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# Lostock Sustainable Energy Plant

## Lostock Sustainable Energy Plant Ltd

Supporting Information – EP Variation

ENGINEERING CONSULTING

# Document approval

| | Name | Signature | Position | Date |
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# Non-Technical Summary

Lostock Sustainable Energy Plant Limited (LSEP Ltd) was granted an Environmental Permit (EP) for a waste incineration facility (LSEP or the 'Facility') on 16 December 2013. The EP has been subject to one variation since it was granted.

LSEP Ltd is applying for the following changes to the EP:

1. Increase the capacity of the Facility from 600,000 tonnes per annum (based on a throughput of 72.2 tonnes per hour and an availability of around 8,000 hours) to 728,000 tonnes per annum (assuming a throughput of 91 tonnes per hour and an availability of 8,000 hours);
2. Amend the Site Layout/Installation Boundary to align with the design of the Facility allowing for its design evolution since the original EP was granted;
3. Amend the Operating Techniques/permit conditions to align with the design of the Facility allowing for its design evolution since the original EP was granted;
4. Introduce two additional EWC codes to the EP; and
5. Introduce an additional emission point to allow the discharge of excess process effluents to sewer.

LSEP Ltd considers that this application should be determined as a Substantial Variation, due to the proposed increase in capacity exceeding the relevant threshold of 3 tonnes per hour as set out in Part 2 of Schedule 1 of the Environmental Permitting Regulations (EPRs).

Air quality assessments for the proposed increase in capacity have been undertaken (refer to Appendix E). The conclusions of the Air Quality Assessment are as follows:

- The significance of the impact of process emissions from the Facility would be negligible and not significant on human health.
- In relation to ecological features, a number of small exceedances of screening thresholds at statutory and locally designated sites were predicted as a consequence of emissions from the Facility. However, the predicted impacts are less than those predicted for the currently permitted Facility, and it is concluded by the Project Ecologist that no likely significant effects are predicted for European or Ramsar Sites, and no significant harm is predicted for SSSIs or locally designated sites.

# Contents

# 1 Introduction

Lostock Sustainable Energy Plant Limited (LSEP Ltd) was granted an Environmental Permit (EP) for a waste incineration facility (referred to as the 'Facility') at Lostock Gralam, Northwich (Ref: EPR/WP3934AK). The EP was originally granted on 16 December 2013 and has since been subject to a single variation to include for a number of additional EWC codes.

This document and its supporting appendices contain the information for the application for a variation to the EP and should be read in conjunction with the formal application forms.

Section 1 of this document provides an overview of the application; section 2 provides a justification of the proposed changes to the capacity of the Facility; section 4 details the changes to the heat export arrangements from the facility; section 5 details the additional EWC codes to be incorporated into the EP; section 7 details the conclusions of environmental assessments undertaken to assess the impact of the proposed changes; and section 8 provides a review of the implications of the Waste Incineration (WI) BREF.

Table S1.2 within the EP sets out the operating techniques for the Facility. A detailed review of the operating techniques referenced in the EP, in addition to other conditions within the EP, has been undertaken. A number of changes/amendments are proposed to be consistent with the proposed design of the Facility. These are presented within Appendix B.

A s.36 variation application has been submitted to the Local Planning Authority to allow for the proposed changes to the design of the Facility. The EIA Report submitted with the s.36 variation application is presented within Appendix H for reference.

## 1.1 Proposed changes

LSEP Ltd is proposing the following changes to the EP:

1. Increase the capacity of the Facility from approximately 600,000 tonnes per annum (based on a throughput of 72.2 tonnes per hour and an availability of around 8,000 hours) to approximately 728,000 tonnes per annum (assuming a throughput of 45.5 tonnes per hour and an availability of 8,000 hours);
2. Amend the Site Layout/Installation Boundary to align with the design of the Facility allowing for its design evolution since the original EP was granted;
3. Amend the Operating Techniques/EP conditions to align with the design of the Facility allowing for its design evolution since the original EP was granted;
4. Introduce two additional EWC codes to the EP; and
5. Introduce an additional emission point to allow the discharge of excess process effluents to sewer.

The changes outlined above will not result in any changes to the footprint (size) and general layout of the Facility. However, following detailed design of the Facility, some minor modifications are proposed to the site layout (such as access roadways within the site) – refer to section 3. For consistency, updated site layout (Installation Boundary) and emissions points drawings are presented within Appendix A.

## 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.

LSEP Ltd 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. The proposed increase in capacity is more than this threshold. Therefore, LSEP Ltd consider that the application is a 'Substantial Change' to the EP and should be determined as a Substantial Variation.

# 2 Increase in capacity

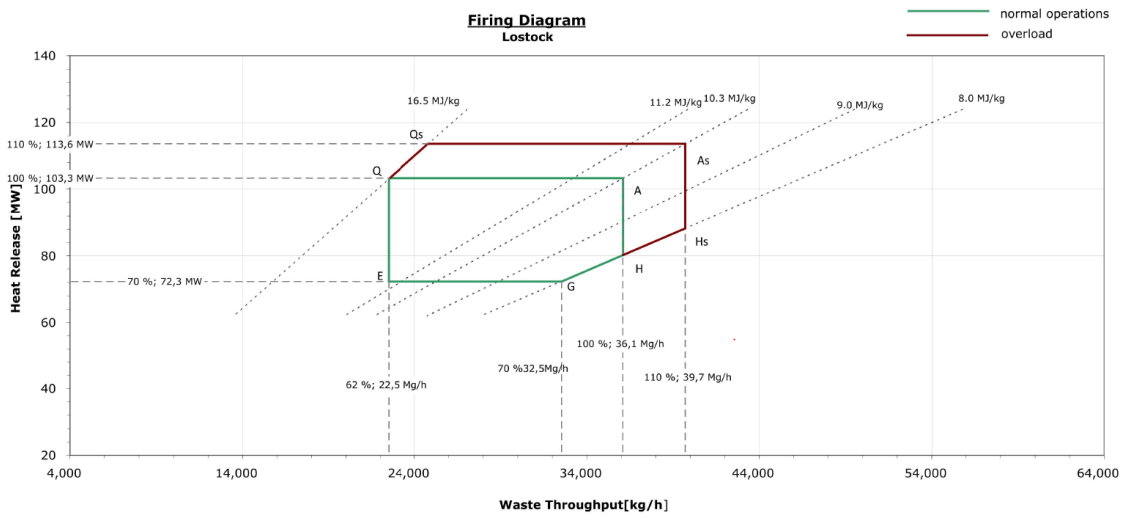
It should be noted that the proposed increase in the permitted capacity is to reflect proposed changes to the design of the boilers. To understand the proposed increase in capacity, it is important to understand how the capacity of the Facility has been calculated. The annual capacity is calculated as follows:

*Annual Processing Capacity = Hourly Processing Capacity x Operational Period*

## 2.1 Permitted plant capacity

As stated within the original EP supporting document (Table 2.4), the Facility originally had a capacity of approximately 578,000 tonnes per annum of waste (600,000 proposed as the maximum capacity), based on a throughput of around 72.2 tonnes per hour (for both lines) at an availability of 8,000 hours. This equates to an hourly throughput of 36.1 tonnes per line per hour at an NCV of 10.3 MJ/kg, reflected by point A within the firing diagram shown in Figure 1 below. A larger copy is included within Appendix A. The original thermal capacity of each boiler was around 103.3 MWth (at 100% load), with the NCV rage of the combustion process between 8 – 16.5 MJ/kg,

