Fuel Oil storage and handling

Auxiliary fuel oil (diesel)[5] will be stored in two dedicated ISO compliance storage tanks fitted with integral secondary containment. The fuel oil storage tanks will be designed and constructed to ISO standards and fitted with secondary containment that provides and equivalent containment volume of 110% of the tank's capacity.

All filling pipework and connections will be fitted within the perimeter protection of the containment area.

The fuel oil tank, in line with all chemical storage tanks at the facility will be fitted with level gauges, high tank level sensors and alarms. All tanks will be designed in line with EA and HSE best practice guidance.

Additional raw materials

Various maintenance materials (oils, greases, insulants, antifreezes, welding, and firefighting gases etc.) will be stored in an appropriate manner within the maintenance storage areas. Any gas bottles on-site will be kept secure in dedicated area(s) in accordance with COSHH regulations.

5 Although a mains gas supply is available at site, a final decision on whether it has sufficient uninterruptable capacity to provide the site has yet to be established. If the gas connection is not viable, then fuel oil (diesel) will be selected as the auxiliary fuel.

All liquid chemicals and raw materials will be stored in controlled areas, with secondary containment facilities having a volume of 110% of the stored capacity, in accordance with industry best practice. Any incompatible materials will be stored with the relevant storage separation distance, well ventilated and away from any sensitive site drains.

Sufficient spill response materials will be provided across site and will form part of a site wide emergency response plan.

3.6 RDF Reception

All vehicles will enter the site and report to the northern entry gate at the site entrance to weigh and record the delivered RDF in accordance with the site management system.

All incoming and outgoing delivery vehicles will be recorded via the weighbridge.

All vehicles will be directed from the weighbridge to the Reception Hall. Vehicles will enter backwards into the building and discharge RDF directly onto the floor in the Reception Area. Vehicles will only be unloaded when the roller shutter doors are closed.

The supply of incoming fuel feedstock materials will be through dedicated suppliers under long term supply contract. All feedstock suppliers are contractually obliged to supply material in accordance with the required feedstock specification.

The Fuel Reception Hall has a capacity of 1000t and is fitted with a dedicated fire detection and suppression system.

All waste will undergo a visual inspection during unloading with rejected material removed to the quarantine area. Fuel will transfer into one of the storage bunkers upon arrival. Fuel from the piles to be loaded onto the conveyance system for processing will be extracted by means of the front loader and always in a clockwise direction around the fuel hall.

Newly delivered fuel will be deposited to the left of the extraction site thereby ensuring that the 'oldest' fuel is always being removed from the fuel hall.

All RDF handling activities will be undertaken within the main RDF reception building, which will have contained drainage with links to the process drainage system.

The RDF deposit areas will be fitted with a walking floor which will operate continuously except for plant-wide shutdown periods. The walking floor will transfer the RDF from the RDF deposit areas to the RDF feed conveyors. The RDF feed conveyors will transfer the RDF to feed hoppers, which then feed the waste into the combustion chamber.

A loading shovel will be used to back-load/remove RDF from the RDF deposit areas back into the storage bays or onto road vehicles in the event of unplanned periods of prolonged shutdown. The loading shovel can also be used to remove any unsuitable or non-combustible items which can then be transferred to the quarantine area for further inspection of RDF, prior to transfer offsite to a suitable disposal/recovery facility, if required.

Waste will typically be stored internally for no longer than 4 days prior to use onsite.

All incoming waste materials will be inspected in accordance with the sites waste acceptance procedures.

All waste will be stored in accordance with the site Fire Prevention Plan which is provided within *Annex D – Fire Prevention Plan*.

To avoid any odour emissions from the Fuel Reception Building, the building is kept at slight negative pressure. Air from within the building is extracted into the intake of the primary combustion air fans and any odorous compounds thermally destroyed.

The Fuel Reception Building, including the reception hall, storage areas, and fuel loading conveyor, will be covered by a misting system which will be operated when required to control odour and dust emissions, and in case of fire.

Documented procedures for pre-acceptance and acceptance of RDF will be developed in conjunction with the feedstock supplier and as part of the Operators Environmental Management Systems prior to the commencement of operation.

A high-level summary of the proposed EMS structure is provided within Section XXX of this application.

The pre-acceptance and acceptance checks on RDF being delivered to the Facility will include duty of care audits of RDF producers and/or suppliers to review their operations to confirm that the RDF which they are transferring to the Facility is in accordance with the required descriptions, specifications and EWC codes.

All pre-acceptance and acceptance procedures will comply with the Indicative BAT requirements in section 2.1 of EA guidance EPR5.01, including:

- Pre-treatment of waste (to form RDF) to reduce variations in feed-composition, control emissions within ELVs and prevent unnecessary waste production.
- A high standard of housekeeping will be maintained in all areas and spill kits will be available in suitable locations.
- Vehicles will be loaded and unloaded in designated areas provided with impermeable hardstanding. These areas will have appropriate falls to the process water drainage system.
- Storage of RDF in enclosed buildings with suitable odour control measures.
- Suitable firefighting measures designed in accordance with the requirements of Local Fire Officers. Particular attention will be paid to RDF storage areas. Refer to the Fire Prevention Plan.
- Storage of fuels/chemicals in tanks or silos, with suitable controls to prevent fugitive emission
- Separation of uncontaminated surface water from other water streams to prevent contamination. Provision of sufficient attenuation capacity and containment measures in the event of contamination to prevent discharge off-site.

Additional measures will include the following:

- Delivery and reception of RDF will be controlled by a site environmental management system that will identify all risks associated with the reception of RDF and shall comply with all legislative requirements, including statutory documentation.
- RDF will be:
  – delivered in enclosed vehicles or other appropriate containers; and

– unloaded in the enclosed tipping hall.

- Design of equipment, buildings and handling procedures will ensure there is insignificant dispersal of litter.
- Inspection procedures will be employed to ensure that any wastes which would prevent the thermal treatment process from operating in compliance with its EP are segregated and placed in a designated storage area pending removal.
- Further visual inspection will take place by the plant operatives during vehicle tipping/RDF unloading.

3.7 Waste Feed System

Fuel is loaded into the fuel unloading conveyor, which in turn carries the fuel to the fuel elevating conveyor to disc screen. A spike roll is located upstream of the fuel unloading conveyor to break up clumps of material.

The fuel elevating conveyor to disc screen receives fuel from the fuel unloading conveyor, carries the fuel at an upward slope, and then drops the fuel into the disc screen.

The disc screen separates oversized fuel pieces [> 50 mm] from the rest of the fuel. Oversized fuel pieces are too big to fall through the screen and instead continue traveling along the top of the screen. After reaching the end of the screen, the oversized pieces fall into an “overs” bin. The rest of the fuel falls through the screen and is carried to the metal separator.

The metal separator consists of a self-cleaning magnet that separates ferrous metals from the fuel, and an eddy current system that separates non-ferrous metals from the fuel. The metal free material is then transferred to the fuel elevating conveyor to gasifier metering bin by a fuel transfer screw conveyor. Removed metals are dropped through a chute to a skip for export offsite.

The processed RDF is then conveyed into the combustion feed system.

3.8 Combustion Process

The combustion process utilises a conventional moving grate technology which cascades and agitates the fuel bed to ensure complete combustion and a uniform heat release. The moving grates enable the RDF to travel from the feed inlet along the grate to the ash discharge.

In accordance with the requirements of Chapter IV of the Industrial Emissions Directive the combustion chamber has been designed to ensure that the exhaust gases are raised to a minimum temperature of 850°C, with a minimum of 2 seconds flue gas residence time.

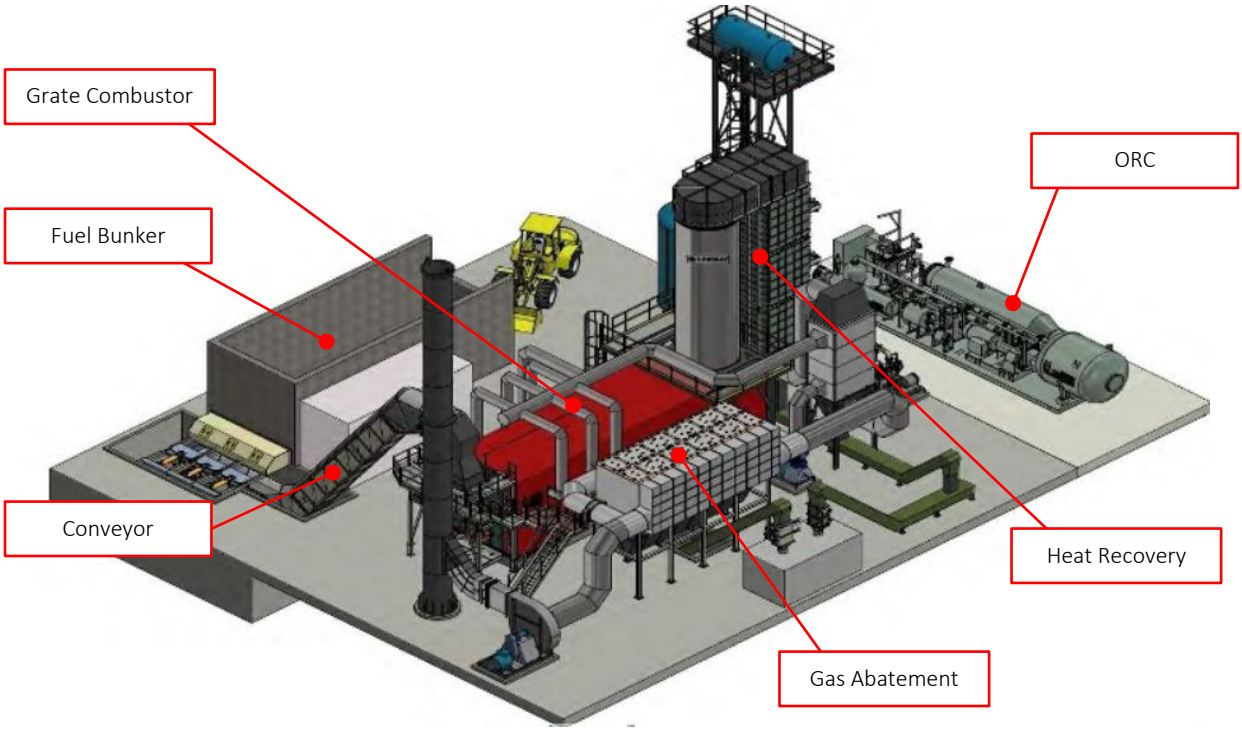

Figure 3.3: Overall combustion system

The combustion control systems ensure that an adequate air supply will be maintained with in the combustion chamber to maintain optimum combustion conditions. The primary combustion air will be introduced under the grates, with secondary and tertiary air distribution systems being introduced within the combustion zones above the bed. Gas temperatures will be monitored and recorded using retractable probe systems at critical points. Audible and visible alarms will trigger in the control panel if the temperature starts to fall towards 850°C, with the auxiliary burners fired accordingly to maintain temperature.

Combustion air flow will be controlled and adapted depending on the energy demand of the boilers, to optimise the combustion process.

Secondary combustion air will be preheated using hot flue gas and will be injected above the grate to improve the chemical reaction of the oxidation process and to ensure the complete combustion of the RDF. The supply of secondary combustion air will be regulated to adjust to the combustion process.

Flue gas recirculation (FGR) has been incorporated into the design of the combustion process – an oxygen probe located in the flue will modulate the contribution of recirculated gases, lower the temperature of the combustion process, and reduce NOx emissions.

The primary combustion zone of the boiler will be subject to the injection of urea solution to enable effective NOx reduction (SNCR).

Furnace conditions will be optimised in order to minimise the quantity of residues arising for further disposal. In accordance with Article 50(1) of the Industrial Emissions Directive, burnout in the furnace will either reduce the Total Organic Carbon (TOC) content of the bottom ash to less than 3%; or Loss on Ignition (LOI) of the bottom ash to less than 5%, by optimising the RDF feed rate and combustion air flows.

Table 3.5: Indicative BAT Requirements for the Combustion Systems and Boilers	
Minimise dioxin production by boiler design and operation	
Avoidance of slow rates of combustion gas cooling between 450 and 200°C.	• A system has been designed to ensure that flue gas is rapidly cooled through the critical de novo synthesis temperature (around 170°C); • CFD will be undertaken to confirm that there are no pockets of stagnant or low velocity gas; • Boiler passes are progressively decreased in volume so that the gas velocity increases through the boiler; and • The design of the boiler ensures that boundary layers of slow moving gas are prevented.
Prevention of boiler fouling	The boiler has been designed with the following control methods to prevent fouling: • Uniform waste feeding and combustion rates; • Supply of uniform and homogeneous waste feedstocks; • High degree of control over combustion air; and • On-line cleaning (steam or compressed air soot blowing) and off-line cleaning.
NOx reduction techniques may also help to minimise dioxin emissions.	NOx reduction is achieved through the use of SNCR, possible SCR, and flue gas recirculation. All NOx limits are within BAT ELV's.
Minimising releases to water from boilers	
Reducing boiler blow down	• System uses oil-based ORC system. This prevents the use of boiler water and minimised overall water use.
Reduction in water treatment and de-ionisation plant effluent.	• As above
Treatment of wash water and cleaning solutions.	• As above

3.9 Energy Recovery

Energy recovery is achieved through the use of an Organic Rankine Cycle (ORC) that utilises thermal oil as a working medium. Thermal oil is pre-heated in a regenerator, further heated and vaporised through a heat exchanger and used to drive a turbine and electric generator. The vapour is then condensed, with all latent heat being used to pre-heat the thermal oil via an economiser / regenerator. The condensed liquid is then pumped back and cooled through air-cooled condensers and reused.

The configuration of the boiler will be a horizontal self-cleaning design which allows for online boiler cleaning. Online cleaning will be undertaken by means of compressed air reverse jets, whereby pulses of compressed air dislodge particulates which have adhered to the surface of the boiler.

Additional off-line boiler cleaning will also be undertaken as part of scheduled maintenance activities.

Figure 3.4: Turboden ORC unit

The Facility comprises a single-line incineration process, including a single thermal oil boiler serving an ORC turbine. The turbine is designed to generate a gross electrical output of 4.64 MWe of electricity (ISO conditions). The rotating mechanical energy produced by the turbine is converted to electrical energy by the alternator for supplying to the National Grid.

The plant has a corresponding parasitic load of approximately 0.75MWe resulting in a net electrical export of approximately 3.9 MWe, for export to the adjacent Industrial Park and the National Grid.

When configured as a CHP the plant will have the potential to export up to 10 MWth of heat, subject to technical and economic feasibility.

The turbine selection has been based upon its high efficiency availability and reliability. To enhance the efficiency the plant is designed as CHP-R. The plant is designed with connections for high and low temperature heat take-off. The plant is fully ready for heat export as installed from the outset of operations.

Waste heat use

Heat will be reused to heat the process buildings and offices and the warming and drying of the prepared feedstock. The plant will be registered for RHI and CHPQA. It is classified as CHP ready in accordance with the latest Guidance.

Grid Connection

This is the point at which the main electricity cables from the high voltage side of the transformers connect to Grid via the local networks system. This connection is to be underground and meets with the statutory requirements for connections of this kind. Electricity will hence be exported to the National Grid and Industrial Park.

3.10 Ash Removal System

Incinerator Bottom Ash (IBA)

Bottom ash arising from the complete combustion and burn out of the wastes exits the bottom on the grate and is quenched. The ash quench both cools and moistens the bottom ash to limit particulate emissions (dust generation) and to reduce fire risk or damage to the conveying equipment.

The initial handling and quenching of the IBA at the Facility will be undertaken in an enclosed building.

Following quenching, the ash is transferred and stored within sealed containers (Roll-On/Roll-Off) 40 yd RoRo skips, prior to transfer off-site for processing and recycling.

Air Pollution Control residues

Air Pollution Control residues (APCr) comprises the fine particulate and reagent residues from the flue gas treatment process. The APCr will be transferred via enclosed conveyor to sealed containers (40 yd Ro-Ro skips) adjacent to the flue gas treatment process. All APCr skips and containers are fully sealed to prevent fugitive emissions.

All ash products arising from the site will be processed and recycled into the aggregates and construction markets.

3.11 Start-up Burner

To comply with the 850°C / 2 second IED requirements, the facility will have an auxiliary start-up burner mounted to the main combustion chamber of the grate.

The auxiliary burners will raise the temperature within the combustion chamber to the 850°C prior to feeding RDF. The auxiliary burners will typically operate for up to 16 hours during a start-up event and 1 hour during a shutdown event. It is anticipated that there will be around 2 start-ups per year per line due to planned maintenance activities. Interlocks will prevent the feed of RDF until the temperature within the combustion chamber has reached 850°C.

