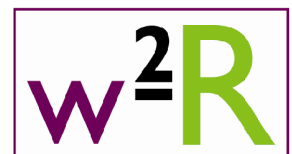


# PSS Appendix 2

## Site Operational Plan



A REPORT BY ENVIROS CONSULTING LIMITED: MAY 2008

# **STAFFORDSHIRE COUNTY COUNCIL**

**SITE OPERATIONAL PLAN**



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<b>1. INTRODUCTION</b>	<b>4</b>
<b>2. SITE DETAILS</b>	<b>5</b>
<b>3. CONSTRUCTION DETAILS</b>	<b>8</b>
<b>4. PERMITTED OPERATIONS AND WASTE QUANTITIES</b>	<b>9</b>
Waste Storage	9
Plant Operation	9
Domestic and Similar Wastes	12
Rejected Waste	13
<b>5. PLANT OPERATION</b>	<b>14</b>
<b>6. RESIDUE REMOVAL</b>	<b>16</b>
Bottom Ash	16
Spent Pollution Abatement Materials	16
<b>7. RAW MATERIAL DELIVERY</b>	<b>18</b>
Gas Abatement Materials	18
Make-up Fuel	18
<b>8. ROUTINE MAINTENANCE</b>	<b>19</b>
<b>9. ENVIRONMENTAL MONITORING</b>	<b>20</b>
Gaseous Emission Monitoring	20
Foul Sewer Discharge Monitoring	20
Residue Monitoring	21
<b>10. AMENITY MONITORING</b>	<b>22</b>
Vermin	22
Odour	23
Black smoke	23
Litter	
Mud and debris	24
Dust	
Security	24
<b>11. ABNORMAL OPERATING</b>	<b>25</b>
Plant Outage or Equipment Failure	25
Leaks and Spills	25
Fire	



## 1. INTRODUCTION

- 1.1. This document details the operation of the proposed new energy from waste plant and is primarily concerned with the handling of waste at the site, rather than the technical operation of the incinerator.
- 1.2. The plant is designed to treat municipal waste, which consists of household and household type waste from both domestic producers and commercial or industrial waste producers. The plant can also accept some types of commercial and industrial non-hazardous wastes. The plant is not designed to treat hazardous wastes, as defined by the Hazardous Waste Regulations 2005 (as amended).
- 1.3. The facility is designed to meet the standards for a non-hazardous waste incinerator, as laid out in European and UK legislation, via the Integrated Pollution Prevention and Control and Waste Incineration Directives from the EU, and the Environmental Permitting Regulations 2008, in the UK.
- 1.4. There are a number of areas of the plant that are not covered by this working plan, as they are not involved with waste handling or treatment operations. These areas include the public information and education areas, staff facilities and administrative areas.

## 2. SITE DETAILS

- 2.1. The site comprises a single main building containing the waste handling and treatment areas. In addition there is a small reception building which operates as both a security gatehouse for the facility, and weighbridge control centre. Other ancillary structures include the air cooled condensers, sub-station and diesel tank containing fuel for the ancillary burners. There are a number of staff facilities, administrative areas such as offices and a public education and information area also housed within the main building.
- 2.2. The site is equipped with two automatic weighbridges for use by vehicles delivering waste to the site. These are located on the western side of the internal access road. All roadways within the facility boundary are impermeable paved and drain to the foul sewerage system, via an oil interceptor. The site does not currently have a wheel or vehicle wash installed, although space is available for one should future needs dictate it is required. There are both staff and public parking areas. The public parking is adjacent to the reception building, with staff parking in a secure area underneath the tipping hall, within the main building.

### *Hours of Operation*

- 2.3. The facility operates on a 24 hour a day, 7 days a week basis. Waste deliveries will not be accepted during all of the operating hours. Waste deliveries will take place between
- ◆ 07:00 and 21:00 Monday to Friday,
  - ◆ 07:00 to 17:00 on Saturdays
  - ◆ 09:00 to 17:00 on Sundays or Bank Holidays
- 2.4. Deliveries may be accepted outside these hours where operational requirements exist for extended household waste collections, such as around public holidays. Where extended delivery times are to be used in the medium to long term, this will only be following written consent from the Local Authority and in agreement with the Environment Agency.
- 2.5. During these operational hours, the site will primarily accept wastes from Local Authority vehicles. These will be a mixture of refuse collection vehicles, and predominantly bulk tippers, which have collected waste from intermediate transfer stations. These will not need to be pre-booked into the facility in order to deliver waste. Commercial and industrial waste deliveries will require pre-booking into the facility.
- 2.6. The plant has been designed for an overall operational availability of 85%. This includes two periods of planned downtime per annum for routine preventative maintenance to be carried out. During these periods of planned downtime, alternative disposal arrangements will be made for the waste deliveries diverted from the site. These will either be diversion to a suitable alternative treatment facility, or to landfill. The volume of waste disposal via landfill will be minimised. Due to the size of the bunker on site, it will be possible to utilise some of this space immediately prior to restarting plant operations. This will minimise the need for off-site disposal.

**Traffic**

- 2.7. All roadways will be clearly marked and signed to show the direction of traffic flow to vehicles entering the site. Delivery traffic will be clearly segregated from other vehicular traffic and parking areas. Loading and offloading areas for the facility have been kept away from the main waste delivery route to ensure that waste collection vehicles are not unduly delayed and help achieve the contract specified turnaround time.

