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Consulting Engineers Limited

Thameside Energy Recovery Facility EP Variation

Thameside Energy Recovery Facility Limited

Environmental Permit Variation Supporting Information

ENGINEERING CONSULTING

Document approval

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Non-technical Summary

An Environmental Permit (EP) (Ref: EPR WP/3007LM) was granted by the Environment Agency (EA) to Thameside Energy Recovery Facility Limited (TERFL) for the Thameside Energy Recovery Facility (TERF) (herein referred to as the Facility) on 28 September 2021. Within this application, TERFL is applying for a variation to the EP.

At the time of submission of the original EP application in 2013, the Facility was expected to have an annual processing capacity of 300,000 tonnes of waste per annum. The EP was subsequently varied in November 2014 to reduce the capacity of the EfW facility to 170,000 tonnes of waste per annum and amend the application with the most up-to-date technical information available.

Following a review of the current waste market and discussions with potential technology providers TERFL has reviewed the design of the Facility to maximise its full potential. TERFL has recently been granted an amendment to the planning consent issued by the Department for Business, Energy and Industrial Strategy (BEIS) to enable it to process up to 350,000 tonnes of waste per annum. To align with its review of the project, TERFL is applying for the following changes to the EP:

1. Changing the waste incineration technology from a conventional moving grate with spreader stoker system to an inclined moving grate with ram feeder.
2. Increase in the annual capacity of the Facility to 350,000 tonnes per annum to align with the planning consent and updated design of the Facility.
3. Changes to the firing diagram which include:
   a. increasing the thermal capacity of the facility from 57 MW_{th} to 126.4 MW_{th}; and
   b. increase in throughput from 14.9 t/h to 43.3 t/h.
4. Update the Site Layout to incorporate layout changes following optimisation of the design of the Facility.
5. Removal of the SRF preparation facility and associated infrastructure.
6. Change the reagent to be used in the SNCR system from urea to ammonia solution.
7. Include additional non-hazardous EWC codes to the permitted waste types which can be processed at the Facility.
8. Provision of a Fire Prevention Plan (FPP).

An air quality assessment is provided with this application. As concluded in the air quality assessment, the proposed changes will not result in any significant impacts on human health and the environment.

TERFL understands that this application will be classified as a Substantial Variation due to the proposed increase in capacity being more than the threshold stated in Part 2, Schedule 1, Section 5.1 (b) of the Environmental Permitting Regulations.

Contents

1 Introduction

An Environmental Permit (EP) (Ref: EPR WP/3007LM) was granted by the Environment Agency (EA) to Tilbury Energy Recovery Facility Limited (TERFL) for the Tilbury Energy Recovery Facility (TERF) (herein referred to as the Facility) on 28 September 2021. Within this application, TERFL is applying for a variation to the EP.

At the time of submission of the original EP application in 2013, the Facility was expected to have an annual processing capacity of 300,000 tonnes of waste per annum. The EP was subsequently varied in November 2014 to amend the design and reduce the capacity of the EfW facility to 170,000 tonnes of waste per annum.

Following a review of the current waste market and discussions with potential technology providers TERFL has reviewed the design of the Facility to maximise its full potential. TERFL has recently been granted an amendment to the planning consent issued by the Department for Business, Energy and Industrial Strategy (BEIS) to enable it to process up to 350,000 tonnes of waste per annum.

1.1 Summary of Proposed Changes

Within this Variation application, TERFL is applying for eight changes to the EP:

1. Changing the waste incineration technology from a conventional moving grate with spreader stoker system to an inclined moving grate with ram feeder.
2. Increase in the annual capacity of the Facility to 350,000 tonnes per annum to align with the planning consent and updated design of the Facility.
3. Changes to the firing diagram which include:
   a. increasing the thermal capacity of the facility from 57 MW_{th} to 126.4 MW_{th}; and
   b. increase in throughput from 14.9 t/h to 43.3 t/h.
4. Update the Site Layout to incorporate layout changes following optimisation of the design of the Facility.
5. Removal of the SRF preparation facility and associated infrastructure.
6. Change the reagent to be used in the SNCR system from urea to ammonia solution.
7. Include additional non-hazardous EWC codes to the permitted waste types which can proposed to be processed at the Facility.
8. Provision of a Fire Prevention Plan (FPP).

The proposed changes are required to ensure that the EP reflects the evolution and optimisation of the design of the Facility.

1.2 Type of Variation

The Environment Agency's guidance on Charging Schemes states that there are four types of variations – administrative, minor technical, normal and substantial.

TERFL acknowledge that the proposed changes will not constitute either an administrative or minor technical variation.

The Environment Agency has published guidance (Regulatory Guidance Note 8 – Substantial Change) which defines a substantial change (it is acknowledged that the guidance has been withdrawn). The guidance defined a substantial change as:

'… a change in operation of installations or mining waste facilities, which in our opinion may have significant negative effects on human beings or the environment. Certain changes are automatically regarded as substantial, namely:

a. *a change in operation of a Part A installation which in itself meets the thresholds, if any, set out in Part 2 of Schedule 1 EPRs; or*
b. *a change in operation of an incineration or co-incineration plant for non-hazardous waste which would involve the incineration or co-incineration of hazardous waste.'*

As demonstrated within section 2.1, the proposed increase in capacity is more than 3 tonnes per hour.

The threshold for a non-hazardous waste incineration facility within Part 2, Schedule 1, Section 5.1 (b) of the Environmental Permitting Regulations is 3 tonnes per hour. As explained in section 2, the proposed increase in capacity is more than this threshold; therefore, TERFL understands that the application is a 'Substantial Change' to the EP and should be determined as a Substantial Variation.

2 Changes to the Design Capacity

2.1 Consented capacity

A firing diagram was submitted with the original EP application, but as explained previously the design and capacity of the Facility was subsequently amended via a variation to the EP. Whilst a firing diagram was not provided with the application for the variation, the key design parameters that would be used to define a firing diagram are presented within the original application. These are summarised in Table 1.

Table 1: Design basis of the consented capacity

	Unit	Consented Design
Thermal Input at design point	MW_{th}	57
Fuel NCV (Nominal design)	MJ/kg	13.8
Hourly fuel input (assuming the Nominal design)	t/h	14.87
NCV Range	MJ/kg	11.6 – 14.6

Allowing for this, an EP variation was granted for a maximum capacity of the 170,000 tpa.

2.2 Proposed capacity

The firing diagram for the proposed design is presented in Appendix A.4, and summarised in Table 2.

Table 2: Design basis of the proposed capacity

	Unit	Proposed Design
Thermal Input at design point	MW_{th}	126.4
Fuel NCV (Nominal design)	MJ/kg	10.5
Hourly fuel input (assuming the Nominal design)	t/h	43.3
NCV Range	MJ/kg	7 – 13

It is assumed that the Facility will have an availability of 8,000 hours per annum. On this basis the maximum capacity of the Facility can be calculated as follows:

$$\textit{Maximum capacity} = \textit{Hourly fuel input x annual availability}$$
$$= \textit{43.3 x 8,000}$$
$$\approx \textit{350,000 tpa}$$

Variations in fuel NCV and input will occur during normal operation and actual annual operating hours may also vary. However, the Facility will have a nominal annual waste throughput of 350,000 tpa. The Section 36 Planning Consent was amended in February 2021 to permit up to 350,000 tpa of municipal solid waste, commercial & industrial waste, solid recovered waste and refused derived

fuel to be accepted at the Facility. A copy of the amended Section 36 Planning Consent is included in Appendix B.