During normal operation, if the temperature falls below 850°C, the low NOx auxiliary burners will be initiated to maintain the temperature above this minimum. Air flow for combustion is controlled by the combustion control system and is based on measuring oxygen content in the flue gas and/or monitoring the energy demand of the boilers.

Start-up emissions control

There is an interlock preventing the addition of fuel to the combustion chamber should the temperature in the secondary combustion chamber be below 850^{o}C. The secondary combustion chamber is preheated to 850^{o}C using gas, also warmed is the main boiler and flue gas clean-up system as part of the start-up emissions control.

The exhaust gas recirculation system will be used from the outset of a start-up sequence to help speed this process of warmup. There is no additional flare installed nor needed by the process.

During conditions of start-up the emissions will be fully treated within the process air pollution control

equipment before discharge to atmosphere via the main stack. There are no bypass ducts nor flares required.

Table 3.6: Expected flue gas emissions from auxiliary fuel		
Flue gas constituents	Units	Value[6]
NOx	mg/Nm^3	< 200
Carbon Monoxide (CO)	mg/Nm^3	< 50

3.12 Flue Gas Treatment

The flue gas generated by the process will enter a cleaning system. The flue gas treatment stages consist of the following:

- DeNOx system:
  - Recirculation of flue gases;
  - Selective Non-Catalytic Reduction (SNCR) through urea injection within the combustion chamber.
- Dry flue gas scrubbing using sodium bicarbonate and activated carbon;
- Baghouse or ceramic filtration for reducing dust particulate quantity in flue gases;
- ID Fan;
- 35m high multi flue Stack (A1); and
- Continuous Flue Gas Monitoring system to monitor all dust and gas emissions.

The plant has been designed to ensure compliance with the New Plant Waste Incineration BREF Guidance Emission Limit Vales (ELVs).

DeNOx System

Achieving the new plant BREF Emission Limit Values is achieved with the primary control measures of controlled two stage combustion and use of Selective Non-Catalytic Reduction (SNCR) technology with injection of 40% urea solution into the hot flue gases.

Acid Gas Removal

Prior to the filters, sodium bicarbonate is injected to enable to neutralisation of SO_2, HCl and HF acids in the flue gas. The advantage of dry flue gas scrubbing is that there is no waste water from the process.

Sodium bicarbonate is metered and injected into flue gas duct, where it reacts with and neutralises acid gases such as HCl, HF and SO_2. Activated carbon is also injected into flue gases in order to remove any residual PCCD / DF, PAH, PCB and Hg (heavy metals).

[6] Concentration at the following corrected conditions: 273°K, 101.3 kPa, 6% O_2 dry base

Bag Filters

Flue gases are cleaned by a dry flue gas filtration unit consisting of bag filters with automatic pneumatic blow-down cleaning.

Flue gases enter the filter from the side chamber where large particles are eliminated. Afterwards gases pass through the material of the filter where small particles are trapped. The filter bags are supported by the filter cage, which prevents them from deforming due to pressure difference. Dust is collected on the outside of the filter from where it is removed by compressed air (4-6 bar) blown down from above and through the filters. Dust is collected at the bottom of the filter chamber.

The site may use ceramic filters instead of bag filters, though this will not effect system performance. This is because ceramic has a higher heat tolerance for potential high flue gas temps if the system has to bypass ECO's. The final selection will be borne out of detailed design before installation.

ID Fan

The ID-fan is placed between the filter and the stack. The ID-fan serves two purposes:

- Maintaining the desired pressure level in the gasifier and boiler; and
- Overcoming the pressure drop generated in the ducts, the silencer, and the bag / ceramic filtration system.

Stack (A1)

There will be a single wind shield stack (35m) for the discharge of cleaned flue-gas to atmosphere.

The height of the stack has been increased to 35m, further aiding dispersion. There will be an emission monitoring position built into the stack in accordance with EA Monitoring Guidance. The modelling has been completely revisited in the light of the technology change to meet the current standards.

All emissions from the stack will be monitored using a fully compliant MCERTS accredited Continuous Emissions Monitoring System (CEMS) which meets the requirements of BS EN 15259.

The CEMS will be IED complaint and monitor HCl, NOx, NH_3, O_2, SO_2, VOC, particulates, H_2O, temperature, pressure, and flow. TOC will be analysed by a Flame Ionisation Detector. HF will be calculated through the measurement of HCl as a surrogate.

Failure of the MCERTs monitoring equipment or the recording of a level of emissions higher than that permitted will result in a pre-programmed shutdown of the plant.

3.13 Water Treatment Plant

Due to the nature of the plant (oil-based ORC, dry gas treatment etc) process water emissions are limited to process area wash down, contaminated rain water etc, and harvested for use within the ash quench system.

To minimise the consumption of water the process, including the air-cooled condensers and the fire suppression system, uses rainwater from the process building roof rainwater harvesting system to reduce

the need for mains water. Most of the rainfall upon the roof of the site is available for use within the process through this recovery system.

3.14 Controls and Environmental Management System

The site shall be operated in accordance with corporate standards and procedures as part of a wider Environmental Management System. The system will be designed to meet the requirements of ISO14001:2015.

All aspects of the operation will be managed in accordance with a formal Environmental Management and Working Plan. The plan will define all activities throughout the lifecycle of the treatment process (i.e., pre-acceptance, acceptance, reception).

The Environmental Management and Working Plan will be structured to meet the requirements of the Environmental Permitting Regulations and associated pollution prevention guidance.

The EMS will be designed to ensure:

- The identification of all foreseeable environmental impacts and risk that the Operators activities pose to the environment.
- Prevention or minimisation of any identified risks to practical minimum.
- Legal Compliance assurance.
- Identification of risks of pollution including those arising from operations, maintenance, accidents, incidents, non-conformances, and complaints, and how these will be minimised.
- Activities at the site will be managed in accordance with the management system, which will be subject to continuous review, audit, and improvement. Specific detailed management system reviews will take place if there is a significant change to the activities, following an accident or if a non-compliance is found.
- Furthermore, the whole management system will be subject to annual external audit by competent third parties.
- The key aspects of the EMS for the site will include:
  - Preventative maintenance;
  - Operator requirements;
  - Training and Competence;
  - Emergency response and incident management; and
  - Monitoring, measurement, and reporting.

The environment management system and procedures will be written to ensure that the environmental risk and impact of the normal running of the site activities are documented and minimised.

The EMS will be fully developed, implemented and in operation at the time of plant commissioning and permit issue and a copy of the management system will be kept at a convenient location on site. Please find a copy of the EMS Summary provided within *Annex B – EMS Summary.*

Site Maintenance

All maintenance activities on site will be carried out in accordance with the manufacturers' recommendations and will be integrated within the company's environmental management system.

The key aspects of the maintenance management programme will include:

- A programme of Planned Preventative Maintenance (PPM) is undertaken to ensure ongoing management and replacement of key plant and equipment rather than waiting for the equipment to fail and the maintenance of any critical environmental equipment.
- The inspection and maintenance schedules that the manufacturer recommends are adhered to, including any period of recommended shut-down.
- Predictive maintenance (e.g., assessment of vibration from bearings in motors) is carried out to prevent any catastrophic breakdown.
- Real time data collection and plant condition monitoring.

The detailed management system operated by the site will include procedures for ensuring that adequate maintenance is undertaken at the site.

The maintenance programme will ensure that all equipment or infrastructure that is deemed essential in the prevention of pollution to the environment (e.g., hard-standing, bunds, abatement plant etc.) or the prevention of local nuisance impacts (e.g., noise abatement equipment etc.) is maintained and kept in good operating condition.

All maintenance activities for critical pollution control equipment (abatement etc.) will form a key part of the certified EMS that will be established prior to the commencement of operations at site.

During planned periods of maintenance, if any of the following situations arise, waste will cease to be charged until normal operations can be restored:

- Continuous monitoring shows that emissions are exceeding any ELVs due to failure of the abatement systems or CEMS are out of service for a total of 4 hours;
- The cumulative duration of the periods of abnormal operation over 1 calendar year has reached 60 hours; or
- The continuous emission monitors are unavailable.

The planned period of abnormal operation will end at the earliest of the following:

- When the failed equipment is repaired and brought back into normal operation;
- When the operator initiates a shutdown of the combustion activity;
- When a period of four hours has elapsed from the start of the period of abnormal operation; or
- When, in any calendar year, an aggregate of 60 hours has been reached for planned periods of abnormal operation.

3.15 Operator Competence

The facility will be fully automated to the point that all process activities will be PLC controlled and DCS monitored. The installation will have on-line monitoring which can be administered remotely to ensure the process is optimised and operating correctly.

Notwithstanding the above, the site will be staffed at all times by the Operations team. The primary role of day staff is to ensure and oversee plant loading operations, fuel transfers and management.

Additional activities will include general site housekeeping and administration activities. Additional staff attending the site will be visiting engineers from the equipment manufacturers who are adequately trained to perform their duties at site. The site operator will maintain written operation instructions for all plant and monitoring equipment present on site.

All personnel working at the facility will be trained in the necessary sections of the EMS and any associated Procedures. All staff working for and on the behalf of the site will be suitably trained and competent (e.g., professional maintenance engineers, electricians, equipment operators etc.).

The Operations Team will employ on a full-time basis a site manager / technically competent person who holds the necessary qualifications.

No operations (pre-conditional or otherwise) that involve the acceptance, handling or processing of any wastes will take place without a technically competent person being employed by the Operator.

Operational Times

The site will be operated on a continuous 24/7 basis.

Deliveries with the transfer of waste to and from the site shall be carried out in accordance with the schedule below:

- Monday – Friday: 07:00 – 19:00;
- Saturday: 08:00 – 18:00; and
- Sunday and Bank Holidays: No deliveries.

In addition to the above core hours, the facility will also need to be available to receive waste in emergencies and in the event of unforeseen delays.

Additional activities will include general site housekeeping and administration activities. The site will maintain written operation instructions for all plant and monitoring equipment present on site.

All personnel working at the facility will be trained in the necessary sections of the Working Plan and associated Procedures.

3.16 Site Security

The site will consist of the relevant security measures including:

- A perimeter fence which will be inspected periodically to ensure that the site security has not been compromised;
- CCTV monitoring of the external and internal areas of the Installation;
- External on-line monitoring and administration of the process from a remote location;
- All personnel and vehicles entering the site are strictly controlled and managed; and
- No vehicles or personnel will be allowed access to the facility without prior authorisation.

3.17 Accidents and Emergencies

Fire Protection Strategy

The fire protection strategy for the Installation includes the fire mitigation and suppression measures listed overleaf:

- An automatic fire detection and alarm system will be installed;
- An automatic suppression system will be installed;
- A suitable number of manual break-glass call points will be installed;
- Appropriate first aid fire-fighting equipment will be provided throughout the site;
- Planning inspection, maintenance and testing procedures will be established and used to ensure that all fire protection systems can be operated effectively. A component person will regularly test and inspect all fire safety equipment, installations, and systems; and
- Fire extinguishers throughout the plant and in the control and electrical room areas.

All escape routes will be designed as per the building regulations and Fire and Service Rescue Acts.

Fire Prevention Plan

The site has developed a Fire Prevention Plan that complies with the Environment Agency Guidance *'Fire prevention plans: environmental permits.'*

The Fire Prevention Plan relates to the internal storage of all fuel product and provides the necessary information on site infrastructure, storage locations, storage practices, monitoring equipment and emergency response procedures.

The Fire Prevention Plan is included as part of *Annex D – Fire Prevention Plan.*

Accident Management Plan

The Applicant has developed a draft Accident Management Plan based around the specific risks associated with the site operations.

The key aspects of the Sites Accident Management Plan are:

- Reviewed by the Site Management annually and as soon as practicable after an accident.
- Considers hazards presented by:
  - Emergency shut-down procedures;
  - Actions in case of fire/explosion;
  - Actions in case of fire/emergencies;
  - Contaminated firewater;
  - Failure of any equipment;
  - Failure of abatement plant;

  - Spillages and uncontrolled release;
  - Plant or equipment failure (e.g., over-pressure of vessels and pipework, blocked drains);
  - Vandalism; and
  - Flooding.
- Identify events or failures that could damage the environment.
- Assesses the likelihood and the potential environmental consequences from accidents at the site.
- Proposes action to minimise the potential causes and consequences of accidents.

In the event of an accident, the EA will be immediately informed and necessary measures to limit the environmental impact of the accident will be carried out, as well as measures to prevent further possible accidents.

Specific emergency response procedures will be developed by the Operator in conjunction with the plant manufacturer. These procedures will be completed prior to operations commencing at the site.

Incident Reporting

The reporting of incidents and non-conformities will form a key component of the companies Environmental Management System. Identified non-conformities under the system include, but are not limited to the following:

- Uncontrolled leaks and spillages of any materials with the potential to cause pollution to the environment (hydraulic fluid / oils, unabated dust emission to atmosphere);
- Non-compliance to any permitted condition or consent limit (emissions excursions, missing of reporting deadlines, breach of any permitted consent limits);
- Internal Audit findings (legal non-compliances, EMS procedural breaches, system non-compliances);
- External and Internal Complaints; and
- Whenever a plant malfunction, breakdown or failure, or any near miss occurs.

The company's EMS will undergo periodic external audit and review to ensure that both compliance and continuous improvement is achieved. The EMS requires that all identified incidents and non-conformities will be investigated and closed out.

All plant and equipment will be PLC controlled, monitored, and alarmed using an advanced DCS system, thus ensuring that continuous plant diagnostics can be facilitated.

Furthermore, the site management system will have documented procedures and registers to:

- Ensure that any members of the public/residents are alerted and informed if a significant plant issue arises (fire, explosion etc);
- Record, report and investigate any internal or external complaints to ensure that any necessary measures are taken to prevent, or where that is not possible to minimise, the causes; and

Inform any members of the public about the nature of the site, key contacts, and sources of further information.

4. EMISSIONS & THEIR ABATEMENT

4.1 Point Source Emissions to Air

Point-source Emissions to Air

All point source emissions from the plant will be through a single 35m high stack and are detailed in the table below. This table provides details of the predicted emissions parameters, concentrations, and source.

All concentrations from the plant will be in line with those ELV's specified in the Waste Incineration BREF. Detailed emission modelling to full WI BREF requirements has been carried out as part of this Application.

All details are provided within the *Annex H1 – HHRA* and *Annex H2 – AQA.*

Table 4.1 provides the stack location and release characteristics associated with Stack A1.

Table 4.1: Air Emissions Release characteristics (A1)		
Reference	Main stack	
Stack Location (grid reference)	SX 49895 62350	
Stack Height (m)	35	
Stack Diameter (m)	1	
Efflux Temperature (^{o}C)	185	
Flue Gas Volumetric Flowrate (As Measured m^3hr^{-1})	44,784	
Flue Gas Volumetric Flowrate (As Measured m^3s^{-1})	12.44	
Efflux Velocity (ms^{-1})	15.84	
Flue Gas Volumetric Flowrate Nm^3hr^{-1} (11% O_2, dry, STP)	38,136	
Pollutant Concentration / Mass Release	$mgNm^{-3}$	gs^{-1}
Oxides of Nitrogen (NOx)	120	1.27
Nitrogen Dioxide (NO_2)*	60	0.635
Particulates (PM_{10})	5	0.053
Carbon Monoxide (CO)	50	0.530
Sulphur Dioxide (SO_2)	30	0.318
Hydrogen Chloride (HCl)	6	0.0636
Hydrogen Fluoride (HF)	1	0.0106
Volatile Organic Compounds (VOC)	10	0.106
Ammonia (NH_3)	10	0.106
Cadmium and Thallium (Cd and Tl)	0.02	0.000212
Mercury and its compounds (Hg)	0.02	0.000212
Group 3 metals (Pb, Ab, As, Cr, Co, Cu, Mn, Ni, V)	0.3	0.00318
Dioxin and Furans	0.00000004	4.24×10^{-10}
Combined Dioxins, Furans, and PCBs	0.00000006	6.36×10^{-10}
Benzo[a]Pyrene (for PAH)	0.001	0.0000106

* Assumes 50% conversion of NOx to NO_2 in the short-term, in line with Environment Agency guidance

HF has been included and is modelled, as it is a controlled emission under WID. The raw materials and high efficiency scrubbing equipment to be used means however, that the emission of HF is anticipated to be zero.

Control of HF will be demonstrated through control of HCl emissions. Hence an exemption from the continuous monitoring of this pollutant is requested under the permissible exemptions. A formal request for the confirmation as with the current plant of removal of the need for continuous HF monitoring is included within the *Annex H* in accordance with the Directive and Agency requirements and Guidance.

