Contents

Method Statement 3 - Technical Solution

Method Statement 3.1 - *Technology*

MS 3.1a - Technology – Key Facility

The Key Facility will be a twin-stream plant with a nominal capacity of 274,600t per annum. Waste will be delivered either to the tipping floor for preliminary sorting or directly into the Key Facility Waste bunker. The resultant useful energy will be recovered to generate electricity and potentially heat for supply to consumers.

Key information on the Key Facility is provided in the table below.

BEDDINGTON ERF	
Total Waste Input	274,600 tpa
Operating weeks/year	46.28 average per stream
Operating days/week	7
Operating hours/day	24
Availability	89.0 per cent
Number of lines	2
Line capacity	17.61 tonnes/hr
MW generation	26.17 MWh/h
MWh per year	172,000
R1 Ratio (design stage)	0.679

Table 3.1-1 Summary, ERF

MS 3.1a.i - *Capacity of the Key Facility*

The Key Facility will be designed to handle a range of calorific values (CVs) within the limits of the firing diagram. The Key Facility will be based on a design point CV of 9.8 MJ/kg (at 17.61 tonnes per hour throughput) as this is the predicted mean value of the fuel and this determines the heat release rate for the Key Facility. All process parameters and design points stated in this Method Statement are based on this design point. The Key Facility will, however, be able to take Waste with a range of CV between 7.0 MJ/kg and 13.0 MJ/kg and will have a maximum throughput capacity of 19.83 tonnes per hour at a CV of 8.7 MJ/kg.

MS 3.1a.ii - *Residence Time*

The furnace will be designed, modelled and demonstrated to achieve the requirements of the Waste Incineration Directive 2000/76/EC (WID) and the Industrial Emissions Directive 2010/75/EU (IED), which will apply to new installations after 06/01/13, with respect to the minimum temperature (850 degrees centigrade) and residence time (2 seconds) when the Key Facility is fuelled with Waste at a net calorific value of 8,700 kJ/kg.

MS 3.1a.iii - *Quality Requirements of Feedstocks*

Separately collected Waste that is classified as hazardous will not be accepted at the Key Facility but will be accepted at the waste transfer station at the Beddington Lane Site. Large or bulky items will be shredded prior to processing. Residual domestic Waste will not normally contain any significant items which will adversely affect the operation of the Key Facility.

Bulky items or obvious non-combustible items can be removed from the Waste bunker by the crane for shredding or alternative disposal/recycling.

Items with high moisture content or material that is highly combustible will be managed by mixing in the bunker to provide an even quality feedstock.

[redacted]

MS 3.1a.iv - *Limiting Factors in Key Facility Operation*

[redacted]

MS 3.1a.v - *Reject Materials*

All incoming Waste will be the subject of a Waste Acceptance Protocol. This will allow unsuitable material to be inspected, quarantined and sorted prior to processing. Should any unsuitable material be identified in the bunker it will be removed by the grab crane and taken down to ground level via the back feed chute. The offending item can then be checked and either subjected to further pre-treatment or sent for alternative treatment/disposal.

MS 3.1a.vi - *Compliance with WID and IED*

The main piece of Legislation that the Key Facility will comply with is the WID 2000/76/EC and, from 06/01/13, the IED. These will be transposed into UK law through the Environmental Permitting Regulations. The Key Facility will be designed and operated to comply with the WID and IED as necessary.

The processes will be designed against the background of a detailed assessment of the prevailing environmental conditions at the Key Facility to ensure that the objectives of the WID and IED are met. Best Available Techniques (under EC Directive 96/61) will be employed at the plant to minimise its impact on the local environment.

MS 3.1a.vii - *Key Facility Performance against WID and IED*

The Key Facility will be designed to operate comfortably within the WID and IED standards for thermal treatment of Waste.

MS 3.1a.viii - *R1 Classification*

It is confirmed that the Key Facility will meet the R1 classification in Annex II of the Waste Framework Directive (Directive 2008/98/EC) based on design information as a waste to energy facility according to the R1 definition and the interpretation in "Guidelines on the interpretation of the R1 energy efficiency formula for incineration facilities dedicated to the processing of municipal solid waste according to Annex II of Directive 2008/98/EC on waste (European Commission, Directorate-General Environment, April 2011)".