Therefore, TERFL is applying for the maximum permitted capacity to be increased to 350,000 tpa to align with the planning consent.

3 Waste Incineration Process Design Changes

3.1 Combustion technology

The design of the original EP application was based on a travelling (or moving) grate combustion system, and the BAT assessment submitted with the original EP application determined that a moving grate represented BAT for the Facility. The fuel feed system in the original application, included for a spreader stoker fuel feed system. In the spreader stoker system, feed screws supply fuel from dosing bins to the furnace, and the fuel is pneumatically blown into the combustion zone.

For the proposed design, TERFL is proposing a moving grate system, but with a slightly different design. The proposed combustion system will utilise an inclined moving grate with a hydraulic feeder to feed waste into the furnace, which is a conventional combustion system for waste incineration plants in the UK and Europe. In this system, a hydraulic ram feeder supplies fuel from the waste hopper to the furnace. The moving grate will agitate the fuel bed to promote a good burnout of the waste and a uniform heat release. In a moving grate, the fuel is moved mechanically by means of reciprocating grate elements from the feed end, through a drying zone, a main combustion zone and, finally, a burn out zone.

Primary combustion air is drawn from waste reception areas to maintain negative pressure in the waste reception areas and fed into the combustion chamber beneath the grate. Secondary combustion air will be injected into the flame body above the grate to facilitate the combustion of waste on the grate and minimise levels of oxides of nitrogen (NOx) emissions. Further up the flue, above the combustion zone, an SNCR reagent (ammonia) will be injected. The ammonia reacts with the oxides of nitrogen formed in the combustion process forming water, carbon dioxide and nitrogen. By controlling the flow rate of ammonia introduced into the gas stream, the concentration of NOx will be reduced to achieve required emission limits.

Both designs are examples of moving grate furnaces which achieve good mixing of the waste and are not distinguished separately within the Waste Incineration BAT Reference document (WI BREF). As stated previously, the original EP application justified the selection of a moving grate system as representing BAT. Therefore, it is not considered that it is necessary to update the BAT assessment for the proposed changes to the combustion technology.

3.2 Site Drainage

Surface water run-off from building roofs, roadways and carparks/areas of hardstanding will be discharged into a new surface water drainage system. During detailed design, a number of sub surface storage options for the new surface water drainage system will be examined, to provide both attenuation and treatment of various levels. It is anticipated that the underground storage facility will have an approximate storage capacity of 1800 m^3. Treatment of the inflow will be provided via a filter strip. The drainage system for the facility will discharge into a dedicated surface water discharge to the Botney Channel as shown in the Emissions Points drawing provided in Appendix A.2.

Under ‘normal operation’ there will not be any discharges of process effluent from the Facility. Where practicable, process effluents from water treatment and boiler blowdown will be re-used within the process – mainly in the ash quench system. In the event that there are excess effluents generated by the process, they will be tankered offsite to a suitably licenced waste management

facility, or discharged to sewer in accordance with a trade effluent consent. An indicative water flow schematic is provided in Appendix A.3

Domestic effluent from welfare facilities will be pumped to the foul sewerage network.

3.3 Site Layout

The proposed changes to the design required a number of minor layout changes. These include:

1. The relocation of the stack, increase in the stack diameter from 1.85 m to 2.4 m, but retaining the same stack height;
2. Changes to building dimensions; and
3. Relocation and / or modification to several of the ancillary components within the site, such as plant and tanks; and
4. The addition of a surface water discharge point to the Botney Channel.

Revised installation boundary and emissions points drawings for the proposed site layout are presented in Appendix A

3.4 Waste Receipt and Preparation

Within the original EP Application for the Facility, a Mechanical Treatment Facility was included within the design to recover recyclates from the waste, referred to as the Solid Recovered Fuel (SRF) Production facility. The residual waste following removal of ferrous metal, non-ferrous metal, plastic, glass and sand / soil was then processed into an SRF to be used as fuel within the Facility. This is included within the existing EP.

Following the evolution of the design of the Facility, this Fuel Preparation Facility is no longer proposed to be included within the design of the Facility.

Therefore, section 1.3.3 Raw Materials: Fuel Preparation – SRF Production within the EP Application should be replaced with the following "Waste Reception and Preparation" text:

Incoming waste will be delivered to the Facility by enclosed road vehicles. The vehicles will be weighed on a weighbridge and inspected at the gatehouse for the correct paperwork, load safety and cleanliness before being directed to the Tipping Hall. Prior to waste being off-loaded into the bunker random waste inspections will be carried out to ensure the waste duty of care is being maintained. Waste will be tipped in a designated area of the Tipping Hall and visually inspected by an operator.

The waste reception area will be a fully enclosed building which will be maintained under slight negative pressure to reduce any emissions of odour, dust or litter. The waste will then be tipped into the bunker, from where a grab transfers the incoming waste to the feed hopper. The grab will also be used to homogenise the incoming waste and to identify and remove any unsuitable or non-combustible items.

Vehicles will be weighed again upon exit from the Facility, to determine the mass of the waste that has been delivered.

The waste bunker will be designed with a storage capacity equivalent to approximately 5 days continuous operation which will enable the Facility to maintain operation during extended bank holiday periods.

3.5 Waste Types

In addition to the waste codes included in Table S2.2 within Schedule 2 of the EP, TERFL would propose to incorporate the additional waste codes listed in Table 3 into the EP.

Table 3: Additional waste codes

EWC code	Description of waste
02	**WASTE FROM AGRICULTURE, HORTICULTURE, AQUACULTURE, FORESTRY, HUNTING AND FISHING, FOOD PREPARATION AND PROCESSING**
02 01	**wastes from agriculture, horticulture, aquaculture, forestry, hunting, and fishing**
02 01 09	agrochemical wastes other than those mentioned in 02 01 08
02 02	**wastes from the preparation and processing of meat, fish and other foods of animal origin**
02 02 03	materials unsuitable for consumption or processing (Catering Wastes & Former Foodstuffs Only)
02 03	**Wastes from fruit, vegetables, cereals, edible oils, cocoa, coffee, tea and tobacco preparation and processing; conserve production; yeast and yeast extract production, molasses preparation and fermentation**
02 03 02	waste preserving agents
02 03 04	materials unsuitable for consumption or processing
02 04	**wastes from sugar processing**
02 05	**materials unsuitable for consumption or processing**
02 05 01	materials unsuitable for consumption or processing
02 06	**wastes from the baking and confectionary industry**
02 06 01	materials unsuitable for consumption or processing
02 06 02	wastes from preserving agents
02 06 03	sludges from on-site effluent treatment (dried sludge only)
02 07	**wastes from the production of alcoholic and non alcoholic beverages (except coffee tea and cocoa)**
02 07 04	materials unsuitable for consumption or processing
03	**WASTES FROM WOOD PROCESSING AND THE PRODUCTION OF PANELS AND FURNITURE, PULP, PAPER AND CARDBOARD**
03 01	**wastes from wood processing and the production of panels and furniture**
03 01 01	waste bark and cork
03 01 05	sawdust, shavings, cuttings, wood, particle board and veneer other than those mentioned in 03 01 04
03 03	**wastes from pulp, paper and cardboard production and processing**
03 03 01	waste bark and wood
03 03 07	mechanically separated rejects from pulping of waste paper and cardboard

