Schedule 13 SWIP Permit Application

Calder Valley Skip Hire Ltd

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Calder Valley Skip Hire
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Quality Management					
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NON-TECHNICAL SUMMARY

Calder Valley Skip Hire Ltd (CVSH) proposes to install a new small waste incineration plant (SWIP) at a site in Sowerby Bridge, West Yorkshire.

The SWIP will be regulated by the local authority (Calderdale Metropolitan Borough Council) under a Schedule 13 SWIP permit. The SWIP will process up to 2 tonnes per hour (tph) of refuse derived fuel (RDF) produced from the residual, non-recyclable fraction of the existing waste stream comprising primarily construction and demolition waste at the existing WTS located on the same site (EPR/SP3196ZQ). The maximum annual throughput will be 10,000 tonnes per annum (tpa) of RDF, all of which will come from the existing adjacent WTS activities.

Heat produced by the SWIP will be used within the drying plant to be installed as part of the WTS activities.

The SWIP will operate under the terms and conditions of a Schedule 13 permit which requires compliance with the ELVs for pollutants specified by the IED for small waste incineration plant.

Effective pollutant abatement will be achieved through the injection of a hydrated lime sorbent to achieve acid gas neutralisation and activated carbon powder to abate dioxins, furans and mercury. A ceramic filter will facilitate removal of particulate bound heavy metals and other particulates. Selective non-catalytic reduction (SNCR) with urea will achieve a reduction in NOx emissions. Continuous monitoring of emissions to air will confirm that levels are within IED emission limits. Where continuous monitoring is not proposed periodic monitoring will be undertaken.

All bottom ash and Air Pollution Control (APC) residue handling will take place within the thermal treatment building. Bottom ash will be manually raked by trained staff directly into containers which will be sealed prior to removal from the building. APC residues will also be handled within the building and will be loaded directly into enclosed skips. Skip vehicles will enter the building and the sealed containers and enclosed skips will be loaded onto such vehicles for transportation out of the site.

The SWIP is intended specifically to recover energy, via combustion, from RDF. Energy will be recovered from the hot combustion flue gas. Approximately 1.28 MW_{th} of heat will be produced and approximately 180 ï 200 kW_e of electrical energy, part of which will be utilised on site and the balance to be exported to the Grid. The thermal energy will be transferred to the drying plant for use in the adjacent drying activities.

The Operator has an existing Environmental Management System (EMS) to direct the operation of currently permitted process operations carried out on site under the waste permit. An addendum to the EMS has been produced to include management systems specific to the operation of the SWIP.

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1 INTRODUCTION

1.1 Background

1.1.1 Calder Valley Skip Hire Ltd (CVSH) proposes to operate a new small waste incineration plant (SWIP) at their waste transfer station (WTS) site in Sowerby Bridge, West Yorkshire.

1.1.2 The SWIP will be regulated by the local authority (LA) under a Schedule 13 SWIP permit. The SWIP will process 1-2 tonnes per hour (tph) of refuse derived fuel (RDF) produced from the residual, non-recyclable fraction of the existing waste stream comprising primarily construction and demolition waste together with a smaller quantity of park waste and similar municipal waste at the existing WTS located on the same site. The SWIP will produce approximately 1.5 MW_{th} per tonne of RDF of energy comprising both heat and electrical energy. It is anticipated that 180 - 200 kW_e electrical energy will be produced, part of which will be utilised on-site with the balance to be exported to the Grid.

1.1.3 Heat produced by the SWIP, which is anticipated to be 1.28 MW_{th}, will be used within a new drying plant which is permitted as part of the WTS activities also operated by CVSH.

1.2 Site Location

1.2.1 The SWIP will be located at Belmont Industrial Estate, Rochdale Road, Sowerby Bridge, West Yorkshire, HX6 3LL.

1.2.2 The site is located off Rochdale Road (A58), with the River Ryburn, woodland and Rochdale Road (A58) to the north. To the east of the site is Spring Bank Industrial Estate, containing a number of small light industrial properties, to the south/south-east is a dismantled railway and embankment beyond which lie residential properties at Hullen Edge Farm, Long Lane and Goose West Lane, and to the west lies the River Ryburn, woodland and small-scale industrial units along Mill House Lane.

1.2.3 The site is not located in a DEFRA Air Quality Management Area (AQMA). The nearest AQMA is in Sowerby Bridge, 670 m from the proposed facility. This area, according to Calderdale Metropolitan Borough Council (CMBC), has been designated under Section 83 Environment Act 1995 due in part to a known exceedance of the annual mean air quality objective for nitrogen dioxide (NO_2) as specified in the Air Quality Regulations 2000. It was also in part due to modelled evidence of a likely exceedance of that value.

1.3 Applicant

1.3.1 The applicant and operator of the site is Calder Valley Skip Hire Ltd (CVSH).

1.4 Other Activities on Site

1.4.1 The existing EA permit (EPR/SP3196ZQ) authorises a household, commercial and industrial waste transfer station (WTS) which is adjacent to the SWIP building, including treatment, with a capacity up to 145,000 tonnes of waste per year. However, as stated above, the existing waste stream comprises primarily waste from construction and demolition sources together with a smaller quantity of park waste and other similar municipal waste. The existing waste stream does not include household waste. The permitted activities are: D15 (storage), R13 (storage of waste), D14 (repackaging of waste), D9 (physico-chemical treatment), R2 (recycling or reclamation of organic substances not used as solvents), R3 (recycling or reclamation of metals and metal compounds) and R4 (recycling or reclamation of other inorganic materials). The waste permit was varied in 2021 to include the operation of the drying unit which will utilise heat from the SWIP.

1.4.2 There are three waste exemptions registered at the site which allow for the storage of waste and use of waste within the constraints of the exemptions.

1.5 Planning Permission and Previous Permit Application

1.5.1 On 4 February 2020 planning permission was granted on appeal by an Inspector appointed by the Secretary of State under Appeal Ref: APP/A4710/W/18/3205776 for construction of external flue, and change of use of existing building from recycling use (B2) to heat and energy recovery process (sui generis) and introduction of mechanical drying of inert soils and aggregates (B2) adjacent to the existing recycling shed together with the installation in underground ducts of pipes connecting the energy recovery plant in the said building to the dryer at the existing WTS site. The heat and energy recovery process comprised in the permitted development is to be carried out by the SWIP and associated plant which is the subject of this application. A copy of the Appeal Decisions dated 4 February 2020 is provided in Appendix B.

1.5.2 The planning permission was granted subject to 22 conditions of which of particular relevance are:

- No hazardous waste shall be used to fuel the SWIP (condition 3);
- Only non-recyclable waste derived from the on-site operations shall be used to fuel the SWIP. No material shall be brought into the site at any time for incineration for the sole purpose of disposal (condition 4);
- The throughput of the SWIP shall be no greater than 2 tonnes per hour (condition 5);
- Before the first operation of the SWIP details of the drying plant (i.e. the plant to be used for drying inert soils and aggregates) and the connections to it from the SWIP shall be submitted to and approved in writing by the local planning authority. The drying plant and the connections to it shall be completed in accordance with the approved details before the first operation of the SWIP and shall be maintained as installed. The SWIP shall not be operated in the event that the drying plant is not available for use (condition 6);
- Before the first operation of the SWIP a scheme shall be submitted to and approved in writing by the local planning authority to demonstrate that electrical generation and/or heat recovery systems have been installed with the capability to meet equivalent energy outputs per unit of waste derived fuel input that meets or exceeds the equivalent of the R1 energy efficiency index. The SWIP shall be operated and maintained in accordance with the approved scheme to ensure that it continues to meet this R1 energy efficiency index and maintains recovery status (condition 8);
- The rating level (as defined in BS 4142:2014+A1:2019 'Method for rating and assessing industrial and commercial sound') of noise emitted from the site shall not exceed the background noise levels by more than 5dB during the day (07:00-23:00 hours) or night (23:00-07:00 hours). The rating level shall be determined in accordance with the procedure set out in BS 4142:2014+A1:2019 for the residential properties located at 28, 44, 46, 80 and 90 Rochdale Road, Sowerby Bridge and 'Bank House' and 'Bank Cottage', Long Lane, Norland, Sowerby Bridge. The assessment period shall be one hour during the day and fifteen minutes at night (condition 10);
- The SWIP shall only operate for 24 hours a day on Monday to Friday. On those days during the hours between 00:00 hours to 07:00 hours and between 18:00 hours to 00:00 hours the SWIP shall only operate when all of the roller shutter doors in the building which contains the SWIP are closed. The SWIP shall not operate on Saturdays, Sundays or on Bank/Public Holidays. (Condition 13(b)).