The following table summarises the BAT justifications regarding the emissions from site.

Table 4.2 BAT Justification for Emissions to Air

Indicative BAT	Justification
Emissions identification and benchmark comparison	The emissions benchmarks in the Sector Guidance Note can be met.
Vent & chimney height dispersion capacity and assessment of emitted substances fate in the environment	An impact assessment has been carried out and is referenced in Section 7 of this document.
Visible particulate plumes	Controlled by the particulate abatement system (bag/ceramic filter system).
Visible condensed water plumes	There will be no visible plume from the facility under a majority of climatic conditions.
Particulate matter	Controlled by the particulate abatement system (bag/ceramic filter system).
NOx - Primary Measures	
Fuel selection	Gas Oil / Diesel used for start-up burners
Combustion chamber design	This is compliant with IED and represents BAT.
Air control – primary and secondary	Automated air control at the point of final combustion – dilution air valve
Temperature control	Temperature control is a key aspect of the control system, as is a uniform temperature gradient.
NOx – Secondary measures	
Flue gas recirculation	This will be used and is considered BAT.
SNCR	SNCR will be used and is considered BAT.
SCR	SCR is not required in order to meet and comply with the BAT ELVs. BAT is met.
Acid gases and halogens	
Primary acid gas measures	The waste feed will exclude hazardous waste and will not contain significantly chlorinated or halogenated components. Each supplier is governed by the fuel specification and supply contract.
Secondary acid gas measures	Sodium bicarbonate and PAC injection will be used in order to control acid gases.
Alkaline reagent selection	Sodium bicarbonate has been chosen because it is easier to handle and is more efficient than lime.
Acid gas control: cost/benefit study	As this installation is a newly built facility, all measures employed are BAT, for this reason a cost benefit study on the merits of primary and secondary measures is not required. Careful consideration has been made during the design stage of this project to ensure that releases

	of acid gases and halogens are well managed by appropriate primary and secondary measures.
Carbon Dioxide	All measures to increase energy efficiency will also reduce CO_2 emissions.
Carbon monoxide and VOCs	CO is not significantly influenced by the conventionally employed abatement techniques. Reduction of both CO and VOCs is achieved by control of conditions in the combustor.
Dioxins and Furans	The primary method of reducing the emissions of dioxins is by careful control of the conditions in the combustor. Boiler residence time is controlled to minimise de novo formation. PAC injection will remove dioxins and furans from the gas phase, followed by bag/ceramic filters which will provide efficient particulate abatement.
Metals	PAC gives reliable and effective heavy metal (e.g., mercury) reductions, and for the majority of metals particulate abatement is the main means of ensuring that releases are minimised.

A full commissioning and acceptance programme will be carried out by the operator and the technology supplier as part of the plant installation and handover. Prior to the commissioning of the plant and at least 3 months before the site is hot commissioned on wase fuels, a detailed commissioning programme will be submitted to the EA for approval.

This programme will be devised by the installation contractor in conjunction with the operator and agreed with the EA as part of a pre-operation condition.

4.2 Fugitive Air Emissions

Sources

There is potential for fugitive dust emissions to be generated from the storage and management of feedstock within the fuel reception hall. Any duct produced by the plant will be contained within the building and will be controlled via appropriate equipment design, dust suppression systems-controlled air extraction, and a preventative maintenance programme. Ventilation systems will be employed that filter air prior to emission from the building where appropriate.

All storage of powdered raw material, by-products and wastes will be contained within sealed silos and skips. Dust emissions arising from the storage and management of IBA is prevented through the use of wet quenching methods.

The onsite storage of liquids in tanks is from the storage of urea, lubricating oil, waste oil, diesel for mobile plant and equipment. These materials and storage vessels are unlikely to generate any fugitive emissions of VOCs.

Table 4.3 shows the BAT justification for preventing fugitive emissions from the proposed development.

Table 4.3: BAT Justification for Fugitive Emissions	
Indicative BAT	Justification
Dust controls	
Covering of skips and vessels	There will be no open skips or vessels at the facility which could give rise to fugitive emissions.
Avoidance of outdoor or uncovered stockpiles (where possible)	There will be no outdoor or uncovered stockpiles which could give rise to fugitive emissions.
Where dust creation is unavoidable, use of sprays, binders, stockpile management techniques, windbreaks and so on	N/A
Regular wheel and road cleaning (avoiding transfer of pollution to water and wind blow)	Due to the nature of the operations, problems with wheel contamination are not expected to be significant. All areas of the site will have hardstanding.
Closed conveyors, pneumatic or screw conveying (noting the higher energy needs), minimising drops. Filters on the conveyors to clean the transport air prior to release	Feed systems are simple and enclosed.
Regular housekeeping	The site staff will be fully trained and regularly audited through the EMS to ensure that housekeeping measures are appropriate to the nature and scale of the activities and that there is minimum possibility of uncontrolled emissions.
The recycling of by-products	All waste will be removed from site by covered vehicles.
Enclosed containers or sealed bags used for smaller quantities of fine materials	No materials will be stored outside. Small volumes of materials for maintenance etc. shall be stored in appropriate containers, sealed so as to prevent fugitive emissions.
Mobile and stationary vacuum cleaning	Mobile and stationary vacuum cleaning will be used if necessary.
Closed storage with automatic handling system	All storage is closed and transferred using an automated handling system.
Sealed charging system	The charging system is fully enclosed.
VOC control measures	N/A

4.3 Point Source Emissions to Surface Waters and Sewers

There will be no direct process emissions to controlled water arising from the Installation.

Uncontaminated clean surface water runoff captured from roof drainage and external roadways / car parking areas will be harvested where possible, used with in the ash quenching systems or discharged to the surface water drainage system (W1).

In the event of a significant site fire, the facility has been designed to fully contain any firewater run-off. In the event of a fire within the bunkers, any water from the suppression system will be contained within the bunkers. In the event of a fire within the waste offloading area, the slab and floor areas are designed such that all firewater will be contained within the building. The building will have a bunding system to stop any potentially contaminated firewater escaping which will be finalised during detailed design. The firewater collected will be tankered off site for disposal.

The Site Drainage System is shown in *Annex A – Site Plans*.

Table 4.4 tabulates all point source emissions to surface water and sewer from the installation, along with justification as to whether these are considered insignificant or require further consideration. Site drainage plans and layouts are included in *Annex A* and drainage is discussed within *Annex L2*.

Table 4.4: Point source emissions to surface water and sewer				
Emission Point Reference	Activity Generating Discharge	Discharge Receiving Type	Name of Receiving Water	Need for Further Consideration and Justification
W1	Surface runoff – non-process areas (clean water runoff)	Surface/Storm sewer	Unnamed tributary of River Tamar	No – uncontaminated surface water run-off only discharged through attenuation and interceptor
S1	Domestic effluent	Sewer	Foul sewer	Discharged in accordance with existing discharge permit from SW Water. *Annex L2*

Uncontaminated clean surface water runoff captured from roof drainage and external roadways / car parking areas will be discharged via an oil separator to a dry ditch (W1).

Table 4.5 below summarises the BAT justification for emissions to water and emissions to groundwater.

Table 4.5 BAT Justification for Emissions to Water	
Indicative BAT	Justification
Water use	Water use will be minimised and recycled where possible.
Contamination identification and fate analysis	Sampling, monitoring and analysis will be carried out, once the installation is operational, in agreement with the Agency.
Filtration	No further filtration necessary.
Off-site treatment	No off-site treatment.
Benchmark comparison - Control of emissions to meet EQS and WID requirements	IED Chapter IV requirements do not apply.
BAT Justification for Emissions to Groundwater	
Identification of List I substances	n/a
Identification of List II substances	n/a
Prior Investigation	Please refer to *Annex C – Site Condition Report*
Surveillance	n/a

Off-site treatment

All mixed effluent discharge to the main sewer (S1) goes for treatment at an appropriate sewage treatment works operated by South West Water.

Surface water management

General surface water runoff from the roofs is collected for use within the installation in the ash cooling systems. This runoff from the roofs will be collected in a tank with an overflow to the surface water drainage system. The rainwater from most of the roof of the development area will be recovered for use in the process. This represents the sustainable drainage system (SUDS) applicable to this phase of the development in accordance with the surface water drainage strategy.

The installation is within a custom building and land less than 10,240m^2 in size but will be covered by impermeable surfaces for 100% of the site, whether by buildings or hardstanding.

In the event of an accidental spillage in the yard area there is and interceptor, penstock valve and the ability to block any drains and contain any spillage. The building itself will act as a bund. Spill kits and sorbents will be available. This would also act as a detention basin for fire waters in the event of a fire at the installation.

4.4 Fugitive Emissions to Surface Waters and Sewer

Techniques to prevent fugitive discharges to surface water, sewer, and groundwater through the site surface from potentially polluting areas are discussed in detail in Site Condition Report (*Annex C*).

4.5 Emissions to Land

There will be no emissions to groundwater or land arising from the Installation. The site is entirely covered with hard standing, and all effluent / water emissions controlled.

4.6 Odour

Due to the design of the building structure and the fully enclosed processing activities, there is very little potential for offsite odour emissions and impacts to arise from the site. Furthermore, the fundamental design of the facility has a hierarchy of odour control and abatement measures to ensure that the potential for odour impacts is eliminated.

Entry to the Reception Hall is via electrically controlled fast acting roller shutter doors so that no air will escape. Vehicles will enter backwards and discharge the waste. The vehicles will only discharge the waste when the roller shutter doors are closed.

To avoid any odour emissions from the Fuel Reception Building (encompassing the reception hall and pre-treatment areas), the building is kept at slight negative pressure. An air extraction system will be in place resulting in odorous air within the building being thermally destroyed by the combustion system.

Although it is considered that there is very little potential for odour emissions from site due to the control measures described above, an Odour Management Plan has been produced as part of the sites Environmental Management System. Please refer to *Annex F – Odour Management Plan* for more information.

Table 4.6: Odour Management Summary		
Tier	Reference	Description
1	Inventory Control	The Installation will process a maximum of 60,000 tonnes per annum of RDF. The site will be operated such that there is never more than 4 days' inventory awaiting processing and will be managed in a manner that prevents wastes being accepted into the site in the event that the site is inoperable. All wastes accepted on site will be required to be pre-declared and be deemed acceptable by the site manager prior to the transportation and delivery to site. All waste accepted on site will be inspected on arrival to ensure compliance with the agreed *'Waste Declaration Form'* and do not have any malodourous properties. Waste Acceptance and inventory controls will be covered in the sites waste acceptance procedures. The delivery and reception of waste is a fully enclosed process and will not produce any odour emissions.
2	Enclosed Building	Entry to the waste reception area is via electrically controlled fast acting roller shutter doors. Vehicles will enter backwards and discharge the waste onto the floor of the waste reception hall. The doors are complete with air curtains to prevent any odorous emissions escaping during the unloading of waste. Once unloaded the vehicles will exit the building and the roller shutter doors are closed.
3	Controlled Extraction System	To avoid any odour emissions from the Fuel Reception Hall, the building is kept at slight negative pressure. An air extraction system will be in place resulting in odorous air within the building being thermally destroyed by the combustion system.

Although no odour from the plant is anticipated, odour shall be monitored daily at points around the site boundary and observations shall be noted in the site diary and/or on a daily monitoring document.

In the unlikely event that there is any discernible odour detected at the site boundary and the odour is judged to be 'moderate' (i.e., odour Intensity Rank 3), then the Site Manager will be notified immediately, and the olfactory survey will continue to attempt to determine the source and extent of the odour plume, as follows:

- A suitable location downwind of the site and potentially sensitive receptor at which the odour plume is unlikely to extend will be selected for assessment;
- Survey will continue toward the facility until a site-related odour is perceived; and
- Assessment points perpendicular to the plume axis and equidistant from the site will then be monitored, subject to access requirements.

The main aim of monitoring will be to test if any odours emitted from the site will be causing the nearest receptors nuisance. In scenarios where nuisance is being caused then operations will be suspended until the conditions improve. The Site Manager may deem it necessary to find the precise source of the odour and attempt to eliminate it or neutralise it immediately.

The following table shows the BAT justification for odour prevention on site.

Table 4.7: BAT Justification for Odour Management	
Indicative BAT	**Justification**
Containment. The Operator should maintain the containment and manage the operations to prevent its release at all times.	Entry to the waste reception area is via electrically controlled fast acting roller shutter doors. Vehicles will enter backwards and discharge the waste onto the floor of the waste reception hall. The doors are complete with air curtains to prevent any odorous emissions escaping during the unloading of waste. Once unloaded the vehicles will exit the building and the roller shutter doors are closed.
Assessment and Management	
For existing installations, the releases should be modelled to demonstrate the odour impact at sensitive receptors. The target should be to minimise the frequency of exposure to ground level concentrations that are likely to cause annoyance.	N/A – not an existing installation.
For new installations, or for significant changes, the releases should be modelled, and it is expected that the Operator will achieve the highest level of protection that is achievable with BAT from the outset.	Dispersion modelling has been undertaken for combustion gases from the facility. No assessment for dust is considered necessary as RDF materials are not inherently dusty and stored internally within the Fuel Reception Hall. Odour is considered low risk and is controlled by the onsite measures therefore no odour modelling is considered necessary however an odour management plan has been produced.
Where there is no history of odour problems then modelling may not be required although it should be remembered that there can still be an underlying level of annoyance without complaints being made.	N/A
Where, despite all reasonable steps in the design of the plant, extreme weather or other incidents are liable, in the view of the Regulator, to increase the odour impact at receptors, the Operator should take appropriate and timely action, as agreed with the Regulator, to prevent further annoyance (these agreed actions will be defined either in the Permit or in an odour management statement).	N/A
Where odour generating activities take place in the open, (or potentially odorous materials are stored outside) a high level of management control and use of best practice will be expected.	N/A – no odour generating activities are taking place outside.
Where an installation releases odour but has a low environmental impact by virtue of its remoteness from sensitive receptors, it is expected that the Operator will work towards achieving the standards described in this Note, but the timescales allowed to achieve this might be adjusted according to the perceived risk.	N/A

Table 4.7: BAT Justification for Odour Management	
Indicative BAT	**Justification**
Specific Odour control techniques:	
Enclosing odorous areas (applicable to all).	All appropriate areas will be enclosed.
Enclosing odorous waste all the way to the furnace (ACI, CWI).	All appropriate areas will be enclosed.
Confining waste to designated areas (all).	Designated areas designed into the layout.
Ensuring that putrescible waste is incinerated within an appropriate timescale (MWI, CWI, ACI, SSI).	Storage times on site are minimised. No putrescible wastes will be processed on site.
Refrigeration of such waste which is to be stored for longer than an appropriate timescale (CWI, ACI).	N/A
Regular cleaning and (for putrescible wastes) disinfection of waste handling areas (all).	All areas will be regularly cleaned.
Design of areas to facilitate cleaning (all).	Facility is new and designed to ease cleaning.
Ensuring that the transport of waste and ash is in covered vehicles, where appropriate (all).	All vehicles will be covered.
Ensuring good dispersion at all times from any release points (all).	Release points have been designed aided by modelling to ensure adequate dispersion. The location and height have been optimised.
Preventing anaerobic conditions by aeration, turning of waste and short timescales (SSI, MWI).	Storage times are minimal hence this is not anticipated to be an issue.
Chlorination of waters being returned to STW or in storage (SSI) drawing air from odorous areas at a rate which will ensure that odour is captured (all) and treating such extracted air prior to release to destroy the odours - see below.	N/A
The use of these techniques should obviate the need for odour masking or counteractants.	No masking agents or counteractants have been specified at the plant.
Treatment of Odour	
The use of odorous air e.g., air from the waste handling area or air displaced from tanks, as furnace air is an ideal way of treating odours. The quantity of contaminated air that can be handled this way is obviously limited by the needs of the furnace. A disadvantage is the need to consider provision for odour control when the incinerator is not operating.	Odorous air is not anticipated to be a problem. Air from the Fuel Reception Hall is extracted into the combustion air system.
Biofilters.	Biofilters will neither be used nor required.
Scrubbing for odour control.	Scrubbing for odour control will not be required.
Carbon filters.	Carbon filters will not be required for odour control.

Table 4.7: BAT Justification for Odour Management	
Indicative BAT	Justification
For a new plant it would normally be the case that the imposition of conditions achieving BAT also secures that no significant pollution (including odour) is caused.	The proposed plant has no potential for significant odour pollution.

4.7 Noise Impacts

The site is located on a designated industrial development site within an existing building in Belliver Way, Roborough. There are a number of nearby residential receptors.