EWC code	Description of waste
03 03 08	wastes from sorting of paper and cardboard destined for recycling
03 03 10	fibre rejects, fibre, filler and coating-sludges from mechanical separation
04	**WASTES FROM THE LEATHER, FUR AND TEXTILE INDUSTRY**
04 02	**wastes from the textile industry**
04 02 09	wastes from composite materials (impregnated textile, elastomer, plastomer)
04 02 10	organic matter from natural products (for example grease, wax)
04 02 20	sludges from on-site effluent treatment other than those mentioned in 04 02 19
04 02 21	wastes from unprocessed textile fibres
04 02 22	wastes from processed textile fibres
07	**WASTES FROM ORGANIC CHEMICAL PROCESSES**
07 02	**wastes from the MFSU of plastics, synthetic rubber and man-made fibres**
07 02 13	waste plastic which is otherwise contaminated and not suitable for recycling
07 02 15	wastes from additives other than those mentioned in 07 02 14
07 02 17	wastes containing silicones other than those mentioned in 07 02 16*
07 05	**wastes from the MFSU of pharmaceuticals**
07 05 14	solid wastes other than those mentioned in 07 05 13
08	**WASTES FROM MFSU OF COATINGS, ADHESIVES, SEALANTS & PRINTING INKS**
08 01	**wastes from MFSU and removal of paint and varnish**
08 01 12	waste paint and varnish other than those mentioned in 08 01 11 (Solidified or Dried only)
08 01 18	wastes from paint or varnish removal other than those mentioned in 08 01 17
08 03	**wastes from MFSU of printing inks**
08 03 13	waste ink other than those mentioned in 08 03 12 (Solidified or Dried)
08 04	**wastes from MFSU of adhesives and sealants (including waterproofing products)**
08 04 10	waste adhesives and sealants other than those mentioned in 08 04 09 (Solidified or Dried only)
08 04 12	adhesive and sealant sludges other than those mentioned in 08 04 11
09	**WASTES FROM THE PHOTOGRAPHIC INDUSTRY**
09 01	**wastes from the Photographic industry**
09 01 07	photographic film and paper containing silver or silver compounds
09 01 08	photographic film and paper free of silver or silver compounds
09 01 10	single-use cameras without batteries
12	**WASTES FROM SHAPING AND PHYSICAL AND MECHANICAL SURFACE TREATMENT OF METALS AND PLASTICS**
12 01	**wastes from shaping and physical and mechanical surface treatment of metals and plastics**

EWC code	Description of waste
12 01 05	plastics shavings and turnings
12 01 17	waste blasting material other than those mentioned in 12 01 16
12 01 21	spent grinding bodies and grinding materials other than those mentioned in 12 01 20
15	**WASTE PACKAGING; ABSORBENTS, WIPING CLOTHS, FILTER MATERIALS AND PROTECTIVE CLOTHING NOT OTHERWISE SPECIFIED**
15 01	**packaging (including separately collected municipal packaging waste)**
15 01 03	wooden packaging which is otherwise contaminated and not suitable for recycling
16	**WASTES NOT OTHERWISE SPECIFIED IN THE LIST**
16 01	**end-of-life vehicles from different means of transport (including off-road machinery) and wastes from dismantling of end-of-life vehicles and vehicle maintenance (except 13, 14, 16 06 and 16 08)**
16 01 19	plastic which is otherwise contaminated and not suitable for recycling
16 03	**off-specification batches and unused products**
16 03 04	inorganic wastes other than those mentioned in 16 03 03
16 03 06	organic wastes other than those mentioned in 16 03 05
17	**CONSTRUCTION AND DEMOLITION WASTES (INCLUDING EXCAVATED SOIL FROM CONTAMINATED SITES)**
17 02	**wood, glass and plastic**
17 02 01	waste wood which is otherwise contaminated and not suitable for recycling
18	**WASTES FROM HUMAN OR ANIMAL HEALTH CARE AND/OR RELATED RESEARCH (except kitchen and restaurant wastes not arising from immediate health care)**
18 01	**wastes from natal care, diagnosis, treatment or prevention of disease in humans**
18 01 04	wastes whose collection and disposal is not subject to special requirements in order to prevent infection (for example dressings, plaster casts, linen, disposable clothing, diapers)
18 01 07	chemicals other than those mentioned in 18 01 06
18 01 09	medicines other than those mentioned in 18 01 08
18 02	**wastes from research, diagnosis, treatment or prevention of disease involving animals**
18 02 03	wastes whose collection and disposal is not subject to special requirements in order to prevent infection
18 02 06	chemicals other than those mentioned in 18 02 05
18 02 08	medicines other than those mentioned in 18 02 07

EWC code	Description of waste
19	**WASTES FROM WASTE MANAGEMENT FACILITIES, OFF-SITE WASTE WATER TREATMENT PLANTS AND THE PREPARATION OF WATER INTENDED FOR HUMAN CONSUMPTION AND WATER FOR INDUSTRIAL USE**
19 02	**wastes from physico/chemical treatments of waste (including dechromatation, decyanidation, neutralisation)**
19 02 06	sludges from physico/chemical treatment other than those mentioned in 19 02 05
19 03	**stabilised/solidified wastes**
19 03 05	stabilised wastes other than those mentioned in 19 03 04
19 03 07	solidified wastes other than those mentioned in 19 03 06
19 05	**wastes from aerobic treatment of solid wastes**
19 05 03	off-specification compost
19 05 99	wastes not otherwise specified
19 06	**wastes from anaerobic treatment of waste**
19 06 04	digestate from anaerobic treatment of municipal waste which is otherwise contaminated and not suitable for spreading on land
19 06 06	digestate from anaerobic treatment of animal and vegetable waste which is otherwise contaminated and not suitable for spreading on land
19 08	**wastes from waste water treatment plants not otherwise specified**
19 08 01	screenings
19 09	**wastes from the preparation of water intended for human consumption or water for industrial use**
19 09 01	solid waste from primary filtration and screenings
19 10	**wastes from shredding of metal-containing wastes**
19 10 04	fluff-light fraction and dust other than those mentioned in 19 10 03
19 10 06	other fractions other than those mentioned in 19 10 05
19 12	**wastes from the mechanical treatment of waste (for example sorting, crushing, compacting, pelletising) not otherwise specified**
19 12 07	wood other than that mentioned in 19 12 06 which is otherwise contaminated and not suitable for recycling
19 12 12	other wastes (including mixtures of materials) from mechanical treatment of wastes other than those mentioned in 19 12 11
19 13	**wastes from soil and groundwater remediation**
19 13 02	solid wastes from soil remediation other than those mentioned in 19 13 01
20	**MUNICIPAL WASTES (HOUSEHOLD WASTE AND SIMILAR COMMERCIAL, INDUSTRIAL AND INSTITUTIONAL WASTES) INCLUDING SEPARATELY COLLECTED FRACTIONS**
20 01	**separately collected fractions (except 15 01)**

EWC code	Description of waste
20 01 28	paint, inks, adhesives and resins other than those mentioned in 20 01 27
20 01 30	detergents other than those mentioned in 20 01 29
20 01 32	medicines other than those mentioned in 20 01 31
20 01 39	Plastics which are otherwise contaminated and not suitable for recycling
20 01 99	other fractions not otherwise specified
20 03	**other municipal wastes**
20 03 99	municipal wastes not otherwise specified

3.6 Review of Operating Techniques

The Operating Techniques for the TERF are set out in 'Table S1.2 - Operating Techniques' of the EP. A detailed review of the Operating Techniques referenced in the EP has been undertaken. A number of changes/amendments are proposed to be consistent with the proposed design of the TERF.