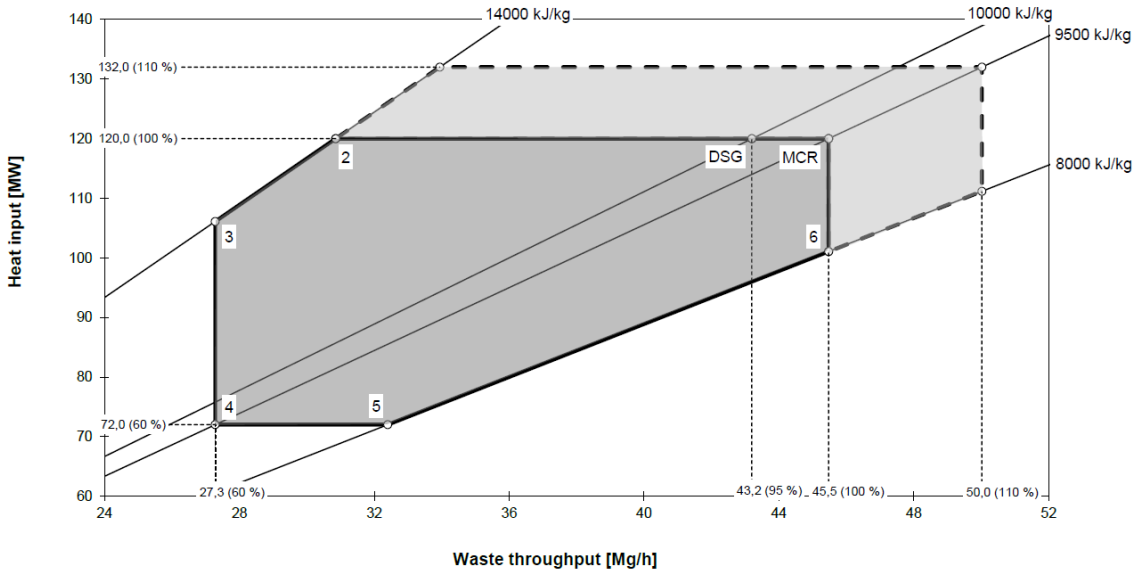
*Figure 1: Original firing diagram (per line)*




## 2.2 Proposed plant capacity

Following further procurement and discussions with technology providers, the design of the Facility has been refined. Each boiler will have an increased thermal capacity of approximately 120MWth, at 100% load. The NCV range of the combustion process is now 8 – 14 MJ/kg. The footprint (i.e. physical size) of the boilers will remain the same. However, the increased thermal capacity represents an improvement in the efficiency of the combustion design and technology, and improved guarantees from the technology provider. The new firing diagram proposed for the Facility is presented in Figure 2 below, with a larger copy included within Appendix A.

*Figure 2: Proposed firing diagram (per line)*




As a result of the increased thermal capacity, the annual capacity of the Facility will increase to approximately 728,000 tonnes per annum of waste, assuming an hourly throughput of 91 tonnes per hour (for both lines), at an availability of 8,000 hours. This equates to an hourly throughput of 45.5 tonnes per line per hour at an NCV of 9.5 MJ/kg, reflected by the MCR point within the firing diagram above.

This is an increase in 128,000 tonnes per annum compared to the originally permitted capacity. Assuming an availability of 8,000 hours, this equates to an increase in the hourly throughput of around 15.8 tonnes per hour of waste.

## 2.3 Raw material consumption

The proposed increase in the annual capacity of the Facility will result in the additional consumption of raw materials. Following further design of the Facility, the estimated consumptions of raw materials have been updated compared to those stated within the original EP application. Table 1 presents the estimated annual raw material consumption in the original application; and the estimated raw material consumption allowing for the proposed increase in capacity and refined design in accordance with the technology providers performance guarantees.

*Table 1: Raw material consumption*

| Raw material | Estimated consumption (tpa) – original EP application | Estimated consumption (tpa) – proposed design |
|---|---|---|
| Ammonium hydroxide | 3,280 | 3,640 |
| Powder activated carbon | 480 | 341 |
| Fuel oil | 1,000 | 433 |
| Sodium bicarbonate | 20,100 | 11,648 |

The original EP application assumed around 35,200 tpa of water would be consumed, which is considered to be an underestimate. The current water balance for the Facility states that 7.9 tonnes per hour of mains water will be consumed. Assuming continuous operation throughout the year (a

conservative assumption), it is expected that up to approximately 70,000 tonnes per annum of mains water will be consumed.

The arrangements for the storage and handling of raw materials will not change as a result of the proposed increase in capacity.

## 2.4 Residue generation

The proposed increase in the capacity will result in the generation of additional quantities of residues, compared to the quantities stated within the original EP application. Table 2 presents the estimated residue generation in the original application; and the estimated residue generation allowing for the proposed increase in capacity in accordance with the technology providers performance guarantees.

*Table 2: Residues generation*

| Residue | Estimated generation (tpa) – original EP application | Estimated generation (tpa) – proposed design |
|---|---|---|
| Bottom ash (inc boiler ash) | 126,450 | 167,440 |
| APCr | 23,000 | 18,928 |
| Ferrous metals | 10,500 | N/A |
| Non-ferrous metals | 1,050 | N/A |

The arrangements for the storage and handling of residues will not change as a result of the increase in capacity, with the exception that no metals recovery is now proposed at the Facility. As a result of this, no storage facilities for the storage of recovered metals are required.

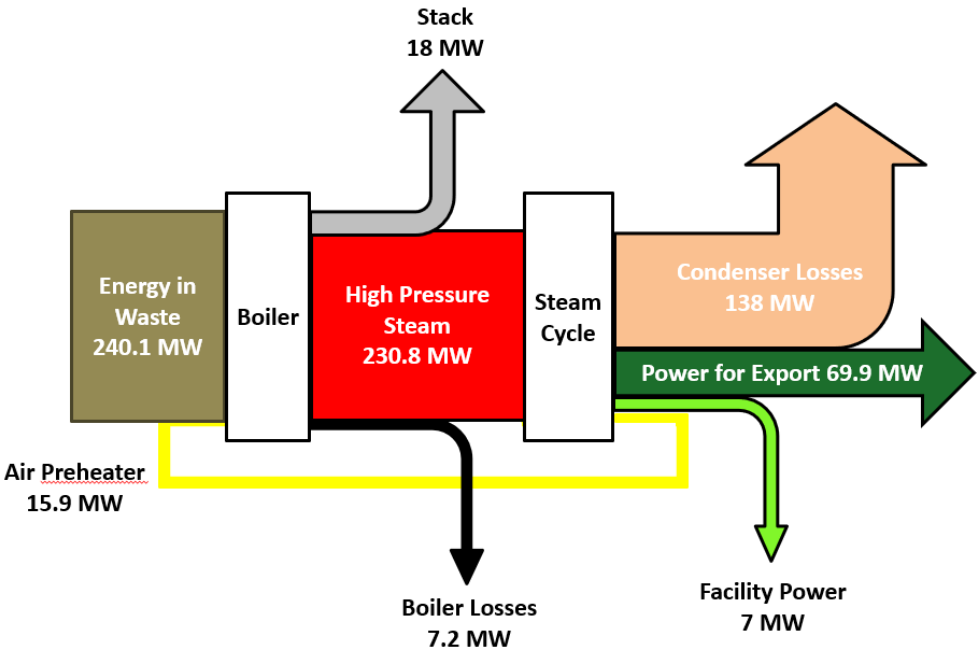
## 2.5 Energy efficiency

The original EP application assumed that the Facility would generate approximately 38 MWe of electricity and supply around 68.6 MWth of heat to a local user in the form of high-pressure steam. This would result in an electrical export of around 32.3 MWe. The turbine was sized to provide up to 60 MWe of electrical output (the 'generating capacity') in the event that steam demand was reduced.

For the proposed design, together with the changes in the heat export arrangements from the Facility, electrical generation is expected to increase to approximately 76.9 MWe with a parasitic load of 7 MWe. Therefore, the Facility will typically export approximately 69.9 MWe. The actual amount of electricity exported from the Facility will depend on the waste CV, environmental and combustion conditions, and the export of heat from the Facility.

An indicative Sankey Diagram for the proposed design (assuming full condensing mode) is presented in Figure 3. The Sankey Diagram is based on operation at the MCR point, assuming operation at 91 tph of waste at an NCV of 9.5 MJ/kg.

*Figure 3: Sankey diagram – no heat export*




Assuming an availability of 8,000 hours and an electrical generation of 76.9 MWe, the Facility would generate around 615,200 MWh per annum. The Facility will have a parasitic load of around 7 MWe and so would export around 69.9 MWe, equivalent to around 559,200 MWh per annum. The nominal design case has been considered against the benchmark data for MSW incineration plants, given in Environment Agency Sector Guidance Note EPR5.01 and in the BREF for Waste Incineration (WI BREF). As can be seen from the findings presented in Table 3, the design of the Facility compares favourably with the relevant benchmarks.

The original/currently permitted design of the Facility has been included within Table 3 for comparative purposes. Although the original design of the Facility assumed both electricity and steam export, to allow for an appropriate comparison between the two designs, the calculations have been undertaken assuming operation in electricity-only mode. As stated above, and within section 2.4 of the carbon assessment submitted with the original EP application, the original design was capable of generating up to 60MWe in the event of a reduction in steam demand. It is not clear from the original application what the parasitic load of the original design is; therefore, a comparison has only been undertaken for gross power generation.