1.5.3 Condition 11 of the planning permission required the submission and approval of a Noise Management Plan with the objective of limiting, so far as practicable, noise arising from activities at the site and condition 14 requires the submission and approval of a dust management scheme for the operation of the SWIP and drying plant, in each case before the first operation of the SWIP. Both management plans have been approved by CMBC. In addition, a scheme for demonstrating compliance with the R1 energy efficiency index (condition 8 highlighted above) has also been approved by CMBC.

1.5.4 A previous permit application was submitted to CMBC in August 2020 to permit the operation of the SWIP. A decision to grant the permit was reached and the permit (reference S13/005) was issued to CVSH. The grant of the permit by CMBC was subject to an application for judicial review for which permission to proceed was subsequently granted. The first and only ground in the judicial review claim conceded by CMBC was procedural in nature. Consequently, an order by consent was issued by the Court on 17 September 2021 quashing the grant of the environmental permit. CMBC was therefore required to redetermine the application. CBMC failed to determine the application within the relevant period. CVSH served notice on CBMC under paragraph 15(1) of Schedule 5 EPR 2016 and the application was deemed to have been refused on 23 May 2022.CVSH submitted an appeal against the deemed refusal dated 2022. The appeal was dismissed 05 July 2023. In his decision, the Inspector John Woolcock cited the approach to the treatment of trees within the air quality assessment supporting the application as the reason for dismissing the appeal. CVSH considers the decision in material respects to be perverse as well as procedurally unfair. This is especially so as regards Inspector Woolcock’s reasons for, in effect, disregarding the effect of paragraph 188 of the NPPF and his treatment of the Planning Inspector’s Appeal Decisions. In those circumstances, it would have been open to CVHS to challenge Inspector Woolcock’s Appeal Decision on judicial review. CVSH has chosen not to do so only because, upon his Appeal Decision being quashed and the appeal being referred back to the Secretary of State for redetermination, another Inspector might be left with residual doubt as regards an explanation of how the ADMS model works in terms of variable surface roughness lengths or whether there was some merit in assessing the effect of nearby woodland as though it was similar to that of nearby buildings as suggested by Inspector Woolcock. In those circumstances, and for that reason, it was decided that the better course, on balance, was, as set out below, to seek an independent review of the treatment of trees within the air quality assessment and to provide an expert explanation of how variable surface roughness lengths work within the ADMS model. Nonetheless, CVSH’s position is fully reserved in this regard.

1.5.5 This application is being submitted on the same basis as the original application. However, we have added further information provided to inform the redetermination in 2022 and certain documents from the hearing sessions in two appeal hearings in November 2022 and May 2023 have been incorporated.

1.5.6 To address the Inspectors reason for dismissing the appeal CVSH appointed an independent review of the treatment of trees within the air quality assessment. The Cambridge Environmental Research Consultants (CERC) undertook this review. CERC are experts in dispersion modelling and both developed and maintain the ADMS model used for the dispersion modelling as well as providing air quality assessment consultancy services. In their report they confirmed that the approach adopted within the air dispersion modelling is considered appropriate and there would are no other suitable models/software available which would more accurately model the effect of trees. A copy of the CERC review is provided as part of the air quality supporting information within Appendix E.

1.5.7 Nevertheless, additional sensitivity modelling has been completed by both CERC and RPS. Details of the additional modelling are included in Appendix E.

2 REGULATORY CLASSIFICATION

2.1.1 The SWIP will burn RDF sourced from the adjacent waste operations on the site (permit reference EPR/SP3196ZQ, previously EAWML 65545). Preparation of the RDF is part of the permitted activities under the waste operation permit.

2.1.2 Part A(1) activities are regulated by the EA and include the following processes:

Part A(1)

(a) The incineration of hazardous waste in a waste incineration plant or waste co-incineration plant with a capacity exceeding 10 tonnes per day.

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

(c) The incineration, other than incidentally in the course of burning landfill gas or solid or liquid waste, of any gaseous compound containing halogens.

2.1.3 The RDF to be burned as fuel in the SWIP will be non-hazardous, but with a maximum burning rate of up to 2 tph it falls below the threshold for a Section 5.1 Part A(1)(b) waste incineration or waste co-incineration plant.

2.1.4 The corresponding Part B scheduled activities, that are subject to local authority regulations include the following:

(a) The incineration in a small waste incineration plant with an aggregate capacity of 50 kilogrammes or more per hour of the following waste;

(i) vegetable waste from agriculture and forestry;

(ii) vegetable waste from the food processing industry, if the heat generated is recovered;

(iii) fibrous vegetable waste from virgin pulp production and from production of paper from pulp, if it is co-incinerated at the place of production and the heat generated is recovered;

(iv) cork waste;

(v) wood waste with the exception of wood waste which may contain halogenated organic compounds or heavy metals as a result of treatment with wood preservatives or coatings;

(vi) animal carcasses.

2.1.5 The RDF to be burned is not included within the list of wastes that fall under the Part B scheduled activities.

2.1.6 Schedule 13 of the Environmental Permitting Regulations (EPR) 2016 (as amended) sets out the criteria for inclusion under the Schedule.

(1) This Schedule applies in relation to -

(a) every small waste incineration plant, and

(b) every waste incineration plant or waste co-incineration plant,

to which Chapter IV of the Industrial Emissions Directive applies, except those which are operated as a domestic activity in connection with a private dwelling.

2.1.7 Schedule 13 SWIP facilities are generally regulated by the LA. The regulator for this permit will be Calderdale Metropolitan Borough Council (CMBC).

2.1.8 SWIPs are subject to the requirements of Chapter IV of the Industrial Emissions Directive (IED). Information in the subsequent sections of this report set out how the proposed SWIP complies with these requirements. In terms of the IED requirements, the SWIP has been assessed against thresholds set out for incineration rather than co-incineration.

3 OPERATION

3.1 Overview

3.1.1 The principal activities proposed are as follows:

- Fuel reception, storage and handling;
- Combustion of fuel with associated recovery of heat at the adjacent drying plant and generation of electrical power;
- High efficiency ceramic filter to remove particulates;
- NO_x control measures including staged supply of combustion air, continuous emissions monitoring system (CEMS) and a urea based selective non-catalytic reduction (SNCR) abatement system;
- Injection of hydrated lime to control acid gases (SO_2, HCl, and HF);
- Injection of activated carbon to minimise emissions of dioxins and furans, and volatile heavy metals (mercury);
- Final discharge of treated exhaust gases to atmosphere via a 12-metre exhaust stack; and
- Collection of bottom ash and air pollution control (APC) residues from the SWIP for subsequent utilisation or disposal.

3.1.2 The proposed activities are summarised in the process flow diagram (PFD) in Appendix G. The locations of raw material and waste storage are provided in Drawing 2.

3.1.3 Operational responsibility for the SWIP will sit with CVSH, which is also the operator of the adjacent WTS.

3.1.4 The SWIP will incorporate a range of monitoring and control features to optimise combustion and the associated use of the thermal energy at the adjacent drying plant, while at the same time minimising pollutant emissions and the generation of solid residues.

3.2 Waste Type and Suitability

3.2.1 The facility will burn non-hazardous RDF (EWC code 19 12 10) from a single source. The RDF is expected to have a calorific value (CV) of circa 10 MJ/kg and a moisture content of 10% or less.

