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Consulting Engineers Limited

Lostock Sustainable Energy Plant

Lostock Sustainable Energy Plant Ltd

Updated Site Condition Report

ENGINEERING CONSULTING

Document approval

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Contents

1 Introduction

An Environmental Permit (EP) (Ref: EPR/WP3934AK) for the Lostock Sustainable Energy Plant (the Facility) was granted to Lostock Sustainable Energy Plant Limited (LSEP Ltd) by the Environment Agency (EA) on 16 December 2013. The EP has since been subject to a single variation to include for a number of additional EWC codes.

Within the original EP application, a site condition report was submitted to the EA. The original site condition report is presented in Appendix A for reference.

LSEP Ltd are now applying to vary the EP to allow for a number of changes, including changes to the Installation Boundary. The proposed additions/removals to the installation boundary are presented in Appendix B. This report is provided as an update to the original site condition report to allow for the proposed changes to the installation boundary, and also any updated ground investigation data to inform the baseline conditions at the site since the original site condition report was developed. This report has been developed in accordance with the EA's latest guidance titled '*Environmental permitting: H5 Site condition report*'.

2 Site details

2.1 Applicant

LSEP Ltd is a joint venture between FCC Environment (FCC) and Copenhagen Infrastructure Partners (CIP). Both companies are experienced in the development of energy recovery facilities (ERFs).

CIP is one of the largest institutional investors in renewable energy, including offshore wind, onshore wind, biomass, solar and energy from waste in multiple locations in Europe, North America and South-East Asia. In the UK alone, CIP has invested multiple projects including four large scale biomass plants and three energy from waste plants.

FCC is one of the UK's leading waste and resource management companies, and operates a range of waste management sites including Material Recycling Facilities (MRF), Energy from Waste (EfW) plants and landfill sites. FCC currently operates 6 EfW facilities across the UK.

2.2 Activity address

The address for the Facility is as follows:

Lostock Sustainable Energy Plant

Lostock Gralam

Northwich

Cheshire

CW9 7NU

2.3 National Grid Reference

The Facility is located at grid reference:

SJ 68321 73942

3 Condition of the land at permit issue

3.1 Environmental Setting

3.1.1 Geology

The underlying geology for the Facility is presented in paragraphs 4.12 – 4.21 of the original site condition report – refer to Appendix A.

3.1.2 Hydrogeology

The hydrogeology for the Facility is presented in paragraphs 4.22 – 4.27 of the original site condition report – refer to Appendix A.

3.1.3 Surface waters

The hydrology and surface waters for the Facility is presented in paragraphs 4.28 – 4.32 of the original site condition report – refer to Appendix A.

3.2 Additional Land

Plans showing the proposed Installation Boundary, and the area of land to be removed/included within the Installation Boundary, is presented in Appendix B.

Specifically, a small area of 'additional land' is proposed to be included within the Installation Boundary, as shown in Figure 1.

Figure 1: Additional area of land

An Envirocheck report was submitted with the original site condition report – refer to Appendix A. The small area of land has been characterised as follows using data from the Envirocheck report.

The landis shown to have been a licensed landfill site. No recorded pollution incidents are shown as having occurred within the land.

Historical mapping shows the land to be predominantly fields from the late 1800's to the early-mid 1900's. By 1954, the western side of the land is shown to be a reservoir for waste lime. In the 1977 historical map, the land is labelled as 'refuse or slag heap' – this is assumed to still mean waste lime. By 1993, most of the land appears to be hardstanding. By 1999, some small buildings are shown on the parcel of land.

It is understood that the land has remained covered in hardstanding since the early 1990's. The land will include for kerbing and contained drainage as part of the design of the Facility and will mostly be used for the 'stacking' of waste delivery vehicles to the site. Taking this into consideration, it is considered that there is little risk of pollution entering the underlying ground and groundwater as a result of the operation of the Facility.

3.3 Pollution History

The pollution history for the Facility is summarised in section 3, titled '*Site Condition Report Summary*', within the original site condition report – refer to Appendix A. As described in the original site condition report, no recorded pollution incidents are known to have affected the site. The site was formerly used as a coal and oil-fired power station, which ceased operation in 2000. Further details on historical land-uses and associated contaminants are provided in the original site condition report.