**Security**

- 2.8. The site is surrounded on all sides by a 2 metre high metal palisade fence. The main entrance is gated. These gates will be open during normal hours of delivery and closed and locked at all other times.
- 2.9. The site has a number of CCTV cameras situated to observe relevant areas of the site. These include the main gates, weighbridge, waste reception area and consumables storage areas. All camera outputs are monitored and any issues arising actioned as soon as practicable. All recordings will be kept for a minimum of 8 days and will be made available if necessary to regulatory bodies.
- 2.10. All visitors to the facility, other than drivers of waste delivery and collection vehicles, will be required to identify themselves at the reception building and sign the Visitors' book, stating the purpose of their visit.
- 2.11. Any unauthorised visitors discovered within the facility will be directed to the reception building. Those with no justifiable reason to be on the site will be requested to leave. If they fail to comply, the site manager will be informed and if necessary the police requested to assist.

**Weighbridge**

- 2.12. The site utilises two separate 18 metre long weighbridges, located on the internal access road, to the west of the main building. The weighbridges will be automatic to prevent a build up of traffic on the access road to the site and allow the site to achieve the turnaround time for collection vehicles contractually necessary. The weighbridges are electronically linked to the gatehouse building for the recording of data.
- 2.13. The weighbridges are both equipped with number plate recognition equipment, to allow easy identification of incoming vehicles. Registrations are compared to a database of council and third party collection vehicles to ensure that only expected vehicles deliver waste at the site. Any commercial and industrial waste vehicles which are not pre-booked will be asked to wait while confirmatory checks on the vehicle contents, and compliance with the duty of care, are carried out.
- 2.14. Normal practice will be to utilise one weighbridge for all incoming vehicles and one weighbridge for exiting vehicles. In the event of a weighbridge failure, the second weighbridge may be utilised for weighing all vehicles. The division of weighbridges into incoming and outgoing vehicles will prevent undue delays for Local Authority vehicles.
- 2.15. All incoming vehicles will be weighed. The automated weighbridge system will then print a three part delivery note, which both the weighbridge operator and vehicle driver will sign. One copy will be retained by the vehicle driver, one by the site and one at a central storage area, where it will be electronically

recorded for easy retrieval if necessary. Those vehicles operating on behalf of the Local Authority will have their waste weight recorded electronically for reporting to the waste collection authority on a monthly basis. In a similar manner, commercial and industrial waste deposits will be reported during monthly invoicing to the carrier. All paper weighbridge tickets will be retained for 7 years from the date of acceptance, with electronic records retained for a similar period of time.

- 2.16. The waste collection authority and other regulatory bodies are welcome to audit the weighbridge records to determine their accuracy and traceability.

#### ***Incinerator Lines***

- 2.17. The plant has two separate incinerator lines each with their own feeding chute, combustion grate, boiler, scrubbing system and flue gas treatment system. Each line will be monitored individually to confirm that it complies with the permitted emission limits and that inputs for flue gas treatment are optimised. This allows the plant to operate each line individually, thus optimising plant availability and throughput.
- 2.18. The two lines share a single stack with individual conduits within it. The steam turbine, air cooled condensing plant and bottom ash storage and treatment plant will be shared.

#### ***Emissions to Water***

- 2.19. The site has a number of emissions to foul sewer, which are in accordance with the terms of a discharge to foul sewer issued by the sewerage undertaker. No direct discharges of waste waters to surface watercourses occur at the site, and no direct discharges to groundwater occur at the site.
- 2.20. It is proposed that the water used in bottom ash quenching will be collected and treated for reuse. Where possible, other “grey” waste waters, such as roof drainage will be collected and used as process water, to reduce mains water usage. Water recycling and re-use will mean that volumes discharged to foul sewer will therefore be minimal.

### 3. CONSTRUCTION DETAILS

- 3.1. The exact construction methods employed to build the proposed EfW facility will be decided by the preferred bidder, and as such are not provided at this stage. The final construction methods and activities will be agreed with the relevant authorities prior to commencement.
- 3.2. Construction is planned to commence in 2010, prior to any construction activities taking place a Construction Environmental Management Plan (CEMP), will be drawn up and agreed with the Local Authority. The CEMP will define the specific mitigation measures to be applied on-site, and will demonstrate application of the relevant pollution prevention guidelines. Due consideration will be given when finalising the construction timetable to the bird breeding season.
- 3.3. Construction operations will take place between the hours of 0700 and 1900 Monday to Friday and 0700 to 1300 on Saturdays. Construction activities are unlikely to take place on Sundays and Bank Holidays and, if required, any significant work outside of these hours would be with the prior consent of the planning authority.
- 3.4. Estimates of construction traffic volumes are provided in Appendix 8.2 of the Environmental Statement. In summary, it is expected that at peak times there would be in the order of 298 car movements and 36 HGV movements per day. A routeing agreement will be secured through the planning application to ensure that any HGVs accessing the facility will travel along Vicarage Road to and from its junction with the A5 as per operational traffic. In addition, car sharing, cycling, the use of public transport and the use of minibuses to transport construction workers will be encouraged.
- 3.5. There will be no public access to the construction site and suitable fencing will be used to secure the site boundary. This will be set back from the southern soil bund to allow the movement of wildlife, and the fencing will prevent access to the land adjacent to the southwest corner of the site that is covered by flood zone 3.
- 3.6. The different mitigation measures that will be put in place during construction to control the environmental effects of construction are provided in the different chapters of this ES.