3.2.2 All of the RDF will have been subject to the same sorting and pre-treated within the adjacent WTS and will comprise the combustible residual, non-recyclable fraction remaining following the sorting and treatment.

3.2.3 The adjoining WTS, also operated by CVSH limits the wastes that are accepted into the facility to non-hazardous and inert waste. CVSH have waste pre-acceptance procedures in place to ensure that only wastes that are non-hazardous and comply with the permitted wastes will be accepted into the WTS. In the event that non-conforming wastes are identified (including any wastes that are considered potentially hazardous), the waste delivery would be rejected in accordance with the waste rejection procedures.

3.2.4 RDF, by virtue of classification of this waste code is considered combustible material. RDF is identified in the EA Fire Prevention Plan (FPP) guidance[1] as combustible waste.

3.2.5 The mechanical treatment stage at the adjacent waste management facility will assist in mixing the incoming waste as received and assist in creating a more homogeneous material than the incoming wastes received at the WTS, albeit still variable in nature.

[1] Fire prevention plans: environmental permits - GOV.UK (www.gov.uk)

3.2.6 Specific chemical analysis of the RDF composition from the CVSH facility is not available. WRAP have developed a classification system for waste derived fuels and gives the following compositional ranges[4]:

Table 3-1: Typical composition of RDF

Parameters	Unit	Typical Range
Biomass	%	50 ï 90
Net Calorific Value (as received)	MJ/kg	6.5 ï 25
Moisture content	% wt/wt	10 ï 40
Chlorine content	% wt/wt	0.2 ï 0.8
Ash content	% wt/wt	10 ï 50
Bulk density	kg/m^3	100 ï 650
Mercury	mg/MJ (80th percentile)	0.04 ï 0.12
Cadmium	mg/MJ (80th percentile)	0.2 ï 10
Heavy metals	mg/MJ (80th percentile)	30 ï 200

3.2.7 Respondents to DEFRA's call for evidence regarding the RDF market in England (December 2014)[2] submitted details of RDF specifications produced or set by end-users, as set out in the table below:

Table 3-2: Typical RDF specification

Parameters	Unit	Typical Range
Net Calorific Value (as received)	MJ/kg	10 ï 20
Moisture content	% wt/wt	12.5 ï 30
Chlorine content	% wt/wt	0.94 ï 2
Mercury	mg/kg	0.05 ï 3
Cadmium	mg/kg	8 ï 50
Size (shred/particle)	mm	30 ï 300

3.2.8 The European Commission Report on Refuse Derived Fuel, Current Practice and Perspectives (July 2003)[3] sets out a comparative analysis of waste recovered fuel quality across Europe. The medians provided in Table 3.14 of the EC report for mixed MSW fall within the ranges given in Table 3-1 and Table 3-2 above.

3.2.9 Respondents to DEFRA's call for evidence regarding the RDF market in England[6] also submitted details of material composition analysis of RDF produced, as set out in Table 3-3.

Table 3-3: Typical material composition

Material	Typical composition (% wt/wt)
Paper	10 ï 40
Plastics	10 ï 40
Food	0 ï 15
Wood	0 ï 20
Textile	0 ï 20
Metals	0 ï 4
Glass	2 ï 3

[2] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/381621/rdf-market-sum-response-201412.pdf

[3] https://ec.europa.eu/environment/waste/studies/pdf/rdf.pdf

Material	Typical composition (% wt/wt)
Fines	2 ï 7
Other	2 ï 20

3.2.10 The expected calorific value (CV) of 10 MJ/kg sits within the CV range for waste derived fuels as set out in WRAP Guidance[4], the lower end of the CV range identified in this guidance is 6.5 MJ/kg. The lower CV range for RDF is higher than the lower end for MSW, noting that MSW is commonly managed effectively via incineration. The moisture content of the RDF is towards the lower end of the RDF range specified by WRAP and lower than that stated by DEFRA.

3.2.11 Whilst the RDF will vary in composition the range is relatively limited, and therefore predictable, as it will comprise the residual, non-recyclable fraction of textiles, wood, paper, cardboard and plastics, all largely derived from construction and demolition industry sources, together with a smaller quantity of canteen waste from time to time. As above, the moisture content will not exceed 10%.

3.2.12 Based on the above, the proposed waste is considered suitable for combustion within the SWIP and the nature of the RDF feed to the SWIP is expected to be within the published ranges reported for RDF. Given the waste acceptance procedures and pre-treatment within the adjacent WTS, combined with restrictions in both the WTS permit and the SWIP permit limiting the waste to certain non hazardous waste streams adequate controls are in place to ensure only permitted non-hazardous waste will be processed within the SWIP.

3.3 Waste Reception, Storage and Feed

3.3.1 The SWIP will include a waste reception and storage area and will be housed within the existing building referred to in the planning permission the interior of which will be converted for use as a thermal treatment building with the external flue the construction of which is authorised by the planning permission. No waste will be delivered from off-site sources directly to the SWIP. That is prohibited by condition 4 of the planning permission as referred to above at paragraph 1.5.2.2. Waste deliveries to the site will be managed via the adjacent existing WTS. All loading activities for the SWIP will take place within the SWIP building (i.e. the thermal treatment building) and no wastes associated with the SWIP will be either stored or processed externally. The RDF will be transferred from the main processing shed at the WTS using a front loader and loaded directly into the waste reception hopper of the SWIP or temporarily stored within the SWIP building. The front loaders will enter the thermal treatment building through the vehicular access doors. These will be fast-acting internally mounted heavy-duty polyethylene roller shutter variety and will only open to permit access in and out of the building by vehicles during normal daytime working hours. At all other times the doors will remain closed in accordance with condition 13(b) of the planning permission, as referred to above at paragraph 1.5.2.

3.3.2 No further processing of the RDF feedstock will take place as part of the SWIP activities and no RDF will be stored outside prior to treatment. RDF will be produced within the adjacent WTS building and the primary storage of RDF will also be within the WTS building. RDF will be either placed directly into the feed hopper of the SWIP or temporarily stored within a dedicated buffer storage bunker within the SWIP building. At any one time, there will be no more than 20 tonnes of RDF stored within the storage bunker or within the feed hopper in the thermal treatment building. All areas with material storage and/or treatment will be within the thermal treatment building which has a concrete floor the integrity of which will be maintained to minimise the potential pathway to land and groundwater in the case of a spillage.

[4] http://www.wrap.org.uk/sites/files/wrap/WDF_Classification_6P%20pdf.pdf

3.3.3 The vehicle operators transferring material to, or removing it from, the SWIP will adhere to the site speed limit, which is 5mph, to minimise the potential for accidental spillages. This will be made clear during site inductions/training and enforced by the Site Manager.

3.3.4 All front-loader drivers will be trained, and this training will include clear instructions on ensuring front-loaders are not overloaded.

3.3.5 The waste feed system for the installed SWIP uses an updated Autoloader design from Inciner8 specifically suited to solid waste feeds such as RDF. Whilst the original standard Inciner8 I-1000 unit includes a top loaded feature the updated Inciner8 design allows for waste to be side-loaded (see Appendix D). The side-loaded feed of RDF will increase the performance capacity of the plant compared to that of the previously top-loaded design. RDF will be transferred from the waste reception into the primary chamber via an Autoloader, providing a regular feed supply to the SWIP.

3.3.6 Once loaded into the Autoloader a loading ram will push the RDF into the compartments of the primary combustion chamber.

3.4 RDF Combustion

3.4.1 All activities relating to the SWIP will be carried out within the thermal treatment building. The thermal treatment building is an existing structure but its interior has been purpose-designed and will be operated under slight negative pressure in order to mitigate potential dust and odour dispersion impacts. The SWIP has been designed to be airtight. Air from within the thermal treatment building will be supplied as combustion air to the SWIP. The roller shutter doors to the thermal building will be kept closed, opening only for vehicular access during normal daytime working hours, as required by condition 13(b) of the planning permission. This requirement will be enforced by the Site Manager.