*Table 3: Facility design parameters comparison table*

| Parameter | Unit | The Facility – Original design | The Facility – Proposed design | Benchmark |
|---|---|---|---|---|
| Gross power generation | MWh/t waste | 0.800 | 0.845 | 0.415-0.644 |
| Net power generation | MWh/t waste | - | 0.768 | 0.279-0.458 |
| Gross power efficiency | % | 29.04% | 32.04% | 20 – 25%* |
| Internal power consumption | MWh/t waste | - | 0.08 | 0.15 |

| Parameter | Unit | The Facility – Original design | The Facility – Proposed design | Benchmark |
|---|---|---|---|---|
| Power generation (assumed gross) for 100,000 tpa of waste | MWe | 10.0 | 10.6 | 5-9 |

** BAT-AEEEL for an existing plant within the Waste Incineration BREF*

# 3 Changes to the Installation Boundary and site layout

Since the original EP application was granted, the design and layout of the Facility has undergone a number of small changes. The changes to the design and layout of the Facility will not change the operating techniques for the Facility as listed in Table S1.2 of the EP; however, an updated Installation Boundary and Emissions Points drawing is required to be submitted with this application.

Following detailed design of the Facility, some minor modifications are proposed to the site layout (such as access roadways within the site). As a result of this, small areas of land are required to be added/removed from the Installation Boundary. These areas are all around the perimeter of the site, and do not include any areas designated for the storage and handling of incoming waste. A drawing is presented within Appendix A which highlights the areas lost/gained from the Installation Boundary. An updated site condition report is presented within Appendix I which provides an update on the baseline conditions for the site and takes into consideration the changes to the Installation Boundary.

In submitting this application, it is requested that the EA updates the Installation Boundary within Schedule 7 of the EP, to represent the revised Installation Boundary as presented in Appendix A. An updated emissions point drawing is presented within Appendix A, to reflect the revised Installation Boundary. It should be noted that the locations of the emissions points to air and water have not changed.

It is considered that the areas of land to be removed from the Installation Boundary fall under a ‘low risk surrender’, as operations have not yet commenced at the Facility. Therefore, there has been no storage of hazardous or potentially contaminating materials associated with operations at the Facility (such as lime, PAC, ammonia, APCr, etc).

# 4 Heat export

## 4.1 Background

The original EP application was submitted in 2012 on the basis that the Facility would export 'up to 100 tonnes per hour of steam' to the nearby Tata Chemicals Europe (TCE) (formerly known as Brunner Mond) manufacturing facility. The Facility was considered as a potential option to replace steam that was provided to the chemicals manufacturing facility by a gas fired CHP plant located at TCE's Winnington site.

At the time the original EP for the Facility was granted (in 2013), TCE received its steam and electricity supplies under the terms of their agreement with E.ON, who developed, built and operated TCE's CHP plant from its inception. This Steam and Electricity Supply Agreement (SESA) was uneconomic for both E.ON and TCE and was terminated early in September 2013. At that time, the Facility had not been developed and therefore was not able to provide TCE with its steam requirements. Therefore at the point of termination of the SESA, TCE acquired the ownership of the CHP facility from E.ON to ensure continuity of supply of heat/steam to its chemical facility. TCE continues to own the plant, and to provide its own steam and electricity requirements. As a result, the Facility is not currently required as the primary source of heat/steam for TCE's chemical manufacturing facilities, although TCE is keen to reach an agreement with LSEP Ltd by which TCE can take a volume of steam from the Facility when TCE requires this in the future.

## 4.2 Heat export arrangements

The Facility has been designed to be capable of exporting up to 100 tonnes per hour heat/steam. A steam supply agreement was signed with TCE on 26 March 2019, which obliges LSEP Ltd to supply up to 25 tonnes per hour of steam to TCE's plant, on occasions when it is needed by TCE for their chemical manufacturing facility. Therefore, whilst TCE is unlikely to be a 'guaranteed' baseload user of heat from the commissioning date of the Facility, the Facility will be able to provide steam on those occasions when TCE requires it.

Furthermore, there are a number of circumstances when TCE may, in the future, require the Facility to provide significant baseload quantities of heat, namely:

- on the closure (due, for example, to economic or technical life expiry) of the CHP plant; and/or
- in the circumstances that fossil fuel or carbon costs increase to the point that the Facility represents a more economic source of heat than the existing gas-fired CHP plant.

Sufficient space has been provided for within or close to the turbine hall to house CHP equipment for the export of up to 25 tonnes per hour of steam. Furthermore, this area has been designed for up to 100 tonnes per hour of steam to be exported with modifications to the turbine and the installation of suitably sized CHP equipment in the event that TCE was to require this quantity of steam in the future.

## 4.3 Potential heat export opportunities

Taking into consideration the above, a Heat Demand Investigation has been undertaken to identify potential heat clusters within 10km of the Facility – this is presented within Appendix C.

Furthermore, a CHP assessment has been undertaken to reflect the proposed changes to the Facility – refer to Appendix D. The CHP assessment presents the relevant energy efficiency measures to

demonstrating compliance with relevant legislative requirements, and provides a CHP-Ready Assessment in accordance with EA guidance.

Four potential heat clusters have been identified within the Heat Demand Investigation. However, none of the potential heat network routes to these heat clusters are considered to be financially viable at this stage. LSEP is committed to undertaking ongoing reviews to identify additional potential opportunities to export heat from the facility and realise CHP. Therefore, as a 'CHP-ready facility', the Facility will be designed to be ready, with minimum modification, to supply heat in the future to the identified potential heat users and also any additional future heat users.

## 4.4 Changes to operating techniques/permit conditions

Although the original EP does not include specific conditions relating to the export of heat/steam, there are various aspects of the operating techniques which refer to the original EP application, which includes references to the export of heat/steam to Tata.

Allowing for the design evolution of the Facility since the original EP was granted, a review of the operating techniques / EP conditions listed within the EP has been undertaken in relation to heat export arrangements from the Facility – refer to Appendix B.

# 5 Additional EWC codes

LSEP Ltd is proposing to incorporate the following two additional EWC codes into Table S3.2 of the EP:

*Table 4: Proposed EWC codes*

| EWC Code | Description | Justification |
|---|---|---|
| **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) | This is not a hazardous or a clinical waste; therefore, it is understood that waste received under this code will not require any additional storage, handling or processing requirements.<br>This waste will typically include dressings, plaster casts, linen, disposable clothing, nappies etc, which are typical healthcare and sanitary products that can be found in municipal waste. These wastes will not be subject to special requirements in order to prevent infection and will be suitable for incineration on a conventional moving grate. |
| 18 01 09 | medicines other than those mentioned in 18 01 08 (excluding sharps or infectious waste) | This is a is non-hazardous clinical waste which will comprise medical waste only. It is understood that this waste will not require additional waste handling facilities to segregate it from the other incoming waste streams. Only waste which is suitable for conventional incineration and storage within the waste bunker will be accepted under this EWC code. |

The EWC codes above have been classified using the Government guidance note '*HTM 07-01: Safe management of healthcare waste*'.

The quantities of waste received under either EWC code will be small compared to the overall waste capacity of the Facility. Waste acceptance procedures will be in place for all incoming wastes, as described within the original EP application.

Wastes received under either of these EWC codes will be managed in the same way as all other incoming waste, and will not result in any additional odour impacts from the Facility. It is the responsibility of the Facility management to ensure that odour control can and is maintained. There will be robust odour control measures in place at the site as described in the original EP application. If upon arrival at the site, it is deemed that odour control cannot be maintained due to the nature of the waste, the waste will not be accepted at the Facility.

# 6 Additional emission point

The current EP does not allow for any discharges to sewer from the Facility. Under normal operations, process effluent will be re-used within the process and will not require to be discharged from the site. However, in the event that excess process effluents are generated (such as emptying the boiler during maintenance activities), these will be required to be discharged off-site. It is proposed to discharge these to sewer in accordance with a Trade Effluent Consent.

Therefore, it is proposed to update the relevant table within the permit to include for an additional emissions point S1, to allow the discharge of process effluents to sewer.

*Table 5: Additional emissions point*

| Emission point reference | Source |
|---|---|
| S1 | Excess process effluents to sewer |

# 7 Environmental assessments

## 7.1 Air quality assessments

As a result of the proposed changes to capacity, and following refinement of boiler design, detailed air quality and human health risk assessments have been undertaken for the Facility. In addition, an Abnormal Emissions Assessment has been undertaken to assess the impact of abnormal operation, in accordance with Article 46 of the Industrial Emissions Directive. These assessments are presented within Appendix E.