## 4. PERMITTED OPERATIONS AND WASTE QUANTITIES

### Waste Storage

- 4.1. Waste storage is provided by the internal waste bunker. The waste bunker is located within the main plant building and will be filled via waste delivery vehicles entering through the tipping hall. Vehicles will enter the tipping hall via a ramp on the southern side of the main building. Once within the tipping hall the vehicles will be directed to one of six marked delivery bays where they will turn and reverse into the bay and unload into the waste storage bunker.
- 4.2. The waste bunker will provide a volume of storage of 11,000m<sup>3</sup>, which will accommodate up to 5 days worth of waste at a total design throughput of 40tph capacity equivalent to 4,800t. Further storage capacity of up to approximately 1.5 days capacity can be achieved by stacking the waste above the level of the tipping floor. The bunker is oversized sufficiently to allow for continuous operation over weekends and bank holidays where there will be no waste deliveries, such as the Christmas and Easter periods. An oversized bunker also allows the plant to cope with seasonal variations in incoming waste volume such as around the Christmas period.
- 4.3. Automatic overhead cranes equipped with a grab remove waste from the bunker for introduction to the grate via a feed hopper for each of the two lines. Any oversize or unsuitable items which can be identified will be removed by the grabs prior to processing. These will then be passed to the shredder unit located at the side of the waste bunker, where it will be broken down in size, prior to reintroduction to the waste bunker.
- 4.4. The crane grab is able to homogenise waste within the waste bunker to smooth out the calorific value (CV) of the incoming waste. Although the plant is capable of dealing with CV differentials within the waste, homogenisation reduces these peaks and troughs and improves plant efficiency. Separate control systems within the plant measure and control oxygen saturation and thermal stability within the furnace to ensure efficient grate operation, caused by the CV variation.
- 4.5. Where oversized wastes or wastes unsuitable for processing through the plant are identified they will be removed from the bunker and stored in a dedicated area prior to removal from site. Removed wastes will be taken to a suitable disposal or recovery facility. It is likely that these materials will predominantly consist of large metal items which will be diverted to a suitably permitted metal recycling facility.
- 4.6. The tipping hall will have provision for bunker waste to be back loaded into transfer vehicles in the event of prolonged EfW shutdown, although it is expected that this would only be required on very rare occasions.

### Plant Operation

- 4.7. Combustion control is fully automatic, with an operator only being required to select the desired steam output. The incinerator system grate is designed primarily for municipal waste. The furnace has been designed for continuous waste combustion in the range between 66% and 100% of the thermal design load. Short-term peaks due to the non-homogeneity of the wastes calorific value may be absorbed by the system for up to 110% of the design load.

- 4.8. In cases where the temperature in the secondary combustion chamber drops below 850°C, diesel fired auxiliary burners will be automatically activated. However this should be a rare occurrence. These burners are normally only in standby mode, although they will be required during start-up and shut-down of the plant.
- 4.9. The secondary combustion chamber is designed for both optimal air flow and thorough mixing of the combustion gases with introduced secondary air. This secondary air is introduced to give improved burn out of the combustion gas to reduce the levels of emissions. The secondary air will primarily be drawn from the waste reception area, and as such may contain trace odorous gases.
- 4.10. Oxides of nitrogen (NO<sub>x</sub>) within the flue gases, are reduced through the injection of ammonia (or urea), into the secondary combustion chamber in a temperature range of approximately 900 +/- 50oC. The ammonia acts as a reducing agent, reacting with oxygen in the NO<sub>x</sub> to produce water molecules and nitrogen.
- 4.11. Once the flue gases have been passed through the ammonia scrubber, they will pass into the convective section of the boiler. Here all of the heat exchange structures are placed, such as superheaters, evaporators and economisers. These structures transfer the heat energy from the hot flue gasses to produce high pressure, superheated steam. This steam is then utilised to drive a condensing steam turbine to generate electricity. The reduction in the temperature of flue gases at this stage will bring them down to a temperature of 160 – 200C, from 850 C at which they entered the boiler.
- 4.12. The steam is generated from make-up water supplied from the water main that has passed through a demineralisation plant. This water is then de-aerated prior to its being pumped via economisers into the boiler drums and used within the heat exchanger system. Once it has generated steam, it is recombined in a common manifold prior to passing to the turbine.
- 4.13. Although this is generally a sealed system, any potential offsite use of steam for local heating or steam use would result in losses from the system that would require make up with mains water treated on site.

#### ***Electricity Generation***

- 4.14. The plant is equipped with a condensing steam turbine to generate electricity from the waste. This is a single turbine equipped with a one piece rotor to cope with variations in the thermal load and steam conditions within the plant outputs.
- 4.15. The turbine will generate approximately 29MW of electricity in condensing mode. With steam or heat export the amount of electricity produced will be reduced according to the amount of thermal energy being extracted from the steam turbine. The EfW will consume approximately 4.5 MW (2-2.5MW per waste stream), leaving approximately 24.5MW of electrical power that will be exported to the local electricity grid.
- 4.16. Connection to the electricity grid will be made to the overhead 33kV line running to the west of the main building.

#### ***Off Site Steam Use***

- 4.17. In addition to the production of electricity to the National Grid, the proposed EfW has the potential to supply heat locally. The provision of heat can be in the form of hot water for district heating, or steam supplied to local industry. The take-off

point for any potential provision would be from the steam turbine with the associated heat exchanges and pipework for export from the main building also located in the steam turbine building. The facility has been designed to facilitate future provision of heat, should a suitable requirement be identified.