3.4 Baseline soil and groundwater reference data

EA guidance note titled 'H5: Site Condition Report – Guidance and Templates', states that "*where a facility involves the use, production or release of RHS*" a baseline report must be submitted as part of the application Site Condition Report.

It is understood that, to date, 4 intrusive ground investigations have been carried out at the site:

- SLR Consulting Ltd, Waste to Energy Development, Phase 2 Land Quality Assessment, April 2008 (SLR, 2008);
- WSP Energy & Environment, Brunner Mond (UK) Limited, Lostock, First Phase Reporting of the Site Protection and Monitoring Programme Where Reference Data is Required, August 2009 (WSP, 2009);
- IGSL, Sustainable Energy Plant at Lostock, Greater Manchester, England, Ground Investigation Report, March 2013 (IGSL, 2013); and
- RPS, Lostock Energy from Waste Plant, Ground Investigation Geoenvironmental Interpretative Report, May 2018 (RPS, 2018).

The original site condition report submitted with the original EP application was dated August 2012. The reference ground investigation data used in the original site condition report to report on the baseline conditions was derived from the SLR 2008 and WSP 2009 investigations.

As further intrusive investigation has been undertaken since the original site condition report was developed, the site condition report has been updated to reflect the latest baseline data available for the site (i.e., data from the RPS 2018 investigation).

It is understood that, at the time of writing, remedial work for the site is currently ongoing. The remedial work is expected to be completed in early 2022. Following the completion of the remedial works, it is proposed to further update the baseline conditions in the site condition report to allow for updated chemical analysis within the remediation validation/verification report.

3.4.1 RPS, Ground Investigation Geoenvironmental Interpretive Report, 2018

RPS undertook an intrusive ground investigation in February/March 2018 to characterise the site with respect to soil and groundwater contamination and ground gas levels, and to inform any proposed remedial works that may be required. The RPS 2018 investigation has been used to inform the soil, groundwater and ground gas concentrations presented in Appendix D, as it is considered reflective of the most recent baseline conditions at the site at the time of applying for the EP variation application. A borehole location plan is presented within Appendix B to show the location of intrusive investigations used to inform the baseline ground conditions.

The RPS ground investigation included for the following works:

- Concrete coring at all hardstanding locations;
- Drilling of 10 no. rotary boreholes for the purpose of specific planning conditions relating to contamination;
- Drilling of 20 no. rotary boreholes for the purpose of general site coverage for contamination assessment and geotechnical assessment;
- Drilling of 6 no. cable percussive boreholes;
- Drilling of 28 no. windowless sampler boreholes;
- Excavation of 23 no. trial pits;
- In-situ Standard Penetration Tests (SPTs) in cable percussive and rotary boreholes;

- In-situ geotechnical testing within trial pits;
- Recovery of disturbed and undisturbed samples;
- Analysis of soil and rock samples for a range of geotechnical tests;
- Analysis of soil samples for chemical laboratory analysis for a suite of analysis;
- In-situ vapour testing of soil samples using a Photoionisation Detector (PID);
- Installation of 50 mm gas and groundwater monitoring standpipes within 12 no. borehole locations;
- Installation of 19 mm gas and groundwater monitoring standpipes within 12 no. borehole locations;
- Gas (4 no. rounds) and groundwater (2 no. rounds) monitoring upon completion of the ground investigation; and
- Analysis of groundwater samples for a suite of analysis.

A summary of the reported soil pollutant concentrations and ground water concentrations from chemical laboratory analysis of samples are presented in Appendix D.

4 Permitted activities

4.1 Permitted activities

The permitted activities are set out in '*Table S.1 Activities'* of the current EP. The activities have been reviewed taking into consideration the proposed changes to the design of the Facility. The permitted activities, allowing for the proposed changes as detailed within the Supporting Information for the EP variation, are presented in the following table:

Table 1: Permitted activities

Schedule 1 Activity	Description of Activity	Limits of Specified Activity
S5.1 A1 (b)	The incineration of non-hazardous waste in a waste incineration plant with a capacity exceeding 3 tonnes per hour.	The incineration of non-hazardous waste including the operation of incineration lines, boilers and auxiliary burners; facilities for the treatment of exhaust gases; on-site facilities for treatment and storage of residues, surface water and waste water; systems for controlling and monitoring incineration operations; and receipt, storage and handling of wastes and raw materials (including fuels). Waste types and quantities as specified in table S2.2 of the permit.
Directly associated activities		
Electricity generation with the potential to export heat / steam	Generation of electrical power using a steam turbine from energy recovered from the flue gases, and the potential to export heat / steam.	The export of electricity to the grid and for on-site operations. The potential to export heat / steam beyond the installation boundary.