MS 3.1a.ix - *Energy Recovery from Secondary Materials*

In the absence of existing heat distribution networks and customers, the Key Facility will initially be designed and built as an electricity only installation with provision for the future installation of heat distribution infrastructure. It will be designed to generate approximately 26.17 MW of electrical power as measured at the generator terminals.

MS 3.1a.x - *Emergency Shut down Procedures*

[redacted]

MS 3.1a.xi - *Opportunities for Recycling*

The process output (incinerator bottom ash (IBA)) from the Key Facility will be screened for ferrous metals prior to use in aggregate production. Metals recovered will be stored until a sufficient quantity has been accumulated for consignment to a suitable recycling operation.

As part of the IBA recycling operations, the opportunity to recover non-ferrous metals will be fully explored, and, if commercially viable, will be implemented.

[redacted]

MS 3.1b - Plant and Equipment

MS 3.1b.i - *Technical specifications and hourly throughput*

Key technical specification details are provided in the table below.

Key Component	Subsystems	Main technical specifications	Area of Responsibility
Waste handling	Weighbridges		[redacted]
	Tipping hall	[redacted]	[redacted]
			[redacted]
			[redacted]
	Waste bunker	[redacted]	[redacted]
	Waste cranes and grabs	[redacted]	[redacted]
	Shredder	[redacted]	[redacted]
Combustion plant	Waste feeding	[redacted]	[redacted]
	Reverse acting grates	[redacted]	[redacted]

Key Component	Subsystems	Main technical specifications	Area of Responsibility
		[redacted]	
	Combustion air systems	[redacted]	[redacted]
	Combustion control	[redacted]	[redacted]
	Auxiliary burners	[redacted]	[redacted]
Energy recovery	Steam raising plant	[redacted]	[redacted]
	Steam turbine	[redacted]	[redacted]
	Air cooled condenser	[redacted]	[redacted]
	Feed water systems	[redacted]	[redacted]
	Feed water conditioning plant	[redacted]	[redacted]

Key Component	Subsystems	Main technical specifications	Area of Responsibility
Flue Gas Treatment	NOx reduction systems	[redacted]	[redacted]
	Lime and carbon injection systems	[redacted]	[redacted]
	Bag filters	[redacted]	[redacted]
	Induced draft fan	[redacted]	[redacted]
	Flue stack	[redacted]	[redacted]
Residue handling systems	Bottom ash	[redacted]	[redacted]
	APCR	[redacted]	[redacted]
	Metals recovery	[redacted]	[redacted]
Electrical systems	Motors and drives	[redacted]	[redacted]

Key Component	Subsystems	Main technical specifications	Area of Responsibility
	Power distribution (internal)	[redacted]	[redacted]
	Grid connection (export)	[redacted]	[redacted]
	Standby generator	[redacted]	[redacted]
Control and monitoring systems	Continuous emissions monitoring	[redacted]	[redacted]
	Control systems	[redacted]	[redacted]
	Operator interfaces	[redacted]	[redacted]

Table 3.1-2 Technical specifications and hourly throughput

MS 3.1b.ii - *Description of key elements of the Key Facility*

a) *Weighbridges*

[redacted]

b) *Tipping hall*

[redacted]

[redacted]

c) *Waste bunker*

[redacted]

d) *Waste cranes and grabs*

[redacted]

e) *Shredder*

[redacted]

f) *Combustion plant*

The Key Facility will be designed to handle a range of CVs within the limits of the firing diagram. The Key Facility will be based on a design point CV of 9.8MJ/kg. The Key Facility will be able to take Waste with a range of CV between 7MJ/kg and 13MJ/kg.

f.i) Waste feeding

In operation, the feed chutes will be sealed by the incoming Waste to prevent air ingress through the chutes to the furnaces. To control air ingress to the furnace during start up and shut down a damper will be installed in the feed chutes.

f.ii) Reverse acting grate

The grate will be a MARTIN GmbH reverse-acting grate, which will be horizontally inclined from the feeder to the discharger. The grate will be composed of a series of alternating, fixed and moving steps.

Mechanical wear indicators and thermocouples will be built into selected bars in the main combustion zone.

Materials used in the grate construction will be specified for high wear resistance and the feed table will be suitably reinforced to withstand impacts from Waste loading operations.

f.iii) Combustion air systems

Air for combustion will delivered both through the Waste and directly into the furnace above the grate.