3.6.1 Solid Recovered Fuel Preparation

The TERF will not include a Solid Recovered Fuel (SRF) preparation facility for the processing of incoming waste to produce SRF. Therefore, the TERF will not recover recyclable materials to produce a solid recovered fuel (SRF). The TERF will process non-hazardous residual Municipal Solid Waste (MSW), Commercial and Industrial (C&I) waste and Refuse Derived Fuel (RDF).

3.6.2 SNCR Reagent

Ammonia solution rather than urea will be used in the Selective Non-Catalytic Reduction (SNCR) system for minimising emissions to air of oxides of nitrogen. Further detail is provided in Section 4.

3.6.3 Start-up and shutdown

TERFL request that the start-up and shutdown parameters are amended to the following:

Start-up ends when all of the following conditions are met:

- the feed chute damper open, feeder ram, grate and ash extractors are all running;
- exhaust gas O2 is less than 15% (wet measurement); and
- the combustion grate is fully covered with waste.

Shutdown begins when all of the following conditions are met:

- the feed chute damper is closed;
- shutdown burner is in service; and
- exhaust gas O2 is equal or above than 15% (wet measurement).

3.6.4 Air Pollution Control Residues offloading

Section 2.7.2, Air Pollution Control Residues, within the Supporting Information submitted with the original EP application states:

During the tanker filling operation, displaced air will vent back to the silo.

Following evolution of the design of the Facility, TERFL requests that this amended to state the following:

During the tanker filling operation, displaced air will vent back to the silo or will be released to atmosphere in the process area via an exhaust air filter using an exhaust air fan. Any releases to atmosphere would pass through a fabric filter.

3.6.5 Flue Gas Recirculation

Section 2.4.3.1, Flue Gas Recirculation, within the Supporting Information submitted with the original EP application states:

The facility will employ flue gas recirculation.

Following evolution of the design of the Facility, TERFL requests that this is amended to the following:

The facility may employ flue gas recirculation.

It is proposed by TERFL that following completion of detailed design, details of the NOx abatement systems are provided to confirm whether they include a flue gas recirculation system.

4 NOx Abatement Reagent

As set out in the original EP application, it was proposed to use urea as a reagent within the SNCR system. However, it is proposed to change this to ammonia solution.

NOx abatement systems can be operated with dry urea (prills), urea solution or aqueous ammonia solution. There are advantages and disadvantages with all options:

- urea is easier to handle than ammonia - the handling and storage of ammonia can introduce an additional risk;
- ammonia tends to give rise to lower nitrous oxide formation than urea;
- dry urea can be contained in Flexible Intermediate Bulk Containers (FIBCs or 'big-bags'), whereas ammonia solution is usually stored in silos and delivered in tankers; and
- ammonia emissions (or 'slip') can occur with both reagents, but good control will limit this when using either reagent.

The Environment Agency's sector guidance on waste incineration, titled *"Incineration of waste (EPR5.01)"*, considers all options as suitable for NOx abatement. It is proposed to use aqueous ammonia solution as a reagent in the SNCR system.

TERFL considers that the climate change impacts associated with the use of urea outweigh the handling and storage issues associated with ammonia solution which can be overcome by good design of the ammonia tanks and pipework and the use of suitable procedures for the safe handling and delivery of ammonia. Taking this into consideration, the use of ammonia in the SNCR abatement system is considered to represent BAT for the Facility.

4.1 Storage and Handling of Ammonia Solution

Ammonia solution will be delivered to the Facility by road in designated road tankers. The road tankers will transfer the contents of the tanker into the storage tank. The storage tank will be located within a controlled area, with secondary containment facilities having a volume of 110% of the stored capacity.

Re-filling activities will be supervised by trained operational staff. Documented management procedures will be developed. Procedures will identify the roles and responsibilities for re-filling operations, and emergency actions to be undertaken in case of spills/release of ammonia solution.

Tanker unloading areas will include ammonia detection systems to identify the release of ammonia during unloading activities.

5 Environmental impacts

The environmental impacts associated with the proposed changes to the Facility have been considered in sections 5.1 to 5.9.

5.1 Air quality

The following air quality assessments have been undertaken to consider the impact of the proposed changes to the Facility on air quality:

- Air quality assessment (AQA) (Appendix C.1);
- Dioxin Pathway Impact Assessment (Appendix C.2); and
- Abnormal Emissions Assessment (Appendix C.3).

As concluded in the AQA, in relation to human health, the emissions from the operation of the Facility will not cause a breach of any AQAL. The change in impact between the permitted Facility and Proposed Facility can be screened out as 'insignificant' for all pollutants and averaging periods.

At all ecological receptors, the change in impact from the Permitted Facility can be screened out as 'insignificant' as it is less than 1% of the long term Critical Levels and Critical Loads and less than 10% of the short term Critical Levels. Therefore, it is concluded that the proposed changes to the design of the Facility will not result in any unacceptable air quality impacts on ecological receptors.

The abnormal emissions assessment concludes that during periods of abnormal operation the Facility is not predicted to give rise to an unacceptable impact on air quality or the environment.

5.2 Greenhouse gases

A Greenhouse Gas Assessment (Appendix D) has been undertaken which considers the change in greenhouse gases which will be released from the Facility, due to the proposed increase in processing capacity.

The Greenhouse Gas Assessment concludes that there will be a decrease of approximately 10,210 tonnes per annum of CO_2 attributable to the increase in waste throughput when taking into account the conventional generation which will be displaced by the Facility.

5.3 Raw material consumption

Aside from the use of ammonia in place of urea as outlined in Section 4, the proposed changes to the design will not result in different raw materials being consumed. Due to the proposed increase in capacity the quantities of raw materials consumed will increase. A comparison of the estimated consumption of consumables is provided in Table 4.

Table 4: Consumables and residue comparison

Consumable / Residue	Units	Proposed Design
Auxiliary fuel	tpa	420
SNCR reagent (24.9% Ammonia solution)	tpa	2,650

Consumable / Residue	Units	Proposed Design
Hydrated lime	tpa	6,400
PAC	tpa	210

5.4 Residues generation

The proposed changes to the design will not result in different residues being generated, but due to the proposed increase in capacity the quantities of residues generated will increase. A comparison of the estimated quantities of residues generated is presented in Table 5:

Table 5: Estimated residue generation

Residue	Units	Consented estimated residue generation	Proposed estimated residue generation
Incinerator Bottom Ash (IBA)	tpa	30,900	94,500
Air Pollution Control residues (APCr)	tpa	7,700	15,900

Following the increase in residues generation, the storage capacity for waste and IBA has increased, as detailed in Table 6.

Table 6: Waste storage capacities

Species	Proposed Storage Capacity / tonnes
Incoming Waste	5,000
IBA	1,400
APCr	340

5.5 Energy efficiency

With the proposed design, at the nominal design capacity, the Facility will export a minimum of 40 MW_e, which is comparable to the export capacity stated in Condition 1.1.4 of the EP. Furthermore, the Facility will have a parasitic load of approximately 4 MW_e. Therefore, the Facility will generate approximately 44 MWe.

As stated in section 2.2, the assumed annual availability of the Facility is 8,000 hours. On this basis, the Facility is expected to generate approximately 352,000 MWh and export 320,000 MWh of electricity.

The electrical output of the proposed design has been compared with the benchmark data for MSW incineration plants, given in the EA Guidance Note EPR5.01 and in the BREF for Waste Incineration (BREF WI) as presented in Table 7.