Plans showing the proposed Installation Boundary, and the area of land to be removed/included within the Installation Boundary, are presented in Appendix B.

4.2 Non-permitted activities undertaken

There are no 'non-permitted' activities undertaken at the Facility.

5 Changes to the activity

The changes proposed to the design of the Facility associated with the proposed variation, are as follows:

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.

Plans showing the proposed Installation Boundary, and the area of land to be removed/included within the Installation Boundary, are presented in Appendix B.

At the time of writing, the Facility has not been fully constructed; only the enabling works have been undertaken. Therefore, no 'dangerous substances' have been used/produced by the permitted activities (such as the raw materials to be used in the process or the ash generated by the process).

6 Measures taken to protect land

Construction of the Facility has only recently commenced (as stated in section 5), and the pollution prevention measures (such as the site drainage systems) have not been installed or commissioned. Therefore, there are no records available associated with the inspection and testing of pollution prevention measures. These records will be available following completion of construction and commissioning of the Facility.

7 Pollution incidents and remediation

Construction of the Facility has only recently commenced, and the pollution prevention measures have not been installed or commissioned. Therefore, there are no records available associated with the pollution incidents at the Facility which could impact on the ground conditions within the installation boundary. The Site Condition report will be updated to maintain a record of any pollution incidents during the lifetime of the Facility.

8 Soil, gas and water quality monitoring

The baseline conditions for the site have been established in section 3.4 (and supporting Appendix D). During the lifetime of the Facility, the results of any additional soil, gas and water monitoring will be incorporated into the site condition report.

Appendices

A Original site condition report

B Plans and drawings

C 2018 RPS Site Investigation Report

D Updated baseline conditions

Table 2: Summary of pollutant concentrations in soils

Analyte	Unit	Maximum Concentration	Minimum Concentration
Asbestos Quantification	%	<0.001	3.05
Phenol	mg/kg	<100	3100
Ethylbenzene	µg/kg	3.1	44
Toluene	µg/kg	2.09	74.8
Benzene	µg/kg	25.5	118
o-Xylene	µg/kg	3.16	20.4
m,p,o Xylenes	µg/kg	9.48	54.4
Aromatics >C6-7	µg/kg	25.5	25.5
Aromatics >C7-8	µg/kg	13.9	74.8
Aromatics >C8-10	µg/kg	12.3	173
Aromatics >C10-12	µg/kg	10.5	463
m,p xylenes	µg/kg	6.32	34
Aliphatics >C5-6	µg/kg	10.1	79.9
Aliphatics >C6-8	µg/kg	10.3	1250
Aliphatics >C8-10	µg/kg	10.1	252
Aliphatics >C10-12	µg/kg	10.4	695
GRO >C5-12	µg/kg	54.4	1340
1,4-Dichlorobenzene	µg/kg	<5	<100
1,2-dichloroethane	µg/kg	<5	<5
Chlorobenzene	µg/kg	<5	<5
1,2,4-Trichlorobenzene	µg/kg	<20	<100
Tetrachloroethene	µg/kg	<5	<5
1,3-Dichlorobenzene	µg/kg	<8	<100
Carbon tetrachloride	µg/kg	32	32
1,1,1,2-tetrachloroethane	µg/kg	<10	<10
Chloroform	µg/kg	<8	<8
1,1,1-trichloroethane	µg/kg	362	362
Vinyl chloride	µg/kg	<6	<6
Carbon disulfide	µg/kg	14.5	35.8
1,1-dichloroethane	µg/kg	<8	<8
Trichloroethene	µg/kg	<9	<9
1,2,3-trichlorobenzene	µg/kg	<20	<20
Hexachlorobutadiene	µg/kg	<20	<100
1,2-Dichlorobenzene	µg/kg	<10	<100