### **Flue Gas Treatment**

- 4.18. Treatment of flue gases include a range of processes to reduce the level of oxides of nitrogen (NO<sub>x</sub>), gas scrubbing to reduce acidic gases, heavy metals and any remaining furans or dioxins, and filtration to reduce solid particles.
- 4.19. The treatment of flue gases will be designed to comply with the EC Directive on the Incineration of Waste (2000/76/EC) and the final design of the plant will be agreed with the Environment Agency (EA) in accordance with the Integrated Pollution Prevention Control (IPPC) directive and Environmental Permitting Regulations 2008.
- 4.20. Treatment of flue gas begins in the combustion chamber through the maintenance of high temperatures (850°C), for at least two seconds and mixing of flue gases by secondary air injection. This helps to ensure efficient and complete destruction of furans and dioxins by heat. The rapid drop in flue gas temperature as heat is transferred in the boiler helps to minimise the reformation of these compounds in the temperature range of approximately 300°C to 200°C.
- 4.21. NO<sub>x</sub> emissions within the flue gasses are reduced through the injection of ammonia (or urea), into the secondary combustion chamber in a temperature range of approximately 900 +/- 50°C. The ammonia acts as a reducing agent, reacting with oxygen in the NO<sub>x</sub> to produce water molecules and nitrogen. The reaction is very temperature sensitive so injection nozzles will be installed at different heights in the secondary combustion chamber to enable precise adjustment to temperature conditions in the chamber. The flow of ammonia is controlled by monitoring NO<sub>x</sub> at the outlet monitor.
- 4.22. The combustion of municipal waste generates acid gases such as hydrogen chloride, hydrogen fluoride, sulphur dioxide and traces of sulphur trioxide. After passing through the boiler, the acidic flue gases will be neutralised through the injection of an alkaline reagent (such as hydrated lime or sodium bicarbonate). Hydrated lime and water is mixed and then added to the flue gases, in the form of a slurry. The slurry is pumped into the top of spray absorption towers and mixed with the flue gases where the water evaporates to leave the reaction products dry. The lime is stored in two 4m diameter silos (adjacent to the flue gas treatment hall) with associated lime slurry tanks (total footprint of approximately 14x9m).
- 4.23. Controlled amounts of activated carbon powder are conveyed by compressed air from the storage silo, and injected into the stream of flue gas. The carbon adsorbs mercury and other heavy metals as well as organic compounds including dioxins and furans. The activated carbon powder is stored in a 5m diameter silo that is located with other storage silos adjacent to the flue gas treatment hall.
- 4.24. Following the scrubbing process the flue gas passes through the bag-house filter to remove particles from the gas including the removal of activated carbon and hydrated lime used in the scrubbing process. These are known as Flue Gas Treatment (FGT), residues, which build up on the surface of the filter bag (to form filter cake).

- 4.25. The neutralisation of acidic gases by hydrated lime is completed as the gases pass through this filter cake. The filter cake is removed at regular intervals, and some is re-circulated back into the filter bag house to increase the neutralisation reaction efficiency. The bag filters also filter out other metals such as copper and cadmium besides those contaminants already mentioned.
- 4.26. Membrane type bags will be used rather than felt bags as the membrane is not dependent on the particulates for filtering and are less likely to release FGT residue when cleaning. The membrane filters offer reduced PM10 (particulate matter <10µm in diameter) emissions across the full operating range, for the equivalent gas flow rates.
- 4.27. The cleaned gases are drawn through the boiler and gas treatment system by an induced draught fan located in the outlet ducting for each bag filter. The fan then discharges the cleaned gases into the chimney flue.

#### ***Waste Acceptance***

- 4.28. Incoming waste will comprise residual Municipal Solid Waste (MSW) collected from domestic households and some commercial properties, although there may be some commercial waste with the same characteristics as municipal waste. This waste will be the residual waste stream following the removal of some organic waste and dry recyclable materials through kerbside sorting and recycling collection schemes (depending on which Local Authority has collected the waste). It will be delivered by covered trucks entering the site via Four Ashes Industrial Estate and along Enterprise Drive.
- 4.29. Air for the furnace plants will be extracted from above the waste bunker to help maintain a negative air pressure and to remove or control any accumulation of dust, vehicle exhaust and odour emissions. The extracted air is fed into the grate as secondary air that is necessary to ensure complete waste combustion occurs. This will also treat any odours generated by the waste.

#### **Domestic and Similar Wastes**

- 4.30. The majority of waste accepted at the site will be municipal wastes, which consists of residual domestic (black bag) waste and similar commercial and industrial wastes. These commercial and industrial wastes will not include wastes classified as hazardous waste, as defined by the Hazardous Waste Regulations 2005.

#### ***Pre-acceptance Testing***

- 4.31. No pre-acceptance testing or verification will be carried out on loads of domestic waste delivered to the facility. In the case of commercial or industrial wastes, no pre-acceptance testing is carried out where the waste is similar in composition to domestic waste.
- 4.32. Where there is a single waste stream - commercial or industrial waste that the facility is asked to treat - pre-acceptance testing and, where necessary, confirmatory testing on the delivered waste will be carried out. This will be in line with the latest Environment Agency guidance. Details of all pre-acceptance and confirmatory testing will be kept on file for a period of no less than 2 years from the date of original quotation or sampling. All commercial and industrial waste streams will be re-tested on an annual basis. Where the waste displays a

high level of variability, this re-testing will be on a more frequent basis, dependant upon the nature of the waste stream.

### **Waste Delivery**

- 4.33. Waste will either be delivered to the site in refuse collection vehicles directly from collections or in bulk containers following bulking up at transfer stations. Upon arrival all vehicles will be weighed using the site weighbridge. Commercial and Industrial wastes will generally be delivered in bulk containers. A limited number of waste streams may be delivered in skips, but these are only accepted where the waste is securely sheeted or netted to prevent escape of waste.
- 4.34. Wastes delivered in RCV's will be from local authority collections and do not require pre-booking. Domestic waste that has been bulked up at a transfer station will not require pre-booking. Loads of commercial and industrial waste from transfer stations or other sources will need to be pre-booked to the site. Any loads not pre-booked will be asked to wait while the site manager's opinion is sought.
- 4.35. Once within the tipping hall the vehicles will be directed to one of six marked delivery bays where they will turn and reverse into the bay and unload into the waste storage bunker.
- 4.36. After tipping their waste, all vehicles will be weighed prior to departure from site, apart from RCV's and Local Authority bulk containers that have a pre-determined 'tare' weight.

