SECTION D INFRASTRUCTURE & OPERATION

D.1 Infrastructure

Complete the following table detailing the site infrastructure. **Attachment D 1** should contain the appropriate documentation. Information provided should follow the sequence, and use the headings, established in Table D.1. Additional advice on completing this section is provided in the application *Guidance Note*.

Table D.1. Infrastructure		Y/n	Comments
D.1.a	Site security arrangements including gates and fencing	Y	See appendix D1
D.1.b	Designs for site roads	Y	See appendix D1
D.1.c	Design of hardstanding areas	Y	See appendix D1
D.1.d	Plant	Y	See appendix D1
D.1.e	Wheel-wash	N	
D.1.f	Laboratory facilities	N	
D.1.g	Design and location of fuel storage areas	Y	See appendix D1
D.1.h	Waste quarantine areas	Y	See appendix D1
D.1.i	Waste inspection areas	Y	See appendix D1
D.1.j	Traffic control	Y	See appendix D1
D.1.k	Sewerage and surface water drainage infrastructure	Y	See appendix D1
D.1.l	All other services	Y	See appendix D1
D.1.m	Plant sheds, garages and equipment compound	Y	See appendix D1
D.1.n	Site accommodation	Y	See appendix D1
D.1.o	A fire control system, including water supply	Y	See appendix D1
D.1.p	Civic amenity facilities	N	
D.1.q	Any other waste recovery infrastructure	N	
D.1.r	Composting infrastructure	N	
D.1.s	Construction and Demolition waste infrastructure	N	
D.1.t	Incineration infrastructure (if applicable). Provide information to fulfil Article 4 (2) & (3) of the Incineration of Waste Directive	Y	See appendix D1
D.1.u	Any other infrastructure	N	

Please refer to Attachment D1 and Drawing UZT/ BE005 for further information regarding Infrastructure.

Attachment D.1
Infrastructure

ATTACHMENT D1 - SITE INFRASTRUCTURE

Details of the proposed infrastructure are shown in drawing UZT/BE005 and UZT/BE002

D.1a Site security arrangements including gates and fencing

The Facility will be equipped with an Access Control System to prevent access of unauthorised persons the Facility. The Access Control System will record information regarding staff present at the Facility. It will include measures, which will ensure that in the event of fire, escape of persons will always be possible.

Permanent boundary fencing will be established for the Facility, which will extend around the entire Facility and join with each Access Point thus forming a secure site. The boundary fencing will have a minimum height of 2.4 m.

The Facility will provide a suitable Access Point, which will allow HGV traffic to enter and leave the Facility simultaneously in a safe manner. The location and design of the Access Point will ensure that there is no queuing on Pigeon House Road. The Access Point will be designated to be capable of receiving 50 waste vehicles per hour with a maximum turnaround time of 20 minutes including queuing, weighing, unloading and re-weighing as well as cleaning of the waste reception area and vehicle. The estimated average traffic impact will however be less than this maximum capacity. In this relation please see chapter 7 of the EIS "Traffic"

The Access Point will be secured by a metal gate, which can be safely closed automatically at the gate as well as by remote control. The gate will be a minimum of 2.4m high and of a sturdy construction. The gate will include a lower paneled section to a height of 400 mm. The gate will be operated mechanically and slide on rollers. Operation of the gate will be done locally from within the security building and from remote locations where there is a clear view of the Access Point, either by direct line of sight or with the aid of CCTV equipment. The operation of the gates will be controlled by security measures such as keys or access codes. There will be a fail-safe mechanism and a manual means of operating the gate.

The Access Point will be provided with a security building, which will be designed to accommodate two persons comfortably. The security building will have a clear, unobstructed view of the Access Point, which it is monitoring.

The Facility will be provided with a central security room – in the control room – from where each element of the Facility can be supervised and monitored. An intercom communication device system will be installed enabling security personnel to communicate with each other, the control room and with persons at the Access Point.

D.1.b Designs for site roads

The following areas will as a minimum be paved with asphalt, bitumen macadam or concrete to a standard suitable for HGV traffic:

- all access roads
- any additional roadwork beyond the boundary of the Facility which may be required to provide a suitable tie-in with the public road network
- any other areas subject to vehicular movements, including marshalling, waste inspection and parking areas

All paved areas will be clearly marked or signposted to indicate safety-related information, instructions to drivers and, where appropriate, their designed use.

D.1.c Design of hardstanding areas

All paved areas where vehicles may travel will be all-weather surfaces and constructed to a standard that will allow for daily manoeuvring of HGV traffic for the life of the Facility.

All hardstanding areas will be drained via a suitably sized oil interceptor and silt trap.

D.1.d Plant (weighbridge, including capacity, dimensions, record keeping system)

The Facility will be provided with four weighbridges, two for ingoing trucks and two for outgoing trucks, each for vehicles up to a length of 24 m. The weighbridges will ensure that weighing does not limit the turnaround times of waste vehicles. Each of the weighbridges will have sufficient capacity to receive 50 vehicles per hour.

Automatic detection of vehicles entering the weighbridge and measures to assist correct positioning of vehicles on the weighbridge will be provided. A barrier will be provided whereby the weighbridge operator can control the movement of vehicles over each weighbridge. The weighing station operator will be located in the security building at the gate, he will have a clear view of the access road leading to and from the weighing station and of the vehicles and their drivers when in position on the weighbridges. It will be possible for the weighbridge operator to easily communicate with drivers within their vehicles.

Vehicle weights will be displayed in kilograms to both the weighbridge operator and the waste vehicle driver.

The Facility will be provided with an intelligent weighing system, which will automatically register vehicles and accurately record the weight of the contents of each. The weighing system will be capable of producing reports in a format that facilitates their inclusion in the Annual Operations Report.

Details for the Weighing Stations Driver Terminals:

(a) Each weighbridge will be fitted with a driver terminal, which will enable the driver - without leaving his vehicle - to see the weight, register and communicate with the weighing station staff through an electronic communication system.
(b) Registration of vehicles can be achieved by a bar code reader, card reader placed in the terminal or by a radio chip mounted on the vehicle for automatic registration. The terminals will enable printing of receipts to the drivers.
(c) The registration method will have to be agreed by the Agency.
(d) Weighing Computer Station
 (i) The weighing computers and software will be based on good industry practice, thus ensuring:

  (A) fast and simple weighing of vehicles
  (B) evidence of all weighing transactions
  (C) communication with the general administrative system

 (ii) The weighing computer station will be able to produce detailed reports in a format that facilitates their inclusion in the annual operations report. The weighing system will record information automatically in a standard digital format to be agreed with the Agency. The information will be kept in one database.