The conclusions of the Air Quality Assessment are as follows:

- The significance of the impact of process emissions from the Facility would be negligible and not significant on human health.
- In relation to ecological features, a number of small exceedances of screening thresholds at statutory and locally designated sites were predicted as a consequence of emissions from the Facility. However, the predicted impacts are less than those predicted for the currently permitted Facility, and it is concluded by the Project Ecologist that no likely significant effects are predicted for European or Ramsar Sites, and no significant harm is predicted for SSSIs or locally designated sites.

The conclusions of the Human Health Risk Assessment are as follows:

- The impact of emissions of dioxins and dioxin-like PCBs from the Facility on human health is predicted to be negligible and the effect is not significant.

The conclusions of the Abnormal Emissions Assessment are as follows:

- Periods of abnormal operation (as permissible under the IED (Article 46)) are not predicted to give rise to an unacceptable impact on air quality or the environment.

## 7.2 Greenhouse gas assessment

An updated Greenhouse Gas Assessment has been undertaken to reflect the proposed increases in the capacity of the Facility (as outlined within section 2). The Greenhouse Gas Assessment is presented within Appendix F.

## 7.3 Noise

This variation is not proposed to result in any changes to the waste processing equipment or the associated Operating Techniques listed within Table S1.2 of the EP. Furthermore, the Facility is required to be designed in accordance with the existing constraints on noise impacts imposed through the planning regime and also within constraints of the noise assessment for the original EP application. Therefore, it is not expected that there will be any increases to the noise levels associated with the Facility when compared to the original EP application. Therefore, it is not proposed to submit an updated noise assessment with this application.

Prior to the commencement of commissioning, in accordance with the requirements of POC6 within the permit, a report will be submitted to the EA on the detailed programme of noise and vibration monitoring that will be carried out during the commissioning stage.

## 7.4 Odour

As this variation is not proposed to result in any changes to the operating techniques for the handling and storage of waste and residues at the Facility, it is not anticipated that there will be any changes to the types and amounts of odour generated at the Facility.

Therefore, the odour control measures outlined within the original EP application remain valid, and it is understood that an Odour Management Plan is not required to be produced in support of this variation application.

## 7.5 Other assessments

The proposed changes to the design will not affect the procedures and measures to reduce and mitigate the level of environmental risk introduced by the Facility compared to the original EP application. Therefore, it is understood that an updated Environmental Risk Assessment is not required to be produced in support of this EP variation application.

# 8 Waste Incineration BREF

Following pre-application discussions with the EA, it was agreed that a review of the BAT conclusions listed within the WI BREF would be undertaken against the proposed design of the Facility. The review of the WI BREF BAT conclusions is presented within Appendix G.

The WI BREF identifies an 'existing facility' as a facility that was granted an EP before the WI BREF. On this basis, as the Facility was granted the original EP in December 2013, it should be classified as an existing facility.

However, following discussions with the EA via the Environmental Services Association (ESA), it is understood that for facilities which had not commenced construction before the EA published its Draft BREF Implementation Plan, the EA could choose to apply the BAT-EALs for 'new facilities' where they had not commenced operation. The Draft BREF Implementation Plan states:

> *"In some circumstances the EA may ask operators of existing plants which have not yet been built to meet new plant limits where is it is practicable for them to do so. This will be considered on a case-by-case basis."*

The EA issued its Draft BREF Implementation Plan for consultation with the waste sector on 1 April 2021. LSEP Ltd signed a contract with its EPC Contractor for the Facility in March 2019. The EPC Contract was based on a number of performance guarantees associated with the proposed design of the boiler and the flue gas treatment systems.

Therefore, as the Facility was granted an EP before the WI BREF was published, and considering the extensive financial commitments entered into when the EPC Contract was signed, LSEP Ltd considers that the Facility should be classified as an existing Facility for WI BREF compliance purposes.

# Appendices

# A Plans and Drawings

# B Review of Operating Techniques

*Table 6: Review of operating techniques and permit conditions*

| Permit reference | Original EP application reference | Operating Technique | Proposed revision to the Operating Technique |
|---|---|---|---|
| Introductory note | - | The incinerator has a total capacity of approximately 206.6 MW (thermal input) and has been designed to operate under several modes of operation. Under normal circumstances, the incinerator will generate 38.4 MWe of electrical energy as well as supply heat in the form of high-pressure steam (68.63 MW) to the neighbouring soda ash works. About 32.28 MWe electricity will be exported to the grid. In the event of an unplanned reduction in steam demand from the soda ash works or steam is not required, all useful steam will be turned into electricity generation via the SEP turbine/generator which has been sized for up to 60 MWe electrical output. | The incinerator has a total capacity of approximately 240 MW (thermal input) and has been designed to operate under several modes of operation. Under normal circumstances, the incinerator will generate 76.9 MWe. About 69.9 MWe electricity will be exported to the grid. The incinerator will also have the potential to export heat to local heat users. The amount of electricity exported will reduce if heat is exported. |
| Introductory note | - | Solid residues produced by the incinerator will be bottom ash (including boiler ash) and air pollution control residues. The bottom ash will be processed at the facility to recover ferrous metal, non-ferrous metals and unburned waste. Any unburned material would be returned to the waste bunker and combusted. The ferrous and non-ferrous metals would be separately collected and sent for off-site recovery. | Solid residues produced by the incinerator will be bottom ash (including boiler ash) and air pollution control residues. Any unburned material would be returned to the waste bunker and combusted. |
| Table S1.1<br>Directly associated activities | - | **Activity:** Electricity and Steam Generation<br>**Description:** Generation of electrical power and heat using steam turbine from energy recovered from the flue gases.<br>**Limits:** The export of electricity to the grid and for on-site operations. The export of steam beyond the installation boundary. | **Activity:** Electricity generation with the potential to export heat / steam<br>**Description:** Generation of electrical power using a steam turbine from energy recovered from the flue gases, and the potential to export heat / steam. |

| Permit reference | Original EP application reference | Operating Technique | Proposed revision to the Operating Technique |
|---|---|---|---|
| | | | **Limits:** The export of electricity to the grid and for on-site operations. The potential to export heat/ steam beyond the installation boundary. |
| Table S1.2 Application | Non-technical summary | The SEP will burn up to 600,000 tonnes of waste fuels per annum (assuming a calorific value of 10.3 mega joules per kilogramme). | The SEP will burn up to 728,000 tonnes of waste fuels per annum (assuming a calorific value of 9.5 mega joules per kilogramme). |
| Table S1.2 Application | Non-technical summary | The project will be developed in two separate phases. Phase one will comprise a single line burning up to 300,000 tpa of waste fuels (assuming a calorific value of 10.3 mega joules per kilogramme). Phase two will introduce a second identical line doubling the throughput. | The SEP will comprise a twin line waste incineration facility. Each line will burn up to 364,000 tpa of waste fuels (assuming a calorific value of 9.5 mega joules per kilogramme). |
| Table S1.2 Application | Non-technical summary | The proposed SEP will displace a portion of the steam currently being generated by the Winnington CHP. The SEP will comprise 2 no. 103MW thermal boilers and is assumed to generate approximately 100 tonnes per hour of IP steam (@12.5 barg and 250°C) and 38MW of electricity. | The SEP will comprise 2 no. 120MW thermal boilers and is assumed to generate approximately 76.9 MW of electricity, with the potential to export up to 25 tonnes of steam (which would reduce the electrical output of the Facility). |
| Table S1.2 Application | Non-technical summary | The burning of waste and fuel derived from waste within the proposed SEP will reduce reliance on power and heat supplied from the existing gas fired combined heat and power. | Remove. |
| Table S1.2 Application | Non-technical summary | Reducing natural gas burned within Winnington CHP. | Remove. |
| Table S1.2 Application | Non-technical summary | It is estimated that the proposed SEP will provide greenhouse gas savings of between 152 and 174 thousand tonnes of carbon dioxide equivalent emissions per annum. This equates to the annual emissions from approximately 25,000 – 29,000 homes or 61,000 – 70,000 cars. | It is estimated that the proposed SEP will provide greenhouse gas savings of approximately 159,989 tonnes of carbon dioxide equivalent emissions per annum in the base case. |