### **Rejected Waste**

- 4.37. Wastes that are either hot or on fire will be identified upon arrival at site and offloaded in the quarantine area until either they have cooled down sufficiently for treatment, or have been extinguished. All such incidents will be reported to the site manager and recorded in the site diary.
- 4.38. Upon offloading it may be discovered that the waste is not suitable for treatment at the site. Examples of this would include inert packaging wastes, soils and wastes classified as hazardous under the Hazardous Waste Regulations 2005. Any such loads identified will be reloaded into the delivery vehicle and removed from site immediately. Reloading vehicles will be carried out using the backloading hopper located at the side of the waste bunker. The only exception will be hazardous wastes, which will be segregated and the producer informed. Once the appropriate paperwork detailing their delivery to a suitably authorised facility has been raised they will be removed from site. This should not take more than 24 hours.
- 4.39. Oversized wastes delivered to the site may be treated using the on-site shredder to allow their treatment. If this is not possible due to the size or nature of the waste, they will be removed from the site for recovery or disposal as soon as is practicable.
- 4.40. All rejected wastes will be dealt with and removed from site within 24 hours, except in the case of hazardous wastes. All such incidents will be brought to the attention of the delivery contractors and where appropriate the producer. In the event of multiple incidents occurring from the same producer, consideration will be given to preventing further deliveries from that source until the operator is satisfied that there will not be further incidences.

## 5. PLANT OPERATION

The plant will operate normally on a 24 hours a day basis, 7 days a week. There will be an annual two week shutdown period for routine plant maintenance.

### *Operating Hours*

- 5.1. Energy Recovery Plants must be operated on a continuous basis due to the potential damage to the plant caused by cycles of cooling and heating. Although waste deliveries will only take place during a set number of daytime hours, the facility will operate 24 hours a day.

### *Domestic and Similar Wastes*

- 5.2. Waste delivered during the day will be stockpiled in the waste bunker pending transfer to the combustion grate. This stockpiling will be in a controlled manner to ensure that the waste is treated based on its length of time on site and to ensure no untreated waste remains on site longer than necessary. Waste may remain under normal operating conditions for up to 5 days to allow the plant to continue operating over weekends and public holidays.

### *Introduction of waste*

- 5.3. Waste is introduced to the grate via a grab. The grab transfers waste from the stockpile to the correct waste feed chute. There is an interlock installed between the feed chute and the grate temperature sensors, preventing waste from being loaded if the grate temperature falls below 850C. Should the interlock be active for more than 2 minutes, an audible and visual alarm is activated within the control booth.

### *Site manning and supervision*

- 5.4. The facility will employ approximately 38 full time staff with a combination of shift and daytime workers. The shift pattern will be on a 12hr basis with four teams of four people working so that only two teams of four people are working during a 24hr period.
- 5.5. The breakdown of employees is provides in Table 1.

**Table 1. Breakdown of Employees for the Proposed EfW Facility**

Position	Number
ERF Manager	1
Operations Manager	1
Maintenance Manager	1
Administration	1
Weighbridge Clerk	2
Shift Leaders / Supervisors	6
Facility operatives (shifts)	16 (18)
Maintenance	6
Bottom ash	4
TOTAL	38(40)

- 5.6. The two extra operatives shown in brackets above are for the CHP operation, should this be adopted in the future. There may also be need to employ a part-time office worker responsible for education/visits etc.

***Technical competence***

- 5.7. The site will have two members of staff who hold the correct level of technical competence to ensure compliance with the Environmental Permit held by the site.

## 6. RESIDUE REMOVAL

- 6.1. There are a number of separate residues generated within the process that will require storage on site, prior to removal and treatment off site. These residues are generated through the normal operation of the facility. Oversized wastes and unsuitable wastes will also require removal from the facility as already discussed.
- 6.2. The escape of residues from the site, particularly dust is guarded against through the design of the facility. All residue loading areas are located within the main building envelope, and away from the main traffic flow on the site, to prevent disruption to operations. Where loading valves and couplings are used these will be protected from accidental damage and monitored by CCTV to ensure their correct use. In the unlikely event of a vehicle removing materials from site equipped with the wrong couplings, it will be turned away and not allowed to load.

### **Bottom Ash**

- 6.3. Bottom ash constitutes material that has remained un-burnt through the incineration process. It contains metals, glass, stones and other inert materials. The majority of such materials will have already been removed from the waste stream at source through kerbside recycling schemes where possible, to reduce the generation of this waste stream.
- 6.4. Ash from the combustion process drops off the end of the grate directly into a water bath. The water bath serves to quench the hot ash and moisten the ash to prevent particulate emissions. The water also acts as a seal and prevents uncontrolled ingress of air into the combustion chamber. A hydraulic ram will push this bottom ash from the water bath onto the bottom ash transport system for transfer to the Bottom Ash and Metals Storage Hall. Water is separated from the ash and will be re-circulated to the water bath. This process produces steam which is then cooled and the condensate returned to the bath. A water top-up feed will maintain an adequate water level in the water bath.
- 6.5. The bottom ash will be transferred to transport vehicles by a front-loading shovel from the bottom ash storage bays. This loading process will take place within the building envelope. Bottom ash will either be taken to a reprocessing plant where it will be processed into engineering aggregate or disposal to landfill (as non-hazardous waste).

### ***Metal Removal***

- 6.6. The cooled bottom ash is treated by means of an eddy current generator and overband electromagnet in order to remove aluminium and ferrous materials respectively. The separated metals are stockpiled separately on site, prior to removal by a metal recycling contractor. Utilising this method of metals recovery means a higher percentage of metals recovery is achieved than using metal separation on the incoming wastes.