The design of the Installation has considered the potential impacts on the environmental and neighbouring receptors with regards to noise. The plant and building have been designed to abate and control noise, odour, and fugitive emissions. The building is fully enclosed and nominally air tight.

There are a number of potential noise sources at the Installation which remain as per the previous approved operations. The modifications to the site will not increase the impacts modelled and approved under previous operations. The site is located on a designated industrial development site within an existing building in Belliver Way, Roborough. There are a number of nearby residential receptors.

Potential noise sources at the installation include the following:

- Vehicle movements;
- Mechanical handler;
- Conveyors;
- Thermal treatment plant (fans/compressors);
- ORC;
- Exhaust stack; and associated emissions abatement plant;
- Chiller plant / Condenser fans; and
- Building Ventilation.

The processing plant and associated equipment has been designed in accordance with best practice and to ensure that internal noise does not present an issue to the employees at the site under the Control of Noise at Work Regulations and to ensure that noise breakout does not lead to noise nuisance at the identified sensitive receptors.

A noise assessment in accordance with statutory noise guidance has been carried out, including detailed modelling shown in *Annex I – Noise Impact Assessment.*

The report concludes that the total, aggregate environmental noise impact arising from the proposed operation of the plant, in full compliance with the plant noise specification as presented within the report, results in a “low” noise impact at the worst affected noise sensitive receptors, all as assessed in accordance with British Standard BS4142: 2014+A1: 2019.

Table 4.8 below shows the BAT justification for noise prevention on site.

Table 4.8: BAT Justification for Noise	
Indicative BAT	**Justification**
Maintenance • Plant • Equipment • Fans • Bearings • Vents • Building Fabric • Other	Appropriate preventative maintenance will be provided for the various elements of the installation. This will ensure no deterioration of plant or equipment that would give rise to increases in noise.
Control Techniques and comparison with BAT indicative thresholds	Control techniques will be in line with BAT. The noisiest equipment is housed in acoustic enclosures and / or within separate appropriately signed and controlled acoustic housings.
Reasonable Cause for Annoyance – Sensitive Receptors/Complaints?	The facility will not give rise to reasonable cause for annoyance. In the unlikely event that complaints are received measures described in the integrated management system will be put in place.
Noise Survey	A noise assessment in accordance with statutory noise guidance has been carried out, including detailed modelling shown in *Annex I – Noise Impact Assessment.*

4.8 Waste Generation and Management

Types and Amounts of Waste

The close coupled combustion process will not inherently produce significant quantities of waste.

The main solid by-products produced from the operation of the combustion facility will be:

- Bottom Ash; and
- APC Residue (Air Pollution Control (APC) residues).

Bottom ash from the system will be handled by a water-cooled screw-type ash transporter used for the transport and cooling of the ash. Ash is then stored within an ash container prior to transfer off site.

APC residue is removed from the filtration unit and collected within a closed skip prior to transport off site.

Table 4.9 below shows a tabular summary of site wastes.

Table 4.9: Waste Summary					
Waste	EWC Code	Approx. Quant (tonnes/yr)	Source	R / D Code	Environmental Fate
Incinerator Bottom Ash [7]	10 01 15	12,600	Combustion Plant	R5 (Off site recycling)	Reused as a re-cycled aggregate
Fly Ash (Air Pollution Control (APC) residues)8	19 01 05*	3,000	Gas Clean-up Equipment	R5 (Off site recycling)	Exported off site to an appropriate waste disposal facility

All waste produced at the site will be sampled and analysed. Additional samples will be taken if the disposal or recovery route changes or it is suspected that the nature or composition of the waste has changed such that it may no longer be appropriate for its environmental fate.

Throughput of Waste

The facility principally combusts non-reactive non-hazardous solid waste as a means to generate heat which is recovered to generate electricity.

All wastes will be sourced from commercial and industrial sources and will predominantly comprise Refuse Derived Fuel (RDF) that can form a fuel that meets with the plant's specification.

The Installation has been designed to process a maximum of 60,000 tonnes per annum of non-hazardous RDF.

Under 11B of the Waste Framework Directive, the Installation activities fall under the generic description D1.

Waste Storage

The design of the installation has considered the potential impacts on the environmental and neighbouring receptors.

All incoming fuel feedstocks will be stored within the Fuel Reception Hall. All other waste materials, will be clearly identified, sealed, and stored internally within a secured area protected by secondary containment.

Table 4.10 summarises the BAT justification for the proposed storage on site.

Table 4.10: BAT Justification for Storage on Site	
Indicative BAT	Justification
Subsurface structures	N/A
Appropriate surfacing and containment or drainage facilities for all operational areas, taking into consideration collection capacities, surface thicknesses, strength/reinforcement; falls, materials of construction, permeability, resistance to chemical attack, and inspection and maintenance procedures;	Surfacing has been designed in accordance with the CIRIA design standards. There is no open ground in the process area. All joints are sealed. The surfacing is designed to ensure that it is of the appropriate strength, reinforcement, and thickness to withstand the heavy traffic which will pass over it during operations.

7 Approximately 20% of annual waste throughput
8 Approximately 5% of annual waste throughput

Table 4.10: BAT Justification for Storage on Site	
Indicative BAT	**Justification**
• have an inspection and maintenance programme for impervious surfaces and containment facilities; • unless the risk is negligible, have improvement plans in place where operational areas have not been equipped with: – an impervious surface – spill containment kerbs – sealed construction joints – connection to a sealed drainage system	The installation will have an extensive maintenance programme in place which will include provision for the inspection of all appropriate plant and structures. The detailed inspection of the impervious surfaces and containment will be in line with the construction engineer's recommendations. Routine inspections will be undertaken on a daily basis by site personnel as part of the daily site checks. BAT will be demonstrated from commencement of operations.
Above-ground tanks	Above ground bulk storage tanks containing liquids will be appropriately constructed to ISO Standards. Supervised deliveries will ensure that the risk of contamination of surface water is negligible. All tanks and facilities containing potentially contaminative substances will be installed with secondary containment and be designed to comply with the necessary standards and guidance requirements.
Storage areas (IBCs, drums, bags etc.) Storage areas should be located away from watercourses and sensitive boundaries, (e.g., those with public access) and should be protected against vandalism. Storage areas should have appropriate signs and notices and be clearly marked-out, and all containers and packages should be clearly labelled. Where spillage of any stored substance could be harmful to the environment, the area should be appropriately kerbed or bunded. The maximum storage capacity of storage areas should be stated and not exceeded, and the maximum storage period for containers should be specified and adhered to. • Appropriate storage facilities should be provided for substances with special requirements (e.g., flammable, sensitive to heat or light) and formal arrangements should be in hand to keep separate packages containing incompatible substances (both "pure" and waste). • Containers should be stored with lids, caps and valves secured and in place - and this also applies to emptied containers. • All stocks of containers, drums and small packages should be regularly inspected (at least weekly).	All non-bulk storage (IBCs, Barrels etc.), where used, shall be stored within the fully contained building. In the event of a release, it is not possible for the materials to enter the surface water drainage system.

Table 4.10: BAT Justification for Storage on Site	
Indicative BAT	Justification
• Procedures should be in place to deal with damaged or leaking containers.	

5. ENVIRONMENTAL MONITORING

5.1 Emissions to Air

All emissions to atmosphere, as discussed in section 6 will arise from the main plant stack.

The plant will have continuous emissions monitors (CEMS) located on the exhaust flue of the plant (Emission Point A1).

The CEMS system will monitor the stack emissions and provide data reporting. The system features a single-point extraction and includes monitors for CO, O_2, NOx, SO_2, ammonia slip, and dust.

The CEMS will be WI BREF compliant and continuously monitor, HCl, NO, NO_2, N_2O, NOx, NH_3, O_2, SO_2, CO, VOC, particulates, H_2O, temperature, pressure, and flow. A Flame Ionisation Detector will analyse TOC. HF will be assessed through the surrogate monitoring of HCl.

The dust monitor provides added flow, stack pressure, and temperature. All analysers are provided with remote control, calibration & maintenance.

The continuous monitoring equipment will operate on a 24-hour basis and will include the facility for on-line monitoring of the gas concentrations and provide for any out-of-tolerance indications to be monitored by remote staff.

The top of the gasifier contains a radar detection system to ensure the level of fuel remains consistent and therefore the balance of the output components remains consistent.

All CEMS equipment and associated platforms and sampling ports installed on site will meet the requirements of the latest EA M2 guidance. All CEMS equipment shall be MCERTS approved.

Procedures will be created for monitoring undertaken at the site. These procedures will conform to M1 and M2 guidance and those required by the operator monitoring and assessment scheme and are incorporated into the sites EMS system.

The CEMS will be used such that:

- The values of the 96% confidence intervals of a single measured result at the daily ELV shall not exceed the following percentages:
  - Carbon Monoxide – 10%
  - Sulphur Dioxide – 20%
  - Oxides of Nitrogen (NO and NO_2) – 20%
  - Particulate Matter – 30%
  - Total Organic Carbon – 30%
  - Hydrogen Chloride – 40%
- Valid half-hourly average values or 10-minute averages shall be determined within the effective operating time from the measured values;
- Where is it necessary to calibrate or maintain the monitor resulting in data not being available for a complete half hour period, the half-hourly average or 10-minute average shall in any case be considered valid if measurements are available for a minimum of 20 minutes or 7 minutes during the

half-hour or 10-minute period respectively;

- Daily average values shall be determined as the average of all valid half-hourly average or 10-minute average values within a calendar day; and
- No more than ten daily average values per year shall be determined not to be valid.

5.2 Emissions to Surface Waters and Sewer

There will be no direct process emissions to controlled water arising from the Installation.

Uncontaminated clean surface water runoff captured from roof drainage and external roadways / car parking areas will be discharged via oil separator to dry ditch (W1).

It is proposed to undertake periodic visual compliance monitoring to ensure that this discharge to surface water is free from contaminants. Visual inspection will take place as part of the site daily inspections.

Monitoring of treated wastewater from the WTP prior to discharge to sewer (S1) will be undertaken at the frequency and of the parameters required to ensure accordance with the permit.

5.3 Emissions to Land

There are no process emissions to land arising from the facility, as such no monitoring is required.

5.4 Monitoring Frequency

Monitoring methods and frequency are included in 7.1 overleaf.

Table 5.1 Monitoring Frequency				
Air				
Emission Point	Source of release	Parameters	Frequency	Methodology
A1	Exhaust Stack	Particulates	Continuous	MCERTS Certified Equipment
		HCl	Continuous	MCERTS Certified Equipment
		SO_2	Continuous	MCERTS Certified Equipment
		NOx including NO_2	Continuous	MCERTS Certified Equipment
		CO	Continuous	MCERTS Certified Equipment
		VOC	Continuous	MCERTS Certified Equipment
		O_2	Continuous	MCERTS Certified Equipment
		HF	Continuous	Exemption requested
		Heavy Metals	Periodic	Specialist Certified Contractor
		Dioxins & Furans (PCB /PAH)	Periodic	Specialist Certified Contractor
		Ammonia	Continuous	MCERTS Certified Equipment

Surface Waters and Sewer				
Emission Point	Source	Location	Parameter	Frequency
W1	Surface water and roof water run-off	Interceptor tank	Visual inspection for oil	Daily
S1	Domestic Effluent Only	Prior to release to sewerage system	In accordance with Discharge consent	In accordance with Discharge consent

Records will be kept of all monitoring carried out at site. The records will be made as soon as practicable and will be retained for at least 5 years from the date the records were made. Monitoring and record keeping will be in accordance with the site's EMS.

6. BAT APPRAISAL

6.1 Technology Appraisal

There is a number of potentially suitable Energy from Waste (EfW) technologies which have been considered for the application Site. Although all of the technologies reviewed are capable of treating refuse derived fuels, a majority have been rejected on ground of environmental impact, operational cost, or efficiency.

Moving Grate combustion is a proven method for the recovery of energy from waste. The modular systems utilised by the operator are proven at small scale and have a number of advantages over alternative *'Advanced Conversion'* or fluidised bed thermal treatment processes, mainly due to the following factors:

- Reliability: Moving grate combustion systems have a high tolerance to feedstock variability and do not rely on complex thermal conditions to operate. Although the potential for ATT is great, there are very few proven systems that can operate on MSW derived waste streams.
- Less front-end processing: The incoming fuel does not require a high degree of fuel feedstock preparation (shredding, material removal etc) therefore contributing to overall process efficiency.

A summary of the advantages and disadvantages of the available combustion technologies is included in Table 6.1.

The processes proposed for this facility have been selected against detailed criteria which are based on the application of BAT, both to the particular process operation and to the combined process as a whole.

The objectives for the process were established as follows:

- To provide a thermal treatment facility that can produce energy from waste using proven combustion systems;
- To meet the highest level of emissions compliance (current and future BREF ELVs);
- To achieve a high degree of plant availability and reliability;
- To offer a cost effective and financially low risk solution for the generation of renewable power; and
- To utilise conventional unit operation techniques and technologies which meet the above aims and are established as BAT.

The design principles for the process were therefore defined as follows:

- To provide equipment with a suitable level of robustness and redundancy for the process duty and the inherent risk associated with that duty;
- To utilise conventional technologies to avoid the business and reliability risks associated with syngas clean up techniques for gas engine (compression or spark ignition) and gas turbine appliances which are not yet commercially proven or widely available;
- To utilise primary NOx control (low NOx combustion) combined with flue gas recirculation and SNCR; and
- To achieve excellent acid gas removal utilising dry or semi-dry injection (high acid gas removal efficiency) without the need for additional SCR.

The combustion system comprises of a single reciprocating grate system that is operated at optimised stoichiometric conditions. This design of combustion is generally accepted as being the most robust and least sensitive to variations in feedstock homogeneity. Moving grate incineration technologies are a well accepted, robust, and proven means of thermally treating waste and as such the hybrid design does not have the complexity of some fluidised bed or pressurised gasification systems.

Table 6.1: BAT Comparison for Combustion Technologies				
BAT Criteria	Moving Grate (MG) Combustion	Fluidised Bed Combustion	ATT	
			Gasification	Pyrolysis
Emissions	Abated emissions meet IED, lower levels are achieved by many plants.	Lower temperature leads to low NOx levels, but abatement will still be required to guarantee IED.	Abated emissions meet IED, and lower levels are achievable.	Abated emissions meet IED, and lower levels are achievable.
Waste	Untreated (or partially treated) municipal waste is main application.	Only suitable for reasonably homogenous material. May be used for waste that has been sufficiently treated.	Highly homogenous feedstock required. Opportunity to link to waste management facility and allow increased recycling.	Homogenous feedstock required. Opportunity to link to waste management facility and allow increased recycling.
Residue Generation	Produces bottom ash (<3% carbon) and air pollution control (APC) residues.	Produces larger volumes of residues for disposal.	Raw material consumption is lower than conventional incineration options and hence residue production is lower. Produces bottom ash (<5% TOC/3% LOI) and APC residues.	Raw material consumption is lower than conventional incineration options and hence residue production is lower. Produces carbon char and APC residues. Char can then be gasified or directly combusted to create process heat.
Odour	Odour management typically avoids nuisance.	Odour management typically avoids nuisance.	Odour management typically avoids nuisance. Due to pre-treated feedstock less likely to be odour producing than untreated municipal waste.	Odour management typically avoids nuisance. Due to pre-treatment feedstock less likely to be odour producing than untreated municipal waste.
Raw Materials	Depends on flue gas treatment option selected.	Higher due to fluidisation sand requirements.	Selection of appropriate flue gas treatment minimises raw material consumption. Typically, less than conventional incineration options.	Selection of appropriate flue gas treatment minimises raw material consumption. Typically, less than conventional incineration options.
Noise	With appropriate abatement noise can successfully be controlled.	Similar to MG, although pre-treatment plant may cause additional noise requiring abatement.	With appropriate abatement noise can successfully be controlled.	With appropriate abatement noise can successfully be controlled.

Table 6.1: BAT Comparison for Combustion Technologies				
BAT Criteria	Moving Grate (MG) Combustion	Fluidised Bed Combustion	ATT	
			Gasification	Pyrolysis
Accidents	Proven technology with a large number of operational facilities. Similar accident potential as for other incineration options, mainly related to loss of storage of FGT reagents, supplementary fuel, and residues.	Some operational experience, with mixed performance. Similar accident potential as for other incineration options, mainly related to loss of storage of FGT reagents, supplementary fuel, and residues.	Operated on a smaller scale to conventional incineration options. Increased accident potential from storage of oxygen and pressurised oxygen delivery systems*.	Operated on a smaller scale to conventional incineration options. Not considered to have any greater accident potential as other incineration options. Gas containment and storage issues (similar to AD) associated with storage of pyro gas.