Table 7: Facility design parameters comparison table

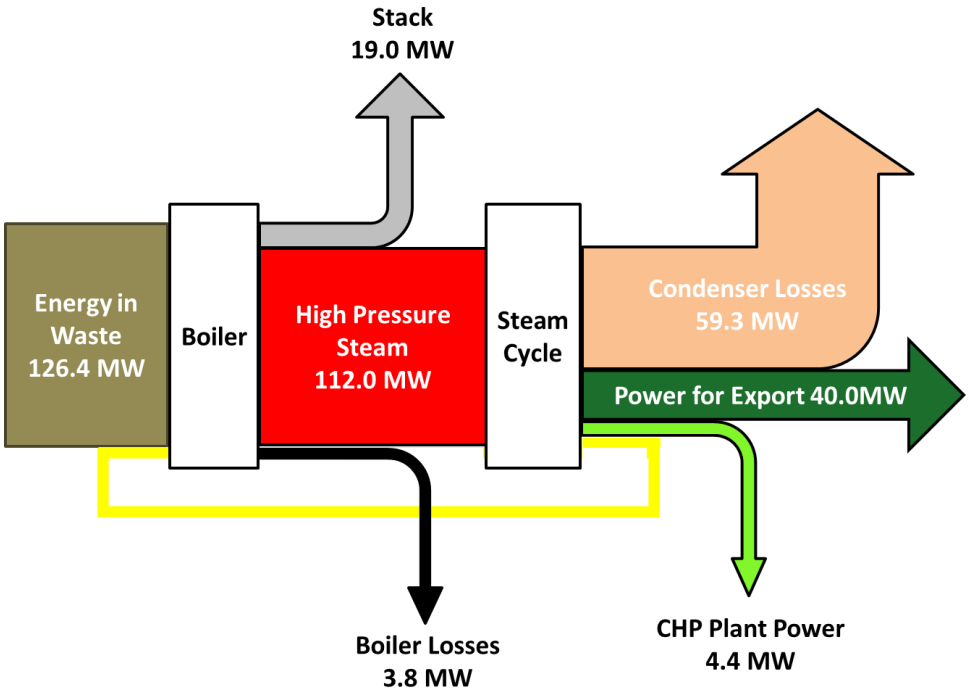
Parameter	Unit	Proposed design	Benchmark
Net power generation, nominal design	MWh/t waste	0.91	0.6 - 0.9
Internal power consumption, nominal design	MWh/t waste	0.10	0.06 - 0.19
Power generation (assumed gross) for 100,000 tpa of waste	MWe	12.7	5-8

Benchmark sources: EPR5.01 for power generation per 100,000 tpa of waste, WI BREF otherwise

As shown in Table 7, the design of the Facility compares favourably with the relevant energy efficiency benchmarks.

An indicative Sankey Diagram for the proposed design is presented in Figure 1 .

Figure 1: Indicative Sankey Diagram for No Heat Case



5.6 Fire prevention plan

it is understood that a Fire Prevention Plan for the Facility was not submitted in support of the original EP application. As the proposed changes to the design will result in the storage of additional quantities of waste it is understood that a Fire Prevention Plan is required to be submitted in support of this application. The Fire Prevention Plan for the proposed design is presented in Appendix E.

5.7 WI BREF Best Available Techniques

The Final Waste Incineration BREF was published by the European IPCC Bureau on 3 December 2019. Whilst the Facility has been granted an EP prior to this date, it is expected that the EA will consider the Facility as a new Facility as construction has not yet commenced. Therefore, TERFL will need to demonstrate to the EA that the Facility will be able to comply with the requirements set out in the BREF for new Facilities. Appendix F identifies the requirements of the BAT conclusions and explains how the Facility will comply with them.

5.8 Noise

A revised noise assessment has been undertaken to incorporate the proposed changes to the Facility and submitted in support of the application for the Section 36C amendment. This is provided in Appendix G. The noise assessment concludes that the sound levels predicted at the designated noise sensitive receptors associated with the proposed changes to the Facility are below the background level +5dB which has been agreed as a suitable assessment criteria with the local planning authority. Furthermore, the assessment demonstrates that the proposed changes to the design of the Facility will not result in any unacceptable noise impacts in accordance with BS 4142:2014.

5.9 Odour

It is not considered that the proposed changes will result in an increased risk of odour at the Facility.

Appendices

A Plans and Drawings

A.1 Installation Boundary

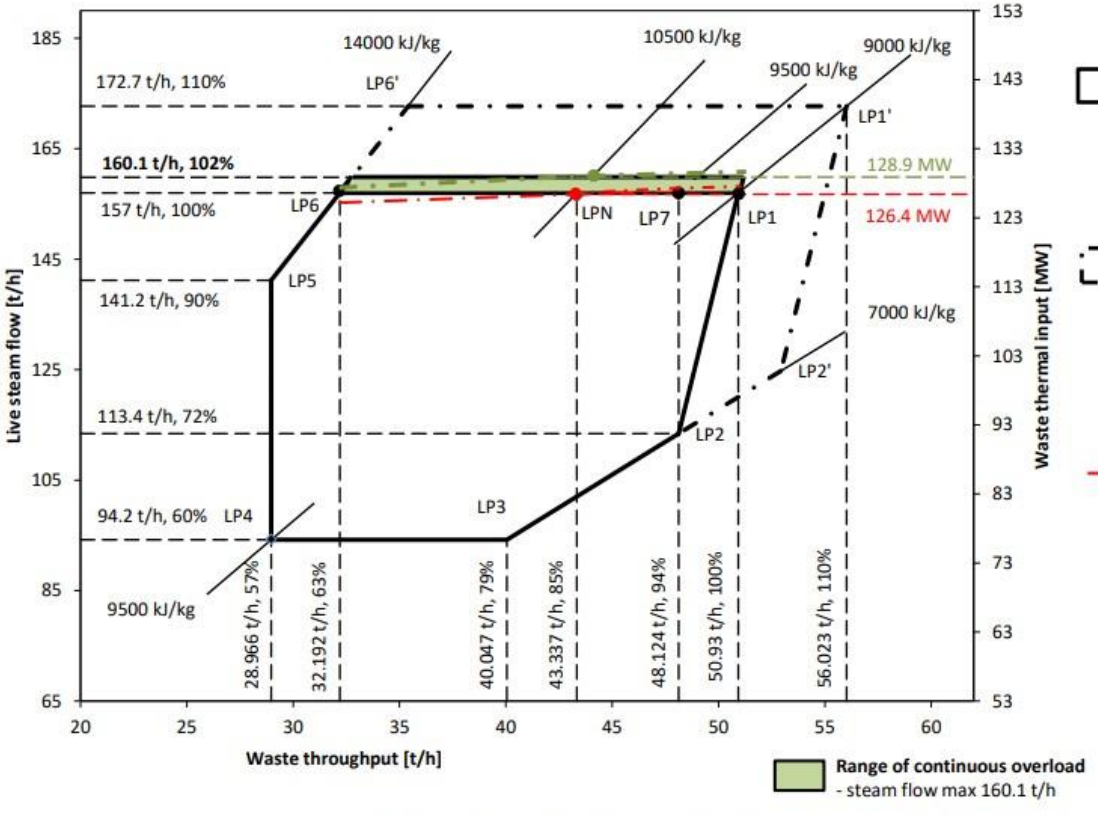
A.2 Emissions Points Drawing

A.3 Indicative Water Flow Schematic

A.4 Firing Diagram

Combustion Diagram

Project:	Project number:	Drawing number:	Revision:	Date:	Name:	Visa:



Design point LPN definition
- Waste NCV = 10500 kJ/kg
- 100% MCR steam flow = 157 t/h

Range of continuous operation
Definition of the limits:
- steam flow min-max = 94.2-157 t/h
- waste throughput min = 28.966 t/h
- waste throughput max = 50.930 t/h
- waste NCV min-max = 7-14 MJ/kg

Range of short time overload
due to control deviations while the set-point lies in the range of continuous operation.

