Acciona Industrial

NESS Energy from Waste Facility

Pollution Prevention and Control Permit Application - Non-Technical Summary

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Contents

Appendices

Glossary

AC	Alternating current
ACC	Air Cooled Condenser
APCr	Air Pollution Control residue
BAT	Best Available Techniques
C&I	Commercial and Industrial
CEMS	Continuous Emission Monitoring System
CHP	Combined Heat and Power
CFD	Computerised Fluid Dynamics
CMS	Control Management System
CoTC	Certificate of Technical Competence
CV	Calorific Value
DLC	Design Load Case
DMZ	Demilitarized Zone
DSEAR	Dangerous Substances and Explosive Atmospheres Regulations 2002
EfW	Energy from Waste
ELVs	Emission Limit Values
EMS	Environmental Management System
EWC	European Waste Catalogue
FGR	Flue Gas Recirculation
GWP	Global Warming Potential
HMI	Human Machine Interface
IBA	Incinerator Bottom Ash
ID	Induced Draft
IED	Industrial Emission Directive
IMS	Integrated Management System
LCV	Low Calorific Value
LSS	Lean Six Sigma
MJ/kg	Megajoules per kilogram
MWth	Megawatts thermal
NVMP	Noise and Vibration Management Plan
NVQ	National Vocational Qualification
MIS	Management Information System
MSW	Municipal Solid Waste
PAC	Powdered Activated Carbon
PLC	Programmable Logic Controller
POCP	Photochemical Ozone Creation Potential
PPC	Pollution Prevention Control
PWWB	Process Waste Water Basin
QHSE	Quality, Health and Safety, and Environment (Manager)
RCV	Refuse Collection Vehicle
TOC	Total Organic Carbon
SEPA	Scottish Environment Protection Agency
SCADA	Supervisory Control and Data Acquisition
TOC	Total Organic Carbon
WAMITAB	Waste Management Industry Training and Advisory Board
WAP	Waste Acceptance Protocol

WCA	Waste Collection Authority
WDA	Waste Disposal Authority
WID	Waste Incineration Directive
WTN	Waste Transfer Note
WTS	Waste Transfer Stations

1 Introduction

1.1 Overview

This document is the Non-Technical Summary submitted to the Scottish Environment Protection Agency (SEPA) in support of an application by EfW NESS Limited (the Applicant) for a Pollution Prevention and Control (PPC) permit to operate the NESS Energy project[1] Energy from Waste (EfW) facility. EfW NESS Limited is a whole owned subsidiary of Acciona Industrial and is subsequently referred to as Acciona in this report.

The development site is located within the established East Tullos Industrial Estate on the south side of Aberdeen. The location of the site and redline boundary is shown in Appendix A. It is centred on National Grid Reference NJ 95426 03997 and OS grid reference E 395427 N 803991.

The operation of the facility is regulated in accordance with the Pollution Prevention and Control (Scotland) Regulations 2012 (PPC Regulations), which implement Directive 2010/75/EU, on industrial emissions (integrated pollution prevention and control), the Industrial Emission Directive (IED).

This report sets out how the design and operation of the EfW facility will meet the requirements of the legislation and all associated guidance.

[1] North East Scotland Shared Energy (from Waste) project.

2 Application Summary

2.1 Background to application

The Waste (Scotland) Regulations 2012 were introduced by the Scottish Government to change the way the population of Scotland views waste and to encourage a reduction in the generation of waste materials, promote reuse and recycling of any waste that is produced therefore leaving as little as possible to be disposed of. The regulations announced a ban on putting biodegradable waste into landfill, to come into force in 2021 and effectively bans the landfill of municipal residual waste.

In 2016, Aberdeen City, Aberdeenshire and Moray Council together sent over 170,000 tonnes of untreated waste to landfill and concluded that a joint Energy from Waste facility is the best option for providing a local solution for waste disposal while generating electricity and heat to benefit the local community.