Electricity Generation

An oil-based heat recovery and turbine generator system has been determined as BAT for the project for the following reasons:

- High thermal efficiency in comparison to steam turbines at smaller scale;
- Fewer components than steam-based boiler systems;
- Lower water use;
- High reliability for sustained high-power output;
- High power to weight ratio;
- Maximum electrical generation while ensuring the plant is 'CHP ready' in the event of any viable off-takers.

Internal combustion systems, such as a gas turbine or a spark ignition gas engine, provide higher levels of thermal efficiency, but require highly cleaned, conditioned, and stable syngas for them to operate reliably and are not suitable for moving grate combustion systems.

Table 6.2: BAT Comparison for Electrical Generation

BAT Criteria	Steam Cycle	ORC	Gas Turbine / Spark Ignition Gas Engine
Efficiency	Up to 29% process efficiency at larger scale – efficiency reduced at small scale (<25%)	Typically, 25% when used with thermal oil media . System does not require water / steam boiler systems and ACC systems.	Cannot be used with moving grate combustion systems
Feedstock	Less preparation required – steam cycle plant can reliably operate on low quality, low CV fuel feedstocks.	Less preparation required – steam cycle plant can reliably operate on low quality, low CV fuel feedstocks.	Cannot be used with moving grate combustion systems
Flexibility	Highly flexible: Steam can be raised by many gas combinations and or auxiliary firing if required	As per steam turbine.	Cannot be used with moving grate combustion systems
Design	Well proven	Well proven	Cannot be used with moving grate combustion systems
Reliability	Excellent with maintenance	As per steam turbine	Cannot be used with moving grate combustion systems

Flue Gas Clean-up Technologies

The flue gas clean-up requirements for combustion systems are relatively minimal due to the combustion of the gases at relatively high temperatures.

NOx reduction is achieved primarily using Selective Non-catalytic Reduction (SNCR). The SNCR system comprises the injection of urea into the first pass of the boiler. SNCR additionally has the benefit of inhibiting dioxin formation and is considered BAT for the facility. Flue gas recirculation also aids the efficiency of the process as described earlier.

Acid gas removal is achieved using a dry gas scrubbing system, utilising a sodium bicarbonate reagent.

Dry scrubbing techniques compare favourably with wet scrubbers and achieve the best acid gas removal efficiencies. They also eliminate any water effluent treatment requirements and allows for use with other reagents such as activated carbon for the absorption and removal of heavy metals, dioxins, VOC, and other harmful substances.

Dry Flue Gas Treatment (FGT) has become the predominant solution for modern flue gas facilities. The basic FGT consists of a filtration unit combined with an injection of dry sorbent. The actual acid gas neutralisation takes place in the duct and on the surface of the filters.

Benefits of dry FGT over wet scrubbing systems include;

- Low Investment Cost;
- Simplicity of design and operation;
- Proven ability to meet stringent emission limits;
- Small physical footprint;
- Lower parasitic loads;
- Flexible operation with regards to temperature and capacity; and
- Easy stabilisation of dry residues.

The Installation will have a fabric filtration system which is designed to have the capacity to remove dust particles within anticipated emission limit values of the Industrial Emission Directive.

Table 6.3: BAT Comparison for Reagent Use

BAT Criteria	Sodium Bicarbonate	Lime
Storage	Easy to handle Safe reagent	Can be difficult to handle, especially in the presence of humidity. Will be stored within hoppers.
Reagent Preparation	Can be a ready to use reagent – a pre-milled, ready to inject reagent is available	A ready to use reagent
Availability	More expensive than lime	Readily available
Temperature	Is injected at temperatures higher than 140°C up to 400°C+.	Operates in a temperature window of 140 – 160°C.

Table 6.3: BAT Comparison for Reagent Use		
BAT Criteria	Sodium Bicarbonate	Lime
Efficiency	Very high efficiency	Medium to high efficiency (assuming high surface area lime is used)
Recirculation	Due to high efficiency only goes once through the system – no need for recirculation	A residue recycle loop can be incorporated into the design to increase removal efficiency
Use in Scrubbing systems	Proven in dry systems	Can be used in wet, dry, or semi-dry systems
Residue Handling	Residues are easy to handle. They contain NaCl, Na_2SO_4 and Na_2CO_3 stable sodium salts	Lime residues are hazardous and need to be contained.
Operating Costs (Reagent cost plus disposal cost)	Raw material costs of Sodium Bicarbonate are high, and the security of supply is uncertain. Residue production is lower per tonne of reagent. Overall, there are no cost advantages over Lime	Lime is readily available and cost effective. Residue production per tonne of lime is high, so disposal costs are higher. Overall, there are no cost advantages over Sodium Bicarbonate

The Installation will have a fabric filtration system which is designed to have the capacity to remove dust particles within anticipated emission limit values of the Industrial Emission Directive.

6.2 The Industrial Emissions Directive (IED) and Best Available Technology (BAT) Compliance

Chapter VI of the IED describes all aspects of management and operation of a process as well as the environmental impact but allows for the Member State to vary the requirements of the IED where there is good reason. The following tables outline the IED and Waste Incineration BREF technical requirements that apply and a justification of how they have been met.

The gases evolved from combustion are fully oxidised in the combustion system at temperatures above 850°C for a period of over 2 seconds.

The flue gas treatment equipment scrubs out the acid gases, NOx, particulates and dioxins and furans to ensure that the emission levels do not exceed the ELVs detailed in the WI BREF.

The ash discharged from the moving grate base also experiences temperatures more than 850°C for approximately 30 minutes. A level of combustion will be achieved such that the requirements of the WI BREF will be met.

Table 6.4 overleaf demonstrates Chapter IV compliance.

Table 6.4: Chapter IV Compliance - SPECIAL PROVISIONS FOR WASTE INCINERATION PLANTSAND WASTE CO-INCINERATION PLANTS	
IED technical requirement	Justification
Article 41 – 45	NA
Article 46 Control of Emissions (1) Waste gases from waste incineration plants and waste co-incineration plants shall be discharged in a controlled way by means of a stack the height of which is calculated in such a way as to safeguard human health and the environment.	Significant ground level pollution will not arise as a result of this installation. Section 4 and 7 of this application discuss this in detail. Atmospheric Dispersion Modelling and Human Health Risk Assessment have been completed by the applicant.
(2) Emissions into air from waste incineration plants and waste co-incineration plants shall not exceed the emission limit values set out in parts 3 and 4 of Annex VI or determined in accordance with Part 4 of that Annex. If in a waste co-incineration plant more than 40 % of the resulting heat release comes from hazardous waste, or the plant co-incinerates untreated mixed municipal waste, the emission limit values set out in Part 3 of Annex VI shall apply.	All Chapter IV IED Emission Limit Values will be met by the Installation.
(3) Discharges to the aquatic environment of waste water resulting from the cleaning of waste gases shall be limited as far as practicable and the concentrations of polluting substances shall not exceed the emission limit values set out in Part 5 of Annex VI.	There are no waste water discharges resulting from the boiler plant or the gas cleaning process. The exhaust gases will be cleaned using dry processes, namely flue gas recirculation, sodium bicarbonate / activated carbon injection and bag or ceramic filters. There will be no aqueous gas cleaning effluents.
(4) The Emission Limit Values shall apply at the point where waste waters from the cleaning of waste gases are discharged from the waste incineration plant or waste co-incineration plant. When waste waters from the cleaning of waste gases are treated outside the waste incineration plant or waste co-incineration plant at a treatment plant intended only for the treatment of this sort of waste water, the emission limit values set out in Part 5 of Annex VI shall be applied at the point where the waste waters leave the treatment plant. Where the waste water from the cleaning of waste gases is treated collectively with other sources of waste water, either on site or off site, the operator shall make the appropriate mass balance calculations, using the results of the measurements set out in point 2 of Part 6 of Annex VI in order to determine the emission levels in the final waste water discharge that can be attributed to the waste water arising from the cleaning of waste gases. Under no circumstances shall dilution of waste water take place for the purpose of complying with the emission limit values set out in Part 5 of Annex VI.	N/A There are no waste water discharges resulting from the boiler or gas cleaning process. The exhaust gases will be cleaned using dry processes, namely flue gas recirculation, sodium bicarbonate / activated carbon injection and bag or ceramic filters. There will be no aqueous gas cleaning effluents.

Table 6.4: Chapter IV Compliance - SPECIAL PROVISIONS FOR WASTE INCINERATION PLANTSAND WASTE CO-INCINERATION PLANTS	
IED technical requirement	Justification
(5) Waste incineration plant sites and waste co-incineration plant sites, including associated storage areas for waste, shall be designed, and operated in such a way as to prevent the unauthorised and accidental release of any polluting substances into soil, surface water and groundwater. Storage capacity shall be provided for contaminated rainwater run-off from the waste incineration plant site or waste co-incineration plant site or for contaminated water arising from spillage or fire-fighting operations. The storage capacity shall be adequate to ensure that such waters can be tested and treated before discharge where necessary.	There will be an environmental management system (EMS) in place to include procedures to manage waste delivery and reception. Hazardous waste will not be accepted at the Installation. Feedstock will be delivered to the renewable energy facility within a fully enclosed building / conveyor system. Roadways, floor, and surfaces will be designed and constructed so as to prevent any emissions to groundwater, surface water and soil. All waste handling activities and the main process will take place inside the process building. There are no external processes on site. All fire water will be contained within the building and tankered away to a suitable water treatment facility. The site surface water drainage systems will pass through an oil separator prior to discharge off site.
(6) Without prejudice to Article 50(4)(c), the waste incineration plant or waste co-incineration plant or individual furnaces being part of a waste incineration plant or waste co-incineration plant shall under no circumstances continue to incinerate waste for a period of more than 4 hours uninterrupted where emission limit values are exceeded. The cumulative duration of operation in such conditions over 1 year shall not exceed 60 hours. The time limit set out in the second subparagraph shall apply to those furnaces which are linked to one single waste gas cleaning device.	The combustion plant will be operated with a CEMS which will be linked into the controls system. In the unlikely event of CEMS failure, a full replacement back-up CEMS will be available on site.
Article 47 Breakdown In the case of a breakdown, the operator shall reduce or closedown operations as soon as practicable until normal operations can be restored.	The combustion has an independent fuel feed system. The feed system for the process is automated and in the event of temperature loss or departure from operating conditions the process will automatically shut down in a controlled manner.
Article 48 Monitoring of Emissions (1) Member States shall ensure that the monitoring of emissions is carried out in accordance with Parts 6 and 7 of Annex VI.	Monitoring will meet all the requirements of Article 48. The plant is designed to have continuous emissions monitors (CEMS) located on the exhaust stack of the combustion plant (Emission Point A1). The CEMS will be IED compliant.

Table 6.4: Chapter IV Compliance - SPECIAL PROVISIONS FOR WASTE INCINERATION PLANTSAND WASTE CO-INCINERATION PLANTS	
IED technical requirement	Justification
(2) The installation and functioning of the automated measuring systems shall be subject to control and to annual surveillance tests as set out in point 1 of Part 6 of Annex VI.	The combustion plant will be operated with a CEMS unit which will be linked into the controls system. In the unlikely event of CEMS failure, a full replacement back-up CEMS will be available on site. Please see section 5.1 for more details.
(3) The competent authority shall determine the location of the sampling or measurement points to be used for monitoring of emissions.	The exact positions of all sampling points will be agreed with the Environment Agency prior to commencement of operation however will be compliant with BS EN 15259.
(4) All monitoring results shall be recorded, processed, and presented in such a way as to enable the competent authority to verify compliance with the operating conditions and emission limit values which are included in the permit.	Reporting format will be agreed with the Environment Agency prior to commencement of operation and will reflect the requirements of the permit. CEMS will be backed up by non-continuous check monitoring to comply with the IED.
(5) As soon as appropriate measurement techniques are available within the Union, the Commission shall, by means of delegated acts in accordance with Article 76 and subject to the conditions laid down in Articles 77 and 78, set the date from which continuous measurements of emissions into the air of heavy metals and dioxins and furans are to be carried out.	Should such a technique become available, it will be adopted as required.
Article 49 Compliance with the Emission Limit Values The emission limit values for air and water shall be regarded as being complied with if the conditions described in Part 8 of Annex VI are fulfilled.	The plant has been designed to comply with the specific ELV's stipulated the Waste Incineration BREF which are more stringent then Part 8 of Annex VI of the IED. The reference conditions in the exhaust gas will be Temperature 273 K; Pressure 101.3 kPa, 11% oxygen; Dry Gas.
Article 50 Operating Conditions (1) Waste incineration plants shall be operated in such a way as to achieve a level of incineration such that the total organic carbon content of slag and bottom ashes is less than 3 % or their loss on ignition is less than 5 % of the dry weight of the material. If necessary, waste pre-treatment techniques shall be used.	The waste streams will be treated so the recoverable organic fraction will be removed by upstream processing. Bottom ash will therefore comply with the 3% TOC / 5% LOI limits. Testing will be undertaken quarterly for the first year and annually thereafter to demonstrate this. The design, which incorporates a combustion chamber, ensures that the minimum temperature of 850°C is met at the final point of combustion whenever waste is being fed, and the residence time of combustion gases at or above this temperature is more than 2 seconds.

Table 6.4: Chapter IV Compliance - SPECIAL PROVISIONS FOR WASTE INCINERATION PLANTSAND WASTE CO-INCINERATION PLANTS	
IED technical requirement	Justification
	This will be demonstrated by CFD modelling. The EMS will include procedures for the checking of waste composition and removal of contaminants.
(2). Waste incineration plants shall be designed, equipped, built, and operated in such a way that the gas resulting from the incineration of waste is raised, after the last injection of combustion air, in a controlled and homogeneous fashion and even under the most unfavourable conditions, to a temperature of at least 850°C for at least two seconds. Waste co-incineration plants shall be designed, equipped, built, and operated in such a way that the gas resulting from the co-incineration of waste is raised in a controlled and homogeneous fashion and even under the most unfavourable conditions, to a temperature of at least 850 °C for at least two seconds. If hazardous waste with a content of more than 1% of halogenated organic substances, expressed as chlorine, is incinerated or co-incinerated, the temperature required to comply with the first and second subparagraphs shall be at least 1100°C. In waste incineration plants, the temperatures set out in the first and third subparagraphs shall be measured near the inner wall of the combustion chamber. The competent authority may authorise the measurements at another representative point of the combustion chamber.	The waste incinerator has been designed to meet the requirements of IED.
(3) Each combustion chamber of a waste incineration plant shall be equipped with at least one auxiliary burner. This burner shall be switched on automatically when the temperature of the combustion gases after the last injection of combustion air falls below the temperatures set out in paragraph 2. It shall also be used during plant start-up and shut-down operations in order to ensure that those temperatures are maintained at all times during these operations and as long as unburned waste is in the combustion chamber. The auxiliary burner shall not be fed with fuels which can cause higher emissions than those resulting from the burning of gas oil as defined in Article 2(2) of Council Directive 1999/32/EC of 26 April 1999 relating to a reduction in the sulphur content of certain liquid fuels, liquefied gas, or natural gas.	The site will be complete auxiliary burners for start-up and combustion support to ensure that combustion temperature reaches 850°C prior to waste introduction. Note: this is 850°C at the final point of combustion chamber. The auxiliary burners will be using main gas (if available) or will operate using fuel oil (diesel).
(4). Waste incineration plants and waste co-incineration plants shall operate an automatic system to prevent waste feed in the following situations:	The combustion plant has an independent fuel feed system.

Table 6.4: Chapter IV Compliance - SPECIAL PROVISIONS FOR WASTE INCINERATION PLANTSAND WASTE CO-INCINERATION PLANTS	
IED technical requirement	**Justification**
(a) at start-up, until the temperature set out in paragraph 2 of this Article, or the temperature specified in accordance with Article 51(1) has been reached; (b) whenever the temperature set out in paragraph 2 of this Article, or the temperature specified in accordance with Article 51(1) is not maintained; (c) whenever the continuous measurements show that any emission limit value is exceeded due to disturbances or failures of the waste gas cleaning devices.	Fuel is transferred from the three fuel bunkers into intermediate storage which will serve as a fuel buffer during dosing. This is an automated system. The feed system will have automatic shutdown to prevent waste feed if the temperature in the combustor at the final point of combustion is <850°C, or if emission limit values, obtained via the CEMS, look to be breached.
Article 51 Authorisation to change operating conditions	No requests to change operating conditions will be required.
Article 52 Delivery and reception of waste (1) The operator of the waste incineration plant or waste co-incineration plant shall take all necessary precautions concerning the delivery and reception of waste in order to prevent or to limit as far as practicable the pollution of air, soil, surface water and groundwater as well as other negative effects on the environment, odours and noise, and direct risks to human health.	All waste will be received directly into a purpose designed building. All pollution abatement and prevention methodologies are detailed in this main application document.
(2) The operator shall determine the mass of each type of waste, if possible, according to the European Waste List established by Decision 2000/532/EC, prior to accepting the waste at the waste incineration plant or waste co-incineration plant.	The site will only receive non-hazardous refuse derived fuels. The range of waste codes from the List of Wastes (England) Regulations 2005 that will constitute this prepared fuel is included in Section 3.5 of the application. This will be weighed at the weighbridge. Unsuitable material and material that is hazardous, or contains unwanted materials, will not be accepted.
(3) Prior to accepting hazardous waste at the waste incineration plant or waste co-incineration plant, the operator shall collect available information about the waste for the purpose of verifying compliance with the permit requirements specified in Article 45(2).	No hazardous waste will be accepted into the plant. All wastes will be non-hazardous RDF only.
(4) Prior to accepting hazardous waste at the waste incineration plant or waste co-incineration plant, at least the following procedures shall be carried out by the operator:	No hazardous waste will be accepted into the plant. All wastes will be non-hazardous RDF only.