Steam flow conditions
- 450°C at boiler exit
- 80 bar abs at boiler exit

Waste thermal input at 100% MCR
= "waste throughput" x "waste NCV"

Load Point	Th.Input [MW]
LP1	127.326
LP7	126.995
LPN	126.400
LP6	125.192

Conditions:
- design conditions (amb. and waste)
- mildly fouled boiler (T exit 130°C)
- Feedwater temperature = 120°C
- PA and SA preheater in service

B Section 36 Planning Consent

C Air Quality Assessments

C.1 Air Quality Assessment

C.2 Dioxins Pathway Assessment

C.3 Abnormal Emissions Assessment

D Greenhouse Gas Assessment

E Fire Prevention Plan

F WI BREF Best Available Techniques

#	BAT Conclusion	How met or reference
1	To improve the overall environmental performance, BAT is to elaborate and implement an environmental management system (EMS) that incorporates all the features as listed in BAT 1 of the BREF.	The EMS will be developed throughout the development stage of the project and will be accredited to a suitably recognised standard. It is proposed that a pre-operational condition in included within the EP which requires TERFL to provide a summary of the proposed EMS prior to commencement of operation.
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 calculated to be approximately 34.8 %. Therefore, TERFL understands that this satisfies the requirements of BAT 2.
3	BAT is to monitor key process parameters relevant for emissions to air and water including those given in BAT 3 of the BREF.	As set out in Section 2.3.1.1 of the Supporting Information submitted in support of the EP application, the process parameters for monitoring of emissions to air are as follows: • water vapour content • temperature; and • pressure. The oxygen content and flow rate of the flue gases will also be monitored. Temperature will be monitored in the combustion chamber. There will be no emissions of water from FGC systems and there will be no bottom ash treatment undertaken at the Facility – therefore, the process parameters to be monitored for emissions to water as listed in BAT 3 do not apply to the Facility. TERFL can confirm that the Facility will include for monitoring of the key process parameters relevant for emissions to air in accordance with BAT 3.
4	BAT is to monitor channelled emissions to air with at least the frequency given in BAT 4 of the BREF 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.	As set out in section 2.3.1.1 of the Supporting Information submitted in support of the EP application, emissions to air will be monitored with frequencies in accordance with the requirements of the BREF. The methods and standards used for emissions monitoring will be in compliance with BREF requirements and other appropriate requirements. TERFL considers that the proposals for monitoring of emissions to air are in accordance with the requirements of BAT 4.

#	BAT Conclusion	How met or reference
5	BAT is to appropriately monitor channelled emissions to air from the incineration plant during Other Than Normal Operating Conditions (OTNOC).	The continuous emissions monitoring systems (CEMS) installed at the Facility will monitor emissions to air of NOx, NH3, CO, SO2 HCl, dust and TOC during periods of OTNOC. Measurement campaigns to measure dioxins and furans during start up and shutdown operations will be conducted once every 3 years, where it is possible to schedule the monitoring.
6	BAT is to monitor emissions to water from Flue Gas Cleaning (FGC) and/or bottom ash treatment with at least the frequencies set out in BAT 6 of the BREF 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.	As explained in section 5.3 the Facility will utilise a dry flue gas treatment system. Therefore, there will not be any emissions to water from the FGC systems. Furthermore, there will not be any emissions to water from the treatment or handling of bottom ash. Therefore, it is understood that the requirements of BAT 6 are not applicable to the Facility.
7	BAT is to monitor the content of unburnt substances in slags and bottom ashes at the incineration plant with at least the frequency as given in BAT 7 of the BREF (at least once every 3 months) and in accordance with EN standards.	As explain in section 2.3.1.2 of the Supporting Information submitted in support of the EP application. TERFL considers that the proposals for monitoring of slags and bottom ashes are in accordance with the requirements of BAT 7.
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, wastewater) after the commissioning of the incineration plant and after each change that may significantly affect the POP content in the output streams.	The Facility will not incinerate hazardous waste. Therefore, TERFL does not consider that the requirements of BAT 8 are applicable to the Facility.
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) as listed in BAT 9 of the BREF, and, where relevant, also techniques (d), (e) and (f).	The relevant techniques are described in section 2.1 of the Supporting Information submitted in support of the EP application. It is understood that technique (f) of BAT 9 does not apply as the Facility will not incinerate hazardous waste. TERFL considers that the proposed arrangements for the receipt and segregation of waste complies with the requirements of BAT 9.

#	BAT Conclusion	How met or reference
10	To improve overall environmental performance of the bottom ash treatment plant, BAT is to include output quality management features in EMS (see BAT 1).	The Facility will not include a bottom ash treatment plant within the installation boundary. Therefore, TERFL does not consider that the requirements of BAT 10 apply to the Facility.
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 9c) including, depending on the risk posed by the incoming waste, the elements as listed in BAT 11 of the BREF.	Periodic monitoring of waste deliveries will be undertaken at the Facility - refer to section 2.1 of the Supporting Information submitted in support of the EP application. TERFL Environmental considers that the proposed arrangements for monitoring the waste deliveries as part of the waste acceptance procedures complies with the requirements of BAT 11.
12	To reduce the environmental risks associated with the reception, handling and storage of waste, BAT is to use both of the following techniques: Use impermeable surfaces with an adequate drainage infrastructure; and Have adequate waste storage capacity.	The surfaces of the waste reception, handling and storage areas have been designed and will be constructed as impermeable structures. Adequate drainage infrastructure will be fitted to areas where receipt, handling and storage of waste takes place – these areas will have appropriate falls to the process water drainage system. The integrity of areas of hardstanding will be periodically verified by visual inspection. Regular maintenance of the drainage systems will be undertaken in accordance with documented management procedures to be developed for the Facility. Adequate waste storage capacity will be available on site – the maximum waste storage capacity of the waste bunker will be clearly established and not exceeded. The quantity of waste will be regularly monitored against the maximum storage capacity. During periods of planned maintenance, quantities of fuel within the bunker will be run down. During extended periods of shutdown, provisions will be made for the waste to be backloaded from the bunker and transferred to alternative licensed waste management facilities. TERFL considers that the proposed arrangements for environmental risks associated with the reception, handling and storage of waste comply with the requirements of BAT 11.

#	BAT Conclusion	How met or reference
13	To reduce the environmental risk associated with the storage and handling of clinical waste, BAT is to use a combination of the techniques as listed in BAT 13 of the BREF.	The Facility will not be dedicated to the processing of clinical waste. In addition, the Facility will not receive hazardous clinical waste. Therefore, TERFL Environmental considers that the requirements of BAT 13 are not applicable to the Facility.
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 as listed in BAT 14 of the BREF:	Bunker crane mixing and advanced control systems will be employed at the Facility. A modern and advanced control system, incorporating the latest advances in control and instrumentation technology, will be utilised at the Facility to control operations, optimise the process relative to efficient heat release, good burn-out and minimum particle carry over. As described in Section 2.1 of the Supporting Information submitted in support of the EP application, the system will control and/or monitor the main features of the plant operation including, but not limited to the following: • combustion air; • fuel feed rate; • SNCR system; • flue gas oxygen concentration at the boiler exit; • flue gas composition at the stack (including HCl measurements); • combustion process; • boiler feed pumps and feedwater control; • steam flow at the boiler outlet; • steam outlet temperature; • boiler drum level control; • flue gas control (including differential pressure across the bag filters); • power generation; and • steam turbine exhaust pressure.