D.1.e Wheel wash

The Facility will not be equipped with a wheel wash system, and therefore no description of the system is included in this application.

D.1.f Laboratory facilities

The Facility will not be equipped with laboratory facilities as these services will be sub-contracted to independently accredited laboratory.

D.1.g Design and location of fuel storage areas

Diesel will be stored in a tank with a capacity of 100 m^3. ' The tank will be in a bund with a capacity of 110% of the volume of the tank. Suitable equipment will be provided for the unloading and storing of fuel, the tank will be rendered impervious for the fuel therein.

All drainage from storage areas will be diverted for collection and safe disposal.

D.1.h Waste quarantine areas

A waste inspection/quarantine area will be located within the waste reception hall and will comprise of a dedicated impermeable area with all drainage directed for use as process water within the Facility. The inspection/quarantine area will be of a suitable size for the inspection of waste and the subsequent quarantine where required. Here the waste lorry unloads the waste and a skilled person will perform visual inspection of the waste.

If the waste is accepted, it will be transported to the waste bunker.

If the waste is refused, the waste collection company will be responsible for removing the waste from the waste inspection/quarantine area.

In addition to the provision of a waste quarantine area the following procedures will be conducted on site.

- In the waste supplier contracts, it will be specified which incoming waste will be accepted at the Facility.
- In the reception hall regular spot checks of the waste will be performed. If a waste load contains non-conforming waste the whole load will be refused.
- Metal parts or other unsuitable waste parts, unloaded into the bunker, will be removed from the bunker and put into a container in the reception hall awaiting appropriate disposal.

D.1.i Waste inspection areas

The waste inspection/quarantine area will be a designated area of the Waste Reception Hall, and will be inside the building, protected from wind and rain.

Safe and efficient means of removing waste from the waste inspection area either to a vehicle or to the bunker will be provided.

D.1.j Traffic control

Arrival
The two weighbridges for incoming traffic will be located at a sufficient distance from the Site boundary to allow queuing on Site. At the weighbridges there will be traffic control in the form of barriers. There will also be two weighbridges for outgoing traffic to ensure that weighing does not limit the turnaround times of waste vehicles.

Waste reception hall
The 12 unloading chutes in the reception hall will be provided with a green/red signal system that will control the traffic, please see photo from Elsam Odense Waste to Energy facility


Photo 1 Waste reception hall at Elsam Odense Waste to Energy

D.1.k Sewage and surface water drainage infrastructure

All sewage from the building will be connected to the local community sewer system.

All surface water (rainwater) from the roof drainage system and from the hardstanding outside areas (access roads, paved areas) will be collected separately, led through a slit trap and oil separator prior to entering the rainwater storage tank.

All surface water from the inside operations, e.g. water from washing at the waste reception hall, drainage water from boiler and turbine, bottom ash cooling water and water from washing in the bottom ash storage will be recycled in a closed process system and used in the flue gas cleaning system. Please see enclosed drawing GD / MQ001 in attachment B.2

In addition to the above a minor amount of process water may be collected by a tank truck during maintenance and service overhauls

D.1.l All other services

A parking area with dedicated space for two 24 m vehicles and about 35 cars will be provided on the Site. The Main Access Road provides access to the parking area.

D.1.m Plant sheds, garages and equipment compound

Plants sheds and garages will be located within the main building.

D.1.n Site accommodation

The weighbridge operator will be located in a security building at the gate with appropriate space for 1-2 persons.

The Facility will be provided with a service building that will include at least the following:

- offices for administration staff, supervisors and management
- storage rooms for records, manuals, etc.
- shower and toilet facilities
- board room (20 persons)
- canteen comprising a kitchen and a eating area for the use of all personnel who works and/or meets at the Facility

The Facility will be provided with a central security office, at the control room, from which each element of the Facility will be supervised and monitored.

D.1.o Fire control system

All reasonable measures will be taken to prevent the outbreak of fire in the Facility and to ensure, as far as is reasonably practicable, the safety of persons in the Facility in the event of fire. The Facility will be provided with automatic fire detection and warning system and an automatic fire prevention and control system.

It will be ensured that adequate automatic fire detection, fire prevention and fire fighting equipment and features are included in the Facility and that there are a sufficient number of fire escapes in the building, which allow for alternative escape routes. The Access Control System at the gate will include measures to ensure that in the event of fire, escape of persons will always be possible.

Fire sectioning, fire alarm systems and fire safety equipment
In cable safe rooms, a fire detection system will release an inert gas for automatic fire prevention. The boiler and turbine locations will be provided with delivery pipes, hydrants with flexible hoses and portable fire extinguishers.

The following will be provided: dry rises at stair wells with roof exit, hydrants at ground level, foam extinguishers which can cover the silo with foam, water-filled pipeline with flexible hoses in process buildings, fire detection system in process rooms, smoke ventilation duct in roof and emergency lighting.

It is ensured that all fire safety measures will comply with the requirements of the Chief Fire Officer and the applicant will consult with him in this regard. All necessary approvals will be obtained, e.g. Fire Safety Certificate from the Dublin Fire Officer.

D.1.p Civic amenity sites

Civic amenity sites will not be provided at the Facility, and therefore no description of such sites is included in this application.

D.1.q Any other waste recovery infrastructure

In the event that land spreading of sludge will no longer be an option due to environmental constraints, it will be possible to pump the sludge directly to the proposed WtE facility for thermal treatment.

The Facility will be designed to use treated effluent from the Ringsend Waste Water Treatment Works for use in the process and thus reducing the potable water consumption.

D.1.r Composting infrastructure

Not Applicable

D.1.s Construction and demolition waste infrastructure

Not Applicable.

D.1.t Incineration infrastructure

Waste category
The Facility has been planned and designed for the acceptance of household, commercial and non-hazardous industrial waste. This means that there will be no incineration of “hazardous waste” (according to definition in Article 3 EU Directive 2000/76/EC).

Waste acceptance will be determined on contract basis and in accordance with acceptance criteria conditioned by the Agency. Random inspections of all incoming waste will be undertaken.