2.2 The proposed facility

The installation is located on the East Tullos Industrial Estate, Aberdeen (National Grid Reference NJ 95426 03997) see Appendix A. The site is located in the proximity of other waste management facilities, including Biffa Waste Services Ltd, Suez Recycling & Recovery UK and NORM Solutions. It is a brownfield site, which is currently vacant, with a total area of approximately two hectares (4.9 acres).

The address of the facility is:

Greenbank Crescent,

East Tullos Industrial Estate,

Aberdeen,

Scotland,

AB12 3BG.

The proposed EfW facility is designed to treat source segregated residual municipal solid waste (MSW) and commercial and industrial (C&I) waste streams of a similar nature. MSW, simply put, is residential waste that isn't put out for recycling. Industrial waste is waste generated by factories and industrial plants. Commercial waste is waste arising from the activities of wholesalers, catering establishments, shops and offices.

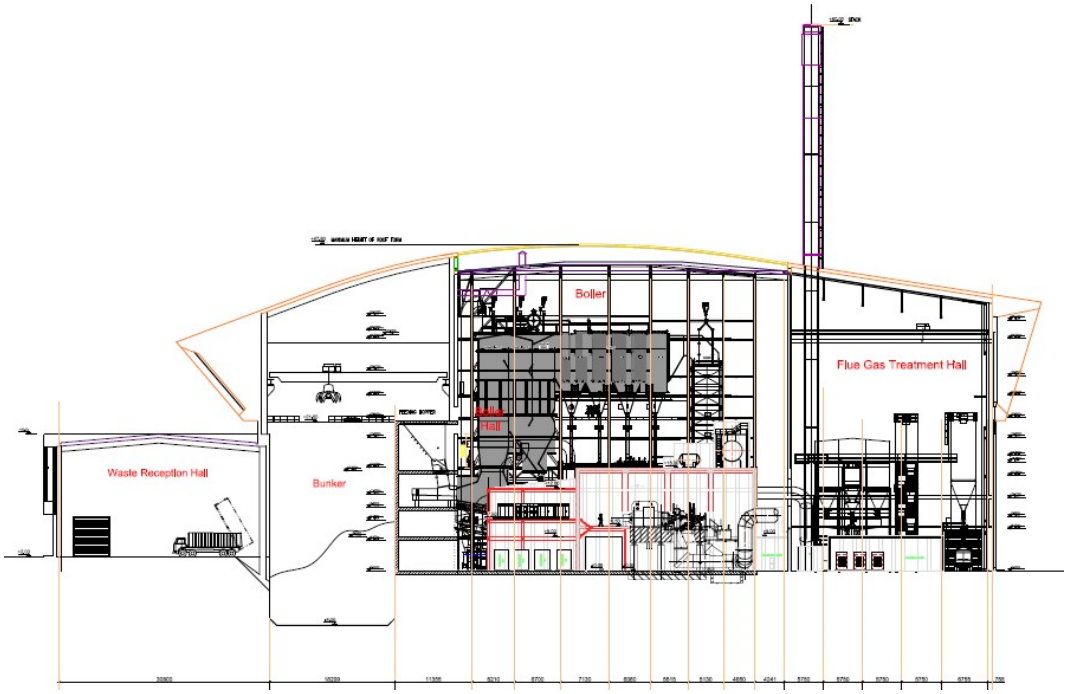
The new facility will include the following activities:

- Delivery of MSW and C&I waste to the waste reception hall.
- A waste reception and handling system which enables tipping of waste into the storage bunker, inside the waste reception hall.