Analyte	Unit	Maximum Concentration	Minimum Concentration
Hexachlorobenzene	µg/kg	<100	<100
Anthracene	µg/kg	20	83700
2,4-Dichlorophenol	µg/kg	<100	<100
Pyrene	µg/kg	28	255000
Benzo (g,h,i) perylene	µg/kg	37.6	28700
Indeno(1,2,3-cd)pyrene	µg/kg	25.2	37200
Fluoranthene	µg/kg	28	295000
Benzo(k)fluoranthene	µg/kg	20.8	71200
Acenaphthylene	µg/kg	14.6	32300
Chrysene	µg/kg	13.8	120000
Benzo(a)pyrene	µg/kg	21.6	83500
Benzo(a)anthracene	µg/kg	16.2	137000
Acenaphthene	µg/kg	9.97	5060
Phenanthrene	µg/kg	29.9	304000
Napthalene	µg/kg	15.3	9820
Benzo(b)fluoranthene	µg/kg	19.7	82500
Dibenz-a-h-anthracene	µg/kg	27.4	9840
Fluorene	µg/kg	12.1	29200
Pentachlorophenol	µg/kg	<100	<100
2,4,6-Trichlorophenol	µg/kg	<100	<100
2-Chlorophenol	µg/kg	<100	<100
2,4,5-Trichlorophenol	µg/kg	<100	<100
PCB-118 2,3',4,4',5 - Pentachlorobiphenyl	µg/kg	<3	<3
PCB 77	µg/kg	<3	<3
PCB 105	µg/kg	<3	<3
PCB 169	µg/kg	<3	<3
PCB-156 2,3,3,4,4,5 - Hexachlorobiphenyl	µg/kg	<3	<3
PCB 189	µg/kg	<3	<3
PCB 167	µg/kg	<3	<3
PCB 126	µg/kg	<3	<3
PCB 123	µg/kg	<3	<3
PCB 157	µg/kg	<3	<3
PCB 81	µg/kg	<3	<3
PCB 114	µg/kg	<3	<3
Sum of detected WHO 12 PCBs	µg/kg	<36	<36

Analyte	Unit	Maximum Concentration	Minimum Concentration
Pcb, Total Of 7 Congeners	µg/kg	<21	<21
PCB-153 2,2',4,4',5,5' - Hexachlorobiphenyl	µg/kg	3.8	3.8
PCB-138 2,2',3,4,4',5' - Hexachlorobiphenyl	µg/kg	3.34	3.34
PCB-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	µg/kg	3.85	3.85
PCB-52 2,2',5,5' - Tetrachlorobiphenyl	µg/kg	<3	<3
PCB-101 2,2',4,5,5' - Pentachlorobiphenyl	µg/kg	<3	<3
PCB-28 2,4,4' - Trichlororbiphenyl	µg/kg	<3	<3
Aromatics >C12-16	µg/kg	138	232,000
Aromatics >C16-21	µg/kg	471	1,220,000
Aromatics >C21-35	µg/kg	997	1,830,000
Aromatics >C35-44	µg/kg	254	600,000
Aromatics >C40-44	µg/kg	588	359,000
Aromatics >C12-44	µg/kg	997	3,550,000
Aliphatics & Aromatics >C5-44	µg/kg	1940	3,750,000
Aliphatics >C12-16	µg/kg	111	58,000
Aliphatics >C16-21	µg/kg	645	87,100
Aliphatics >C21-35	µg/kg	912	474,000
Aliphatics >C35-44	µg/kg	334	261,000
Lead	mg/kg	0.00212	440
Mercury	mg/kg	0.178	289
Nickel	mg/kg	0.00424	162
Arsenic	mg/kg	0.00562	1130
Cadmium	mg/kg	0.000808	6.89
Chromium	mg/kg	0.0106	46.1
Copper	mg/kg	0.00674	247
Vanadium	mg/kg	3.72	176
Zinc	mg/kg	0.0102	469
Selenium	mg/kg	1.07	11.3
Note: "<" indicates concentration below the limit of detection			

Source: Ground Investigation Geoenvironmental Interpretative Report, Lostock Energy from Waste Plant. RPS, 2018