The recommendations in the Best Available Techniques Reference Document on Waste Incineration are implemented in all incoming waste procedures and will like this meet the requirements of Article 4 of EU Directive 2000/76/EC.

Energy Efficiency
In accordance with the BREF document on Waste Incineration the heating and cooling system has been designed and optimised to achieve a very high overall energy efficiency and energy recovery.

Residues
The two main residues from the incineration process will be bottom ash and flue gas treatment residues.

In order to achieve optimal reduction of flue gas emissions at the Facility a combination of a wet scrubbing process and a semi dry cleaning has been designed. The result will be lower flue gas emission than in traditional flue gas treatment.

BREF (Best Available Techniques Reference Document on Waste Incineration) is implemented in all process techniques in order to meet the demands in Article 4 of EU Directive 2000/76/EC.

Disposal of residues
It is confirmed that the disposal of the residues, which cannot be prevented, reduced or recycled will be carried out in conformity with national legislation.

Monitoring techniques for emissions
The control and monitoring of emissions will be done according to the requirements of EU Directive 2000/76/EC, of national legislation and according to the requirements of the competent authority.

The Dublin Waste to Energy facility will, by applying the **European Standards EN 14181: 2004** and **EN 13284-2: 2004**, meet the requirements for quality assurance of automated measuring systems:

- standard EN 14181:2004 describes quality assurance procedures related to Automatic Measuring Systems (AMS) installed to measure stationary source emissions.
- standard EN 13284-2:2004 describes quality assurance procedures related to Automatic Measuring Systems for the determination of dust in flue gas.

D.1.u Any other infrastructure

Not applicable.

D.2 Facility Operation

In **Attachment D 2** describe the plant, methods, processes and operations of the waste facility, as required by the *Guidance Note*.

Attachment included	yes ☒	no ☐	not applicable

Please refer to Attachment D2 for details regarding Facility Operation.

Attachment D.2
Facility Operation

ATTACHMENT D.2 - FACILITY OPERATIONS

The Dublin Waste to Energy Facility comprises two identical waste-to-energy lines, each with separate boilers and flue gas cleaning.

Each line will have a rated capacity of approximately 35 tonnes/hour at a lower heating value (LHV) of 10.5 GJ/tonne. This is equivalent to a total annual capacity of approximately 600,000 tonnes of waste.

The two lines will supply steam to one complete turbine/generator set with high-voltage system that will be connected to the electrical grid. Cooling of the exhaust steam from the turbine takes place in a seawater-cooled condenser. The net power output from the Facility is expected to be approximately 60 MWe.

The entire operation is divided into the following process units, illustrated by figure D.2-1:

1. Waste handling practices applied before the thermal treatment stage
2. Thermal processing
3. Energy recovery
4. Flue gas treatment
5. Waste water treatment
6. Solid residues

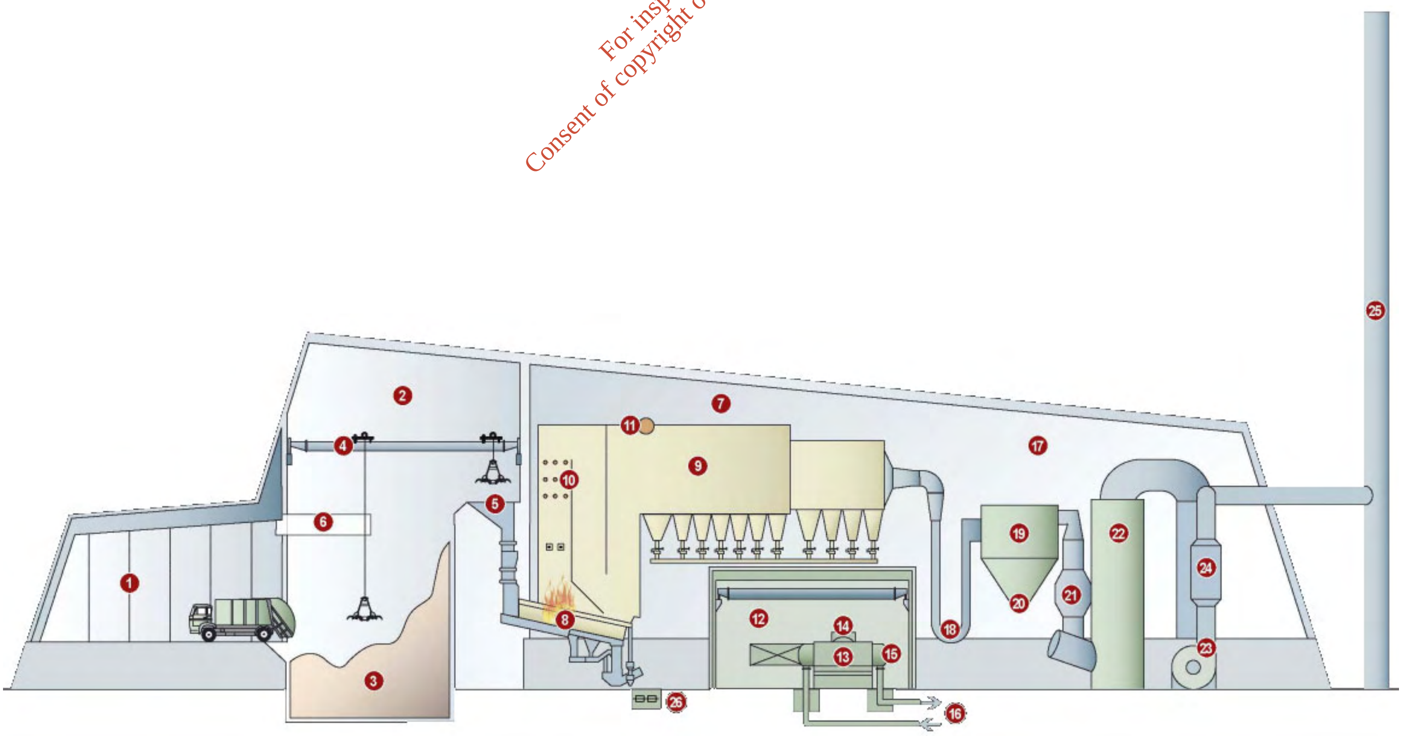


Figure D.2-1: Schematic illustration of the operation process

1. Waste reception hall
2. Waste bunker building
3. Waste bunker
4. Waste crane for feeding the boiler grate
5. Waste hopper
6. Control room
7. Boiler building
8. Grate
9. Boiler, where the heat energy is transferred from the flue gas to the boiler water
10. NO_x reduction by spraying ammonia water into the flue gas
11. Boiler drum, where water and steam are separated
12. Turbine building
13. Steam turbine
14. Generator, producing electricity
15. Condensator, where the remaining heat energy in the steam is cooled
16. Cooling system
17. Flue gas cleaning building
18. Activated carbon and lime are added to the flue gas to bind dioxins and other components to the fly ash
19. Fabric filter, where the fly ash is removed from the flue gas
20. Fly ash for deposit
21. Flue gas cooler
22. Two-stage wet scrubber for reduction of HCl, SO2, HF and Hg emissions
23. ID fan
24. Silencer
25. Stack
26. Bottom ash for recycling

Waste handling practises

When the waste arrives at the Facility it will be logged electronically at the weighbridge.