- Blending of the incoming wastes within the waste storage bunker to produce a consistent waste fuel feed to the furnace and an optimised combustion process.
- Combustion of the feed waste within the furnace and combustion chamber including a two second combustion of the flue gas at a minimum of 850ºC.
- The hot gases from the combustion processes will be used to produce steam to generate electricity via a steam turbine generator and to provide heat. The electricity will be exported to the local electrical distribution network and it will be possible to export heat, in the form of steam, to the neighbouring district heating network when one is commissioned.
- The treatment of combustion gases before release via the chimney. This includes removing nitrous oxides, dioxins and furans which are adverse to human health.
- Raw material and process residues storage and handling.

The facility will have operating treatment capacity of 150,000 tonnes of waste per annum and operate for 8000 hours per year. A cross section of the EfW CHP facility is included in Figure 1.

Figure 1 EfW CHP facility cross section



2.3 The Applicant

The legal applicant ('the Applicant') is EfW NESS Limited, which is a wholly owned subsidiary of whole owned subsidiary of Acciona Industrial. The applicant is considered to be a "fit and proper person" under the Pollution Prevention and Control (Scotland) Regulations 2012. The management of the facility will be in the hands of a technically competent person, and the appropriate training certificates of competence has been provided in Appendix B.

3 Site condition report

The Site Condition Report sets out to record of the current condition of the site, gives a description of the substances that will be present on-site as part of the facility and assesses the likelihood of emissions to ground and groundwater occurring during the operation of the facility.

The investigations performed on the site have identified the presence of contaminants within soils that may pose a risk to a range of receptors including human health, water environment, building materials, potable water pipes and flora and fauna.

The key findings from investigations performed to date are summarised below:

- Presence of excessive levels of metal contaminants (e.g lead).
- Presence of asbestos fibres within a made ground sample tested posing a risk to human health.
- Groundwater pollution found in samples taken that are in excess of guidelines – exceedances in groundwater potentially associated with off-site up gradient activities (e.g landfill).
- Ground level gas releases that may require the installation of gas protection measures to protect buildings from gas ingress (incomplete assessment performed to date).
- Clarification is needed on the need or not for Radon Gas protection measures.

It is clear that currently gaps exist in the understanding of contamination risk and that the risk assessments that have been performed are incomplete. Further investigation and assessment is required to fully characterise the potential contamination risks present both from on-site and off-site sources.

4 Operating techniques

4.1 In process controls

4.1.1 Acceptance of waste

The main purpose of the EfW facility is to treat the source segregated MSW from the Aberdeenshire, Morrey and Aberdeen City area which cannot be recycled, reused or composted. The facility will therefore primarily handle municipal waste collected by the local authorities. The remaining processing capacity will be used to treat similar C&I waste from local businesses in the surrounding area.

Waste will be delivered to the facility in contained vehicles, including refuse collection vehicles (RCVs) and bulk transporters. Waste delivery vehicles will be directed from the gatehouse to the waste reception hall.

4.1.2 Waste reception hall

The waste reception hall will serve as the tipping area, for the delivery and tipping of waste into the storage bunker, ensuring that dust, noise and odour are contained within the building. The delivery vehicles will enter the reception hall and unload the waste directly, via one of six chutes, into the waste storage bunker. As the load is being tipped into the bunker the tipping hall operator or crane operator will oversee tipping to visually check the waste type is compliant with the Waste Acceptance Protocol (WAP). In certain circumstances, drivers may be directed to tip into a designated quarantine area, located adjacent to the waste bunker, to allow a load to be inspected for non-conforming waste.

4.1.3 Waste bunker

The waste in the bunker will be continually mixed in the storage area by the waste cranes in order to ensure the proper operation of the incinerator. This will allow a certain amount of inspection of the waste as it is mixed. The bunker volume will be equal to 14 days of waste deliveries, to allow for waste storage during planned maintenance periods.

4.1.4 Waste charging

The waste will be fed by the waste crane directly into the furnace feed hopper. The feed will normally be operated by an automatic control management system (CMS) to ensure optimisation of the combustion process, by managing charging rates based on conditions within the furnace, and to prevent waste feed in the event that key operating parameters are not met.