### **Spent Pollution Abatement Materials**

- 6.7. A number of pollution abatement materials are used on site. These will be stored within sealed silos prior to removal from site for either recovery or treatment. These wastes will typically equate to around 4% of the waste input.

These wastes comprise both hazardous and non-hazardous waste and where possible are recovered off-site to minimise landfill disposal.

#### ***Activated Carbon***

- 6.8. Spent activated carbon from the gas scrubbing process is a hazardous waste. It is removed from use when it has become saturated with contaminants and transferred to a storage silo. When there is a sufficient quantity in storage, it will be removed from site using a powder tanker for regeneration at a suitably authorised facility. Where possible, the regenerated activated carbon will be returned to site for reuse. 100% recycling of this material cannot be achieved, due to wear and the creation of very fine powders. This necessitates a volume of fresh activated carbon being required on site.

#### ***APC Residues***

- 6.9. APC residues are a hazardous waste and are generated on a daily basis. They will be stored in a dedicated powder silo on site, with removal by either powder tank or in 1 tonne tote bags as appropriate on a daily basis. All such movements will be accompanied by the appropriate Hazardous Waste consignment note.
- 6.10. It is intended to utilise the highly alkaline APC residues at a suitably permitted facility for the neutralisation of waste acid. The residues from such a process will then be landfilled at a suitable site. Other recovery options may become available for this waste stream, which could also be utilised over the lifetime of the plant.

#### ***Used Filters***

- 6.11. The plant utilises a number of bag filters to remove particulates from the gaseous emissions. Once these filters have become 'blinded' they are no longer suitable for use and will be replaced. All filters will be securely stored on site, prior to off-site recovery or disposal.

## 7. RAW MATERIAL DELIVERY

- 7.1. There will be a range of deliveries of raw materials delivered to the facility during its operational phase.
- 7.2. All raw material delivery drivers upon their first visit to the site will be asked to read and sign the site health and safety guidance for visitors and contractors. During their first visit and subsequent visits as deemed necessary they will be accompanied by a member of staff who will supervise the offloading to ensure that all relevant procedures are complied with.
- 7.3. All off-loading areas are located within the main building envelope, away from the main traffic flow on the site, to prevent disruption to operations. Where off-loading valves and couplings are used these will be protected from accidental damage and monitored by CCTV to ensure their correct use. In the unlikely event of a vehicle delivering materials to site equipped with the wrong couplings, it will be turned away and not allowed to offload.
- 7.4. Raw materials offloading areas are kept away from the loading areas for residues from the process, to ensure that there is no cross contamination of materials, or loading / unloading mistakes.

### Gas Abatement Materials

- 7.5. All deliveries of raw materials for gas cleanup will be pre-arranged. Upon arrival on site, drivers will report to the site office with the appropriate paperwork. Drivers and vehicles will then be directed to the appropriate storage and offloading area. All offloading will be supervised either by a member of staff in person or via CCTV monitoring of the offloading points.

### Make-up Fuel

- 7.6. All deliveries of make-up fuel will be prearranged, with the driver reporting to the site office upon arrival at the site. Once the paperwork has been checked, the driver and vehicle will be directed to the correct fuel storage area. All coupling to the storage tanks will be monitored by staff or CCTV.
- 7.7. All fuel storage tanks are double skinned and located in a bunded area, capable of holding 110% of the total fuel storage volume. This is in line with best practice.



## 8. ROUTINE MAINTENANCE

The site will be operated under a program of routine maintenance to prevent unexpected outages due to plant or equipment failure. This will consist of two periods of planned downtime per year, each of 7 days duration. Other routine maintenance will be carried out on a programmed basis to reduce the risk of unplanned downtime. The use of two incinerator lines, allows items such as the grabs or feed chutes to be maintained, while the plant remains operational.

### *Weighbridge maintenance*

- 8.1. The weighbridge will be maintained by an external contractor as required. A daily check will be made to ensure that it is working correctly and calibration will be carried out by an external contractor on an annual basis. In the unlikely event it is discovered the weighbridge is in-operational for a prolonged period, alternative arrangements will be made for the weighing of vehicles.

## 9. ENVIRONMENTAL MONITORING

- 9.1. The facility will operate under the terms of the Environmental Permit issued by the Environment Agency. This permit includes the requirements of the Waste Incineration and Integrated Pollution Prevention and Control Directives. This permit also transposes the consent to discharge to foul sewer issued by the sewerage undertaker, who retains the enforcement of this permission.

### Gaseous Emission Monitoring

- 9.2. Gaseous emissions from the plant, released via the 80m tall stack are subject to continuous monitoring for the parameters set within the Environmental Permit. This monitoring includes NO<sub>x</sub>, HCl, total dust, HF, SO<sub>2</sub>, along with operational parameters such as gas velocity, pressure and water content. This monitoring will be carried out to the relevant BS and EN standards. The Waste Incineration Directive sets the maximum values for these parameters; however, the plant is designed to meet BAT (best available techniques) that will result in emissions far lower than those permitted.
- 9.3. All continuous monitoring will be carried out using pre-installed equipment which is suitable for purpose. Computer recording of the outputs will be carried out, with returns sent to both the regulator and public liaison committee on a quarterly or as requested basis. Any failure or breach of the required standards will be notified to the regulator immediately, and plant operations examined to determine the probable cause of the failure.
- 9.4. In addition a number of other trace emissions will be spot monitored, at least four times per year for the first year of operation and two times a year afterwards. These spot checks will include dioxins and heavy metals and will be carried over a sampling period agreed with the regulator. All sampling and testing of the samples shall be carried out to the appropriate BS or EN standards by MCERTS accredited contractors and laboratories.
- 9.5. Results from the periodic monitoring will be collated and passed in full to the regulator on a quarterly basis. A report detailing the findings will be prepared for the liaison committee.
- 9.6. All continuous monitoring equipment will be calibrated upon installation and subject to a bi-annual external calibration check, or after any prolonged period of plant downtime. Periodic monitoring will be carried out at the monitoring ports agreed within the Environmental Permit.
- 9.7. Results from the continuous and periodic monitoring will be reviewed to monitor trends in plant performance. Where continuous monitoring shows an upward trend in emissions, a process review will be carried out to identify where the issue is arising in the system and where possible, corrective actions will be taken. Continuous monitoring will also ensure that pollution abatement equipment is replaced at the correct intervals.