The waste will be stored in the waste bunker. The bunker capacity will as a minimum provide for the storage of scheduled waste deliveries for one week. The size of the waste bunker will make mixing of the waste prior to thermal treatment possible. The mixing creates a more homogenous fuel, which is important for an optimum combustion process.

In order to ensure high availability, two cranes will be installed, each with sufficient capacity to handle the waste in the bunker and to feed both waste to energy lines.

Thermal processing

Waste will be fed to the combustion chamber via a hopper situated above the waste feeding chute. The waste feeding hoppers will be kept filled with solid waste in order to reduce air ingress into the combustion chamber. The waste is fed into the furnace by means of a number of feeding pushers, which are integrated in the control of the combustion process.

The combustion grate, where the incineration of the waste occurs, is of the moving grate type. The moving grate is a well-proven technology.

The boiler is a natural circulation boiler of the horizontal type with three empty vertical passes and one horizontal convection pass with evaporator, superheaters and economisers.

The combustion chamber is a fully evaporator-cooled chamber consisting of fully welded, gas proof membrane pipe walls (panels). Primary combustion air is drawn from the waste bunker, thus keeping the waste reception hall and the waste bunker area under negative pressure and preventing the release of odours and dust from these areas.

Secondary air is drawn from the top of the boiler house and from the bottom ash extraction area.

The waste feed rate, the supply of primary and secondary combustion air and the grate speed are controlled by an advanced combustion control system which measures flow rate, flue gas oxygen and combustion temperature in order to obtain the best possible operational conditions.

A secondary combustion zone will be established after the last combustion air injection. It will be dimensioned in order to comply with the requirements of Article 6 of the Incineration Directive regarding flow conditions, residence time and a temperature of 850° C for two seconds as a minimum in the normal load range and without auxiliary firing.

The boiler will be equipped with light oil auxiliary burners, which will be able to fire the boiler up to 850° C for start-up. The auxiliary burner installation will not be in use under normal operation.

The boiler will be constructed for the simplest possible operation, monitoring and maintenance. The boiler will be cleaned using a combination of online and offline boiler cleaning techniques to reduce dust residence and accumulation in the boiler.

The boiler will have a thermal conversion efficiency of >90%.

Energy recovery

The Facility is currently designed to optimise power output. The Facility is also designed for District Heating purposes and when a district heating system comes into operation this can be implemented with minor modifications to the equipment.

The turbine design optimises the power output and thus the electricity supply regime, as no heat supply regime is in place at present. The condenser pressure is minimised using cooling water from the River Liffey thus securing a higher electrical efficiency compared to that obtained with air-cooled condensers and/or wet cooling towers.

The design thus results in a net power output of approximately 60 MW equivalent to a net power efficiency of approximately 29%.

Flue gas treatment

The flue gas cleaning process comprises an active carbon and semi-dry lime scrubbing process followed by particle removal in a fabric filter followed by a two-stage wet scrubbing process.

The waste scrubbing process will remove the vast majority of HF, HCl, SO2 and Hg left from the semi-dry stage. In order to avoid wastewater from the flue gas cleaning process, the small amount of wastewater from the wet process is evaporated in the boiler.

The reduction of dioxin takes place by adding activated carbon to the flue gas prior to the fabric filter, where the dioxin and activated carbon is collected together with fly ash and FGT-residues.

The reduction of NO_x from the combustion process will take place in a selective non-catalytic reduction (SNCR) process by injecting ammonia water (NH_4OH) into the first pass of the boiler, thus securing compliance with the Waste Incineration Directive 2000/76/EEC.

Wastewater treatment

The Facility will be equipped with a rainwater collection system enabling collection and reuse of rainwater in the process. The rainwater will be led to a technical water tank and from this tank the water will be used within the process, e.g. in the bottom ash extraction system and the flue gas cleaning system. Wet scrubber effluent will be re-circulated within the scrubber system.

In the bunker the waste will absorb any water, therefore no drainage system is provided in the bunker. When the waste is incinerated, the water will be released as water vapour in the boiler. Any contamination in the water will thus be caught in the flue gas cleaning system.

Separate systems will be implemented for drainage, treatment and discharge of rainwater that falls on the Site, including roof water, so that it does not mix with potentially or actually contaminated wastewater streams. Surplus rainwater, which cannot be stored on site, will be discharged to the public sewer.

The Facility will utilise cooling water from River Liffey. Under normal operating conditions, the amount of cooling water required is expected to be approximately 3.5 m^3/sec, heated to 9 °C above intake temperature.

Sanitary wastewater will be discharged to the public sewer

Solid residues

Bottom ash constitutes the largest percentage of solid products resulting from the combustion process.

After burnout of the refuse at the end of the grate, the combustion bottom ash falls down the bottom ash chute into the water bath of the wet ash extractor. The bottom ash consists of inert materials from the combustion process such as glass, metal, earth and other fractions. It is stored in a separate bottom ash bunker with sealed surfaces.

The bottom ash bunker is located adjacent to the boiler area on the north side of the Facility. The bottom ash bunker offers a temporary storage capacity of approximately 10,000 tonnes. This is equivalent to the amount of bottom ash produced over a period of approximately 1 month.

The flue gas treatment residue containing fly ash, calcium-based salts, lime and activated carbon (or coke) is collected in the hopper(s) of the fabric filters. The fly ash collected in the hoppers is continuously discharged via a screw conveyor especially developed for refuse incineration plants.

The flue gas treatment residue is transported pneumatically to two (2) fully enclosed silos/steel tanks located north of the flue gas cleaning area. The steel tanks have sealed surfaces and a gross volume of approximately 700 m^3 in total.