4.1.5 Furnace

The combustion technology will consist of an inclined, reciprocating grate. Combustion will be controlled and optimised by the automatic CMS. The combustion temperatures will be maintained at a minimum of 850°C for a residence time of at least two seconds, in line with the IED, through optimised control of the combustion process parameters.

4.1.6 Boiler House

The boiler consists of three empty vertical passes, followed by a horizontal pass, containing the boiler's super heater bundles. After the horizontal section, a vertical economiser is placed to maximise heat recovery. Heat recovery will take place in the boiler house, cooling the combustion gases to a temperature where they can be treated.

4.1.7 Steam turbine

The steam produced in the boiler will drive a steam turbine to generate renewable electricity, for use at the facility and for export to the grid. Steam would also be

available to be exported to the neighbouring district heating network when one is commissioned.

4.1.8 Control room

The facility control room will be continuously manned, from which the facility will be operated and monitored.

4.2 Emission control

All appropriate preventative measures will be taken against pollution, in particular through application of the best available techniques. No significant pollution is likely to occur. The preventative and mitigation measures for emissions are set out, in this section.

The facility will be equipped with an advanced Continuous Emissions Monitoring System (CEMS), which will be capable of continuously monitoring and recording the following parameters:

- Carbon Monoxide (CO).
- Oxides of Nitrogen (NO_X).
- Total Organic Compounds (TOCs).
- Particulate matter.
- Hydrogen Chloride (HCl).
- Hydrogen Fluoride (HF).
- Sulphur Dioxide (SO_2).

The CEMS will be subject to regular controlled testing by means of an annual surveillance test in accordance with the relevant British Standard (BS EN 14181). This will be undertaken by an approved organisation accredited to BS EN ISO 17025.

4.2.1 Point source emission to air

The emission from the EfW facility will be discharged via the 80m high chimney.

The facility has been designed to ensure that the emissions from the facility will comply with the IED Emission Limit Values (ELV), the final draft of the updated BREF, BAT conclusions and will not result in local air quality exceeding national air quality objectives.

The control of combustion emissions within the combustion gases will be achieved by:

- Optimised combustion control.
- The injection of urea into the combustion chamber to remove nitrogen oxides.
- Neutralisation of the acid gases using calcium hydroxide.

- Injection of powdered activated carbon, for adsorption of dioxins and furans.
- Use of a bag filter, for retention of pollution control reagents and dust particles.

A detailed air quality assessment has been undertaken to inform the appropriate chimney height which will ensure sufficient dispersion of emissions is achieved, and has confirmed that emissions will not exceed the limits set out in the Air Quality (Scotland) Regulations 2000, the Air Quality (Scotland) Amendment Regulations 2002 and the Air Quality (Scotland) Amendment Regulations 2016.

4.2.2 Point source emission to surface water and sewer

The surface water drainage system will collect run-off from roofs, site roads and other areas of permeable and impermeable surfacing where there is minimal risk of surface water becoming contaminated by waste or other materials. It will be drained using various sustainable drainage system components such as suitably located permeable paving, filter drains and attenuation ponds, prior to discharge to the East Tullos Burn culvert, passing under the site. The contained nature of the site will ensure that contamination of surface water is minimised.

All process waste water, together with surface water from area where there is a risk of contamination, will be collected and re-used, primarily for ash cooling and there will be no aqueous emission from the process.

4.2.3 Odour

The potential odour and dust emission sources from the proposed development include waste tipping, within the waste reception hall, and the waste storage bunker.

The waste bunker room will be an enclosed area separated from the rest of the building. The odour emission from the waste will be contained within the bunker room by fast acting doors on the waste tipping chutes and a negative pressure created by the extraction of air from the waste bunker for use in the combustion process.

Waste tipping will be carried out within the enclosed waste reception hall where the waste will be tipped into the waste storage bunker. The reception hall will act as an air lock to the waste bunker room to avoid any odour emission from the building.