Table 6.4: Chapter IV Compliance - SPECIAL PROVISIONS FOR WASTE INCINERATION PLANTSAND WASTE CO-INCINERATION PLANTS	
IED technical requirement	Justification
Article 53 Residues (1) Residues shall be minimised in their amount and harmfulness. Residues shall be recycled, where appropriate, directly in the plant or outside.	The process has been designed around a specified electrical power generation capacity. It is a new installation, so a waste minimisation audit is yet to be carried out. This will be done in compliance with the permit condition specified.
(2) Transport and intermediate storage of dry residues in the form of dust shall take place in such a way as to prevent dispersal of those residues in the environment.	Bottom ash from the system will be quenched and then conveyed to dedicated building. sh. Ash is then stored within an ash container prior to transfer off site. APC residue is removed from the filtration unit and collected within a closed skip prior to transport off site.
(3) Prior to determining the routes for the disposal or recycling of the residues, appropriate tests shall be carried out to establish the physical and chemical characteristics and the polluting potential of the residues. Those tests shall concern the total soluble fraction and heavy metals soluble fraction.	Chemical analysis will be undertaken regularly.
Other requirements (former WID compliance requirement not specifically stated under the IED) **Technical Competence** **Former WID Article 6 (8)** The management of the incineration or the co-incineration plant shall be in the hands of a natural person who is competent to manage the plant.	The operator will employ on a full-time basis a site manager / technically competent person who holds the necessary qualifications. The operator will also meet all the other requirements of operator competence as stipulated in the Environmental Permitting Regulations. There will be named individuals with the relevant qualifications to supervise the operation of this renewable energy facility.
Former WID Article 11 (3) The residence time as well as the minimum temperature and the oxygen content of the exhaust gases shall be subject to appropriate verification, at least once when the incineration or co-incineration plant is brought into service and under the most unfavourable operating conditions anticipated.	During the plant's first year of operation, we would seek to discuss with the Agency the need for a validation study to measure residence times through the combustor at above 850°C. Oxygen, moisture, and temperature measurements will be made via the CEMS as well as spot sampling and analysis.
Former WID Article 11 (4) The continuous measurement of HF may be omitted if treatment stages for HCl are used which ensure that the emission limit value for HCl is not being exceeded. In this case the emissions of HF shall be subject to periodic measurements as laid down in paragraph 2(c).	HF will be assessed through surrogate monitoring of HCl.

Former WID Article 11 (5) The continuous measurement of the water vapour content shall not be required if the sampled exhaust gas is dried before the emissions are analysed.	Water vapour is continuously monitored to correct emissions for dry gas conditions.
Former WID Article 11 (6) Periodic measurements as laid down in paragraph 2(c) of HCl, HF and SO2 instead of continuous measuring may be authorised in the permit by the competent authority in incineration or co-incineration plants, if the operator can prove that the emissions of those pollutants can under no circumstances be higher than the prescribed emission limit values.	CEMS will be provided for continuous HCl and SO_2 measurement, allowing calculation of HF through surrogate monitoring of HCl.
Former WID Article 11 (7) The reduction of the frequency of the periodic measurements for heavy metals from twice a year to once every two years and for dioxins and furans from twice a year to once every year may be authorised in the permit by the competent authority provided that the emissions resulting from co-incineration or incineration are below 50 % of the emission limit values determined according to Annex II or Annex V respectively and provided that criteria for the requirements to be met, developed in accordance with the procedure laid down in Article 17, are available. These criteria shall at least be based on the provisions of the second subparagraph, points (a) and (d). Until 1 January 2005 the reduction of the frequency may be authorised even if no such criteria are available provided that: L 332/100 EN Official Journal of the European Communities 28.12.2000 (a) the waste to be co-incinerated or incinerated consists only of certain sorted combustible fractions of non-hazardous waste not suitable for recycling and presenting certain characteristics, and which is further specified on the basis of the assessment referred to in subparagraph (d); (b) national quality criteria, which have been reported to the Commission, are available for these wastes; (c) co-incineration and incineration of these wastes is in line with the relevant waste management plans referred to in Article 7 of Directive 75/442/EEC; (d) the operator can prove to the competent authority that the emissions are under all circumstances significantly below the emission limit values set out in Annex II or Annex V for heavy metals, dioxins, and furans; this assessment shall be based on information on the quality of the waste concerned and measurements of the emissions of the said pollutants; (e) the quality criteria and the new period for the periodic measurements are specified in the permit; and (f) all decisions on the frequency of measurements referred to in this paragraph, supplemented with information on the amount and quality of the waste concerned, shall be communicated on a yearly basis to the Commission.	After one year of operation sampling and measurement of heavy metals will be reduced from twice a year to once every two years as well as sampling and measurement for dioxins and furans will be reduced from twice a year to once a year, once it is demonstrated that the emissions are shown to be 50% of those stated in Annex V.

Former WID Article 13 (3) The incineration plant or co-incineration plant or incineration line shall under no circumstances continue to incinerate waste for a period of more than four hours uninterrupted where emission limit values are exceeded; moreover, the cumulative duration of operation in such conditions over one year shall be less than 60 hours. The 60-hour duration applies to those lines of the entire plant which are linked to one single flue gas cleaning device.	The plant will be operated with CEMS which will be linked into the controls system. In the unlikely event of CEMS failure, backup CEMS will be available on site.
Former WID Article 13 (4) The total dust content of the emissions into the air of an incineration plant shall under no circumstances exceed 150 mg/m^3 expressed as a half-hourly average; moreover, the air emission limit values for CO and TOC shall not be exceeded. All other conditions referred to in Article 6 shall be complied with.	The applicant does not request the abnormal emission limit value for particulates available under Article 13(4). In the unlikely event of CEMS failure on one of the streams, backup CEMS will be available on site.

Table 6.5 provides a BAT appraisal against the Waste Incineration BREF BAT Guidance.

Table 6.5: Waste Incineration BREF Compliance

BAT Ref No.	BAT Conclusion	Justification
BAT 1	In order to improve the overall environmental performance, BAT is to elaborate and implement an environmental management system (EMS) that incorporates the features provided within the BREF document.	The Operator maintains an Environmental Management System in place that incorporates the features provided within the BREF document. This BAT requirement is met. The EMS includes: – Accident management; – Dust Management; – Odour Management; – Fire Prevention; – OTMOC Management; and – others as required.
BAT 2	BAT is to determine either the gross electrical efficiency, the gross energy efficiency, or the boiler efficiency of the incineration plant as a whole or of all the relevant parts of the incineration plant.	The gross electrical efficiency of the plant is > 25%.
BAT 3	BAT is to monitor key process parameters relevant for emissions to air and water including those given in the Guidance.	Emissions to air will be monitored by CEMS as described in the permit application. In addition, in accordance with the BREF Guidance: • Flue-gas from the incineration of waste will be continuously monitored for flow, oxygen content, temperature, pressure, and water vapour content; and

		• Combustion chamber will be continuously monitored for temperature. There will be no emissions to water from flue gas cleaning as the proposed system uses dry techniques. There is no bottom ash treatment carried out on site. All ash is transported off site for treatment. The plant has an oil-based ORC which removes the potential for boiler blow down. All process water is used for ash quenching.
BAT 4	BAT is to monitor channelled emissions to air with at least the frequency given below and in accordance with EN standards. If the EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.	CEMS will monitor the relevant emissions to air detailed within the guidance. The waste accepted on site will have a low mercury content, therefore periodic monitoring is considered appropriate. Periodic testing of the fuel will provide confirmation of substance levels which are not continuously monitored.
BAT 5	BAT is to appropriately monitor channelled emissions to air from the incineration plant during OTNOC	Emissions to air will be monitored appropriately during abnormal emissions.
BAT 6	BAT is to monitor emissions to water from FGC and/or bottom ash treatment with at least the frequency given below and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.	There will be no emissions to water from flue gas cleaning as the proposed system uses dry techniques. There is no bottom ash treatment carried out on site.
BAT 7	BAT is to monitor the content of unburnt substances in slags and bottom ashes at the incineration plant with at least the frequency given below and in accordance with EN standards.	TOC's will be monitored once every three months in accordance with the guidance.
BAT 8	For the incineration of hazardous waste containing POPs, BAT is to determine the POP content in the output streams (e.g., slags and bottom ashes, flue-gas, waste water) after the commissioning of the incineration plant and after each change that may significantly affect the POP content in the output streams.	n/a – no hazardous waste is incinerated.
BAT 9	In order to improve the overall environmental performance of the incineration plant by waste stream management (see BAT 1), BAT is to use all of the techniques (a) to (c) given below, and, where relevant, also techniques (d), (e) and (f).	The sites EMS will be complete with details on the following: • The waste that can be processed on site; • Pre-acceptance procedures; • Waste acceptance procedures; • A waste tracking system and inventory; and • Waste segregation.

BAT 10	In order to improve the overall environmental performance of the bottom ash treatment plant, BAT is to set up and implement an output quality management system (see BAT 1).	n/a – there is no bottom ash treatment plant on site.
BAT 11	In order to improve the overall environmental performance of the incineration plant, BAT is to monitor the waste deliveries as part of the waste acceptance procedures (see BAT 9 c) including, depending on the risk posed by the incoming waste, the elements given in the guidance.	The waste acceptance procedure will include the monitoring of waste deliveries for: • Weighing of the waste deliveries; • Visual inspection; and • Periodic sampling of waste deliveries and analysis of key properties/substances (e.g., calorific value, content of halogens and metals/metalloids). Due to the type of waste and the UK radioactive substances regulation minimising the risk of radioactive material accidently arriving at the site radioactivity detection will not be provided.
BAT 12	In order to reduce the environmental risks associated with the reception, handling and storage of waste, BAT is to use both of the techniques given in the guidance.	Waste reception, waste handling and the storage of waste will take place internally within the relevant internal storage areas on impermeable surfaces with sealed drainage. No waste will be accepted on site unless the site has adequate waste storage capacity. This will be achieved by: • The maximum waste storage capacity being clearly established on site; and • Regular monitoring of the waste stored on site against the maximum allowed storage capacity.
BAT 13	In order to reduce the environmental risk associated with the storage and handling of clinical waste, BAT is to use a combination of the techniques given in the guidance.	n/a – no clinical wastes requiring specialist handling and storage will be accepted on site.
BAT 14	In order to improve the overall environmental performance of the incineration of waste, to reduce the content of unburnt substances in slags and bottom ashes, and to reduce emissions to air from the incineration of waste, BAT is to use an appropriate combination of the techniques given in the Guidance.	All incoming fuel feedstocks are procured to a specification and will be devoid of unsuitable materials. A fuel will be delivered directly to the Fuel Reception Hall. HGV's will unload in the internal tipping area and a visual inspection will take place. The delivered RDF feedstocks will then be transferred directly to the walking floor bunkers and transferred the combustion system. The plant will be controlled by an advanced DCS control system which will optimise and control the process. All ash will be transported off site, processed, and recycled.
BAT 15	In order to improve the overall environmental performance of the incineration plant and to reduce emissions to air, BAT is to set up and implement procedures for the adjustment of the plant's settings, e.g. through the advanced control system (see description in Section 5.2.1), as and when needed and practicable, based on the characterisation and control of the waste (see BAT 11).	The plant will be controlled by an advanced DCS control system which will optimise and control the process with special attention to the combustion conditions, abatement, flue gas treatment and monitoring.
BAT 16	In order to improve the overall environmental performance of the incineration plant and to reduce emissions to air, BAT is to set up and	Procedures will be in place to limit shut-down and start-up operations as far as practically possible.

	implement operational procedures (e.g., organisation of the supply chain, continuous rather than batch operation) to limit as far as practicable shutdown and start-up operations.	
BAT 17	In order to reduce emissions to air and, where relevant, to water from the incineration plant, BAT is to ensure that the FGC system and the waste water treatment plant are appropriately designed (e.g., considering the maximum flow rate and pollutant concentrations), operated within their design range, and maintained so as to ensure optimal availability	The flue gas cleaning system and water treatment plant are appropriately designed for the facility, will be operated within the design range, and maintained to ensure optimal availability.
BAT 18	In order to reduce the frequency of the occurrence of OTNOC and to reduce emissions to air and, where relevant, to water from the incineration plant during OTNOC, BAT is to set up and implement a risk-based OTNOC management plan as part of the environmental management system (see BAT 1) that includes all of the elements within the guidance.	An abnormal operation risk-based management plan will be produced as part of the EMS in accordance with the guidance.
BAT 19	In order to increase the resource efficiency of the incineration plant, BAT is to use a heat recovery boiler.	A thermal fluid heat recovery boiler steam boiler will be used to recover the energy from the waste. The ORC is highly thermally efficient and has the following stated performance: • Max working efficiency at full power (boiler): 89.2% • Nominal working efficiency (boiler): 84 ±2% • ORC nominal working efficiency: 28.5% • Overall efficiency (max): 25.42 %
BAT 20	In order to increase the energy efficiency of the incineration plant, BAT is to use an appropriate combination of the techniques given in the guidance.	In accordance with the guidance, the following techniques are used to increase energy efficiency: • Reduction of the flue-gas flow; • Minimisation of heat losses; and • Optimisation of the boiler design.
BAT 21	In order to prevent or reduce diffuse emissions from the incineration plant, including odour emissions, BAT is to: • store solid and bulk pasty wastes that are odorous and/or prone to releasing volatile substances in enclosed buildings under controlled sub atmospheric pressure and use the extracted air as combustion air for incineration or send it to another suitable abatement system in the case of a risk of explosion;	An air extraction system will be in place resulting in odorous air within the building / bunkers being thermally destroyed by the combustion system. In the event of a shutdown where no incineration capacity is available, no more waste deliveries will be accepted on site. If any waste stored on site exceeds the maximum storage times on site, the waste will be removed off site. This is considered BAT for the site.

	• store liquid wastes in tanks under appropriate controlled pressure and duct the tank vents to the combustion air feed or to another suitable abatement system; • control the risk of odour during complete shutdown periods when no incineration capacity is available, e.g., by ▪ sending the vented or extracted air to an alternative abatement system, e.g., a wet scrubber, a fixed adsorption bed; ▪ minimising the amount of waste in storage, e.g., by interrupting, reducing, or transferring waste deliveries, as a part of waste stream management (see BAT 9); ▪ storing waste in properly sealed bales.	
BAT 22	In order to prevent diffuse emissions of volatile compounds from the handling of gaseous and liquid wastes that are odorous and/or prone to releasing volatile substances at incineration plants, BAT is to feed them to the furnace by direct feeding.	n/a – no gaseous and liquid wastes are processed on site.
BAT 23	In order to prevent or reduce diffuse dust emissions to air from the treatment of slags and bottom ashes, BAT is to include in the environmental management system (see BAT 1) the following diffuse dust emissions management features: • identification of the most relevant diffuse dust emission sources (e.g., using EN 15445); • definition and implementation of appropriate actions and techniques to prevent or reduce diffuse emissions over a given time frame.	n/a – there is no treatment of slags and bottom ashes on site.
BAT 24	In order to prevent or reduce diffuse dust emissions to air from the treatment of slags and bottom ashes, BAT is to use an appropriate combination of the techniques given in the guidance.	n/a – there is no treatment of slags and bottom ashes on site.
BAT 25	In order to reduce channelled emissions to air of dust, metals, and metalloids from the incineration of waste, BAT is to use one or a combination of the techniques given in the guidance.	Particulate is controlled by the filter system. Activated carbon (dry sorbent injection) is used which gives reliable and effective heavy metal (e.g., mercury) reductions, and for the majority of metals particulate abatement is the main means of ensuring that releases are minimised. This is considered BAT for the plant and the BAT-AEL's will be met.