LANDFILLS

The following Sections D3 to D7 should only be completed for Landfill Applications. Reference should be made to the Agency landfill manual 'Landfill Site Design (2000)' when completing this section.

D.3 Liner System

Complete the following table regarding the liner system to be used for the landfill/landfill extension and detail the information requested as **Attachment D.3**. ***Items D3c to D3g should only be completed for immediate projects only (ie Years 1 & 2).*** A schedule of Liner construction activities for the medium to long term need only be listed in item D3a below, since Condition 3 of any licences granted will provide reporting requirements for any future projects.

TABLE D.3 LINER SYSTEM

		y/n	Comments
D.3.a	**Provide information to fulfil Annex 1 of the Landfill Directive**		Not Applicable
D.3.b	**What type of liner system is specified?**		Not Applicable
D.3.c	**Has a Quality Control Plan been specified?**		Not Applicable
D.3.d	**Has a Quality Assurance Plan been specified?**		Not Applicable
D.3.e	**Have independent, third-party supervision, testing and controls been specified?**		Not Applicable
D.3.f	**Have basal gradients for all cells and access ramps to the cells been designed?**		Not Applicable
D.3.g	**Has a leak detection survey been specified?**		Not Applicable

TABLE D.4.1 LEACHATE MANAGEMENT ARRANGEMENTS

		y/n	Comments
D.4.a	Is there a Leachate Management Plan?		Not Applicable
D.4.b	Have annual quantities of leachate been calculated?		Not Applicable
D.4.c	Has the total quantity of leachate been calculated?		Not Applicable
D.4.d	Have the size of the cells been specified taking account of the water balance calculations?		Not Applicable
D.4.e	Has a leachate collection system been specified?		Not Applicable
D.4.f	Has a leachate storage system been specified?		Not Applicable
D.4.g	Has a system for monitoring the level of leachate in the waste been designed?		Not Applicable
D.4.h	Is leachate recirculation proposed/practised?		Not Applicable
D.4.i	Has leachate treatment on-site been specified?		Not Applicable
D.4.j	Has leachate removal been specified?		Not Applicable

D 5 Landfill Gas Management

All landfill sites should have suitable arrangements for the management of landfill gas. **Attachment D.5** should contain the appropriate documentation. Information provided should follow the sequence, and use the headings, established in Table D.5. ***Items D5g to D5m should only be completed for immediate or current gas collection projects only (ie Years 1 & 2).*** A schedule of gas management aspects for the medium to long term need only be listed in item D5f below, since Condition 3 of any proposed decision/licence will provide reporting requirements for any future projects.

Table D.5. Landfill Gas Management

		y/n	Comments
D.5a	**Is there a Landfill Gas Management Plan?** **Provide estimates of the volumes of landfill gas which will be produced by the waste disposed of in the site for the next 20 years, and compare to the EPER list for methane:**		Not Applicable
D.5b	**Is there a passive venting system?**		Not Applicable
D.5c	**Does the passive system cover all of the filled area?**		Not Applicable
D.5d	**Have gas alarm systems been installed in the site buildings?**		Not Applicable
D.5e	**Have measures been installed to prevent landfill gas migration (e.g. barriers)?**		Not Applicable
D.5f	**Has a time-scale been proposed for the installation of landfill gas infrastructure?**		Not Applicable
D.5g	**Is gas flaring undertaken at the site?**		Not Applicable
D.5h	**Is there an active (i.e., pumped) landfill gas extraction system?**		Not Applicable
D.5i	**Does the active system cover all of the filled area?**		Not Applicable
D.5j	**Is landfill gas used to generate energy at the site?**		Not Applicable
D.5k	**Have emissions from the flarestack and utilisation plant been assessed for source, composition, quantity and level and rate?**		Not Applicable
D.5l	**Has a maintenance programme for the control system been specified?**		Not Applicable
D.5m	**Has a condensate removal system been designed?**		Not Applicable

D.6 Capping System

Complete the following table detailing the design of the capping system. **Attachment D.6** should contain the appropriate documentation. ***Items D6e to D6k should be completed <u>for immediate projects only</u> (ie Years 1 & 2).*** Condition 10 of any proposed decision/licence will provide reporting requirements for capping requirements beyond this timeframe.

Table D.6 Capping System

		y/n	Comments
D.6a	**Has the daily cover been specified?**		Not Applicable
D.6b	**Has the intermediate cover been specified?**		Not Applicable
D.6c	**Has the temporary capping been specified?**		Not Applicable
D.6d	**Has the Capping System been designed and does it meet the requirements of the Landfill Directive Annex 1 (3.3)?**		Not Applicable
D.6e	**Does the Capping System include a flexible membrane liner?**		Not Applicable
D.6f	**Have all capping materials been specified?**		Not Applicable
D.6g	**Has a Method Statement for construction been produced?**		Not Applicable
D.6h	**Has a Quality Control Plan been produced?**		Not Applicable
D.6i	**Has a Quality Assurance Plan been produced?**		Not Applicable
D.6j	**Has a programme for monitoring landfill stability been developed?**		Not Applicable
D.6k	**Has a programme for monitoring landfill settlement been developed?**		Not Applicable

SECTION E EMISSIONS

Give particulars of the source, location, nature, composition, quantity, level and rate of emissions arising from the activity and, where relevant, the period or periods during which such emissions are made or are to be made.

The applicant should address in particular any emission point where the substances listed in the Schedule of S.I. 394 of 2004 are emitted.

E.1 Emissions to Atmosphere

Details of all point emissions to atmosphere should be supplied. Table E.1.(i) (for Landfill Gas Flare emissions) must be completed for all landfills with a flare. Complete Table E.1(ii) and E.1(iii) for all other main emission points, including stack sources (incinerator stacks, landfill gas utilisation plants, air handling unit emissions etc.). Complete Table E.1(iv) for minor/fugitive/ground emission points.

Please refer to Drawing UZT / BE008 for the locations of the following point emissions to atmosphere:

A2-1 Waste to Energy line 1 stack of 100 m
A2-2 Waste to Energy line 2 stack of 100 m
A2-3 Emergency Diesel Generator exhaust.

Please refer to Attachment E.1 and Table E.1(ii) and E.1(iii) for details on point emissions.