During periods when the combustion process is shut down for maintenance, air from the tipping hall and waste bunker will continue to be extracted through a separate activated carbon and dust filter and vented from a discharge at the top of the facility building.

4.3 Management control

The facility will be operated under the Acciona Industrial Environmental Management System (EMS) which is accredited to ISO 14001:2004 for activities including the operation of power generation plant.

A site-specific management system will be developed for the Aberdeen NESS EfW facility, which will be operated under the Acciona EMS. The site-specific EMS will put in place operational procedures covering all aspects of the different activities at the NESS facility.

4.4 Raw materials use

Raw materials used at the facility will be periodically reviewed to ensure that they are all appropriate for use and that consumption is optimised. Waste minimisation, in relation to use of raw materials, has been included in the design process and regular waste minimisation audits will be undertaken to promote efficient use of raw materials.

The facility has been designed to minimise water consumption by using closed loop systems, such as the air-cooled condensing system for the steam from the turbine, and by reuse of waste process water for ash cooling. The primary use of water in the installation will be for boiler feed water make up. The source of the water will be both from rainwater harvesting and the mains potable water supply, with the predicted consumption being 39,760m^3 per annum (4.72m^3 per hour).

4.5 Residual waste management

Residual waste produced by the EfW facility will include an estimated 26,232 tonnes per annum of Incinerator Bottom Ash (IBA) and 7,500 tonnes per annum of Fly Ash and Air Pollution Control residue (APCr).

The IBA will be stored in the ash bunker and transported off-site in covered vehicles. The IBA will be sent by road to the Rock Solid semi-mobile IBA treatment plant in Scotland, or by road and sea to the Rock Solid site in the Netherlands.

The APCr from the bag filter is considered hazardous waste. The APCr will be shipped by hermetically sealed silo tankers from the facility to Carbon8's treatment and aggregate manufacturing facility in Leeds.

4.6 Energy

The EfW facility will generate electricity via a steam turbine generator and heat, in the form of steam. Electricity will be exported to the local electrical distribution network and it will be possible to export heat, in the form of steam, to the neighbouring district heating network when it is commissioned.

The design thermal capacity of the plant is 49.1MW_{th}/h based on 8000 operating hours per year

A Sankey diagram for the facility, operating in CHP mode with 10MW heat output, is provided in Figure 2.

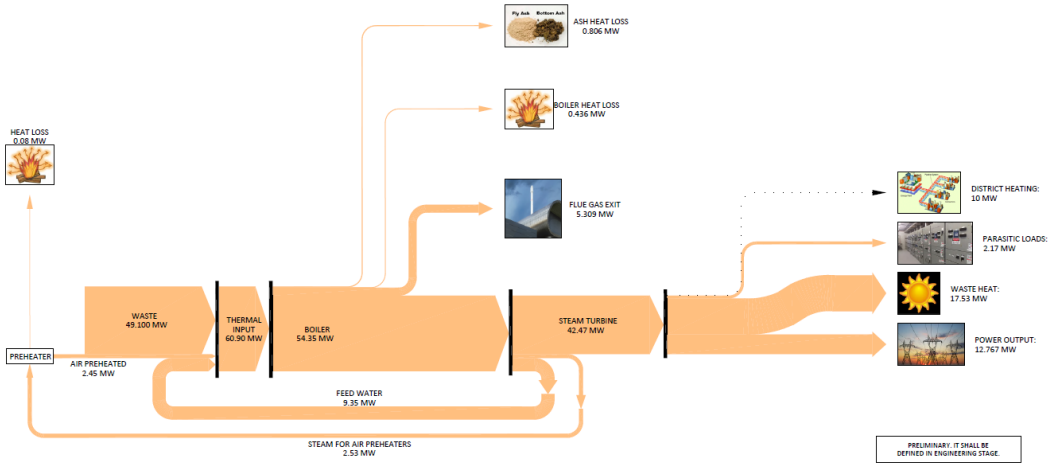


Figure 2 Sankey (energy flow) Diagram for EfW facility

When the facility operates in power only mode, with no heat export, then the net efficiency is 24.79%. When the EfW facility operates in CHP mode with the anticipated heat output of 10MW the net efficiency of the plant will be 41.98%.