BAT 26	In order to reduce channelled dust emissions to air from the enclosed treatment of slags and bottom ashes with extraction of air (see BAT 24 f), BAT is to treat the extracted air with a bag or ceramic filter (see Section 5.2.2).	n/a – there is no treatment of slags and bottom ashes on site.
BAT 27	In order to reduce channelled emissions of HCl, HF and SO_2 to air from the incineration of waste, BAT is to use one or a combination of the techniques given below.	Acid gas removal is achieved by the use of a dry scrubbing system, utilising a sodium bicarbonate-based reagent. This is considered BAT for the plant.
BAT 28	In order to reduce channelled peak emissions of HCl, HF and SO2 to air from the incineration of waste while limiting the consumption of reagents and the amount of residues generated from dry sorbent injection and semi-wet absorbers, BAT is to use technique (a) or both of the techniques in guidance.	Reagent dosage will be automated based on continuous monitoring. This is considered BAT for the plant and the BAT-AEL's will be met. Recirculation of reagents is not necessarily due to the reagents having a high surface area.
BAT 29	In order to reduce channelled NOX emissions to air while limiting the emissions of CO and N2O from the incineration of waste and the emissions of NH3 from the use of SNCR and/or SCR, BAT is to use an appropriate combination of the techniques given in the guidance.	The NOx that is formed during the combustion process is abated using a Selective Non-Catalytic Reaction (SNCR) system and flue gas recirculation. This is considered BAT for the plant and the BAT-AEL's will be met.
BAT 30	In order to reduce channelled emissions to air of organic compounds including PCDD/F and PCBs from the incineration of waste, BAT is to use techniques (a), (b), (c), (d), and one or a combination of techniques (e) to (I) given in the guidance.	The primary method of reducing the emissions of dioxins is by careful control of the conditions in the combustor. Boiler residence time is controlled to minimise de novo formation. PAC injection will remove dioxins and furans from the gas phase, followed by bag or ceramic filters which will provide efficient particulate abatement. In addition, in line with BAT the following techniques will be used: • Optimisation of the incineration process; • Control of the waste feed; • On-line and off-line boiler cleaning; Rapid flue-gas cooling; and Dry Sorbent Injection. This is considered BAT for the plant and the BAT-AEL's will be met.
BAT 31	In order to reduce channelled mercury emissions to air (including mercury emission peaks) from the incineration of waste, BAT is to use one or a combination of the techniques given in the guidance.	Activated carbon (dry sorbent injection) is used which gives reliable and effective heavy metal (e.g., mercury) reductions, and for the majority of metals particulate abatement is the main means of ensuring that releases are minimised. In line with BAT the following techniques are used. This is considered BAT for the plant and the BAT-AEL's will be met.
BAT 32	In order to prevent the contamination of uncontaminated water, to reduce emissions to water, and to increase resource efficiency, BAT is to segregate waste water streams and to treat them separately, depending on their characteristics	Uncontaminated clean surface water runoff captured from roof drainage and external roadways / car parking areas will be harvested where possible and discharged to the surface water drainage system (W1).

		Any effluent arising from the process will be collected and recycled into the ash quench system and captured within the ash. There are no releases to either sewer or controlled waters from the process. All domestic foul effluent arisings will be discharged via sewer. Water streams are collected and treated separately and considered BAT.
BAT 33	In order to reduce water usage and to prevent or reduce the generation of waste water from the incineration plant, BAT is to use one or a combination of the techniques given in the guidance.	A dry scrubbing system is proposed for flue gas cleaning which does not generate waste water.
BAT 34	In order to reduce emissions to water from FGC and/or from the storage and treatment of slags and bottom ashes, BAT is to use an appropriate combination of the techniques given below, and to use secondary techniques as close as possible to the source in order to avoid dilution.	A dry scrubbing system is proposed for flue gas cleaning which does not generate waste water. There is no treatment of slags and bottom ashes on site. Bottom ash from the combustion system will be quenched and conveyed to a dedicated building. Ash is then stored within an RO-RO ash container prior to transfer off site.
BAT 35	In order to increase resource efficiency, BAT is to handle and treat bottom ashes separately from FGC residues.	Bottom ash and APC Residue (Air Pollution Control (APC) residues) are handled separately.
BAT 36	In order to increase resource efficiency for the treatment of slags and bottom ashes, BAT is to use an appropriate combination of the techniques given below based on a risk assessment depending on the hazardous properties of the slags and bottom ashes.	n/a – there is no treatment of slags and bottom ashes on site.
BAT 37	In order to prevent or, where that is not practicable, to reduce noise emissions, BAT is to use one or a combination of the techniques in the guidance.	A noise impact assessment has been carried out as part of the permit application which demonstrates that the noise impacts from site will have an insignificant effect on existing residential receptors due to the appropriate design, mitigation, and intervening distances to the nearest residential receptors. All operational measures provided within the guidance will be carried out with noise attenuation being used where necessary. In line with BAT the following techniques will be used on site: • Appropriate location of equipment and buildings; • Operational measures; • Low-noise equipment; • Noise Attenuation; and • Noise-control equipment / infrastructure.

BAT

The following BAT demonstration is based on the EPR 5.01 The Incineration of Waste. The BAT demonstration is summarised in the following tables. These detail all of the indicative BAT requirements as far as they apply to this process.

Table 6.6: BAT Justification	
Indicative Requirement	**BAT justification**
Incoming waste and raw materials management	
Waste code	The proposed technology uses non-hazardous refuse derived fuel. The waste codes from the List of Wastes (England) Regulations 2005 are identified in Table 3.3.
Pre-treatment	All fuel feedstocks processed by the plant have been pre-processed with all recoverable recyclates removed and the residual material being procured to an agreed specification.
EMS	The Operator operates an environmental management system (ISO14001) which will ensure that procedures are in place for fuel input and raw material management. All necessary operating procedures will be in place and documented and stored within the company EMS. The operator will aim for certification of the renewable energy facility to ISO14001 within the first year of operation.
Odour control – internal storage	Entry to the waste reception area is via electrically controlled fast acting roller shutter doors. Vehicles will enter backwards and discharge the waste onto the floor of the waste reception hall. The doors are complete with air curtains to prevent any odorous emissions escaping during the unloading of waste. Once unloaded the vehicles will exit the building and the roller shutter doors are closed. To avoid any odour emissions, the building is kept at slight negative pressure. An air extraction system will be in place resulting in odorous air within the building being thermally destroyed by the combustion system. During periods of planned shutdown, the feedstock within the storage system will be run down prior to the shutdown. All doors will remain closed as far as practicable. Fuel stores will only start to be increased again slightly in advance of the planned recommencement date. If there are extended periods of unplanned shutdowns deliveries will be diverted to other suitably permitted facilities. For longer unplanned shutdowns the feedstock will be removed from site.
Fire fighting	The feedstock is not volatile or easily combustible. An automatic fire detection and suppression system will be installed on site. All fire water will enter the drainage system and be contained within the building. All fire water will then be tankered away to a suitable water treatment facility. A Fire Prevention Plan is included in *Annex D – Fire Prevention Plan*. The Fire Prevention Plan relates to the internal storage of all fuel product and provides the necessary information on site infrastructure, storage locations, storage practices, monitoring equipment and emergency response procedures.

Table 6.6: BAT Justification	
Indicative Requirement	BAT justification
Storage of treatment chemicals	Treatment chemicals will be stored in drums, tanks, or bags (whichever are required for the quantity needed to be held in storage). These will be stored in the building and on hardstanding, within bunded areas that can contain 110% of the largest drum or 25% of the total storage capacity, whichever is the greater.
Preventing rainwater contamination	There are no external processes on site. Surface water run-off from the site roads will enter the existing surface water drainage system.
Incoming waste covered	Incoming waste will be delivered in covered vehicles with walking floor trailers and discharged internally with the Fuel Reception Hall.
Litter avoidance	It is not anticipated that litter will be a problem. If litter does arise a litter patrol will be initiated at the end of each working day.
Maximisation of homogeneity of feed	Homogeneity of the waste is achieved by off site pre-treatment. An incoming fuel specification is in place which stipulates the parameters that must be achieved.
Inspection and removal	The waste acceptance procedures will include the validation of a load against the pre-acceptance documentation. Loads may be inspected at the weighbridge and during unloading. A waste rejection procedure will be in place for unsuitable loads / part loads / items within a load.
Feed transfer	RDF is transferred to a fuel feeding system to allow continuous feed into the gasifier. This is an automated system. The control system automatically controls the feed of feedstock to the gasifier. Waste will be stored on site for a maximum of 4 days for scenarios such as a long weekend, resulting in the continuous operation of the combustion system without major load reduction.
Control of dust emissions	The waste will neither be dry or friable (i.e., the moisture content will be sufficiently high so to avoid excessive dust) therefore dust generation is unlikely. The waste is also delivered and stored within an enclosed building and enclosed conveyors, so dust generation is further minimised. All reagent storage silos are fitted with bag filtration to prevent dust emissions from the main process. Ash residues will be stored in enclosed vessels and removed from the facility in enclosed vehicles.
Odour prevention. Storage time within the buffer store	Entry to the waste reception area is via electrically controlled fast acting roller shutter doors. Vehicles will enter backwards and discharge the waste onto the floor of the waste reception hall. The doors are complete with air curtains to prevent any odorous emissions escaping during the unloading of waste. Once unloaded the vehicles will exit the building and the roller shutter doors are closed. To avoid any odour emissions, the building is kept at slight negative pressure. An air extraction system will be in place resulting in odorous air within the building being thermally destroyed by the combustion system. The process itself has no significant potential for odours as the combustion system thermally oxidises any odorous compounds.

Table 6.6: BAT Justification	
Indicative Requirement	BAT justification
	During short-term shutdowns, the storage areas will be kept closed and the stocks of feedstock will be reduced. During long-term shutdowns in addition to the previous actions, no incoming waste will be accepted. The Applicant will operate to an environmental management system (EMS) that includes procedures relating to all reception and handling areas.
Waste Charging	
Automatic waste feed prevention system	The combustion system has a dedicated and controlled fuel feed system. The installation is provided with a control system that automatically controls the feed of waste to the combustion system. At start-up waste cannot be fed to the gasifiers until the combustor reaches the required operating conditions. The feed system for the combustion process is automated and in the event of temperature loss or departure from operating conditions the process will automatically shut down in a controlled manner.
Furnace interlock	The waste feed system is interlocked with the combustion chamber conditions to prevent feed taking place when synthesis gas combustion is inadequate or other parameters are not within limits.
Airtight charging design, with interlock for chute or hopper	The combustion line has an independent fuel feed system. The waste will be transferred via a conveyor system into the metering bins. This is then continuously fed into the combustion plant. The conveyors also ensure that the fuel is compressed and air free to allow controlled combustion to take place. In the event of the plant deviating from its normal operating conditions, the control system will automatically alter the waste feed rate to the gasifier to ensure optimum conditions are achieved.
Charging rate and firing diagram, throughput rate, optimised combustion, waste residence time	Please refer to the firing diagram provided within *Annex G1*.
Feed of RDF	Before entering the combustion plant, all feedstock has been pre-processing to an agreed specification.
Furnace Requirements	The waste is combusted at temperatures typically between 850 to 1,000°C. CFD modelling of the combustor will be undertaken to demonstrate that residence times are above 850°C in excess of 2 seconds. Following commissioning of this installation, the results will be validated. No waste that contains a significant chlorinated or otherwise halogenated component is accepted. This is to ensure that halogen content cannot exceed 1% (as chlorine). The combustion process is controlled on temperature and remains above 6% O_2 at all times.
Validation of combustion conditions	CFD modelling of the combustor will be undertaken to demonstrate that residence times above 850°C in excess of 2 seconds. This will inform the design of the combustor. Testing using plug flow methodologies will be undertaken by the operator as part of the commissioning process.

Table 6.6: BAT Justification	
Indicative Requirement	BAT justification
Measuring oxygen levels	Measurement of oxygen is taken by extractive measurement in the stack as part of the emissions monitoring package to allow sample data to be converted to standard conditions.
Combustion Control	There are numerous temperatures measuring positions throughout the thermal process which ensure correct combustion conditions at all times including at the point of final combustion.
Dump stacks and by-passes	There will not be any dump stacks or by-passes during normal operation at the installation.
Flue gas recirculation	Secondary NOx control will be employed using recirculated flue gas to minimise NOx formation.
Cooling systems	Cooling will be provided by an air-cooling / dump chiller, or by a V air blast cooler / radiator with water in a closed circuit if significant heat offtake is required. The purpose of the coolers is to condense the thermal fluid by dissipating low grade heat to the atmosphere. There will be no cooling towers required, therefore, there will be no use of biocides in any cooling water systems and no release to land.
Boiler design	The boiler design has been chosen to prevent as far as possible the formation of dioxins and furans. The boiler, connecting duct work and economiser sections are designed to minimise the residence time of gases. This is in order to minimise the formation of dioxins and furans by de-Novo synthesis.
Environmental Performance Indicators	Key process performance indicators will be devised in discussion with the Agency prior to commencement of operation of the facility.

6.3 Resource Efficiency and Climate Change

General

The Facility will utilise thermal oil boilers which will generate oil vapour used to supply an ORC turbine to generate electricity. The Facility will generate power for export to the local electricity distribution network via a transformer which increases the voltage to the appropriate level.

The Facility also has the potential to export heat off-site to local users.

In case of failure of the electricity supply, an emergency diesel generator will be provided to safely shut down the Facility and to provide an emergency supply to the rest of the Facility

In considering the energy efficiency of the Facility, due account has been taken of the requirements of the IED BAT Guidance.

Basic Energy Efficiency Measures

An indicative Sankey Diagram for the plant for the 'No heat export' case is presented in Figure 6.1.

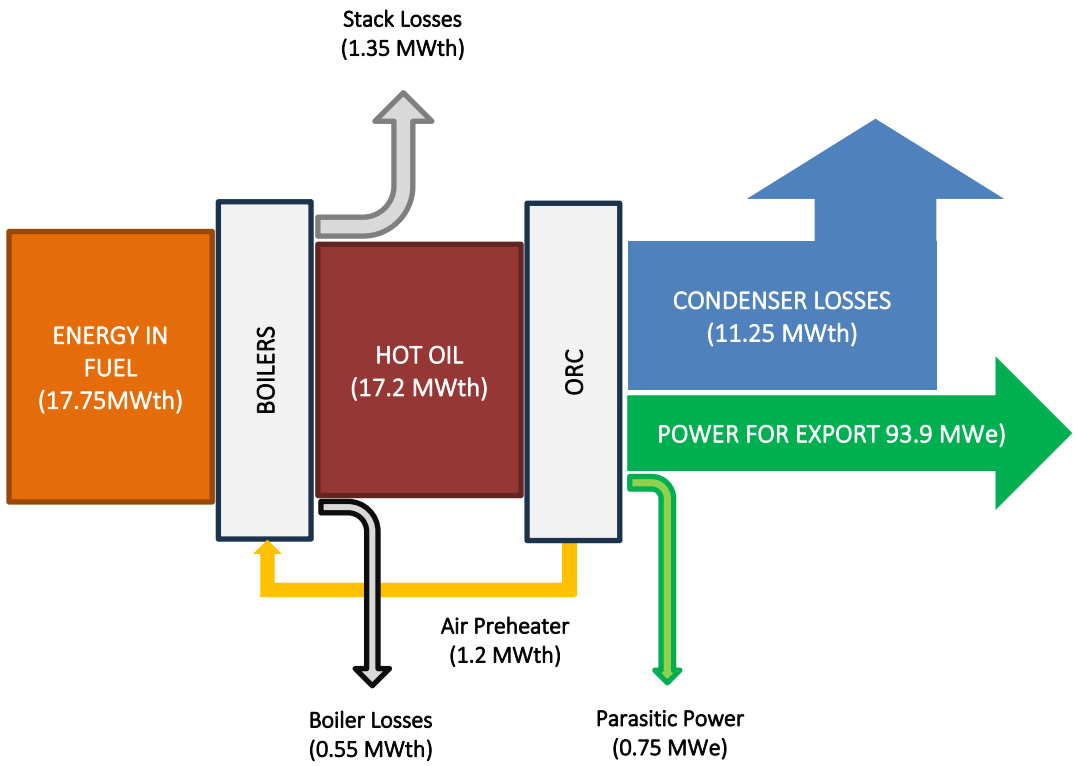

Figure 6.1: Process Sankey Diagram

The most significant electrical energy consumers at the Facility are anticipated to be the following:

- Primary and secondary combustion air fans;
- Induced Draft fans;
- ACC fans / V air blast coolers;
- Oil circulation pumps;
- RDF loading systems; and
- Residue conveying systems.