| Permit reference | Original EP application reference | Operating Technique | Proposed revision to the Operating Technique |
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| Table S1.2 Application | Non-technical summary | The SEP comprises two processing lines each with a 103 mega watt thermal input boilers that will generate steam. | The SEP comprises two processing lines each with a 120 mega watt thermal input boiler that will generate steam. |
| Table S1.2 Application | Non-technical summary | Steam raised in the boilers will be passed to a single turbine to generate electricity and exported as process steam from a turbine extraction. Steam will be utilised within the soda ash process at the Lostock site whilst electricity will be exported to the National Grid. | Steam raised in the boilers will be passed to a single turbine to generate electricity, with the potential to export heat to local users should this become commercially and technically viable. |
| Table S1.2 Application | Non-technical summary | Recycling of residues from the SEP avoiding the need for processing of virgin materials (e.g. aggregates and ferrous metals). | Recycling of residues from the SEP avoiding the need for processing of virgin materials (e.g. aggregates). |
| Table S1.2 Application | Non-technical summary | Bottom ash will be processed onsite. The bottom ash processing will include treatment which will recover ferrous metal, non ferrous metals and also unburned waste will be recovered.<br>Any unburned material would be returned to the waste bunker and combusted. The ferrous and non-ferrous metals would be separately collected and sent for off-site recovery. | Bottom ash will be stored at the site prior to transfer off-site for processing. Unburned waste would be recovered from the bottom ash if identified, with any unburned material returned to the waste bunker and combusted. |
| Table S1.2 Application | Section 2: Management of activities | 2.73 Boiler ash and bottom ash will be combined prior to on site processing. In addition, both ferrous and non-ferrous metals will be recovered from the bottom ash. | Boiler ash and bottom ash will be combined prior to transfer off-site for processing. |
| Table S1.2 Application | Section 2: Management of activities | Table 2.5: Waste Generation, Storage and Disposal/Recovery | *Remove references to ferrous and non-ferrous metals* |
| Table S1.2 Application | Section 2: Management of activities | 2.7.5 Bottom ash is generated from the furnace grate. The bottom ash is collected at the end of the grate in the water filled bottom ash extractor located beneath the grate, where this material is quenched. From here the ash is | 2.7.5 Bottom ash is generated from the furnace grate. The bottom ash is collected at the end of the grate in the water filled bottom ash extractor located beneath the grate, where this material is quenched. From here the ash is moved via an |

| Permit reference | Original EP application reference | Operating Technique | Proposed revision to the Operating Technique |
|---|---|---|---|
| | | moved via an inclined steel plate conveyor, which permits water to drain from the ash back into the quench bath for reuse. Larger ferrous metal items will be removed from the quench conveyor magnetic methods, prior to collection of the ash within the bottom ash bunker. | inclined steel plate conveyor, which permits water to drain from the ash back into the quench bath for reuse. The bottom ash will be collected and stored within the bottom ash storage facility. |
| Table S1.2 Application | Section 2: Management of activities | 2.7.6 Bottom ash from the bunker will be loaded onto vehicles and transported to the bottom ash storage building. Here ferrous metal, non-ferrous metals and also unburned waste will be recovered. Any unburned material would be returned to the waste bunker and combusted.<br>The ferrous and non-ferrous metals would be separately collected and sent for off-site recovery. | 2.7.6 Bottom ash will be stored in a dedicated ash storage building. Here, any unburned waste that is identified will be recovered. Any unburned material would be returned to the waste bunker and combusted. |
| Table S1.2 Application | Section 3: Operations | 3.63 The boiler and furnace are integrated to maximise energy recovery. A single unit is provided for each line generating a total of circa 240 tph of steam. | 3.63 The boiler and furnace are integrated to maximise energy recovery, with a single unit provided for each line. |
| Table S1.2 Application | Section 3: Operations | 3.64 Energy is recovered from the hot flue gases within the steam boiler. The resulting high pressure steam is directed to the turbine, generating electricity which is exported to the grid. Steam is also extracted for direct supply to the Tata Chemicals Lostock site. | 3.64 Energy is recovered from the hot flue gases within the steam boiler. The resulting high pressure steam is directed to the turbine, generating electricity which is exported to the grid. The Facility will also have the potential to export heat to local users should this become commercially and technically viable. |
| Table S1.2 Application | Section 3: Operations | 3.78 Steam will also be extracted for supply to the soda ash process | Remove. |
| Table S1.2 Application | Section 3: Operations | 3.79 Steam extraction for supply to both the soda ash process and internal steam demand within the SEP will be at:<br>• 14 bara;<br>• 5 bara; and | Remove. |

| Permit reference | Original EP application reference | Operating Technique | Proposed revision to the Operating Technique |
|---|---|---|---|
| | | • 0.9 bara | |
| Table S1.2 Application | Section 5: Impacts Summary | Section 5: Impacts Summary | *To be removed. The information presented within this section of the original EP application is not considered to represent an operating technique.* |
| Table S1.2 Application | Section 6: BAT Assessment | 6.47 Given that this application is being made to also provide steam to the Tata Chemicals soda ash process at Lostock, it has been assumed that all options will involve onsite combustion of any secondary fuels and that all facilities will be required to operate in accordance with the requirements of the WID. | 6.47 It has been assumed that all options will involve onsite combustion of any secondary fuels and that all facilities will be required to operate in accordance with the requirements of the IED. |
| Table S1.2 Application | Section 6: BAT Assessment | 6.55 For any given thermal treatment plant, the waste material to be accepted will be fixed during the project planning and contract definition process and there will subsequently be a reasonably well defined composition in terms of carbon content and specifically in this case, the throughput has been designed to maximise the energy output for use within the adjacent soda ash process. | 6.55 The waste material to be accepted has been fixed during the project planning and contract definition process within the fuel supply contracts, and there will subsequently be a reasonably well defined composition in terms of carbon content. |
| Table S1.2 Application | Section 6: BAT Assessment | Table 6.1: Conventional thermal treatment<br>(moving grate and fluidised bed).<br>Steam is used in a turbo-generator to generate electricity at up to approximately 27% electrical energy conversion efficiency. | Table 6.1: Conventional thermal treatment<br>(moving grate and fluidised bed).<br>Steam is used in a turbo-generator to generate electricity at approximately 29% net electrical energy conversion efficiency. |
| Table S1.2 Application | Section 6: BAT Assessment | 6.77 This application is being made to operate a plant to handle approximately 600,000 tonnes per annum of fuel derived from MSW (or similar). The plant will incorporate 2 lines each handling approximately 300,000 tonnes per annum. | 6.77 This application is being made to operate a plant to handle approximately 728,000 tonnes per annum of fuel derived from MSW (or similar). The plant will incorporate 2 lines each handling approximately 364,000 tonnes per annum. |

<table>
<tr><th>Permit reference</th><th>Original EP application reference</th><th>Operating Technique</th><th>Proposed revision to the Operating Technique</th></tr>
<tr><td>Table S1.2<br>Application</td><td>Section 6: BAT Assessment</td><td>6.80 For the waste materials to be accepted at the plant, carbon dioxide releases from the plant associated with the combustion of the waste material will therefore be limited by the plant capacity of 600,000tpa.</td><td>6.80 For the waste materials to be accepted at the plant, carbon dioxide releases from the plant associated with the combustion of the waste material will therefore be limited by the plant capacity of 728,000tpa.</td></tr>
<tr><td>Table S1.2<br>Response to email dated 08/01/13</td><td>Confirmation of nominal design calculations</td><td>• Lines = 1 line (phase 1) up to 2 lines (phase 2)<br>• Annual throughput = 300,000 tpa (for one line; 600,000 tpa for 2 lines)<br>• Annual operating hours = 8,000 hours<br>• Calorific value = 10.3 MJ/kg<br>• Thermal input = 103 MW (206 MW in total)<br>• Total electricity generated = 38.4 MW<br>• Electricity exported = 32.28 MW<br>• Steam exported = 68.63 MW<br>During start-up the facility will import electricity from the grid. It is expected that the electricity imported will be 4MW for approximately 7 hours and up to 8 start-ups per annum. On this basis electricity imported will be up to 224MWhrs. The Table below has been updated to include imported electricity during start-up.
<table>
<tr><th rowspan="2">Energy source</th><th colspan="3">Energy consumption</th></tr>
<tr><th>Delivered MWh</th><th>Primary MWh</th><th>% of Total</th></tr>
<tr><td>SEP Energy Demand</td><td></td><td></td><td></td></tr>
</table></td><td>• Lines = 1 line (phase 1) up to 2 lines (phase 2)<br>• Annual throughput = 364,000 tpa (for one line; 728,000 tpa for 2 lines)<br>• Annual operating hours = 8,000 hours<br>• Calorific value = 9.5 MJ/kg<br>• Thermal input = 120 MW (240 MW in total)<br>• Total electricity generated = 76.9 MW<br>• Electricity exported = 69.9 MW<br>During start-up/shutdown operations, the Facility will import electricity from the grid. Further detail on energy consumption during start up and shutdown (and during non-operational hours) is provided within the Greenhouse Gas Assessment – refer to Appendix F.</td></tr>
</table>