4.7 Accidents management

An accident risk assessment for the facility has been produced which identifies the likelihood and consequences of accidents and identifies actions for the prevention and mitigation of all identified risks. The prevention and mitigation measures will be incorporated into the site management processes, and site operatives will be made aware of these measures during training. Ongoing assessment of accident and safety risks will be carried out throughout the detailed design, including a study which will examine issues such as:

- The use of emergency shutdown systems and electrical trips.
- Gas, fume, dust and liquid detection.
- Firefighting systems.
- Containment of releases.
- Emergency escape.

4.8 Control of Major Accidents and Hazards Regulations 2015

The installation is not situated on a site for which a major accident prevention policy document is required under regulation 5 of the Control of Major Accident Hazards (COMAH) Regulations 1999.

Both light heating oil and hydraulic oil fall under Item 24, Part 1, Schedule 1 of the COMAH Regulations 2005, however both will be stored on site at quantities below the lower tier threshold of 2,500 tonnes.

The calibration gases will include mixtures of oxidising gases, listed under Item P4, Part 1, Schedule 1 of the COMAH Regulations 2005. These gases will be stored on site at quantities below the lower tier threshold of 50 tonnes.

4.9 Site closure

Following commencement of operations Acciona will prepare and maintain, in accordance with the permit requirements, an outline decommissioning plan for the EfW facility with an aim to ensure that pollution risk is avoided and the site is returned to a satisfactory state. The plan will set out the steps to be taken by Acciona after final cessation of the permitted activities which will include the removal of all waste from the site, cleaning out of all infrastructure and consideration of the need for testing of ground conditions, based on the operational, accident and pollution reports maintained during the operational life of the facility.

5 Environmental assessments

5.1 Overview

Operation of the EfW facility would result in point source emissions to air and to water. In addition to this there is the potential for fugitive emissions to air, water and land and release of odour and noise emission from the site. Each point source emission is identified in Table 1.

Table 1 Inventory of point source emissions.

Release Point	Source
Air	
A1	EfW CHP facility chimney
A2	Shutdown ventilation system outlet
Water	
W2	Surface water discharge to surface water sewer

5.2 Assessments

The assessment of the potential impact due to the operation of the proposed EfW facility was undertaken using a number of techniques, including:

- Air quality assessment.
- Human Health risk assessment.
- Habitats risk assessment.

- Noise assessment.
- H1 software tool. This is a SEPA tool used to assess the environmental impact of developments using air quality inputs, raw materials and waste data.

5.2.1 Air quality and Human Health risk assessments

Emissions to air from the chimney would consist of the combustion exhaust emissions, from the incineration of waste and potentially odour emission from site operations. The proposed EfW facility has been designed to use the best available techniques (BAT) to comply with the required emission limits from the EfW chimney and would avoid any odour emission from the facility though use of the BAT standards for odour management.

An atmospheric dispersion model was used to assess the potential for impact to the local air quality due to the emission from the EfW facility. The assessment, using a pessimistic approach to consider the emissions in relation to the air quality standards and the SEPA guidelines, found that the operation of the facility would not result in any significant impacts to local air quality on human or ecological receptors.

A human health risk assessment demonstrated there is no significant carcinogenic risk or non-carcinogenic hazard, arising from exposures via both inhalation and the ingestion of foods.

Emissions from the chimney will be measured and continuously recorded as part of a CEMS. The results will be available for SEPA and Aberdeen and Moray Local Authorities to inspect, so that it can be confirmed that the emissions are within the permitted limits and data will also be published on a web based platform, available to those with internet access.