The plant and ancillaries have been designed to operate with a high level of energy efficiency. Key energy efficiency measures that have been included within the design of the plant are as follows:

- Secondary combustion air will be preheated using exhaust fumes;
- Primary and secondary air distribution will be optimised;
- Heat will be recovered from the flue gases by means of boilers integral with the furnaces;
- The boilers will be arranged to minimise flue gas exit temperature to optimise thermal cycle efficiency;
- Boiler heat exchange surfaces will be cleaned on a regular basis to ensure efficient heat recovery.
- All plant and equipment will be individually monitored and controlled using a SCADA monitoring system and PLC controls, optimised for efficiency of operation;
- All aspects of the plant are controlled in real time to ensure maximum thermal efficiency and operational control;

- All plant energy data will be monitored, recorded, and targeted to ensure optimal plant performance; and
- As part of the company's environmental management system, targets will be set regarding the increased thermal efficiency of the plant and the potential export of heat to neighbouring facilities.

As described within the CHP assessment (Annex G), the Facility will have the capacity to export up to approximately 10 MWth of heat. The CHP assessment has identified that there are potentially opportunities to export a majority of the heat from the site to the neighbouring industrial facilities, subject to commercial and economic viability. The export of heat would reduce the electrical output of the Facility but increase the overall thermal efficiency.

The combined thermal capacity of the Facility is approximately 16.8 MWth. Assuming electricity only mode, the Facility will generate approximately 4.64 MWe of electricity. The Facility will have a parasitic load of approximately 0.75 MWe. Therefore, the export capacity of the Facility is approximately 3.892 MWe. Taking this into consideration, the gross electrical efficiency of the Facility will be approximately 26.1%.

As stated previously, the Facility will process approximately 50,000 tpa of waste, assuming an NCV of 10.11 MJ/kg and an availability of 7,900 hours per annum. This equates to an approximate hourly throughput of 6.35 tph for both lines. Assuming this availability, the Facility will annually generate approximately 36,350 MWh and export approximately 30,750 MWh of electricity.

As presented in Table 6.7, the design figures are compared with the benchmark data for MSW incineration plants, given in the Environment Agency Sector Guidance Note EPR5.01 and in the BREF for Waste Incineration (WI BREF). As can be seen, the design of the Facility is in accordance with the benchmark values provided in the BREF and EPR5.01.

Table 6.7: Facility design parameters comparison table

Parameter	Unit	The Facility	Benchmark	Source
Net power generation, design capacity (50,000 tpa, 7,900 hours)	MWh/t RDF	0.69	0.6 – 0.9	BREF
Internal power consumption, design capacity (50,000 tpa, 7,900 hours)	MWh/t RDF	0.13	0.06 – 0.19	BREF
Power generation (assumed gross) for 50,000 tpa of RDF	MWe	4.64	2.5 – 4.5	EPR5.01

Appendix 1 of the UK regulators WI BATC Interpretation Document sets out the EA BAT position on energy efficiency at incinerators. The document states that plants will need to meet the following minimum gross electrical efficiencies, depending on their throughput:

- Plants 200 kt/year or greater: 30%
- Plants below 200 kt/year: 25%

The Facility will have a capacity of up to 60,000 tpa of waste and will have a gross electrical efficiency of approximately 26.1%.

In accordance with Article 44 of the Industrial Emissions Directive, heat generated during incineration should be recovered as far as practicable, through the generation of heat, steam, or power. In order to demonstrate

this, the following points should be noted:

- The boilers will be equipped with economisers to optimise thermal cycle efficiency.
- The Facility generate electricity and will have the potential to export heat to local users – refer to the CHP assessment presented within *Annex G*.

Development of KPI's

The Operator will establish Key Performance Indicators (KPIs) when site electricity generation figures are available. The composition of the waste materials in the process will not vary greatly over the life of the plant. Should any site equipment or technology be replaced, efforts will be made to replace the unit with one which is more energy efficient, if available.

The Operator will create KPIs based on monitoring data from how much energy is used to run the site and whether this can be reduced. Within six months of operating the Applicant will produce a report detailing the energy uses at the site and where energy use improvements, if any, can be made.

Raw Materials and Water Usage

- The plant has been designed to ensure that all residues are reused or recycled; and
- The use of an oil thermal fluid ORC significantly reduced water usage and therefore the plant net water use comfortably meets the sector average (250 – 1100kg per tonne of material processed).

Avoidance, Recovery and Disposal of Waste

- All feedstock delivered to the site will be subject to an acceptance and pre-acceptance process that should ensure that the potential for inappropriate feedstock delivery is minimised;
- The site has a detailed inspection process to avoid unsuitable wastes to be introduced to the process; and
- The safe storage of rejected loads has been provided within and procedures will be in place for dealing with such loads to ensure that they are safely stored and dispatched for onward disposal. The storage times will be minimised.

An Energy Balance has been provided within *Annex G1 – Mass Balance.*

6.4 CHP-Ready Assessment

Heat will be reused to heat the process buildings and offices and the warming and drying of the prepared feedstock. The supply to heat energy use in the adjacent industrial park is a possibility to be negotiated as this represents a superb and stable heat load. The plant will be registered for RHI and CHPQA. It is classified as CHP ready in accordance with the latest Guidance.

A CHPR Assessment was conducted during the previous operation of the facility (*Annex G*). However, this will need to be reviewed and updated after the upgrades to the plant are complete. Suitable off-takers will need to be identified and terms agreed before exporting of heat energy.

This situation will be reviewed on a periodic basis and the feasibility re-appraised.

6.5 BAT Comparison

An assessment of the applicable indicative BAT requirements (as stated by EPR Guidance Note 5.01 Incineration) for the sector has been carried out. The following indicative BAT measures are considered to be met by the process.

Operations

- Very high levels of housekeeping will be employed throughout the site;
- All vehicles will be loaded and unloaded under cover and on sealed concrete hardstanding and engineered containment;
- The RDF feedstocks are stored internally;
- The building will be maintained under negative pressure;
- Segregated water systems have been incorporated into the design of the plant to minimise the contamination of rainwater; and
- All building doors will be self-closing.

Waste Charging

- All feedstock into the combustion system will be on automatic feed systems to prevent waste feed at start-up:
    - Until the required temperature has been reached;
    - Whenever the required temperature is not maintained; and
    - Whenever the continuous monitors show that any emission limit value is exceeded due to disturbances or failures of the purification devices.
- Waste charging will be interlocked with combustion conditions so that charging cannot take place when:
    - The temperatures and airflows are inadequate;
    - Any flue gas cleaning bypasses are open;
    - Where the continuous monitors show that the emission limit values are being exceeded for a period more than the limits set within the WI BREF; or
    - Monitoring results required to demonstrate compliance with emission limit values are unavailable.
- The charging process has been designed to be sealed and all pressure controls have been designed to avoid escape of fumes or excess air flows; and
- The charging rates will be maintained at the optimum feedstock design rate of 4.8 tonnes per hour.

Legislative Requirements

- The gases resulting from the combustion process will be maintained at above 850ºC for at least 2 seconds;
- The combustion temperature and residence time and the oxygen content of the stack gases have been validated under the most unfavourable operational conditions;
- Ash produced by the plant will comply with the IED/WID 3% TOC requirements; and

- The installation will not give rise to significant ground level air pollution as demonstrated in this document.

Emissions to Air

- Fabric or ceramic filters will be used to provide reliable abatement of particulate matter to below 5mg/m^3;
- Filters with multiple compartments will be used, which can be individually isolated in case of individual filter failures. There will be sufficient of these to allow adequate performance to be maintained when filters fail, i.e., design will incorporate capacity for meeting emission limits during online maintenance;
- The plant is fitted with SNCR (Urea Injection) to control and abate NOx formation;
- The gas is cooled quickly to avoid de novo synthesis of dioxin between 450ºC and 200ºC;
- Dry scrubbing systems incorporating lime and PAC injection neutralise acid gases and remove heavy metals; and
- All indicative IED WI BREF ELV's will be met.

Odour Emissions

Odour will be minimised through the following measures:

- Containing waste to designated areas;
- Ensuring that no putrescible waste is processed at the plant;
- Regular cleaning of waste handling areas;
- The design of all waste handling areas facilitates cleaning; and
- Drawing air from feedstock areas at a rate which will ensure that any odour present is captured.

7. IMPACT TO THE ENVIRONMENT

7.1 Impacts to Air

An assessment has been carried out to determine the potential air quality impacts associated with the proposed operation of the Plymouth EfW Facility. The assessment has utilised the latest ADMS dispersion model.

Scope of the Assessment

The scope of the assessment has been determined in the following way:

- review of air quality data for the area surrounding the Site, including data from the Defra Air Quality Information Resource (UK-AIR);
- Desk study to confirm the location of nearby areas that may be sensitive to changes in local air quality; and
- Review and modelling of emissions data which have been used as input to the UK Atmospheric Dispersion Modelling System (ADMS) dispersion model.

The assessment for the facility comprises a review of emission parameters for the development and dispersion modelling to predict ground-level concentrations of pollutants at sensitive human and habitat receptor locations.

Operational impacts associated with the combustion sources have been assessed using a dispersion model to predict the impact at ground level utilising five years of meteorological data from Plymouth Mount Batten measuring station.

Predicted ground level concentrations are compared with relevant air quality objectives for the protection of health and critical levels / loads for the protection of sensitive ecosystems and vegetation

This modelling presented within *Annex H – Air Quality Assessment and HHRA.*

7.2 Sensitive Human Health Receptors

Specific receptors have been identified where people are likely to be regularly exposed for prolonged periods of time (e.g., residential areas). The location of the discrete sensitive receptors is presented in table 4 of the AQA (*Annex H2*) and repeated below.

Table 7.1 Human Health Receptors

Receptor	Receptor Name	Type	Eastings	Northing	Dist. (m)
1	Lady Fern Road, Belliver	Residential	250080	062343	185
2	Claytonia Close, Belliver	Residential	250180	062227	310
3	Hessary Drive, Belliver	Residential	250097	062138	293
4	45, Leat Walk, Woolwell	Residential	250380	062438	493
5	3, Tavistock Road, Woolwell	Residential	250414	062197	541
6	Legis Walk, Belliver	Residential	249928	061910	441
7	Beverston Way, Belliver	Residential	249758	061711	654
8	Highclere Gardens, Belliver	Residential	249596	061594	813
9	Langley Crescent, Southway	Residential	249078	061520	1,165

10	Soper's Hill, Bickleigh - North north-west	Residential	248678	062088	1,245
11	Soper's Hill, Bickleigh – North-west	Residential	249225	062865	845
12	Soper's Hill, Bickleigh - West	Residential	249350	063262	1,062
13	Tamerton Road, Woolwell	Residential	249841	062904	557
14	Roborough House, Woolwell	Residential	250231	062973	708
15	White Oaks, Widewell Lane, Belliver	Residential	250090	061447	924
16	Bickleigh Down CofE Primary School	School	250777	061469	1,247
17	Widewell Primary Academy, Belliver	School	249860	061305	1,046
18	Oakwood Primary Academy, Derriford,	School	249470	060969	1,445
19	Notre Dame RC School, Southway	School	249052	060181	2,327

The results of the air quality assessment have indicated that the impact of the facilities emissions on local air quality would be not significant with respect to human health.

Please refer to *Annex H – Air Quality Assessment and HHRA* for more information.

7.3 Impact on Sensitive Habitat Sites

The EA's H1 guidance states that the impact of emissions to air on vegetation and ecosystems should be assessed for the following habitat sites within 10 km of the source:

- Special Areas of Conservation (SACs) and candidate SACs (cSACs) designated under the EC Habitats Directive[9];
- Special Protection Areas (SPAs) and potential SPAs designated under the EC Birds Directive[10]; and
- Ramsar Sites designated under the Convention on Wetlands of International Importance[11].

Within 2km of the source:

- Sites of Special Scientific Interest (SSSI) established by the 1981 Wildlife and Countryside Act;
- National Nature Reserves (NNR);
- Local Nature Reserves (LNR);
- Local wildlife sites (Sites of Interest for Nature Conservation, SINC and Sites of Local Interest for Nature Conservation, SLINC); and
- Ancient woodland.

The locations of the local habitat sites are also presented in table 4 of the AQA and repeated below.

Table 7.2 Location of Habitat Sites

Receptor	Receptor Name	Type	Eastings	Northing	Dist. (m)
E1	South Dartmoor Woods SAC 1	Habitat / SAC	253140	064160	3,716
E2	South Dartmoor Woods SAC 2	Habitat / SAC	253233	063730	3,612

9 Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora.
10 Council Directive 79/409/EEC on the conservation of wild birds
11 Ramsar (1971), The Convention of Wetlands of International Importance especially as Waterfowl Habitat.

E3	South Dartmoor Woods SAC 3	Habitat / SAC	253883	063447	4,136
E4	Plymouth Sound and Estuaries SAC 1	Habitat / SAC	247342	065106	3,757
E5	Plymouth Sound and Estuaries SAC 2	Habitat / SAC	247081	063261	2,958
E6	Tamar Estuaries Complex SPA 1	Habitat / SPA	247371	062792	2,562
E7	Tamar Estuaries Complex SPA 2	Habitat / SPA	246608	060909	3,589
E8	Dartmoor SAC 1	Habitat / SAC	257257	064715	7,733
E9	Dartmoor SAC 2	Habitat / SAC	260007	061407	10,156
E10	Southway Valley LNR	Habitat / LNR	249638	060960	1,414
E11	Haxter Wood	Habitat	249756	062422	157
E12	Langley Plantation	Habitat	248825	061473	1,383
E13	Dunsburgh Wood (Ancient)	Habitat	248675	062694	1,268
E14	Dunsburgh Wood (Ancient Replanted)	Habitat	248739	062755	1,225
E15	Whiteshill Wood	Habitat	248299	062823	1,665
E16	Blaxton Coppice	Habitat	248248	063048	1,789
E17	Bame Wood	Habitat	248846	063353	1,451
E18	Broadley Wood	Habitat	249015	063682	1,596
E19	Hele Wood	Habitat	251433	063334	1,826
E20	Coombe Wood	Habitat	251655	062152	1,771
E21	Darklake Wood	Habitat	251315	061285	1,775
E22	West Wood	Habitat	250404	061150	1,303
E23	Holt Wood	Habitat	250511	061036	1,451

The locality of the facility is not considered to be highly sensitive to ecological impacts. The nearest Special Areas of Conservation (SAC) and European Special Protection Areas (SPA) are circa 2 – 3 km away and include the Tamar Estuaries, South Dartmoor Woods, and Plymouth Sound There are no immediate highly sensitive habitat receptors in close proximity of the site. In addition, there is one Local Nature Reserve (LNR) and numerous wildlife sites within 2 km.

The impact of airborne emissions on the identified habitat sites has been assessed within the air quality assessment.

The habitat assessment considers the impact of airborne concentrations of the oxides of nitrogen, sulphur dioxide, ammonia, and hydrogen fluoride. Predicted concentrations have been compared to relevant critical levels. In addition, the impact of nutrient nitrogen deposition and acidification were assessed with deposition fluxes compared to the most stringent critical loads for the habitats present at each designated site.

Where the impacts could not be screened out (i.e., long term exposure is greater than 1% or short-term exposure is greater than 10% of the relevant critical levels/loads) an interpretation of the likelihood of effects on the habitat sites has been provided by the project ecologist.

Please refer to *Annex H – Air Quality Assessment and HHRA* for more information.

The results of the air quality assessment have indicated that the impact of the process emissions on local

habitat sites is not significant compared with existing background conditions and relevant critical levels and critical loads.

7.4 Global Warming Potential

The global warming potential of the plant has been calculated using the EA H1 Annex H methodology and has been summarised and included in *Annex J – GWP.*

In accordance with the H1 methodology the Global Warming Potential (GWP) is 16,868 (tonnes CO_2 equivalent per annum).

7.5 Impacts to Land

There are no impacts to land relating to this permit application.

7.6 Impacts to Surface Waters and Sewer

There are no impacts to controlled waters relating to this permit application.

Discharges to surface waters and sewer comprise:

- Uncontaminated surface water run-off, which is discharged to a dry ditch, and ultimately the River Tamar, via an oil separator (W1); and
- Trade and domestic effluents, and treated effluent streams from the WTP, are discharged to sewer (S1).

All emissions from S1 and W1 will be in line with the emission limit values stipulated within the permit.

Due to the nature of discharges and no direct discharges to controlled waters a H1 Assessment has been deemed unnecessary for this permit application.