### Foul Sewer Discharge Monitoring

- 9.8. All waste water for discharge to foul sewer will be checked prior to its release from site. Flow monitoring will be in accordance with the methodology required by the Environment Agency and sewerage undertaker, at the designated point. The pH will be continuously monitored using a calibrated probe. Chemical

confirmatory testing will be carried out on a daily basis to confirm that the terms of the discharge limits set both within the Environmental Permit, and the terms of the consent to discharge to foul sewer issued by the sewerage undertaker are complied with.

- 9.9. All monitoring data shall be centrally recorded on an electronic system, to monitor system performance over time. This monitoring allows system performance over time to be assessed and should prevent breaches of the permit values by identifying upward trends.

### **Residue Monitoring**

- 9.10. Waste residues removed from site for treatment or recovery elsewhere will be subject to monitoring to ensure that subsequent holders receive full and accurate information relating to their composition.
- 9.11. Incinerator bottom ash is generally viewed as non-hazardous waste from modern incinerators by the Environment Agency. Representative sampling during the first year of plant operation will be used to confirm this position. Testing will be carried out on a long term basis where the bottom ash is being removed from site for reuse or recovery.
- 9.12. Air pollution control residues, both lime and activated carbon based, are hazardous wastes and will be disposed of as such. These will be subject to at least annual testing to ensure the treatment site that receives the waste is aware of what is being accepted. If the material is to be sent to landfill for disposal, this will be subject to regular confirmatory WAC testing, in line with the current Environment Agency guidance.

## 10. AMENITY MONITORING

- 10.1. There are a number of amenity issues associated with any waste facility. Where possible these will be pro-actively monitored and assessed by site staff to reduce any impact on the surrounding community. All monitoring checks will be recorded in the site diary and any issues identified raised immediately with site management. Where necessary, specialist contractors will be employed to address problems. Any interventions of this nature shall be actioned within 12 hours of the problem being identified.
- 10.2. A daily record will be kept of the weather conditions based on a combination of the output from the on-site weather station and observation. This record shall include, but not be limited to, maximum wind speed, wind direction, atmospheric pressure and prevailing weather.

### ***Complaints***

- 10.3. A record will be kept of any complaints from the public and local companies. This includes any complaints made to third parties such as the Local Authority and the Environment Agency. All such complaints will be investigated as soon as practicable and the investigation findings reported to both the regulator and complainant. All investigation reports will be recorded in the site diary. If any remedial measures are identified, then a timescale for their implementation will also be reported.
- 10.4. The public liaison committee will be supplied with a summary of all complaints and investigation reports on a quarterly basis. Any remedial measures undertaken as a result of a complaint will also be highlighted.

### **Vermin**

- 10.5. Due to the nature of the materials handled at the site, there is a potential for vermin; however in the UK, waste management facilities that are contained within buildings have never been associated with significant rodent infestation. At the EfW plant all the waste is contained within the waste bunker in the tipping hall where it is constantly being disturbed either through new loads being tipped or the overhead crane removing material and it is therefore not an environment that rodents find attractive.
- 10.6. All waste storage areas will be cleaned using high pressure water and where necessary detergents or disinfectant on a minimum of a weekly basis, to prevent the build up of residual wastes. If problems due to particular loads of waste are noted, which arrive at site with evidence of an infestation within the collected waste, these will be treated as soon as practicable.
- 10.7. A daily check will be made for any vermin infestation. Baited traps will be used at all times and where there are signs of an infestation, specialist contractors will be employed.
- 10.8. There should be no issues with birds at the site, due to waste operations being carried out inside the building.

## Odour

- 10.9. The material delivered to site is inherently odorous. The off-site impact of this will be minimised through a combination of good plant and facility design and a rapid throughput of waste. No waste will be offloaded outside of the building. Commercial and industrial wastes which are particularly odorous will be excluded from the site. If other contract wastes are identified as being odours, these wastes will be treated as quickly as possible to remove the source of the odour.
- 10.10. The building operates under a negative air pressure to prevent the escape of odour, and the entrance doors are both rapid closing and incorporate an air curtain to further minimise the risks of odour escape. The extracted air from the waste reception area is utilised within the incinerator as secondary air within the secondary combustion chamber and any odorous components will be burnt.
- 10.11. An assessment of odour outside the facility will be made by a suitably qualified member of staff on a daily basis at the designated odour monitoring points. These points include the facility entrance, at least one point on each side of the site perimeter, and close to the nearest sensitive receptor. All such findings will be recorded in the site diary. If an issue is detected, the source of the odour will be sought as a matter of urgency for remedial actions to be undertaken.
- 10.12. In the unlikely event that odour leaving the facility proves to be an issue, the operator will seek to address it by using a combination of active and passive measures. Fragrant plants and trees will be planted as a downwind screen for the plant, to help passively remove odour. Active measures such as odour masking sprays will also be utilised when necessary.