#	BAT Conclusion	How met or reference
		Water, electricity and auxiliary fuel usage will also be monitored to highlight any abnormal usage. TERFL considers that the proposed arrangements for ensuring 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 comply with the requirements of BAT 14.
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, as and when needed and practicable, based on the characterisation and control of the waste (See BAT 11).	The Facility will be controlled from a dedicated control room, with an advanced control system to optimise the process. The system will control and/or monitor the main features of the plant operation, as described in the response to BAT 14 above. Emissions to air will be reduced by the adjustment of the plants settings through the advanced control system. TERFL considers that the proposed control systems will ensure that the Facility is designed to allow for the adjustment of the plant's settings to comply with the requirements of BAT 15.
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 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.	The Facility will operate continuously, with planned shutdowns for maintenance limited as far as reasonably practicable. Waste will be kept at suitable levels in the waste bunker to maintain operation during holiday periods. Operational procedures will be developed to limit as far as practicable shutdown and start-up operations. TERFL considers that the operation of the Facility will limit as far as practicable shutdown and start-up operations to comply with the requirements of BAT 16.
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 wastewater treatment plant are appropriately designed (e.g. considering the maximum flow rate and pollutant concentration), operated within their design range, and maintained so as to ensure optimal availability.	The FGT and wastewater treatment systems will be appropriately designed and operated within the design range. The FGC and wastewater treatment systems will be subject to regular maintenance through the implementation of documented management procedures. TERFL considers that the design and operation of the FGC and wastewater treatment plants will ensure that emissions to air (and water where applicable) are reduced, and will ensure their optimal availability, to comply with the requirements of BAT 17.

#	BAT Conclusion	How met or reference
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 EMS (See BAT 1) that includes the elements as identified in BAT 18 of the BREF.	A risk based OTNOC management plan will be incorporated into the Facility EMS. This will include the following elements: • Identification of potential OTNOC, root causes and potential consequences. • Regular update of the list of identified OTNOC following periodic assessment. • Appropriate design of critical equipment (the Facility will utilise compartmentalisation of the bag filter and ensure that the bag filter is not bypassed during periods of start-up or shutdown). • Implementation of preventative maintenance plans for critical equipment. • Monitoring and recording of emissions during OTNOC and associated circumstances. • Periodic assessment of the emissions and circumstances occurring during OTNOC and implementation of corrective actions if necessary. TERFL considers that the incorporation of a risk based OTNOC management plan will ensure the Facility compliance with BAT 18.
19	To increase resource efficiency of the incineration plant, BAT is to use a heat recovery boiler.	The Facility will use a heat recovery boiler to produce steam which is used to produce electricity. The Facility will also have the provision to export heat to local users. TERFL considers that the use of a heat recovery boiler is in direct compliance with the requirements of BAT 19.
20	To increase energy efficiency of the incineration plant, BAT is to use an appropriate combination of techniques as listed in BAT 20 of the BREF.	The Facility will use techniques as described in section 2.6 of the Supporting Information submitted in support of the EP application to increase the energy efficiency of the plant. TERFL considers that the techniques listed above will increase the energy efficiency of the plant and ensure that the Facility will comply with the requirements of BAT 20.
21	To prevent or reduce diffuse emissions from the incineration plant, including odour emissions, BAT is to use the methods as stated in BAT 21 of the BREF.	In accordance with the BREF, the Facility will employ the following measures to reduce odour emissions:

#	BAT Conclusion	How met or reference
		• Waste in the Facility will be stored in an enclosed building under negative pressure. The extracted air will be used as combustion air for incineration. • The operation of the Facility will not give rise of odorous liquid wastes. Therefore, the requirement to store liquid wastes in tanks under controlled pressure and duct the tank vents to the combustion air feed or other suitable abatement system will not apply to the Facility. • Odour will be controlled during shutdown periods by minimising the amount of waste in storage. Waste will be run-down prior to periods of planned maintenance, and there will also be provisions in place to back-load waste from the waste bunker during extended periods of unplanned shutdown. In addition, doors to the tipping hall will be kept shut during periods of shutdown. The measures listed above to reduce odour emissions will ensure that the Facility will comply with the requirements of BAT 21.
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.	Gaseous wastes will not be accepted by the Facility. It is not anticipated that liquid wastes will be received at the Facility, but should any liquid wastes be received, they will be delivered in containers suitable for incineration (such as drums) and fed directly into the furnace. Therefore, the requirements of BAT 22 do not apply to the Facility.
23	To prevent or reduce diffuse dust emissions to air from the treatment of slags and bottom ashes, BAT is to include in the EMS the diffuse dust emission management features as listed within BAT 23 of the BREF:	There will not be treatment of slags and/or bottom ashes undertaken on-site. Therefore, the requirements of BAT 23 do not apply to the Facility. However, identification of the most relevant diffuse dust emissions, and definition and implementation of appropriate actions and techniques, will be included within the scope of the EMS at the Facility.
24	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 as given in BAT 24 of the BREF.	There will not be treatment of slags and/or bottom ashes undertaken on-site. Therefore, the requirements of BAT 24 do not apply to the Facility. However, it can be confirmed that the following techniques will be employed at the Facility to minimise dust emissions: • All ash handling including conveying undertaken within enclosed buildings.

#	BAT Conclusion	How met or reference
		• Where possible, minimising the height of ash discharge. • Use of a water ash quench to minimise the generation of dusts from ash handling activities.
25	To reduce channelled emission to air of dust, metals and metalloids from the incineration of waste, BAT is to use one or a combination of the techniques as listed in BAT 25 of the BREF.	In accordance with the BREF, the following techniques will be utilised at the Facility to reduce channelled emissions to air: • Bag filters – to reduce particulate content of the flue gas. • Dry sorbent injection – adsorption of metals by injection of activated carbon in combination with injection of dry lime to abate acid gases. The concentrations of metals and metalloids will be monitored in accordance with the EP for the Facility. It is considered by TERFL that the techniques listed above to reduce channelled emissions to air will ensure that the Facility will comply with the requirements of BAT 25.
26	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 filter.	There will not be treatment of slags and/or bottom ashes undertaken on-site. Therefore, the requirements of BAT 26 do not apply to the Facility. The bottom ash hall will not be held under negative pressure, however the methods as listed in response to BAT 24 will enable dust emissions to be minimised from the handling of bottom ash.
27	To reduce channelled emissions of HCl, HF and SO2 to air from the incineration of waste, BAT is to use one or a combination of the techniques as listed in BAT 27 of the BREF.	In accordance with the BREF, the following techniques will be utilised at the Facility to reduce channelled emissions to air of HCl, HF and SO_2: • Dry sorbent injection – adsorption of metals by injection of activated carbon in combination with injection of dry lime to abate acid gases. It is considered by TERFL that the use of dry sorbent injection to reduce channelled emissions to air of acid gases is in compliance with the requirements of BAT 27.
28	In order to reduce channelled peak emissions of HCl, HF and SO_2 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 optimised and	In accordance with the BREF, the following techniques will be employed at the Facility to reduce peak emissions of HCl, HF and SO_2 whilst limiting reagent consumption and residue generation from dry sorbent injection:

#	BAT Conclusion	How met or reference
	automated reagent dosage, or both the previous technique and the recirculation of reagents.	• The concentration of hydrogen chloride in the flue gases upstream of the flue gas treatment system will be measured to optimise the performance of the emissions abatement equipment, including automated reagent dosage. • A proportion of the APC residues will be recirculated to reduce the amount of unreacted reagent in the residues. • The concentrations of HCl, HF and SO_2 released from the Facility will comply with BREF limits. The techniques listed above to reduce channelled peak emissions to air of acid gases will ensure that the Facility will comply with the requirements of BAT 28.
29	In order to reduce channelled NOx emissions to air while limiting emissions of CO and N_2O from the incineration of waste, and the emissions of NH_3 from the use of SNCR and/or SCR, BAT is to use an appropriate combination of the techniques as listed in BAT 29 of the BREF.	The following elements have been incorporated into the design of the Facility: • optimisation of the incineration process via the use of an advanced control system and monitoring of process parameters (refer to the response to BAT 14); • an SNCR system; and • optimisation of the design and operation of the SNCR system (through CFD modelling to optimise the location and number of injection nozzles, and optimisation of reagent dosing to minimise ammonia slip). As identified in 2.4.3 of the Supporting Information submitted in support of the EP application, it is currently assumed that flue gas recirculation will be employed at the Facility. The design elements listed above to reduce channelled NOx emissions to air (whilst limiting emissions of CO, N_2O and NH_3) will ensure that the Facility will comply with the requirements of BAT 29.
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) as listed in BAT 30 of the BREF.	The Facility will employ the following techniques to reduce channelled emission to air of organic compounds: • Optimisation of the incineration process – the boiler will be designed to minimise the formation of dioxins and furans as follows:

#	BAT Conclusion	How met or reference
		• Minimise residence time in critical cooling section to avoid slow rates of combustion gas cooling, minimising the potential for 'de-novo' formation of dioxins and furans. • Utilisation of an SNCR system which inhibits dioxin formation and promotes their destruction. • Keep transfer surfaces as low as possible, around 170°C subject to other reaction considerations. • Apply CFD modelling to the design where appropriate to ensure gas velocities are in a range that negates the formation of stagnant pockets/low velocities. • Minimise volume in critical cooling sections. • Prevent boundary layers of slow-moving gas along boiler surfaces via good design and regular maintenance. • Online and offline boiler cleaning through a regular maintenance schedule to reduce dust residence time and accumulation in the boiler, thus reducing PCDD/F formation in the boiler. • Dry sorbent injection using activated carbon and dry lime, in combination with a bag filter. The concentrations of dioxins and furans released from the Facility will comply with BREF limits. The techniques listed above to reduce channelled emission to air of organic compounds will ensure that the Facility will comply with the requirements of BAT 30.
31	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 as listed in BAT 31 of the BREF.	In accordance with the BREF, dry sorbent injection of activated carbon will be employed at the Facility in combination with a bag filter. It is considered by TERFL that the use of these techniques will ensure that the Facility will comply with the requirements of BAT 31.
32	To prevent the contamination of uncontaminated water, to reduce emissions to water, and to increase resource efficiency, BAT is to	There will be separate foul/domestic water, process water and surface water drainage systems at the Facility.

#	BAT Conclusion	How met or reference
	segregate wastewater streams and to treat them separately, depending on their characteristics.	Foul effluents from domestic sources will be discharged to foul sewer. It can be confirmed that there will be no wastewater arising from flue gas treatment. Bottom ash handling will be undertaken in an enclosed building with a dedicated drainage system. The drainage in the Facility waste reception, handling and storage areas will be contained, with any process water collected reused within the process (e.g. in the ash quench). Process water will be collected in an intermediate storage vessel prior to re-use. Uncontaminated water streams, such as surface water run-off, will be segregated from other wastewater streams requiring treatment. Surface water runoff from roadways and vehicle movement areas will pass through interceptors to contain oil and sediments prior to discharge. Areas where liquid raw materials are stored (e.g. liquid ammonia) will be covered to prevent contaminated surface water from leaving the site. It is considered by TERFL that the segregation and treatment of different wastewater streams, as described above, will ensure that the Facility will comply with the requirements of BAT 32.
33	To reduce water usage and to prevent or reduce the generation of wastewater from the incineration plant, BAT is to use one or a combination of the techniques as listed in BAT 33 of the BREF.	In accordance with the BREF, the following techniques will be utilised at the Facility to reduce water usage and prevent wastewater generation: • Use of an FGC system that does not generate wastewater – by utilising dry sorbet injection of lime and PAC. • Water reuse and recycling in the process – effluents generated by the process will be re-used within the process, e.g. in the ash quench. Under normal operation the Facility will not generate process effluent. It is considered by TERFL that the techniques listed above to reduce water usage and prevent/reduce the generation of wastewater will ensure that the Facility will comply with the requirements of BAT 33.
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	There will be no treatment of slags and bottom ashes undertaken on-site. In addition, there will be no emission to water from FGC.

#	BAT Conclusion	How met or reference
	combination of the techniques as listed in BAT 34 of the BREF, and to use secondary techniques as close as possible to the source in order to avoid dilution.	The risk of emissions to water from the storage of bottom ash at the Facility will be minimised – any overflow from the ash quench will be contained in the process effluent drainage system and hence there will not be any release of effluent from the ash quench system. In accordance with BAT 34 (a), the incineration process and the FGC process will be optimised to target pollutants such as dioxins and furans, and ammonia – refer to the responses to BAT 29 and 30 above. It is considered by TERFL that the Facility will comply with the requirements of BAT 34 by reducing emissions to water from the storage of bottom ash as per the design measures described above.
35	To increase resource efficiency, BAT is to handle and treat bottom ashes separately from FGC residues.	It can be confirmed that bottom ash and APCr will be handled and disposed of separately at the Facility. TERFL considers that the Facility will comply with the requirements of BAT 35.
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 as listed in BAT 36 of the BREF, based on a risk assessment depending on the hazardous properties of the slags and bottom ashes.	There will be no bottom ash treatment undertaken at the Facility. Therefore, it is understood that the requirements of BAT 36 do not apply to the Facility.
37	To prevent or, where that is not practicable, to reduce noise emissions, BAT is to use one or a combination of the techniques as listed in BAT 37 of the BREF.	In accordance with the requirements of BAT 37, it can be confirmed that the following techniques will be employed at the Facility to prevent or reduce noise emissions: • Appropriate location of equipment and buildings – in accordance with normal industry practice, the technology provider will implement an efficient layout to result in relatively quiet operational noise levels. • Operational measures – regular inspection and maintenance of equipment will be undertaken. Doors to buildings will remain closed as far as is reasonably practicable. Waste deliveries will take place primarily during daytime hours. • Low-noise equipment – the proposed technology provider will optimise plant selection to ensure that the most efficient and 'quietest' technology is selected.

#	BAT Conclusion	How met or reference
		• Noise attenuation – plant rooms will have been acoustically designed for limiting noise emissions to acceptable levels for compliance with relevant workplace regulations. • Noise-control equipment/infrastructure – where appropriate, acoustic cladding will be used on buildings. It is considered by TERFL that the techniques listed above to reduce noise emissions will ensure that the Facility will comply with the requirements of BAT 37.

G Noise Assessment

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