Attachment E.1
Emissions to Atmosphere

ATTACHMENT E.1 - EMISSIONS TO ATMOSPHERE

Please see drawing UZT/BE008 for an appropriately scaled plan of the site (≤A3) indicating each emission point.

The heading below follows the sequence of the Waste Application Guidance Notes for the completion of Attachment E.1.

Composting emissions

Not applicable.

Particulates – waste storage/treatment/handling

Incoming waste storage/treatment/handling

Emissions from the bunker will be avoided by taking the primary air for the boilers from the bunker area and thus creating a negative pressure in the enclosed bunker/reception area. In addition, shutters will be provided at each of the unloading bays to further avoid any particulate emissions to the surrounding environment.

No particulate emissions are expected from incoming waste, and Table E.1(iv) has thus not been completed for particulate emissions from incoming waste.

Bottom ash storage/treatment/handling

The bottom ash storage bunker will be located inside the main building The secondary combustion air for the boilers will be taken from the bottom ash storage/treatment/handling area, preventing any dust emissions from these areas.

In addition it should be noted that the bottom ash will be extracted from the boiler's water bed, which means that the physical properties of the bottom ash will be similar to those of wet earth/gravel.

No particulate emissions are thus expected from bottom ash, and Table E.1(iv) has thus not been completed for particulate emissions from bottom ash storage/treatment/handling.

Consumables and flue gas cleaning residues

The consumables, such as lime, activated carbon and flue gas cleaning residues, will be stored in closed silos inside the building in the western part of the building. When the silos are emptied, the material will be transported to silo trucks in closed systems.

No particulate emissions are thus expected from consumables and flue gas cleaning residues, and Table E.1(iv) has thus not been completed for particulate emissions from consumables and flue gas cleaning residues.

Landfill gas emissions

Not applicable.

Landfill leachate emissions

Not applicable.

Infectious organisms/pathogens (clinical waste handling)

Not applicable.

Thermal oxidizer emissions

The Facility will include two wastes to energy lines, which will result in thermal oxidizer emissions. These are marked as A2-1 and A2-2 on drawing UZT/BE008. The relevant tables of Annex 1 Standard Forms have been completed for A2-1 and A2-2.

Other emissions
The Facility will include emergency diesel generators. The emission point from the emergency diesel generators is marked as A2-3 on drawing UZT/BE008. The relevant tables of Annex 1 Standard Forms have been completed for A2-3.

The Waste Application Guidance Notes specifies that in addition to the above listed items 1-7 the following items 8-13 must also be addressed

Dust emissions from solids stored in the open
There will be no dust emissions from solids stored in the open, as consumables and residues will be stored inside the building

Loading and unloading operations
The loading and unloading operations of incoming waste, bottom ash, consumables and flue gas cleaning residues will take place within the building screen under negative pressure. Any emissions from loading and unloading operations will form part of the combustion air.

Cleaning operations
There will not be emissions to the open from cleaning operations, as these take place inside the building. For wastewater handling please see Sections E.2 to E.3 of this Waste Licence Application.

Emissions from wastewater/leachate treatment (e.g. volatile organics)
For wastewater handling, please see Sections E.2 to E.3 of this Waste Licence Application.

Emissions from any pressure release valves on waste liquid tanks
There will not be emissions to the open from any pressure release valves on waste liquid tanks.

Emissions from composting, including odour and bio-aerosols
Not applicable.

E.2 Emissions to Surface Waters

Attachment E.2 Tables E.2(i) and E.2(ii) should be completed where relevant.

Refer to Attachment E.2.

Attachment E.2
Emissions to Surface Waters

ATTACHMENT E.2 - EMISSIONS TO SURFACE WATER

Rainwater and Sewage

There will be no direct discharge to surface water, of process, sewage or rainwater from the Dublin WtE facility.

The Facility will be connected to the Ringsend Wastewater Treatment Works via a new main combined sewer connection to an existing manhole in the 1800mm diameter Storm Water and Foul Sewer, which runs along the northern Site boundary in the public road, Pigeon House Road.

Separate drainage systems will be provided in the facility for sanitary drainage and for storm water drainage from roofs, roads and parking areas.

Sanitary effluent from the Facility will be generated from the sanitary installations in the kitchens, toilets, floor drains and showers in the administration area and will be discharged to the existing main Storm Water and Foul Sewer in Pigeon House Road.

There will be no discharge of process wastewater from the Facility. All process waste waters from the WtE Facility, such as boiler blow down, boiler water treatment reject water and scrubber water will be collected for recycling in the Flue Gas Treatment System or used for humidification/cooling of the bottom ash outlet. Wash water will be discharged to the floor drains in the boiler house, etc. will also be collected and used in the process water system.

All the surface water run-off from the roofs of the buildings and from the roads, parking areas and capped landscape areas will be collected and stored in the rainwater storage tank in order to enable use of the collected rainwater in the facility process.

The construction of the new main combined sewer connection will include construction of an underground rainwater tank or reservoir with a volume at approximately 750m³. Runoff from roof areas will discharge directly to the underground rainwater tank. The runoff from paved areas will be discharged via a silt trap or grit trap and an oil separator, in order to separate oil, silt and other debris from the water, to the reservoir. The storm water overflow from the reservoir will be diverted to the combined storm water and foul sewer on Pigeon House Road.

References are made to drawing no. GD/MQ001, Water Flow Diagram and drawing no. UZT/BE040, Drainage and Sewage.

Cooling Water Discharge to River Liffey

For a detailed description of the cooling water discharge to the Liffey, please refer to Chapter 12 of the EIS.

E.3 Emissions to Sewer

Attachment E.3 Tables E.3(i) and E.3(ii) should be completed, where relevant.

The only discharge to the sewer will be sanitary effluent and storm water run-off. (Please see Attachment E.3).

During maintenance minor quantities of wastewater may be collected by a licensed waste collection company for recovery or disposal at a licensed facility.

Attachment E.3
Emissions to Sewer

ATTACHMENT E.3 EMISSIONS TO SEWER

The Facility will be connected to the Ringsend Wastewater Treatment Works via a new main combined sewer connection to an existing manhole in the 1800mm diameter Storm Water and Foul Sewer, which runs along the northern Site boundary in the public road, Pigeon House Road.

Separate drainage systems will be provided in the facility for sanitary drainage and for storm water drainage from roofs, roads and parking areas.