## Black smoke

- 10.13. The plant should not emit black smoke, although in some atmospheric conditions, there may be a small white plume visible from the stack. This will mainly be moisture.
- 10.14. Black smoke would be a sign of a problem with the plant and the gas cleanup equipment. Any such incident would be immediately brought to the attention of the site manager by the control room. Remedial measures will be implemented, which may include complete plant shutdown.

## Litter

- 10.15. There should not be an issue with windblown litter at the facility. All off-loading of waste is carried inside the process building and any loose material will be removed from the exterior of vehicles prior to leaving the building. Where commercial or industrial waste is delivered in skips or open vehicles, no unsheeting will occur before the vehicle has entered the waste reception area of the building. Any open vehicle arriving unsheeted at site will be turned away.
- 10.16. Although it is not believed that litter will be an issue at the site, a daily visual inspection of the site, particularly the exterior fence, will be carried out and any litter identified will be actioned for immediate removal.

### **Mud and debris**

- 10.17. It is not envisioned that mud or debris will be an issue at this facility due to the nature of the vehicles utilising the site. All vehicles will be visually checked for exterior debris both at the weighbridge and prior to leaving the waste reception area. Any large debris identified will be removed.
- 10.18. If mud and debris are deemed to be an issue on local roads once the facility becomes operational; then consideration will be given to installing a wheel wash.

### **Dust**

- 10.19. Wastes handled at the site should not be inherently dusty. Such materials are generally not suitable for treatment at this type of plant, and will be turned away when delivered, if not identified at the pre-acceptance stage. In the case of dusty loads of waste that the facility can treat, unloading will only occur within the reception area, with the external doors closed. Where necessary such wastes will be damped down during unloading and storage. Any dusty wastes accepted will be treated as rapidly as possible to minimise their storage time on site.
- 10.20. Dust emissions may arise from handling of abatement materials on site. Such emissions will be minimised through a combination of good plant design and operational practices.
- 10.21. All handling of abatement equipment that may release dust will be carried out within the main building, with containers being sealed as soon as practicable upon filling. All filling hoses and coupling will be checked to confirm that no miscoupling has occurred prior to offloading starting. Due to the chemical nature of abatement technology utilised, damping down of dust using water will be kept to a minimum on health and safety grounds.
- 10.22. Dust could arise within the storage and loading of bottom ash from the facility. This will be minimised, where possible, by keeping the bottom ash damp prior to its removal from site. Where dust is generated by bottom ash handling, damping down will be used to minimise its effect.

### **Security**

- 10.23. The site is surrounded by a security fence with the main gates closed and locked when not in use. The main gates will be closed at night, although access may be required for the removal of spent pollution residues from the site. Access will be controlled from the gatehouse or site office that will have the means of remotely operating the gates if necessary.
- 10.24. A daily visual check will be made of the integrity of the whole fence and gate and any damage noted and actioned for immediate remediation. All CCTV camera recordings will be kept for 8 days in case of issues being identified.

## 11. ABNORMAL OPERATING

- 11.1. During the daily operation of the facility, it is possible that a number of abnormal events could occur that could lead to the plant operating in a different manner to normal.

### Plant Outage or Equipment Failure

- 11.2. In the event of the plant being unexpectedly out of commission, or mechanical failure occurring in any part of the process, priority would be given to the removal of any stockpiled waste on site. The use of two separate lines at the site should minimise the chance of the plant being unavailable due to mechanical or physical breakdown. Where possible the alternative line would be operated while the damaged line was repaired. Where remedial works are likely to take a significant period of time, the plant would process only municipal waste where possible, with commercial and industrial wastes being diverted to alternative sites.
- 11.3. In the event of a mechanical failure within the pollution abatement equipment, the burners will be closed down and operations ceased until the fault has been identified and rectified. The Environment Agency would be informed in writing of such an outage and the identified remedial actions as soon as practicable.

### Leaks and Spills

- 11.4. All liquids used will be stored in double skinned, bunded tanks that are capable of holding at least 100% of the capacity of the associated tank. The tanks will be checked on a regular basis and fitted with high level alarms to prevent overflowing. The bunds will be inspected on a daily basis. In the event of a tank failure, the bund will retain the contents of the tank.
- 11.5. The external areas of the site will drain to attenuation storage via an oil interceptor, which is equipped with a cut off, to prevent liquid exiting the interceptor in the event of a large spillage. The site will be equipped with spillage kits, which are designed to help soak up spilled materials and include devices to cover the drains to prevent the escape of materials.
- 11.6. In the event of an accidental discharge of process waters, contaminated water will be diverted to a wastewater storage pit where it can be re-used in the process, transported off-site for treatment / disposal, or treated and discharged to the foul water sewer under a discharge consent to be obtained from Severn Trent Water.
- 11.7. In the event of a spillage the site manager will be informed as soon as possible. Major spillages will be reported to both the Environment Agency and sewerage undertaker.

### Fire

- 11.8. Waste handling operations at the site should not lead to fires occurring. Loads are observed upon deposit to check for fires or excess heat. Where identified, these wastes will be segregated and doused with water.



- 11.9. The facility will employ a comprehensive fire prevention and detection system. Details of these will be agreed with the relevant fire safety authorities. Rainwater will be collected and stored in a tank below the administration building and adjacent to the waste bunker so that it can be used in the case of a fire in the waste bunker. The bunker itself will be constructed of concrete to provide fire resistance.
- 11.10. Automatic steel doors will close over the waste hoppers within the bunker, in case of fire moving from the furnace, back up the waste feed chute. Flammable liquids and chemicals will be stored in sealed containers within a bunded area.