| Permit reference | Original EP application reference | Operating Technique | | | | Proposed revision to the Operating Technique |
|---|---|---|---|---|---|---|
| | | Electricity generated on site and used on site | 48,960 | 94,233 (see permit appli-cation) | 88.36 | |
| | | Electricity imported from the National Grid or from another source | 224 | 582.4 | 0.54 | |
| | | Oil | 11,836 | 11,836 | 11.1 | |
| Table S1.2 Response to Schedule 5 Notice #1 dated 22/01/13 | Schedule 5 Response #1 Section 2.4 | Further to the information above the bottom ash processing will incorporate the following:<br>• ferrous metals will be recovered using magnetic methods;<br>• an eddie current separator will be used to recovery the non-ferrous metals; and<br>• grinding and separation of the bottom ash will be designed to produced two grades, a fine grade product size 0-8mm and a course grade size 8-40mm. | | | | Bottom ash treatment/processing will not be undertaken at the Facility. |
| Table S1.2 Response to Schedule 5 | Operating techniques described in the responses to the Notice: Response 9 | - | | | | Refer to updated HHRA, presented within Appendix E, and the updated Greenhouse Gas Assessment, presented within Appendix F. |

| Permit reference | Original EP application reference | Operating Technique | Proposed revision to the Operating Technique |
|---|---|---|---|
| Notice #2 dated 02/04/13 | (dioxins risk assessment), Response 10 (GWP calculation). | | |
| Table S1.2 Response to email dated 23/04/13 | Revised list of wastes; revised dioxin calculation (average daily intake of dioxins) | - | Refer to updated HHRA – presented within Appendix E. |
| Table S1.2 Response to email dated 09/07/13 | Clarification of SEP energy demand, electrical output of SEP and emissions points to surface waters. | i) What is the estimated electrical output (MW) when the soda ash works is running at low capacity (see Paragraph 2.28 on page 13 of the main Application)?<br>On the basis that at low capacity 50 tphr of steam is sent to Tata Chemicals, the corresponding electrical output of the SEP would be approximately 41.3MWe (net).<br>ii) What is the estimated electrical output (MW) from the generation of electricity at the soda ash manufacturing site (operated by Tata Chemicals) using process heat/steam supplied by the SEP (see Paragraph 1.27 on page 6 of the main Application)?<br>3-4MWe | Remove. |
| Table S1.2 Response to email dated 09/07/13 | Clarification of SEP energy demand, electrical output of SEP and emissions points to surface waters. | The 3 bullets provided in relation to the SEP energy demand should read as follows:<br>i) Electricity generated on site and used onsite = 48,960 MWh<br>ii) Electricity imported from the national grid = 224 MWh<br>iii) Fuel oil = 11,836 MWh | Remove. |

# C Heat Demand Investigation

# D CHP assessment

# E Air quality assessments

# F Greenhouse Gas Assessment

# G WI BREF BAT conclusions review

| # | BAT Conclusion | How met or reference |
|---|---|---|
| 1 | In order to improve the overall environmental performance, BAT is to elaborate and implement an environmental management system (EMS) that incorporates all of the features as listed in BAT 1 of the BREF. | An EMS will be established in accordance with the requirements of the ISO 14001 standard. A general summary of the proposed EMS is presented in section 2 of the original EP application.<br>LSEP Ltd will submit a summary of the site EMS to the EA prior to the commencement of commissioning of the Facility, in accordance with pre-operational condition POC4 within the permit. Taking the above into consideration, the Facility will comply with the requirements of BAT 1. |
| 2 | BAT is to determine either the gross electrical efficiency, the gross energy efficiency, or the combined boiler efficiency of the incineration plant as a whole or of all the relevant parts of the incineration plant. | As stated in the greenhouse gas assessment (refer to Appendix F), the gross electrical efficiency of the plant is calculated to be approximately 32%. Therefore, LSEP Ltd understand that this is in accordance with 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. | The process parameters for monitoring of emissions to air will be as follows:<br>• water vapour content<br>• temperature; and<br>• pressure.<br>The oxygen content and flow rate of the flue gases will also be monitored. Temperature will be monitored in the combustion chamber.<br>There will be no emissions of water from FGC systems.<br>Bottom ash treatment will not be undertaken at the Facility. Any run-off from bottom ash storage will be collected and re-used within the process in the ash quench. Therefore, the process parameters to be monitored for emissions to water as listed in BAT 3 do not apply to the Facility.<br>LSEP Ltd 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 | It is anticipated that emissions to air will be monitored with the following frequency, in accordance with the requirements of Table S3.1 in the permit: |

| # | BAT Conclusion | How met or reference |
|---|---|---|
| | ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality. | Continuous Monitoring<br>• Oxygen;<br>• Carbon monoxide;<br>• Hydrogen chloride;<br>• Sulphur dioxide;<br>• Nitrogen oxides;<br>• Ammonia;<br>• Volatile organic compounds (VOCs);<br>• Particulates; and<br>• Nitrous oxide.<br>Periodic Monitoring<br>• Hydrogen fluoride (every 6 months);<br>• Group 3 heavy metals (Sb, As, Pb, Cr, Co, CU, Mn, Ni, V) (every 6 months);<br>• Cadmium and thallium (every 6 months);<br>• Mercury (every 6 months);<br>• Dioxins and furans (every 6 months); and<br>• Dioxin-like PCBs (every 6 months).<br>It is understood that the monitoring requirements are in accordance with the requirements of the BREF. Although the BREF states that continuous monitoring of mercury is required, it also states that for plants incinerating wastes with a proven low and stable mercury content, continuous monitoring may be replaced by periodic monitoring once every six months. At the time of submitting this application, the EA has not yet published the BREF Implementation Plan. However, it is understood that the EA is proposing for modern plants to be considered to have low and stable emissions of mercury. Taking this into consideration, it is understood that periodic monitoring of mercury as currently required by the permit is |

| # | BAT Conclusion | How met or reference |
|---|---|---|
| | | considered to be suitable and in alignment with the requirements of the BREF.<br>In addition to the above, the BREF also requires continuous monitoring of hydrogen fluoride; however, it is stated that this may be replaced by periodic monitoring if hydrogen chloride levels are proven to be sufficiently stable. With the proposed measures for the control of the abatement of acid gases (which will be confirmed via the submission of optimisation details via improvement condition IC5), periodic monitoring of hydrogen fluoride is considered to be suitable and in alignment with the requirements of the BREF.<br>Methods and standards used for emissions monitoring will be in compliance with EPRS5.01 and the IED. In particular, the CEMS equipment will be certified to the MCERTS standard and will have certified ranges which are no greater than 1.5 times the relevant daily average emission limit. Sampling and analysis of all pollutants including dioxins and furans will be carried out to CEN or equivalent standards (e.g. ISO, national, or international standards). This ensures the provision of data of an equivalent scientific quality.<br>LSEP Ltd consider that the proposals for monitoring of emissions to air are in accordance with the requirements of BAT 4. |
| 5 | BAT is to appropriately monitor channelled emissions to air from the incineration plant during Other Than Normal Operating Conditions (OTNOC). | LSEP Ltd understands that the UK regulatory agencies are currently consulting with the UK waste incineration industry on the definition of 'appropriate monitoring' of emissions to air during OTNOC. On this basis, LSEP Ltd is currently not able to confirm how the Facility will comply with BAT 5.<br>LSEP Ltd requests that the EA confirm any requirements or conditions relating to OTNOC in line with any required changes following finalisation of these discussions. This may be achieved by an EA-initiated variation or similar, taking into consideration the classification of the Facility as an 'existing' facility under the BREF. |

| # | BAT Conclusion | How met or reference |
|---|---|---|
| 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. | The Facility will utilise a dry flue gas treatment system as explained within paragraph 4.22 of the original EP application. Therefore, there will not be any emissions to water from the FGC systems. Bottom ash treatment will not be undertaken at the Facility.<br>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 detailed within Table S3.4 of the EP, Loss on Ignition (LOI) will be measured to confirm it is less than 5%. Measurements will be taken monthly in the first year of operation, then quarterly.<br>LSEP Ltd considers that the proposals for monitoring of slags and bottom ashes will therefore be 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, LSEP Ltd do 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 Facility will employ the following techniques as required by BAT 9:<br>• Determination of the types of waste that can be incinerated. The Facility will incinerate waste in accordance with the list of EWC waste codes within Table S2.2 of the EP, and waste that falls into the range of calorific values in accordance with the updated design of the Facility. The list of EWC codes will characterise the physical state, general characteristics and hazardous properties of the waste.<br>• Implementation of waste acceptance procedures. The Operator will develop acceptance procedures for all wastes delivered to the Facility, in order to ensure that only the wastes which the Facility is permitted to receive are received at the Facility. Paperwork accompanying each delivery will be checked. Periodic inspections of the waste will be |