3.4.2 The SWIP will operate at a RDF feed rate of up to 2 tonnes per hour with a maximum throughput of 10,000 tonnes per annum (tpa).

3.4.3 The SWIP unit has two combustion chambers and is designed to achieve auto combustion of fuel in the primary chamber, with support burners if needed, and thermally oxidises the off-gas in the secondary combustion chamber to create heat. The primary chamber has five burners and the secondary chamber has two burners. Thermocouples are installed within the unit to measure and monitor temperature.

3.4.4 Once combustion of the fuel is established, it will be self-sustaining.

3.4.5 Bottom ash residue remaining following combustion of the RDF drops down from the primary container and is collected in three storage compartments which correspond to the three compartments of the primary chamber. The bottom ash storage compartments are equipped with robust metal doors which remain closed at all times during the combustion process. The ash storage compartments are spacious and considered to be sufficient to store five days' worth of ash. In accordance with the manufacturer's instructions the ash will only be removed at the end of the incineration process when the SWIP has cooled down. It is anticipated that bottom ash removal will be scheduled for a Monday morning having shut down the plant on Friday evening and before starting it up again on Monday morning. Further detail on bottom ash handling is provided in Section 3.8.

3.4.6 The primary air is delivered by forced draft (FD) fans, integral to the 4 off MAX 25 burners. Additional primary combustion air will be delivered via the FD fan beneath the SWIP grate. The under-grate section of the SWIP unit is divided into three compartments to allow the excess air levels to be controlled to match the requirements of the initial devolatilisation of the RDF as it is distributed over the grates and the slower burn out of the residual char which requires higher excess air levels. Secondary combustion air flows into the Secondary Chamber will be controlled by dampers whose position will in turn be controlled by the PLC system. The secondary air is delivered by FD fans, integral to the 2 off MAX 25 burners above the grate. Secondary combustion air (tertiary air) will be introduced into the secondary chamber to obtain the correct air-to-fuel ratio for combustion of the volatile gases released by the burning of the RDF and tertiary air will be added into the secondary chamber, prior to entry into the air-cooled heat exchanger.

3.4.7 The waste feed system and the incineration process will be controlled by a programmable logic controller (PLC) in accordance with measured and calculated values from a number of sensors, via control and safety logic, see Section 3.10 below.

3.4.8 The SWIP has been designed to use gas oil as a start-up fuel until the primary and secondary chambers meet the required inner wall temperature of 850 °C. Once the furnace unit has reached the required temperature, the RDF will be loaded into the primary chamber via the enclosed autoloading hopper and combusted in the primary chamber on a variable grate. At this stage the unit will become self-sustaining and autothermic.

3.4.9 The auxiliary burners will be switched on automatically in the event that the temperature of the combustion gases after the last injection of combustion air falls below 850 °C, in compliance with Art 50(3) IED.

3.4.10 The waste feed will be automatically prevented in the following circumstance (in accordance with Art 50(4) IED):

- whenever temperature of 850 °C is not maintained
- whenever the continuous measurements show that any emission limit value is exceeded due to disturbances or failures of the waste gas cleaning devices.

3.4.11 All hot gases arising from the combustion of the RDF within the primary furnace chamber will be combusted under oxygen-rich conditions within the secondary chamber to ensure complete combustion takes place.

3.4.12 The design of the SWIP is such that the flue gases will achieve a residence time of 2 seconds after the last secondary air inlet at a minimum temperature of 850 °C. The SWIP has been subject to computational fluid dynamic (CFD) modelling to demonstrate that the design can meet IED minimum temperature and residence time requirements (see Appendix F).

3.5 Start-up and Shutdown Procedures

3.5.1 The SWIP will be operated in accordance with site operating procedures and these will include the flue gas cleaning plant. Operating procedures will cover start-up and shutdown of the plant, foreseeable emergencies as well as normal operation. Start-up procedures will include a visual check that the SWIP unit remains airtight. All SWIP operators will be trained against these procedures.

3.5.2 At the end of each working week, Monday to Friday, the SWIP will be shut down. As the roller shutter doors will remain shut at all times other than for access during daytime operational hours only in accordance with condition 13(b) of the planning permission, the potential for odour or dust emissions will be minimised.

3.5.3 Shutdown procedures will be automatically controlled by the PLC system. During shutdown of the SWIP, flue gas will continue to be discharged via the ceramic filter until the RDF is completely burned out. The urea injection and hydrated lime injection systems will continue to operate if required, as determined by the CEMS measurement of the NO_X and SO_2 emissions concentrations. Activated carbon injection for mercury and dioxins/furan control will continue to operate until shutdown is complete.

3.5.4 During a controlled shutdown, the fuel feed will be stopped, but the SWIP will continue to operate the induced draft and combustion air fans to fully burn out the fuel while the SWIP is still at operational temperatures. During shutdown, the RDF will have completed the devolatilisation stage while the combustion chamber refractory temperatures are significantly elevated, which will ensure the complete combustion of any material evolved from the grate.

3.5.5 The operation of the SWIP will be fully automated. In the event of any faults occurring with the SWIP, or other abnormal operating condition, it will automatically shut down to a safe condition and await attendance by a trained operator to restore it into service. Various safety circuits and fail-safe devices will continuously monitor the SWIP and provide control and safety response to any developing issues. The SWIP will be controlled via a PC interface linked to the process instrumentation and the PLC system, providing the operator with detailed current and historic information on operating conditions.

3.6 Air Pollution Control System

3.6.1 The SWIP will be designed and operated to comply with the Industrial Emissions Directive (IED) including meeting relevant emission limits to air. Emissions limits will be achieved via a combination of primary controls and secondary abatement.

3.6.2 Primary controls will include:

- A staged combustion air system will be employed. The injection system for the combustion air has been designed to provide effective distribution of combustion air to avoid hot zones and minimise the amount of inorganic material volatised.
- Use of low NOx burners for auxiliary fuel.
- Control of the combustion stage to ensure that optimum combustion conditions are maintained.
- Primary air, extracted from the RDF storage area, will be injected beneath the combustion grate. Primary air will be preheated using steam. The primary air injection will be controlled to minimise NO_x production and avoid excessive entrainment of particles.
- Turbulence within the combustion chamber will be achieved via the injection of the secondary air. The injection points for the secondary air have been selected to ensure that the flue gas mixture and secondary air injection achieve good distribution of the oxygen.
- The furnace has been designed to ensure the combustion chamber is as airtight as practicable. In addition, the furnace will be maintained under negative pressure to prevent the release of gases during charging.

3.6.3 The abatement plant will include:

- Particulate abatement (including heavy metals) will be provided using a ceramic filtration unit;
- NOx control using selective non-catalytic reduction (SNCR);
- Acid gas control using hydrated lime injection; and
- Activated carbon injection to control dioxins, furans and mercury.

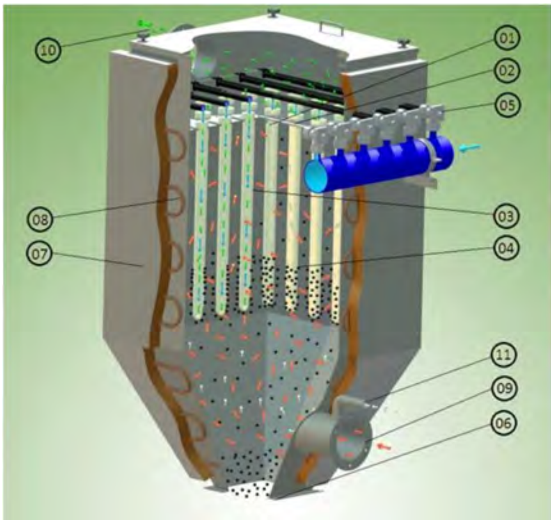
3.6.4 Each of the above abatement systems are discussed in turn below.

Particulate and particulate bound heavy metals control

3.6.5 Particulates carried over within the exhaust gases will pass through the heat exchanger and into the flue gas treatment plant.