Sanitary effluent from the Facility will be generated from the sanitary installations in the kitchens, toilets, floor drains and showers in the administration area and will be discharged to the existing main Storm Water and Foul Sewer in Pigeon House Road.

There will be no discharge of process wastewater from the Facility. Process waste waters from the WtE Facility, such as boiler blow down, boiler water treatment reject water and scrubber water will be collected for recycling in the Flue Gas Treatment System or used for humidification/cooling of the bottom ash outlet. Wash water will be discharged to the floor drains in the boiler house, etc. will also be collected and used in the process water system.

A flow meter will be arranged on the potable water system in order to measure the sanitary effluent water, which is discharged to the new main combined sewer pipeline.

A volume of 5000m³ per year of wastewater consisting of sewage and surplus storm water is expected to be discharged to the main Storm Water and Foul Sewer in Pigeon House Road.

All the surface water run-off from the roofs of the buildings and from the roads, parking areas and capped landscape areas will be collected and stored in the rainwater storage tank in order to enable use of the collected rainwater in the facility process.

The construction of the new main combined sewer connection will include construction of an underground rainwater tank or reservoir with a volume at approximately 750m³. Runoff from roof areas will discharge directly to the underground rainwater tank. The runoff from paved areas will be discharged via a silt trap or grit trap and an oil separator, in order to separate oil, silt and other debris from the water, to the reservoir.

The design of the surface water drainage network for the Facility is based on a rainfall return period of more than 2 year with a maximum rainfall intensity of 7.8 mm/10min.

The design of the rainwater reservoir for the Facility is based on a rainfall return period of 1 year with a maximum rainfall intensity of 28.1 mm/12hr.

The rainwater tank will be provided with an overflow connection to the main combined sewer pipeline.

The reservoir surface water tank will be provided with a monitoring arrangement for measurement of continues pH-values for the restored water in the tank, in order to prevent discharge of overflow from the reservoir surface water tank with pH-values exceeding the permission.

There will be no emission to the ground or direct discharge to groundwater of rainwater, sewage or process wastewater from the Facility. Nevertheless, it is proposed to monitor the quality of groundwater under the Site annually.

Water will be consumed in the process at the rate of approximately 32 m³ per hour in the flue gas treatment system, bottom ash humidification and cooling, and boiler makeup water. Approximately 0.55 m³ per hour will be required for non-process use. Effluent from the process will be reused and rainwater from roofs, roads and parking areas will be collected to minimize the consumption of main water.

The 30-year (1961-1990) average annual rainfall at Dublin City was 710 mm. Rainfall will be collected from roofs, roads and parking areas with an area of approximately 34,500 m². It is estimated that there will be approximately 22,000 m³ rainwater available per annum, which will leave a deficit of approximately 253,500 m³ per annum of water required from the water mains supply (based on 365 days per year of operation on Site).

References are made to Drawing no. UZT/BE40, Drainage and Sewage and Drawing no. GD/MQ001, Water Flow Diagram.

E.4 Emissions to Groundwater

Describe the existing or proposed arrangements necessary to give effect to Articles 3,4,5,6, and 7 of Council Directive 80/68/EEC of 17 December 1979 on the protection of groundwater against pollution by certain dangerous substances.

There will be no discharge of rainwater, sewage or process wastewater to groundwater.

Table E.4(i) should be completed, as relevant, for each source.
Supporting information should form **Attachment E.4**

E.5 Noise Emissions

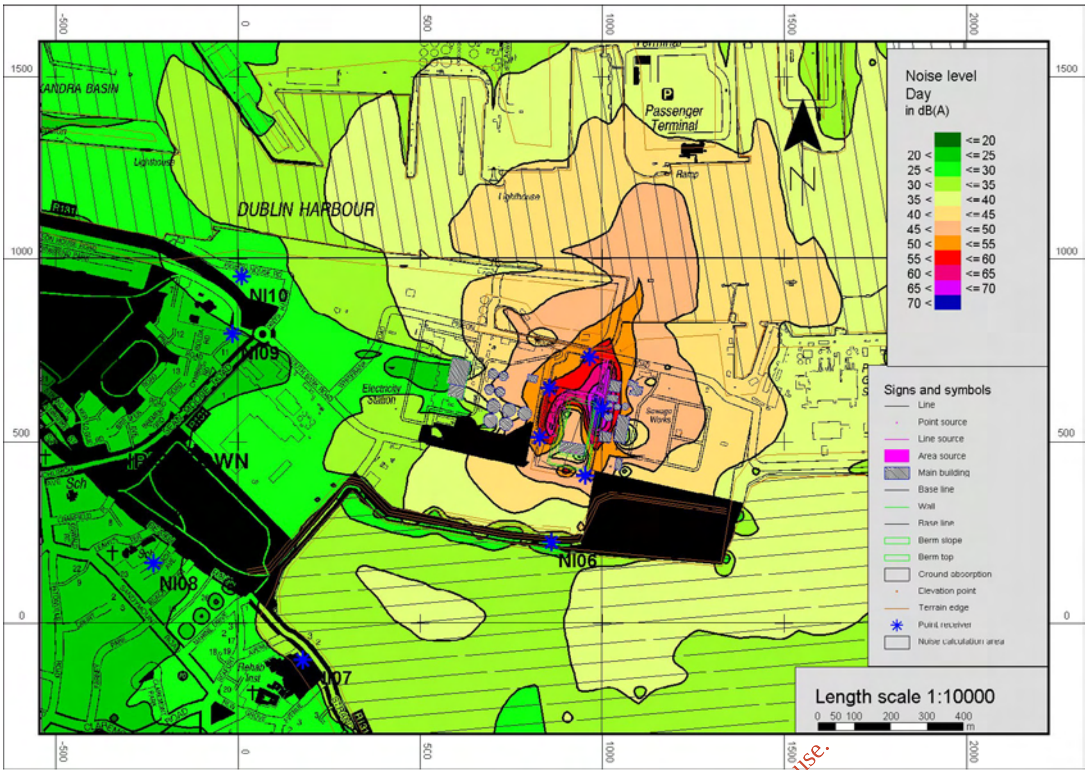
The noise emission from the planned waste to energy plant has been predicted. A detailed 3-D sound calculation model of the plant has been used for this purpose. The calculation of the total noise emission of the plant is based on contributions from the significant planned noise sources.