| # | BAT Conclusion | How met or reference |
|---|---|---|
| | | undertaken as part of the scope where practicable, prior to transfer into the bunker, to confirm that it complies with the specifications of the waste transfer note (WTN). Waste delivered in road vehicles will be inspected by the crane operator as it is tipped into the bunker and mixed.<br>• LSEP Ltd will develop and implement waste pre-acceptance and acceptance procedures at the Facility. The waste acceptance procedures will identify the records required for wastes to be accepted at the Facility and where records associated with the waste should be retained in the document management system which will be employed at the Facility.<br>• Waste acceptance procedures will be used to identify any unacceptable wastes which are not suitable for processing within the Facility and require quarantine and transfer off-site.<br>It is understood that technique (f) of BAT 9 does not apply as the Facility will not incinerate hazardous waste. Further details on waste acceptance are provided within paragraph 1.12 – 1.14 of the original EP application.<br>LSEP Ltd considers that the proposed arrangements for the receipt and segregation of waste complies with the requirements of BAT 9. |
| 10 | In order to improve overall environmental performance of the bottom ash treatment plant, BAT is to set up and implement an output quality management system (see BAT 1). | Bottom ash treatment will not be undertaken at the Facility. Therefore, it is understood that the requirements of BAT 10 do not 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 waste, the elements as listed in BAT 11 of the BREF. | Monitoring of waste deliveries will include the following elements in accordance with BAT 11:<br>• Weighing of the waste deliveries by use of a weighbridge at the entrance/exit of the Facility.<br>• Periodic visual inspection of waste either prior to being tipped into the bunker, or where this is not practicable, as it is tipped into the bunker by the crane operator. As described in paragraph 1.14 of the original EP application, a rolling programme of periodic visual spot checks will be carried out on waste deliveries to the plant. |

| # | BAT Conclusion | How met or reference |
|---|---|---|
| | | The Facility will not undertake radioactivity detection tests as it is not anticipated that any radioactive waste will be received.<br>Periodic sampling of waste deliveries will be undertaken to confirm that waste streams are in accordance with the waste specifications/contracts, especially for new suppliers. Periodic samples would be sent for laboratory analysis to determine and analyse for key properties, such as calorific value and metal content.<br>Taking the above into consideration, LSEP Ltd considers that the proposed arrangements for monitoring the waste deliveries as part of the waste acceptance procedures is in accordance with the requirements of BAT 11. |
| 12 | In order to reduce the environmental risks associated with the reception, handling and storage of waste, BAT is to use both of the following techniques:<br>Use impermeable surfaces with an adequate drainage infrastructure; and<br>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.<br>Adequate waste storage capacity will be available on site – the maximum waste storage capacity of the waste bunker will be established and not exceeded. The quantity of waste will be visually monitored against the maximum storage capacity. During periods of planned maintenance, quantities of fuel within the bunker will be run down where possible.<br>LSEP Ltd considers that the proposed arrangements for environmental risks associated with the reception, handling and storage of waste comply with the requirements of BAT 11. |
| 13 | In order to reduce the environmental risk associated with the storage and handling of clinical waste, BAT is to use a combination of the techniques as listed in BAT 13 of the BREF. | The Facility will not process clinical or hazardous waste. Therefore, LSEP Ltd considers that the requirements of BAT 13 are not applicable to the Facility. |

| # | BAT Conclusion | How met or reference |
|---|---|---|
| 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 below: | Bunker crane mixing and advanced control systems will be employed at the Facility.<br>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. It is expected that the control system will control and/or monitor the main features of the plant operation including, but not limited to, the following:<br>• combustion air;<br>• fuel feed rate;<br>• SNCR system;<br>• flue gas oxygen concentration at the boiler exits;<br>• flue gas composition at the stack (including HCl measurements);<br>• combustion process;<br>• boiler feed pumps and feedwater control;<br>• steam flow at the boiler outlets;<br>• steam outlet temperature;<br>• boiler drum level control;<br>• flue gas control (including differential pressure across the bag filters);<br>• power generation;<br>• heat export (if applicable); and<br>• steam turbine exhaust pressure.<br>Water, electricity and auxiliary fuel usage will also be monitored to highlight any abnormal usage.<br>LSEP Ltd 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 |

| # | BAT Conclusion | How met or reference |
|---|---|---|
| | | 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. | 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: for example, ammonia solution dosing will be optimised and adjusted to minimise the ammonia slip. Acid gas reagent usage will be minimised by trimming reagent dosing to accurately match the acid load using fast response upstream acid gas monitoring. Activated carbon dosing will be based on flue gas volume flow measurement.<br>LSEP Ltd 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 periods when waste is not delivered. Operational procedures will be developed to limit as far as practicable shutdown and start-up operations.<br>LSEP Ltd 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 FGC 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.<br>LSEP Ltd considers that the design and operation of the FGC and wastewater treatment plants will ensure that emissions to air (and water |

| # | BAT Conclusion | How met or reference |
|---|---|---|
| | | where applicable) are reduced, and will ensure their optimal availability, to comply with the requirements of BAT 17. |
| 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 that includes the elements as identified in BAT 18 of the BREF. | LSEP understands that the UK regulatory agencies are currently consulting with the UK waste incineration industry on the definition of OTNOC and related conditions. On this basis, LSEP Ltd is not currently able to confirm how the Facility will comply with BAT 18.<br>LSEP Ltd requests that the EA confirm any requirements or conditions relating to OTNOC in line with any changes required following finalisation of these discussions. This may be achieved by an EA-initiated variation of the EP or similar, taking into consideration the classification of the Facility as an 'existing facility' under the BREF.<br>Should the EA confirm that a risk-based OTNOC management plan is required to be incorporated into the Facility's EMS, it will include the elements outlined in the BREF. |
| 19 | In order to increase resource efficiency of the incineration plant, BAT is to use a heat recovery boiler. | The Facility will use steam boilers to produce steam which is used to produce electricity. The Facility will also have the provision to export heat to local users, as described within the CHP assessment – refer to Appendix D.<br>LSEP Ltd considers that the use of heat recovery boilers is in direct compliance with the requirements of BAT 19. |
| 20 | In order 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 the following techniques to increase energy efficiency from its operation:<br>• Minimise heat losses via the use of integral furnace boilers – heat will be recovered from the flue gases by means of steam boilers integral with the furnaces;<br>• Optimisation of the boiler design to improve heat transfer – the boilers will be equipped with economisers and superheaters to optimise thermal cycle efficiency without prejudicing boiler tube life, having regard for the nature of the waste fuel that is combusted; |

| # | BAT Conclusion | How met or reference |
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| | | • High steam conditions (approximately 440°C and approximately 85 bar(a), subject to detailed design), to increase electricity conversion efficiency;<br>• Cogeneration of heat and electricity – the Facility has been designed as a combined heat and power plant and will have the capacity to provide heat to local users. Subject to commercial agreements with heat users, a scheme for the export of heat will be implemented – refer to the CHP assessment presented within Appendix D for further detail.<br>LSEP Ltd 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 | In order 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:<br>• Waste in the Facility will be stored in an enclosed bunker area under negative pressure. The non-technical summary submitted with the original EP application outlines how potential odours from the storage of waste materials will be extracted from above the storage bunker and used as combustion air within the furnace, thus destroying any potentially odourous compounds.<br>• 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.<br>• 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. In addition, doors to the tipping hall will be kept shut during periods of shutdown.<br>The measures listed above to reduce odour emissions will ensure that the Facility will comply with the requirements of BAT 21. |

| # | BAT Conclusion | How met or reference |
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| 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 and liquid wastes will not be accepted at the Facility.<br>Therefore, the requirements of BAT 22 do not apply to the Facility. |
| 23 | In order to prevent or reduce diffuse dust emissions to air from the treatment of slags and bottom ashes, BAT is to include in the EMS the following diffuse dust emission management features: | The EMS will include for the following features in accordance with BAT 23:<br>• Identification of the most relevant diffuse dust emission sources; and<br>• Definition and implementation of appropriate actions and techniques to prevent/reduce diffuse emissions over time.<br>Taking the above into consideration, it is understood that the Facility will comply with the requirements of BAT 23. |
| 24 | In order to prevent or reduce diffuse dust emissions to air from the treatment of slags and bottom ashes, BAT is to use an appropriate combination of the techniques as given in BAT 24 of the BREF. | Bottom ash treatment will not be undertaken at the Facility. However, the following techniques will be employed to reduce diffuse emissions to air from bottom ash storage at the Facility:<br>• All ash handling/storage including conveying undertaken within enclosed buildings.<br>• Transport of bottom ash from the site in enclosed vehicles.<br>• Where possible, the height of ash discharge will be minimised.<br>• Use of a water ash quench to minimise the generation of dusts from ash handling activities.<br>Taking the above into consideration, it is understood that the Facility will comply with the requirements of BAT 24. |
| 25 | In order 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:<br>• Bag filters – to reduce particulate content of the flue gas. |