3.6.6 Flue gases will exit the flue gas treatment section at a much-reduced temperature (~300ºC). The flue gases will then pass through a high efficiency ceramic filter where the fine particulate matter will be removed. The ceramic filter is illustrated schematically below.

Figure 3-1 - Ceramic Filter



- The ceramic filter element (1) hangs vertically from the header plate (2) within the filter vessel. The header plate separates the filter's clean and dirty compartments.
- Hot gas is drawn through the filter medium (3) from outside to inside.
- Particulates and dry scrubbing sorbents are collected on the outer surface (4) of each filter element. These consist of the PM_{10}, $PM_{2.5}$ size ranges; these agglomerate.
- The particles are removed from the element by reverse jet cleaning (5). This reversal causes the accumulated solids to be detached from the outer surface of the ceramic filter elements.
- The particulates and spent dry-scrubbing sorbents are discharged through the hopper outlet (6) for collection and disposal.
- The filter body can be protected with insulation (7) and trace heated (8) to prevent the formation of the condensation when the equipment is not in use.
- Incoming gas stream (9) and sorbent (if required).
- Outgoing cleansed gas stream (10).
- Injection point for activated carbon and/or sodium bicarbonate.

3.6.7 The ceramic filter will be capable of reducing incoming particulate emissions (including particulate phase heavy metals) by as much as 99.9%, ensuring that emissions will be at all times compliant with the 10 mg/Nm^3 particulate emission limit value specified by the IED for waste incineration plant. The filter will be equipped with a differential pressure sensor that will detect blockages and damage to the filtration media, which will trigger a visual and audible alarm on the control panel if the pressure deviates outside of pre-set control parameters that will be defined at the commissioning stage. If the pressure monitoring detects a fault with the filter, either blockage or failure of a filtration element, then the PLC will initiate a "Critical Alarm", requiring the immediate attention of an operator. In the event that the operator does not respond then the SWIP will be shut down automatically. The operator will be advised by an appropriate alarm text on the control panel and must take appropriate action and then positively confirm this alarm before the SWIP can be placed back into service.

3.6.8 Fouling on the surface of the ceramic filters will be removed by reverse jet cleaning.

3.6.9 A dust management plan (DMP) has been produced in accordance with planning condition 14 of the planning permission referred to at paragraph 1.5.3.

3.6.10 The DMP proposes the following key measures to prevent and control particulate emissions:

- All activities associated with the SWIP will be within the thermal treatment building which will contain airborne particulate dispersion.
- Air from the thermal treatment building will be extracted as combustion air within the SWIP.
- An air-tight Autoloader will be used to load RDF brought into the SWIP.
- The roller shutter access doors for the thermal treatment building will be rapid-closing heavy duty polyethylene roller shutter doors which will only permit vehicle access in and out of the building during normal daytime working hours in accordance with condition 13(b) of the planning permission.
- A ceramic filtration plant will be used as particulate emission control for the SWIP (as described above).
- Site housekeeping measures will minimise dust build-up and spillage procedures will ensure any spillage of dry or dusty material is cleared up immediately.

NO_x control

3.6.11 There are three recognised mechanisms for the formation of NO_x:

- Fuel NO_x
- Thermal NO_x; and
- Prompt NO_x.

3.6.12 Fuel NO_x relates to the conversion of fuel bound nitrogen into nitrogen oxides and therefore is partly a function of the incoming waste material. Fuel NO_x is affected by the level of oxygen in the vicinity of the flame and therefore reducing oxygen levels can influence NO_x emissions. However, there is a balance between minimising NO_x emissions and ensuring effective combustion and compliance with IED requirements for providing good burn out of waste material and minimising carbon in ash levels to <5% LOI or <3% TOC. The proposed air supply regime has been selected to ensure that effective combustion and burnout is achieved whilst controlling oxygen levels to a minimum to limit oxidation of the fuel bound nitrogen to NO_x.

3.6.13 Thermal NO_x requires high temperatures and there is a direct relationship between increasing temperature and unabated NO_x levels in the flue gases. The IED requires that any process burning waste material comprising or containing non-hazardous waste must maintain a minimum temperature of 850 ºC.

3.6.14 Prompt NO_x is formed by the relatively fast reaction between nitrogen, oxygen, and hydrocarbon radicals.

3.6.15 In reality, this very complicated process consists of hundreds of reactions and dozens of species. Prompt NO_x is an important mechanism in lower-temperature processes but is generally much less important compared to thermal NO_x formation at the higher temperatures found in combustion processes.

3.6.16 SNCR will be used for NO_x abatement using a water-based urea fluid as a reducing agent. The urea will be delivered in drums and fed into the storage tank which will in turn supply the injection of urea into the mainstream flue gas in the abatement system. The rate of injections will be optimised during commissioning and controlled during operation to avoid overdosing. Dosing will be linked to the continuous NO_x monitoring.

3.6.17 Due to high temperature in the furnace, urea is decomposed into ammonia and carbon dioxide:

$$CO\ (NH_2)_2 + H2O \rightarrow 2\ NH_3 + CO_2$$

3.6.18 The produced ammonia reduces NOx in the exhaust gas producing nitrogen and water:

$$4NO + 4NH_3 + O_2 \rightarrow 4\ N_2 + 6\ H_2O$$

$2NO_2 + 4NH_3 + O_2 \rightarrow 3 N_2 + 6 H_2O$

3.6.19 The urea will be stored in 25 litre drums within the SWIP building. Up to 20 of these drums (500 litres total) will be stored on site at any one time.

Acid gas abatement

3.6.20 Sulphur dioxide is created by the combustion of sulphur-containing compounds in the fuel. The SWIP will be equipped with a hydrated lime injection system to provide control of emissions of acid gases (SO_2, HCl and HF) to ensure that the emissions concentrations are within relevant emission limit values specified by the IED for waste incineration plant. Hydrated lime will be injected into a reaction chamber upstream of the ceramic filter, with the injection rate controlled by the central PLC unit, linked to the SO_2 emissions concentration data provided by the online CEMS. Both HCl and HF are much more reactive gases than SO_2, therefore control of the SO_2 emissions concentration will ensure compliance with the emissions limit values for both HCl and HF.

Dioxins, furans and mercury abatement

3.6.21 Activated carbon will also be injected into the flue. This will provide additional control of emissions of dioxins and furans, and volatile heavy metals such as mercury, which may be present in the flue gas generated by the combustion of the RDF. APC residues generated by the pollution control systems of the SWIP will be collected by the ceramic filter and stored in an enclosed container while awaiting dispatch from site for disposal to landfill as described in section 3.8 below.

3.6.22 The hydrated lime and activated carbon will be delivered and stored in 25 kg bags, which will be stored in the SWIP building. Up to 40 bags (1 tonne) will be stored on site at any one time.

Exhaust stack

3.6.23 Flue gas exiting the ceramic filter will be discharged via a 12 m stack at an efflux velocity of 21.3 m/s during operation of the SWIP.

3.6.24 The height of the chimney has been designed to provide effective dispersion of pollutants generated by the combustion of the RDF. The results of the stack height assessment indicated that a height of 12 metres would provide effective dispersion of emissions from the exhaust stack.

3.6.25 The application for the development which was granted planning permission on appeal, as referred to in section 1.5 above, was refused permission by CMBC on 2 January 2018. The refusal cited a single reason which related to air quality. The subject of air quality and the air quality assessments submitted in evidence were considered fully by the Inspector as set out in the Appeal Decisions dated 4 February 2020. This included point source dispersion modelling based upon stack emissions assumptions including the discharge height for the stack. The Inspector's overall conclusion on air quality was that the effect of the proposal on living conditions in the local area, with particular reference to air quality, would be acceptable and, in relation to that matter, it would not conflict with the requirements of CMBC's Replacement UDP Policies WM9 or EP1 or the aims of the National Planning Policy Framework (NPPF), with particular reference to location relative to concentrations of population as well as environmental and amenity impacts. (Paragraph 64 of the Appeal Decisions). Further, the Council and CVSH agreed that the proposed development would not have an adverse impact on sensitive ecological receptors including protected species, habitats and wildlife corridors. This agreement is recorded at paragraph 94 of the Appeal Decisions.