The sound power level of some of the noise sources is based on experienced values from other similar waste to energy plants, e.g. noise from stacks and ventilation systems. Other sources, e.g. noise from trucks, are standard values taken from acoustics tables. The sound power level of the facades is calculated based on the attenuation values of the material in the facades and a maximum allowable internal sound pressure level of 85 dB(A).

Some of the more dominant noise sources are trucks, stack tops, facades and ventilation. Depending on the receiver position, various sources dominate. As an example, noise from trucks is dominant at the site boundary to the north of the site. In general, low positioned noise sources are likely to dominate at the site boundary, and noise sources at high positions are more likely to dominate in more distant residential areas.

The operation of the power plant is continuous day and night, 365 days a year. Some basic noise sources are therefore constant round the clock, e.g. noise from stacks, facades, etc.

The noise emission in dB(A) to the surroundings during the day period are shown in the following picture.



Noise emission. Specific noise. Day period. Sound pressure level [dB(A) re 20 μPa].

Information on the single noise source such as position, sound power level, period of emission, etc. is shown in Table E.5(i) of Annex 1 Standrad Forms. As the facility has not been built yet the precise locations for the noise sources may change.

Details of the noise calculations are reported in Test Report 240076, "Dublin Waste to Energy, Calculations of Noise emission", which is prepared as Appendix 9.2 of the EIS to this application.

Potential vibration sources are turbine, generator and ID fan, all situated inside the building. None of these components will be able to produce ground vibrations at a magnitude that can cause damage to surrounding buildings or persons while in operation. The distance to residential areas is so large that no ground vibrations will spread to these areas.

For further details regarding noise emission please refer to Chapter 9 of the EIS.

E.6 Environmental Nuisances

Attachment E.6 should contain the appropriate documentation. Information provided should follow the sequence, and use the headings as relevant established in Table D.6. Additional advice on completing this section is provided in the *Guidance Note*.

TABLE E.6 ENVIRONMENTAL NUISANCES

Bird Control	Control method specified	yes ☒	no ☐	not applicable ☐
	Attachment included	yes ☒	no ☐	not applicable ☐
Dust Control	Control method specified	yes ☒	no ☐	not applicable ☐
	Attachment included	yes ☒	no ☐	not applicable ☐
Fire Control	Control method specified	yes ☒	no ☐	not applicable ☐
	Attachment included	yes ☒	no ☐	not applicable ☐
Litter Control	Control method specified	yes ☒	no ☐	not applicable ☐
	Attachment included	yes ☒	no ☐	not applicable ☐
Traffic Control	Control method specified	yes ☒	no ☐	not applicable ☐
	Attachment included	yes ☒	no ☐	not applicable ☐
Vermin Control	Control method specified	yes ☒	no ☐	not applicable ☐
	Attachment included	yes ☒	no ☐	not applicable ☐
Road Cleansing	Control method specified	yes ☒	no ☐	not applicable ☐
	Attachment included	yes ☒	no ☐	not applicable ☐

Attachment E.6
Environmental Nuisances

ATTACHMENT E.6 - ENVIRONMENTAL NUISANCES

Bird Control

No waste will be transported or stored without cover and the waste will therefore not be exposed to birds.

In the Facility, all waste will be unloaded under cover in the waste reception hall.

All parts of the facility will be kept clean and tidy through good housekeeping practices. These measures will minimise the potential of bird nuisance.

Dust Control

When the facility is in operation, the potential sources of dust will be from the handling of the powdered utility materials, the ash and the flue gas treatment residues. Chapter 10 of the EIS describes the storage, handling and transport of these materials on site and details the dust control measures.

Dust emissions from the waste bunker will be controlled by keeping it and the reception hall under negative pressure. Combustion air for the boilers will be drawn into the reception hall from outside, through the door openings, and then drawn from the reception hall to the space above the waste bunker, from where it will be drawn into the furnaces. This will ensure that no dust will be emitted to the outside.

The site roads and parking areas will be paved with asphalt or concrete, so there should be no dust generated by traffic using them. All vehicles carrying waste to the facility will be covered.

Fire Control

The fire control and emergency response measures, which will be in place at the facility, are described in detail in Chapter 5 of the EIS.

Litter Control

It will be facility management's policy that the vehicles carrying waste to the facility must be covered. The facility's waste acceptance policy will be used to deter deliveries of uncovered waste. Solid waste will be discharged from the enclosed reception hall, via chutes, to the enclosed bunker. The reception hall and waste bunker will be under negative pressure, with the air from these areas being drawn into the furnaces for combustion. This will ensure that no litter will be emitted to the outside.

The bunker will have sufficient capacity to store waste when the plant is shut down for short periods and to allow continuous operation of the furnaces over long weekends when there are no waste deliveries.

The Site will be kept clean, odourless and litter free through regular sweeping and cleaning, and the close monitoring of activities.

The good housekeeping practices will include a 'litter patrol' of the facility and the access road to ensure that all roads are litter free.

Traffic Control

Chapter 7 of the EIS presents a detailed traffic study. This study describes the local road network, the traffic on the road network, the traffic to be generated by the facility and the impact this traffic will have on the road network.

The access roads and internal roads on the Site have been designed to ensure smooth traffic flow. There will be speed limits on internal roads.

Parking lay-bys for HGVs will be provided immediately inside the entrance. The HGVs will enter the facility and park temporarily in the lay-by in order to obtain instructions as to where to proceed to complete the waste acceptance procedures. Thus all trucks will be able to enter the facility on arrival and will not have to queue on the public road. Trucks on a regular contract will have a swipe card to activate the security barrier and allow them to proceed directly to the reception hall, without the need to provide documentation to the security staff. The swipe card will allow their data to be recorded automatically.

Vermin Control

The reception hall and bunker will be enclosed, which should reduce the potential for vermin associated with the incoming waste. This will minimise the potential for vermin in this part of the facility.

A specialist company will be employed to implement a vermin control plan. This company will assess the vermin control measures required, including whether to use traps or poison and the number and location of control points. It is envisaged that the company will make regular site visits and facility management will maintain records of the visit.

Road Cleaning

Chapter 18 of the EIS specifies the measures to be taken during construction to keep the access road free of mud and dirt.

During the Operational Period the Site will be kept clean, and odour and litter free through regular sweeping and cleaning, and the close monitoring of activities.

The site roads and service yards will be paved with asphalt or concrete and the waste trucks will be covered. These measures will ensure that roads are kept clean. This will ensure that no odours, dust or litter will be emitted to the outside.