| # | BAT Conclusion | How met or reference |
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| | | • Dry sorbent injection – adsorption of metals by injection of activated carbon in combination with injection of an acid gas abatement reagent to abate acid gases.<br>The concentrations of metals and metalloids will be monitored in accordance with the permit for the Facility. It is considered by LSEP Ltd 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 | In order to reduce channelled dust emissions to air from the enclosed treatment of slags and bottom ashes with extraction of air, BAT is to treat the extracted air with a bag filter. | Bottom ash treatment will not be undertaken at the Facility; therefore, it is understood that the requirements of BAT 26 do not apply to the Facility. In relation to bottom ash storage, the methods as listed in response to BAT 24 will enable dust emissions to be minimised from the handling and storage of bottom ash. |
| 27 | In order 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. | BAT 27 of the BREF states that BAT is to use one or a combination of the following techniques:<br>• Wet scrubber;<br>• Semi-wet absorber;<br>• Dry sorbent injection;<br>• Direct desulphurisation (only applicable to fluidised beds); and<br>• Boiler sorbent injection.<br>In a dry sorbent injection system, the reagent is injected into the flue gas stream within the flue gas treatment system, located after the boiler. In direct boiler sorbent injection, the reagent is injected directly into the flue gas stream within the boiler. This only achieves partial abatement of the acid gases and does not eliminate the need for additional flue gas cleaning stages.<br>As stated in section 6.3 of the original EP application, it is considered BAT for the Facility to utilise a dry system to abate acid gases. The dry system will be designed to ensure that the Facility will operate in accordance with |

| # | BAT Conclusion | How met or reference |
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| | | the relevant ELVs, assumed to be the BAT-AELs, without the requirement for any additional abatement measures.<br>The design of the dry sorbent injection system will include the following controls to ensure that the Facility operates in accordance with the relevant ELVs:<br>• A flue gas monitoring system at the exit of the boilers to control reagent dosing rate within the flue gas treatment system; and<br>• Recirculation of a proportion of the flue gas treatment residues to reduce reagent consumption.<br>It is considered by LSEP Ltd 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 SO2 to air from the incineration of waste while limiting the consumption of reagents and the amount of residues generated from dry sorbent injection and semi-wet absorbers, BAT is to use optimised and automated reagent dosage, or both the previous technique and the recirculation of reagents. | 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:<br>• The concentration of hydrogen chloride in the flue gases upstream of the flue gas treatment system will be measured in order to optimise the performance of the emissions abatement equipment, including automated reagent dosage.<br>• A proportion of the APC residues will be recirculated to reduce the amount of unreacted reagent in the residues.<br>• The concentrations of HCl, HF and $SO_2$ released from the Facility will comply with BREF limits.<br>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 | The following elements have been incorporated into the design of the Facility: |

| # | BAT Conclusion | How met or reference |
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| | SCR, BAT is to use an appropriate combination of the techniques as listed in BAT 29 of the BREF. | • 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);<br>• An SNCR system; and<br>• 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).<br>As justified in section 3.7 of the original EP application, flue gas recirculation is not currently proposed in the design of the Facility.<br>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) given below to reduce channelled emissions to air of organic compounds:<br>• Optimisation of the incineration process;<br>• Control of the waste feed;<br>• On-line and off-line boiler cleaning;<br>• Rapid flue-gas cooling;<br>• Dry sorbent injection;<br>• Fixed-or-moving bed adsorption;<br>• SCR;<br>• Catalytic filter bags; and<br>• Carbon sorbent in a wet scrubber. | The Facility will employ the following techniques to reduce channelled emission to air of organic compounds:<br>• Optimisation of the incineration process – the boilers will be designed to minimise the formation of dioxins and furans as follows:<br>• 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.<br>• 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.<br>• Minimise volume in critical cooling sections.<br>• Prevent boundary layers of slow-moving gas along boiler surfaces via good design and regular maintenance.<br>• 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. |

| # | BAT Conclusion | How met or reference |
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| | | • Dry sorbent injection using activated carbon and an acid gas abatement reagent, in combination with a bag filter.<br>As described above, it can be confirmed that the Facility will use techniques (a) – (d) and also technique (e), dry sorbent injection, to reduce channelled emissions to air of organic compounds.<br>The Facility will not use catalytic filter bags.<br>The Facility will utilise the injection of ammonia in an SNCR system to abate NOx emissions. This is considered to be a proven method to reduce NOx emissions to below the required ELVs and has been successfully used on a number of plants in the UK and Europe.<br>It should be noted that catalytic filter bags are generally used as a replacement for other filter bags which may already absorb dioxins by the injection of activated carbon, as is proposed for the Facility. The removal of activated carbon injection from the process may result in an increase in mercury emissions to air. Therefore, the use of catalytic filter bags may require additional abatement techniques to be installed for the removal of mercury. This is not considered to represent BAT for the Facility.<br>It is stated within the WI BREF that the flue gas temperature when entering the catalytic filter bags should be above 170 – 190°C in order to achieve effective destruction of PCDD/F and prevent adsorption in the media. As stated in the air quality assessment (refer to Appendix E), the temperature of the flue gas leaving the stack is expected to be approximately 135°C. Therefore, the use of catalytic filter bags is not considered to be appropriate for the design of the Facility, as the flue gases would require re-heating which will reduce the efficiency of the process.<br>The techniques described above to reduce channelled emission to air of organic compounds will ensure that the Facility will comply with the requirements of BAT 30. Therefore, the Facility will meet the requirements of BAT 30 without the use of catalytic filter bags. |

| # | BAT Conclusion | How met or reference |
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| 31 | In order to reduce channelled mercury emissions to air (including mercury emission peaks) from the incineration of waste, BAT is to use one or a combination of the techniques 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 LSEP Ltd that the use of these techniques will ensure that the Facility will comply with the requirements of BAT 31. |
| 32 | In order to prevent the contamination of uncontaminated water, to reduce emissions to water, and to increase resource efficiency, BAT is to segregate waste water streams and to treat them separately, depending on their characteristics. | There will be separate foul/domestic water, process water and surface water drainage systems at the Facility.<br>Foul effluents from domestic sources will be discharged to sewer in accordance with a trade effluent consent.<br>It can be confirmed that there will be no wastewater arising from flue gas treatment. Bottom ash storage will be undertaken in an enclosed building with a dedicated drainage system, with any water re-used within the process.<br>The drainage in the Facility's waste reception, handling and storage areas will be contained and reused within the process.<br>Uncontaminated water streams, such as surface water run-off, will be segregated from other wastewater streams requiring treatment.<br>It is considered by LSEP Ltd 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 | In order 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:<br>• Use of a flue gas treatment system that does not generate wastewater – by utilising dry sorbet injection of the acid gas abatement reagent and PAC.<br>• Process effluents will be re-used within the process.<br>It is considered by LSEP Ltd 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. |

| # | BAT Conclusion | How met or reference |
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| 34 | In order to reduce emissions to water from FGC and/or from the storage and treatment of slags and bottom ashes, BAT is to use an appropriate combination of the techniques 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. | As justified within the response to BAT 6, there will be no emissions to water from the FGC process. Furthermore, bottom ash treatment will not be undertaken at the Facility. Bottom ash storage will be in an area with contained drainage, with the effluent re-used in the process, and with no emissions to water.<br>Therefore, it is understood that the requirements of BAT 34 do not apply to the Facility. |
| 35 | In order 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. Therefore, LSEP Ltd 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 treatment of bottom ash undertaken at the Facility; therefore, it is understood that the requirements of BAT 36 do not apply. |
| 37 | In order to prevent or, where that is not practicable, to reduce noise emissions, BAT is to use one or a combination of the techniques 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:<br>• 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.<br>• 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.<br>• Low-noise equipment – the proposed technology provider will optimise plant selection, where appropriate, to reduce the noise level. |

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

# H Updated EIA

# I Updated site condition report

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