3.7 Breakdown

3.7.1 In the event that emissions in the exhaust gases approach IED limits, alarms will be triggered allowing sufficient time for the Operator to take corrective actions. Spares for the abatement equipment will be held on site. In the event of a problem that cannot be rectified by site staff, the plant will be shut down until a repair can be made.

3.8 Solid Residues Management

3.8.1 The SWIP will generate two residues namely bottom ash and APC residues. All bottom ash and APC residue handling will take place within the thermal treatment building. APC residue and bottom ash will be handled separately.

3.8.2 Bottom ash will be manually raked by trained staff directly into containers which will be sealed within the thermal treatment building prior to removal from the site, see paragraph 3.4.5 above.

3.8.3 The intention would be to sample and test the bottom ash and APC residue to assess their hazard levels. It is expected that the bottom ash will be deemed non-hazardous and may be recycled, with possible applications for land spreading or for use as a component in the manufacture of construction materials such as breeze blocks. Even if it is found that the bottom ash cannot be recycled it is still expected to be non-hazardous and capable of being disposed of at a landfill which is permitted to accept non-hazardous waste.

3.8.4 APC residues will be loaded into fully enclosed skips which will in turn be loaded directly onto vehicles within the building.

3.8.5 The APC residue is expected to be classified as a hazardous waste (as will the bottom ash initially until demonstrated otherwise) and will be removed from the site in enclosed skips which will be loaded onto skip vehicles within the thermal treatment building and removed from the site by a contractor specialising in the treatment, partial recycling and disposal of APC residues.

Table 3-4: Typical Amounts of Recovered Materials and Residual Wastes from the SWIP

EWC	Product Description	Expected Tonnes Per Annum	Material End Use
19 01 07*	Air Pollution Control (APC) residue / Filter cake Solid wastes from gas treatment	240-300	Landfill
19 01 12	Bottom ash and slag other than those mentioned in 19 01 11	800-1,000	Preferably recycling, landfill only if that is not possible

3.9 Noise and Vibration

3.9.1 Noise assessments were carried out during the planning stage and the noise assessment at Appendix 4.1 to the Environmental Statement Addendum, July 2019 (ES Addendum) is provided in Appendix C to this application. The assessment used data from the manufacturers for the equipment that will be installed within the SWIP building as well as other equipment such as the proposed drying plant and associated loading and unloading operations. The cumulative BS 4142 assessment concluded that the proposed operations would result in a negligible significance effect at the nearby receptors.

3.9.2 In the Planning Appeal Decisions the Inspector considered the effect of the scheme on living conditions in the local area with reference to noise and disturbance. The Inspector concluded that, subject to conditions, the effect of the proposal on living conditions in the local area, with particular reference to noise and disturbance, would be acceptable. In that respect he concluded it would accord with the aims of CMBC's Replacement UDP Policies EP8 and WM9 as well as the NPPF. (Paragraph 73 of the Appeal Decisions). The conditions which the Inspector imposed in accordance with his conclusion are Conditions 10 (noise standard) as referred to in paragraph 1.5.2 above and Condition 11 (noise management plan) as referred to in paragraph 1.5.3 above.

3.10 Instrumentation

3.10.1 The SWIP will be equipped with a range of process instrumentation to monitor temperature and flue gas oxygen concentration at strategic locations throughout the process. Instruments are installed to provide continuous information to the PLC system, which monitors and adjusts key operational parameters to ensure efficient combustion of the RDF at all times. The instruments will supply data to the PLC-based process control system overseen by SCADA supervisory control. The selected PLC is a superior design to that originally specified and includes enhanced automatic controls systems providing real time information to the Operator. This will control the combustion process and associated pollution control systems and derive key metrics for optimisation and monitoring of the combustion process by shift personnel.

3.11 Emissions to Air

3.11.1 The SWIP will operate under the terms and conditions of a Schedule 13 permit which requires compliance with the emission limits specified by the IED for small waste incineration plant and set out in Table 3-5 below.

Table 3-5 - IED Compliance Limits

Pollutant	Half hourly Emission Limits (97%ile) (mg.Nm^{-3})	Daily-Mean Emission Limits (mg.Nm^{-3})
Particles	10	10
TOC	10	10
HCl	10	10
HF	2	-
SO_2	50	50
NOx	200	200
CO	100	50
Group 1 metals (a)	0.05 (d)	-
Group 2 metals (b)	0.05 (d)	-
Group 3 metals (c)	0.5 (d)	-
Dioxins and furans	-0.0000001 (e)	-

Notes: All concentrations referenced to temperature 273 K, pressure 101.3 kPa, 11% oxygen, dry gas.

(a) Cadmium (Cd) and thallium (Tl).

(b) Mercury (Hg).

(c) Antimony (Sb), arsenic (As), lead (Pb), chromium (Cr), cobalt (Co), copper (Cu), manganese (Mn), nickel (Ni), and vanadium (V).

(d) All average values over a sample period of a minimum of 30 minutes and a maximum of 8 hours.

(e) Average values over a sample period of a minimum of 6 hours and a maximum of 8 hours. The emission limit value refers to the total concentration of dioxins and furans calculated using the concept of toxic equivalence (TEQ).

3.11.2 Air quality assessments were carried out during the planning stage. In the Appeal Decisions the Inspector gave greater weight in the context of living conditions to the Air Quality Assessment carried out by RPS which was presented at Appendix 3 to the ES Addendum, July 2019. For the Inspectorǿs reliance upon that Air Quality Assessment, reference should be made to the Appeal Decisions commencing at paragraphs 33 to 39. Whilst these documents provide the primary assessment of air quality effects from operation of the SWIP, further consideration of air quality effects has been carried to support this application, specifically to address the reason for dismissing the 2022 permit appeal, namely the treatment of trees. This includes an independent review of the treatment of trees by air quality specialists CERC and additional sensitivity tests completed by RPS. The information supporting this application in respect of air quality effects is provided in Appendix E and comprises the following:

- ES Addendum to 2017 ES Chapter 7: Air Quality Assessment, RPS, July 2019.
- ES Addendum ï Additional Air Quality Assessment, RPS July 2019.
- Response to Air Quality Consultants Ltd. Review of Air Quality Assessment, RPS, March 2022.
- RPS Memo Report Air Quality Including Additional Sensitivity Tests, January 2024 which includes a Review and Provision of Independent Advice by CERC, November 2023.

3.11.3 The air quality assessments concluded that both long term and short term impacts from emissions to air from the SWIP would not be significant.

3.11.4 The RPS Memo Report, 2024 presents the results of two additional sensitivity tests to further investigate the effect of trees on dispersion from the CVSH SWIP. The two scenarios involved:

1. Use of Numerical Weather Prediction (NWP) meteorological data.
2. Consideration of concentrations in column of air above modelled receptors

3.11.5 In doing so, firstly RPS has gone above and beyond the methodology usually adopted for the modelling of air quality impacts and secondly the tests provide even greater confidence that the impacts of trees have been fully considered. The results of these additional sensitivity tests show that the impacts at all receptors remain negligible and the air quality effects are not significant.

3.11.6 Included with the RPS Memo Report 2024 (as Appendix B to that report) is an independent review by CERC in respect of the treatment of trees within the air dispersion modelling concluded that the assessment carried out by RPS was robust. CERC undertook further sensitivity testing to show that the values of the surface roughness used by RPS to represent the impact of trees on dispersion are appropriate and that representing the trees around the site as buildings is not only not appropriate but also has only a very small effect on calculated pollutant concentrations at receptors.