Table 3: Summary of pollutant concentrations in groundwater

Analyte	Unit	Maximum Concentration	Minimum Concentration
Ammoniacal Nitrogen as N	mg/l	0.248	32.9
Iron	µg/l	0.0264	30.6
Aluminium	µg/l	11.2	408
Boron	µg/l	11.4	452
Sodium	mg/l	25.6	13000
Zinc	µg/l	1.95	16.3
Arsenic	µg/l	0.679	4400
Chromium	µg/l	1.23	3.31
Antimony	µg/l	0.111	5.57
Manganese	µg/l	1.18	10800
Copper	µg/l	0.406	52.7
Lead	µg/l	0.209	10.2
Cobalt	µg/l	0.462	12
Nickel	µg/l	0.665	80.6
Selenium	µg/l	0.578	13.1
Tin	µg/l	<3	<3
Cadmium	µg/l	0.1	1.77
Mercury	µg/l	0.0183	0.674
Chloride	mg/l	30.4	44600
Sulphate	mg/l	5.37	540
bis(2-ethylhexyl)phthalate	µg/l	2.76	51.2
Hexachlorobutadiene	µg/l	<1	<1
Hexachloroethane	µg/l	<1	<1
4-Chloroaniline	µg/l	<1	<1
Benzo(k)fluoranthene	µg/l	0.00692	7.97
2,4-Dichlorophenol	µg/l	<1	<1
Pentachlorophenol	µg/l	<1	<1
Di-n-octyl phthalate	µg/l	<5	<5
1,2,4-Trichlorobenzene	µg/l	<1	<1
Butylbenzylphthalate	µg/l	<1	<1
Acenaphthene	µg/l	0.0131	9.13
1,4-Dichlorobenzene	µg/l	<1	<1
Anthracene	µg/l	0.00604	2.67
Napthalene	µg/l	0.0166	39.5
Hexachlorobenzene	µg/l	<1	<1
Benzo(b)fluoranthene	µg/l	0.00792	17.4

Analyte	Unit	Maximum Concentration	Minimum Concentration
Benzo(a)pyrene	µg/l	0.00577	13.1
Fluoranthene	µg/l	0.00857	15.3
1,2,4 trichlorobenzene	µg/l	<1	<1
Benzo (g,h,i) perylene	µg/l	0.0059	10.7
1,2-Dichlorobenzene	µg/l	<1	<1
Indeno(1,2,3-cd)pyrene	µg/l	0.00634	9.11
4-chloro-3-methylphenol	µg/l	<1	<1
Phenol	µg/l	1.31	121
1,3-Dichlorobenzene	µg/l	<1	<1
Di-n-butyl phthalate	µg/l	<1	<1
2-Chlorophenol	µg/l	1.02	1.02
Benzene	µg/l	1.57	1.63
Carbon tetrachloride	µg/l	<1	<1
1,2-dichloropropane	µg/l	<1	<1
Trichloroethene	µg/l	3.47	3.47
Tetrachloroethene	µg/l	<1	<1
1,2,3-trichlorobenzene	µg/l	<1	<1
Ethylbenzene	µg/l	<1	<1
Chloroform	µg/l	<1	<1
Styrene	µg/l	<1	<1
1,2-dibromoethane	µg/l	<1	<1
Bromodichloromethane	µg/l	<1	<1
1,2-dichloroethane	µg/l	<1	<1
Bromoform	µg/l	<1	<1
Dibromochloromethane	N/A	<1	<1
Vinyl chloride	µg/l	<1	<1
1,1,2,2-tetrachloroethane	µg/l	<1	<1
4-chlorotoluene	µg/l	<1	<1
Dichloromethane	µg/l	<3	<3
Toluene	µg/l	1.05	3.24
Bromochloromethane	µg/l	<1	<1
2-chlorotoluene	µg/l	<1	<1
1,2,3 trichlorobenzene	N/A	<1	<1
1,3,5 trichlorobenzene	N/A	<1	<1
Cyanide	N/A	0.077	0.525
Note: "<" indicates concentration below the limit of detection.			

Source: Ground Investigation Geoenvironmental Interpretative Report, Lostock Energy from Waste Plant. RPS, 2018

Table 4: Summary of pollutant concentrations in groundwater

Analyte	Unit	Maximum Concentration	Minimum Concentration
CH_4	%	0.0	14.4
CO_2	%	0.0	2.9
O_2	%	4.1	23.2
CO	ppm	0.0	365
VOCs	ppm	0.0	4.1
H_2S	ppm	0.0	0.0

Source: Ground Investigation Geoenvironmental Interpretative Report, Lostock Energy from Waste Plant. RPS, 2018

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