5.2.2 Habitats risk assessment

A Habitats Risk Assessment (HRA) screening exercise was carried to assess the potential for the EfW facility to impact on European designated wildlife sites located within 15km of the facility. The assessment was subsequently reviewed in the context of any changes to the EfW facility design and emissions, as part of the part of environmental permit application Air Quality assessment. The exercise assessed the magnitude of the pollution that would arise from the facility, the pollution pathways to each of the designated sites and the resulting potential for impacts on the sites' designations due to the operation of the facility. The assessment considered both the air quality concentration at the European designated sites and the potential for adverse nutrient and acidity impacts due to nitrogen and sulphur deposition on habitats within the European sites.

The impact of the EfW facility on ecological receptors, due to air quality concentration at the European sites, was found to be negligible. Further to this, the assessment found that the existing deposition rates would not be adversely affected at European designated sites as a result of the operation of the proposed EfW facility.

In summary, the assessment found no significant adverse impacts as a result of air pollution or deposition associated with the operation of the EfW facility on European sites.

5.2.3 Noise assessment

A noise study was undertaken to assess the potential effect of noise emissions from the EfW facility on a number of local receptors.

The assessment considered the current baseline noise emission from the EfW facility, the future predicted noise emission from the proposed EfW facility and the expected sound pressure (noise) levels at sensitive receptors in close proximity to the facility.

The noise study concluded that for the commercial and education receptors, there are no negative effects predicted to be associated with the noise emissions arising from the operation of the facility. For the nearest residential receptors in Tullos, there is the potential to exceed the background sound level at night-time due to the operation of the proposed facility. In this respect, the facility would not meet the Aberdeen City Council requirements however did meet the World Health Organisation guideline night-time values.

Overall, the facility is not predicted to have a negative effect, but it is nonetheless recommended that a site management procedure be enforced to assist in minimising sound emission from the facility at all times

5.2.4 H1 Software Tool – Emissions to surface water and sewer

The design and operation of the facility will mean that there would be no aqueous emission of process wastewater from the EfW facility.

The surface water drainage system would collect run-off from roofs, site roads and other areas of impermeable surfacing where there is negligible risk of surface waters becoming contaminated by waste or other materials. Collected surface water will be drained using various SuDS components which extend around the majority of the site, including a detention basin, before being discharged to the East Tullos Burn running in a culvert under the site. The surface water in the detention basin will be continuously analysed prior to discharge and an automatic isolation valve will stop any discharge to the burn in the event the surface water discharge standard identified in the environmental permit is not met.

It is considered that, given the control measures that would be in place, there would be no risk of fugitive emissions to surface water, sewer or groundwater arising from the facility's activities.

5.2.5 Environmental assessment conclusion

The assessment undertaken found that the operation of the proposed EfW facility would not result in any significant detrimental effects on air quality, human health or ecological receptors.

Appendix A

Site drawings

A1 Site Location

A3

Notes

1. Do Not Scale this drawing.

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For Information				
Rev	Date	By	Chkd	Appd

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Client
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Project Title
NESS Energy from Waste Facility