3.11.7 Dioxins and furan emissions whilst subject to modelling within the air quality assessment have no established Environment Assessment Levels (EALs) to compare process contributions from the facility against. A human health impact assessment has been carried out to assessment the effect of emissions of these pollutants a copy of this assessment is provide in Appendix H. A summary of the report is provided below:

- The possible impacts on human health arising from dioxins and furans and dioxin-like PCBs emitted from the SWIP were assessed under the worse-case scenario, namely that of an individual exposed for a lifetime to the effects of the highest airborne concentrations and consuming mostly locally grown food.
- The assessment identified and considered the most plausible pathways of exposure for the individuals considered (farmer and residents).
- Committee on Toxicity (COT) Tolerable Daily Intake (TDI) is 2.1 % for a farmer receptor and 0.2 % for residential receptors.
- The farmer is assumed as the worse-case, as they are located within the closest farming area to the facility and all their food is reared and grown at this location this represents an extreme worse-case.
- The risk assessment is based on worse-case scenario and the methodology gives rise to a degree of conservatism.
- In conclusion, the maximum impact of emissions on exposed individuals is considered not to be significant.

3.12 Emissions to Water and Sewer

3.12.1 There will be no emissions to surface water, groundwater or sewer from the SWIP.

3.12.2 In the event of a fire, contaminated fire water from firefighting would be contained on the site by the use of flood gates which will be deployed across all entrances of the SWIP building to contain all contaminated water from firefighting within the plant building. In addition, the adjacent WTS has polybooms available which could be deployed in addition to the flood gates should this be required and following advice from the FRS.

3.13 Monitoring

3.13.1 Exhaust gases from the SWIP will be treated within the flue gas treatment plant. Continuous monitoring of emissions will confirm that levels are within IED emission limits.

3.13.2 To enable demonstration of compliance with the IED emission limit values, an IED compatible Continuous Emissions Monitoring System (CEMS) will be installed in the exhaust stack to enable continuous monitoring and recording of emissions concentrations for the following pollutants:

- Oxides of nitrogen (NO_X);
- Sulphur dioxide (SO_2);
- Carbon monoxide (CO);
- Particulates;
- Hydrogen chloride (HCl);
- Total organic carbon (TOC);
- Water vapour (H_2O);
- Oxygen;
- Temperature; and,
- Pressure.

3.13.3 In accordance with Annex VI part 6 IED, HF will not be monitored continuously as treatment stages for HCl will be used, which will ensure that the emission limit value for HCl is not being exceeded. Emissions of HF will be subject to periodic measurements.

3.13.4 In order to comply with Art 45(1) IED any technically unavoidable stoppages, disturbances, or failures of the purification devices or the measurement devices, during which the emissions into the air may exceed the prescribed emission limit values will be monitored and recorded to ensure that the maximum permissible period set out in the permit is not exceeded.

3.13.5 In order to comply with Art 46(6) IED any period where emission limit values are exceeded will be recorded to ensure that the plant does not continue to incinerate waste for a period of more than 4 hours and that the cumulative duration of operation in such conditions over 1 year does not exceed 60 hours.

The proposed CEMS is capable of measuring all of the above gaseous species and is MCERTS-accredited. The expected unit technical brochures are in Appendix D. The monitoring equipment will be certified to EN15267-3 as required by EA Guidance ōMonitoring stack emissions: technical guidance for selecting a monitoring approachö[5]. Periodic monitoring will be carried out in accordance with EA Guidance ōMonitoring stack emissions: techniques and standards for periodic monitoringö[6]. The monitoring frequencies and methods are provided in Table 3-6 below.

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[5] Environment Agency Guidance, Monitoring stack emissions: technical guidance for selecting a monitoring approach, December 2019. https://www.gov.uk/guidance/monitoring-stack-emissions-technical-guidance-for-selecting-a-monitoring-approach

[6] Environment Agency Guidance, Monitoring stack emissions: techniques and standards for periodic monitoring, December 2019 https://www.gov.uk/government/publications/monitoring-stack-emissions-techniques-and-standards-for-periodic-monitoring/monitoring-stack-emissions-techniques-and-standards-for-periodic-monitoring

Table 3-6. Monitoring Frequency

Emission Point	Parameter	Monitoring Frequency	Method
A1	Particulates; Total organic carbon; Oxides of nitrogen; Sulphur dioxide; Hydrogen chloride; Carbon monoxide; Oxygen; Pressure; Temperature; Water vapour content.	Continuous daily and half hourly average for all parameters	MCERTS certified CEMS equipment (BS EN 15267-parts 1-3)
A1	Hydrogen fluoride (HF); Trace metals; Dioxins and furans.	Bi-annually (periodic)	In accordance with EA guidance ‘Monitoring stack emissions: techniques and standards for periodic monitoring’: • HF: BS ISO 15713 • Metals: BS EN 14385, BS EN 13211 (Hg) • Dioxins and furans: BS EN 1948 Parts 1, 2 and 3

3.13.6 All monitoring equipment will be calibrated in accordance with the relevant standard in accordance with Art 48(2) IED.

3.13.7 To enable periodic compliance check monitoring to be undertaken, the exhaust stack will be equipped with sample ports comprising two 3” BSP sockets complete with screw caps and installed at 90 degrees to each other. The sample ports will be installed at a location in the stack that is 5 x the flue diameter downstream of the nearest bend, and more than 2 diameters from the exit of the stack. This is in accordance with the requirements of Environment Agency Technical Guidance Note M1 and British Standard BSEN15259.

3.13.8 The location of the sample ports will ensure that a full traverse on both sampling planes can be achieved during the annual compliance monitoring programme that will be a condition of the permit. Temporary sampling platforms will be erected to enable full and unfettered access to the sample ports by the specialist contractors appointed to undertake the compliance monitoring programme.

3.13.9 All monitoring results will 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.

3.13.10 The emission limit values for air shall be regarded as being complied with if the conditions described in Part 8 of Annex VI IED are fulfilled.

3.13.11 The CVSH Site Manager will undertake a routine daily inspection of the site which includes visual monitoring for dust. Details of inspections are recorded in line with CVSH’s EMS.

4 ENERGY USAGE

4.1 Energy efficiency

4.1.1 It is recognised that there are both environmental and financial benefits associated with the reduction and minimisation of energy usage. Even small percentage savings in energy consumption can represent considerable financial savings and environmental benefits through emission reductions.

4.2 Energy recovery

4.2.1 The SWIP is intended specifically to recover energy, via combustion, from RDF.

4.2.2 Heat will be recovered from the hot flue gases using an Organic Rankine Cycle (ORC) unit. The ORC constitutes the means by which heat is recovered as far as practicable in accordance with IED Articles44 (b) and 50 (5). The ORC unit is in the nature of a ógas turbineôas defined in IED Article 3(33), however as set out in Article 42(1), it is not part of the waste co-incineration plant (SWIP) and is not, therefore, itself part of the plant which is regulated by the permit. The description here of the ORC is informative only.

4.2.3 The proposed supplier of the ORC unit is Zuccato Energia and the proposed ORC unit is their ZE-200-LT (see Appendix D). The ORC unit will be skid-mounted and therefore can be made mobile, as necessary to facilitate routine maintenance.

4.2.4 The ORC recovers heat through the generation of electrical power by the combination of the turbine and generator. Downstream of the turbine there is a condenser which releases excess heat that can be used as a low-temperature thermal energy source in itself. That excess heat is intended to be combined with some of the heat from the main heat exchanger of the plant to be conveyed by underground pipes to the dryer. As the excess heat will be utilised for most of the time it is not considered that it will be necessary to have an external cooling system.

4.2.5 The ORC will generate approximately 180 ï 200 kW of electricity with 1.28 MW_{th} residual heat being made available for supply to the drying plant which will be installed within the adjacent WTS, close to the façade of the main processing shed.

4.3 Energy consumption

4.3.1 The parasitic load of the SWIP will be approximately 1 MW.

4.3.2 The auxiliary burner is described above and will only be used under abnormal operating conditions in accordance with the IED.

4.4 Basic energy efficient physical measures

4.4.1 The basic, low cost physical techniques include the following:

- Insulation ï hot water pipework, vessels, heat exchangers, combustion plant (high efficiency refractory insulation);
- High-efficiency electric motors for all drives;
- Thyristor control of motors for the ID fan and FD fan.