The furnace will be designed, modelled and demonstrated to achieve the requirements of the WID and IED, with respect to the minimum temperature (850° centigrade) and residence time (2 seconds). During normal operation, the heat required for compliance with WID and IED, will come entirely from the feedstock and no

auxiliary fuel will be required to meet the WID and IED conditions. For start up and shut down combustion control the furnace will be fitted with auxiliary burners.

f.iv) Combustion control

A MICC system will be installed between the process monitors and the superordinate plant control systems as an independent system. Signals from the process monitors will be input to the MICC system which will utilise a flow logic to determine the optimum process control corrections, based on operator controlled preferences.

The MICC system will comprise of the fuel controller, the O_2 controller and grate speed controller, each of which will be independently variable.

Changes in the flue gas temperature will be recorded and reported in real time both to the MICC and as a visual display to the operator.

The MICC system will be controlled independently of the main Key Facility controls and equipped with a dedicated interface for operator or engineer input. A remote access facility will be installed to permit fault finding and adjustment by the relevant Sub-Contractor and MARTIN GmbH.

g) *Auxiliary burners*

Each line of the Key Facility will be supplied with low NOx oil fired auxiliary burners.

h) *Ash discharger*

Each stream of the Key Facility will be equipped with a water quench connected to an ash discharge unit which will utilise recycled process effluent as a cooling medium.

i) *Steam systems*

The high pressure, low pressure, steam and feed water pipework will be designed and manufactured in according with the Construction Sub-Contract.

j) *Steam turbine and auxiliary equipment*

The steam turbine and associated equipment will be designed to accept the total output of both lines of the Key Facility when operating at the maximum thermal overload condition of 110 per cent.

The turbine and generator will be designed and constructed for continuous duty and will export electricity to the National Grid through a dedicated grid connection. In the event that the grid connection is unavailable, the turbine will run in 'island mode' supplying the demands of the Key Facility only.

k) *Turbine*

The turbine will be combined heat and power (CHP) enabled so as to be able to deliver up to 20 MW of thermal energy to a local district heating system. The space required for shell and tube heat exchangers and pumps for a district heating system has been considered in the Key Facility layout so that there will be no restriction on retrofitting this equipment in the future. A minimum footprint of 174m^2 has been allowed to accommodate heat exchangers, pumps, pressurisation system and control equipment.

l) *Gearbox*

The turbine will be connected to the generator by a gearbox.

m) *Generator*

The generator will be directly connected to the gearbox and specified for continuous operation.

n) *Standby generator*

[redacted]

MS 3.1b.iii - *Control and Monitoring*

a) *Continuous Emissions Monitoring Systems*

The continuous emissions monitoring systems (CEMS) is described in Method Statement 3.2 (Environmental Impact Control Plan).

The Key Facility control philosophy will be based on the use of a distributed control system (DCS). In this arrangement, the control of the Key Facility is broken down into sections, each of which monitors and controls a specific area or system of the Key Facility under the overall guidance of an executive control and the Key Facility operators.

CEMS will be installed to record the composition of flue gases discharged from the flue gas treatment.

One full CEMS will be installed for each line of the Facility and an additional complete system will be installed to provide for equipment redundancy. Continuous monitoring data will be made available to the Authority through a dedicated website.

The systems (collectively) will monitor emissions data on a continuous basis and provide data to an MCERTS compatible recording and reporting system.

Raw data collected by process and emissions monitoring devices will be passed to the emissions monitoring station. The monitoring station will correct this data to standard reference conditions (where required) and produce a continuous output of data to be used in trending applications and analysis.

Historical data regarding emissions performance will be archived and secured in order to meet the requirements of the Environmental Permit, MCERTS and the Contract.

The CEMS selection and installation will conform to the requirements of BS EN 14181 – “Stationary Source Emission – Quality Assurance of Automated Measuring Systems”. Annual surveillance tests as defined in BS EN 14181 will be carried out as part of the CEMS validation process and the results of these tests and the Quality Assurance Level 3 tests will dictate when the Quality Assurance Level 2 test will be repeated.

Provision will be made for remote access to the results of monitoring and such access will be made available to the Authority.

b) *Operator interfaces*

[redacted]

[redacted]

c) *Key Facility availability and redundancy*

[redacted]

MS 3.1c - Waste Transfer Station

[redacted]