Drawing Title
Site Location

Scale at A3: 1:50,000

Role: Civil Engineering

Suitability: S2 - For Information Only

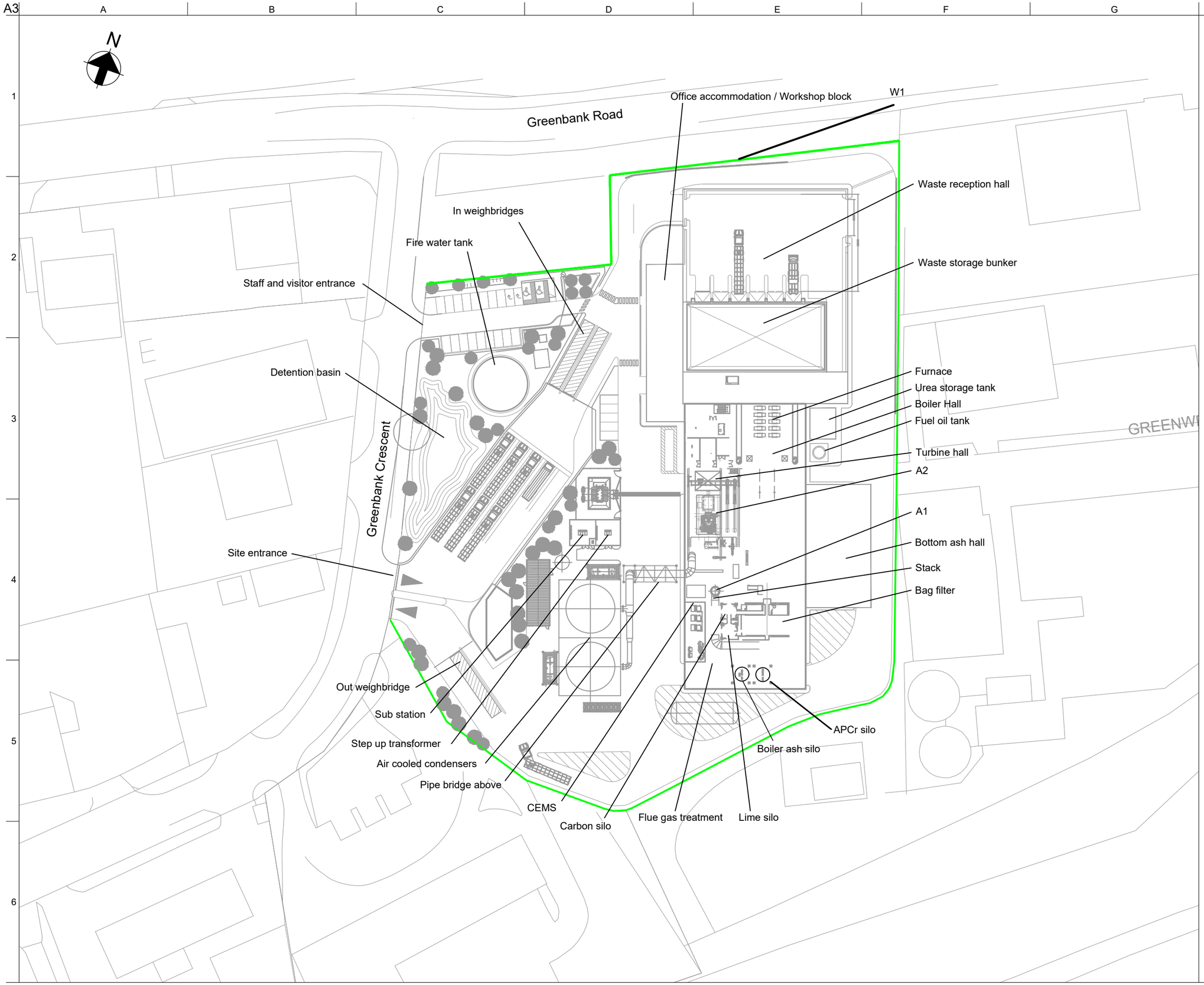
Arup Job No: **256683-00**

Rev: **I1**

Name: **Figure 01**

Do not scale

A2 Site Installation Boundary



Notes

1. Do Not Scale this drawing.

Key

Site Boundary

Rev	Date	By	Chkd	Appd
I2	19/11/18	BM	MR	MR
Updated with latest building layout				
I1	01/11/18	BM	MR	MR
For Information				

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Client
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Project Title
NESS Energy from Waste Facility

Drawing Title
Site Installation Boundary

Scale at A3 1:1000

Role Civil Engineering

Suitability S2 - For Information Only

Arup Job No **256683-00**

Rev **I2**

Name
Figure 03