4.4.2 All connecting joints and flanges within the plant will be sealed effectively to prevent the egress of combustion gases that may pose a risk to the health of the workforce. In so doing, the gas-tight containment of the process equipment prevents the escape of hot flue gas that would otherwise reduce the overall thermal efficiency of the SWIP. During normal operating conditions additional supplementary fuel firing will not be required to maintain operating temperatures.

4.5 Building services energy efficiency measures

4.5.1 The energy use directly associated with the building services will be of minor impact and is expected to account for <1% of the total energy use for the SWIP, i.e. the parasitic load.

4.5.2 The thermal treatment building incorporates skylights to allow natural lighting and therefore minimal additional lighting will be required. It is anticipated that ambient air temperature within the thermal treatment building will be such that no additional heating will be required. However, if it is found that some additional heating is required at times then the energy use associated with it is expected to be minimal.

4.6 Further energy efficiency requirements

4.6.1 Energy management techniques will be incorporated into the EMS that will direct the operation of the SWIP, however, the following provides a concise overview of the techniques and measures that CVSH may employ:

- **Continuous basis**: Use of Critical Control Points and Standard Operating Procedures to ensure operators are able to identify, monitor and maintain optimum process operating conditions;
- **Shift basis**: Hourly recording of key process conditions (a computerised system to record trends and data);
- **Daily**: review of key energy production figures and environmental performance;
- **Monthly**: production of energy report covering energy consumption, based on data generated on Site and utility bills/statements. Cross checked against Site targets and performance for thermal energy.

4.6.2 Combustion efficiency within the SWIP will be optimised by employing the following measures:

- Minimising combustor excess air levels (whilst maximising the combustion of volatile gases released by the burning fuel on the grate). This will be achieved by careful control of air flows and combustion zone temperatures;
- Minimising flue gas exit temperatures (whilst maintaining sufficient temperature to avoid acid dew-point corrosion and excessive visible plume). This will be achieved by design of the combustion and heat recovery sections.

4.6.3 It is expected that the processing of residual waste into RDF in the recycling building will produce a feedstock which will be relatively uniform in reduced moisture content. In accordance with condition 8 of the planning permission the SWIP will be operated and maintained in accordance with an approved scheme to ensure that it continues to meet the R1 energy efficiency index and maintains recovery status.

4.6.4 The parasitic electrical load used by the SWIP will be minimised by employing the following techniques:

- The use of variable speed drives for all motors operating at less than full load for significant periods, including the combustion forced draft and induced draft fans;
- The use of high efficiency motors for all drives.

4.6.5 The design of the SWIP will ensure that the efficiency of energy utilisation is optimised at all times.

5 ENVIRONMENTAL MANAGEMENT SYSTEM

5.1.1 The Operator has an existing Environmental Management System (EMS) to direct the operation of currently permitted process operations carried out on site under the waste permit. An addendum to the EMS has been produced to include specific management aspects associated with the operation of the SWIP, a copy of the EMS addendum can be found in **Error! Reference source not found.**. CVSH holds ISO14001 (environmental management system) certification for the existing WTS EMS, a copy of the EMS is provided in Appendix J.

5.2 Operations and Maintenance

5.2.1 Procedures will be put in place to ensure that those operations associated with the SWIP which have the potential to give rise to significant environmental effects are controlled. Procedures will cover normal operation including start-up and shutdown and will also address accidents and incidents.

5.2.2 In particular procedures will be developed in relation to the following:

- RDF reception, handling and storage within the thermal treatment building;
- Good housekeeping measures;
- Maintenance of key plant and equipment;
- Management and maintenance of the settlement pit lagoon; and
- Handling of bottom ash and APC residues within the thermal treatment building and removal of bottom ash and APC residues from the site.

5.2.3 Planned maintenance routines will be established to ensure all key plant components which have the potential to affect the environmental performance of the facility remain in good working order. Maintenance routines will draw on manufacturersôrecommendations, unless operational experience during the lifetime of the facility would indicate the need for variance.

5.2.4 Inspections will include but not be limited to:

- RDF storage bunker;
- Autoloader
- Auxiliary fuel tank;
- Urea, hydrated lime and activated carbon storage;
- Fuel storage area.

5.2.5 Housekeeping measures that will be implemented on site include:

- The thermal treatment building will be kept clean and tidy;
- Any spillages of materials and wastes will be immediately cleaned up;
- The Site Manager will undertake site inspections which will include checking for dust and litter across site and implementing corrective measures should any be identified. The site inspections will be recorded on the site inspection form (CV07, from the CVSH EMS); and
- The SWIP will be regularly inspected and maintained to ensure it is in good working order. Inspection and maintenance will be in accordance with manufacturers recommendations as a minimum.

5.2.6 Key plant/infrastructure that will be subject to routine inspection will include:

- Routine inspection of the thermal treatment building fabric;
- Routine inspection and maintenance of the automatic doors to the thermal treatment building to ensure they remain in good working order;

- The ceramic filter unit will be regularly inspected and maintained to ensure it is effectively controlling particulate emissions;
- The CEMs monitoring emissions from the SWIP will be subject to routine calibration checks; and
- Routine inspection of the SWIP will be undertaken to ensure it remains airtight and that key systems are working effectively (ID fan, reagent injection systems).

5.2.7 Records of inspections and maintenance will be retained in the site office.

5.3 Training and Competence

5.3.1 The Operator will ensure that all personnel employed to operate the SWIP have appropriate skills and technical capabilities to understand the operation of the process, and their obligations under the terms and conditions of the Permit. This will be managed in accordance with the updated management systems.

5.3.2 On-site operational staff will be trained for normal operation as well as routine interventions, response to alarm conditions, and start-up and shut down procedures. Training records of the personnel involved will be recorded and copies kept on site. Only trained personnel will be permitted to operate the plant. Following commissioning of the plant any new operational staff will be trained under the supervision of experienced operational staff.

5.3.3 Training records will be prepared for all operational staff and training needs will be reviewed on a regular basis as part of the Operator's EMS procedures. Copies of all training records will be available for inspection upon request.

5.4 Accidents and Incidents

5.4.1 The SWIP has been designed to be fully compliant with the relevant operational requirements of the IED.

5.4.2 An Accident Management Plan has been developed as part of the EMS for the activities currently permitted on site. The EMS addendum includes a risk assessment and accident management controls specific to the operation of the SWIP. This includes consideration of fire and spillage management.

5.4.3 The Operator will undertake frequent inspections of the SWIP to identify potential problems with the process equipment that may adversely affect performance. This will include a programme of preventative maintenance of major components of the installation.

5.5 Review and Record Keeping

5.5.1 The daily site inspection is recorded in the Site Manager's Site Diary which is a requirement of the site's existing Environmental Permit and will be extended to cover the SWIP operations.

5.5.2 The Site Manager will also complete a Site Inspection Form, CV07 which is part of the CVSH EMS. As regards the thermal treatment building and operations associated with the SWIP, the site inspection includes:

- Compliance with the environmental permit and EMS Addendum;
- RDF storage;
- Gas oil storage;
- Urea, hydrated lime and activated carbon storage;
- Signage;
- Integrity of thermal treatment building fabric including floor surfaces;

- Dust and odour emissions as well as presence of litter and pests (should there be any); and
- Complaints received.

5.5.3 In accordance with the current environmental permit on site. records will be retained at least 6 years from the date the records were made, or in the case of the records pertaining to off-site environmental and health effects, until the permit is surrendered.

Drawings

Drawing 1 Permit Boundary and Emissions Point

Drawing 2 Layout Plan

Drawing 3 Drainage Plan

Drawing 4 Site Location Plan

Appendices

Appendix A

Application Form

Appendix B

Appeal Decisions

Appendix C

Noise Assessment

Appendix D

Technical Documents

Appendix E

Air Quality Assessment

Appendix F

CVSH SWIP CFD Flow Simulation Report

Appendix G

Process Flow Diagram

Appendix H

HHRA

Appendix I

SWIP EMS Addendum

Appendix J

CVSH Waste Transfer Station EMS