5 THE PROPOSED DEVELOPMENT

INTRODUCTION

5.1 This chapter describes the Proposed Development, provides details on the buildings and structures and gives an overview of the processes that will be employed at the Site.

5.2 The Site will incorporate ACT technologies using gasification (a form of advanced conversion) and associated upstream processing.

5.3 The Proposed Development is a bespoke Energy Recovery Facility that has been designed to recover all available resources from mixed solid waste feedstocks. The Proposed Development provides a single treatment facility for solid wastes which would otherwise be destined for landfill in the absence of adequate alternative recovery capacity.

5.4 The proposed site layout is identified in Figure 5.1.
DESCRIPTION OF THE TECHNOLOGY

Overview

5.5 The proposed waste treatment plant utilises gasification technology which will be operated through a number of key elements. A summary description of each of the elements is provided in Table 5.1 overleaf;
### Table 5.1: Summary Process Description

<table>
<thead>
<tr>
<th>Process</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reception and Preparation</td>
<td>All wastes will be delivered directly into a waste reception building (operated under negative pressure). After inspection, waste will then either be transferred using a front-end loading shovel directly into the gasifier fuel store or undergo some further preparation using mechanical separation and pre-treatment.</td>
</tr>
<tr>
<td>Mechanical Separation / Pre-Treatment</td>
<td>A mechanical materials recovery plant will also be contained within the waste reception hall for the purposes of processing any wastes which do not immediately reach the specification of fuel suitable to go directly into the gasifier fuel store. Its purpose will be to recover any plastics, metals and other materials that may not be suitable for the gasifiers. All segregated materials will be sent off site for recycling, or disposal where appropriate. Residual material from the process will then be transferred into the fuel store for the gasifiers.</td>
</tr>
<tr>
<td>Fuel Store</td>
<td>Material within the fuel store will be managed by overhead cranes and placed onto feed conveyors which will transfer the fuel into metering hoppers which are used to control the rate at which fuel enters the gasifiers.</td>
</tr>
<tr>
<td>Gasification</td>
<td>Three gasification plant systems will gasify the fuel in a reduced oxygen environment and convert it to synthesis gas (‘syngas’). Gasification. The syngas is then combusted to produce heat in an efficient process in three boilers which heat water to produce superheated steam.</td>
</tr>
<tr>
<td>Steam turbine and generator set, and air cooled condensor</td>
<td>The steam from the boilers then passes into a steam turbine and generator set which efficiently coverts the heat energy in the steam into electricity which is then exported to the grid, less any electricity that is used in the operation of the plant. The gross electricity production is expected to be c16.4MW. A secondary valve will also be incorporated into the turbine to allow steam or hot water to be extracted for district heating purposes, i.e., the plant is CHP-ready. An air cooled condenser then converts remaining low grade steam back into liquid water which is then recycled back into the boilers to minimize water usage through the process.</td>
</tr>
<tr>
<td>Gas treatment</td>
<td>The gas treatment process comprises SNCR abatement technology including urea injection for control of the oxides of nitrogen (NOx) and lime injection for control of acid gases. Bag filters are included to control particulate emissions. Emissions to air are monitored though a Continuous Emissions Monitoring System (CEMS).</td>
</tr>
</tbody>
</table>
Waste Feedstocks

5.6 The installation will process up to 195,000 Tonnes per annum approximately broken down as follows.

Table 5.2: Proposed feedstock quantities

<table>
<thead>
<tr>
<th>Waste general type</th>
<th>Approx Annual Quantity (Tonnes)</th>
<th>Applicable EWC Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>RDF and Mixed Source Waste</td>
<td>Up to 195,000</td>
<td>To include 19 12 10; 20 03 01; 20 03 02; 20 03 99</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>195,000</strong></td>
<td></td>
</tr>
</tbody>
</table>

Waste Reception

5.7 Vehicles will enter the Site via the main entrance roadway over a weighbridge in accordance to the vehicle movement plans. Vehicles will be directed from the weighbridge to the relevant reception areas for each of the wastes. The reception of all wastes will take place within the main waste reception area.

5.8 The waste reception area is a purpose built, sealed internal reception area which is operated under negative pressure in order to mitigate potential odour dispersion impacts.

5.9 Vehicles will access the internal waste reception and dispatch areas of the internal waste reception area by a number of doorways, comprising externally mounted heavy duty metal roller shutter doors (for overnight site security), with internally mounted rapid-closing heavy-duty polyethylene roller shutters to permit access in and out of the building by vehicles during normal working hours.

5.10 The reception area will comprise a number of individual bays fitted with push walls.

5.11 The reception area has been designed to physically accommodate all commercially available waste vehicles used for domestic and commercial waste collections. The reception hall has an initial holding bay and associated transfer systems. Wastes will initially be discharged onto the reception area and undergo initial inspection, prior to either being transferred directly into the fuel store for the gasifiers or into the loading system of the pre-treatment system.
5.12 The waste reception area and pre-treatment system will comprise some, or all, of the following:

- Weighbridge (capable of taking the full range of delivery vehicles);
- In-feed overband magnet - for the removal of oversized ferrous metals (optional);
- In-feed eddy current separator - for the removal of non-ferrous metals (optional)
- In-feed shredders - for final material sizing;
- In-feed conveyor system (for transfer of fuel to the gasifier fuel store); and
- Segregation area for rejected / quarantined waste.

5.13 Additional equipment may be added as necessary to cater for the type of wastes that will be received. This could include, but not exclusively, NIR units to control plastics input and a trommel to control the amount of fines input. Any additional equipment would be housed within the proposed reception area.

5.14 Waste that meets the gasifier fuel specification upon delivery will be transferred directly to the gasifier fuel store using a front-end loading shovel.

5.15 Once unloaded, vehicles will be inspected and returned to the weighbridge.

5.16 Any wastes which do not conform to the requirements of the Site, i.e. contain specific hazardous contaminants (oil, solvents, car batteries, WEEE etc), exceed the size requirements etc, will be segregated and isolated / quarantined. Any non-conforming wastes will be rejected in accordance with the Site waste rejection procedures.

5.17 The Waste Reception and Processing Building will be operated under negative pressure, drawing air from within the building and extracted to the gasification hall for use as secondary combustion air. The reception hall will be operated at approximately -50 Pa, thus minimising the potential escape of odour from the building.

5.18 Specific details relating to odour control are described in further detail in Chapter 8.

5.19 Segregated materials will be bulked in designated bays throughout the facility to await dispatch.

5.20 The material handling systems shall be controlled by the central control system and will meet all required safety standards.
Gasification

5.21 The Site building comprises a purpose built gasification process hall which houses the gasification plant and ancillary equipment.

5.22 Other than for equipment maintenance access, there is no requirement for vehicles to enter this building. All other access points are personnel doorways only.

5.23 The installation uses a proprietary gasification system to gasify the fuel.

5.24 The gasification process and associated upstream fuel preparation processes have been designed in a manner that minimises any contaminants and ensures that the gas cleaning equipment controls all emissions to air to the required regulatory standards.

5.25 A heavy duty moving floor feeds the fuel into a reciprocating step grate via a finely controlled metering device. Once inside the gasifiers, the fuel is subjected to heat in a reduced oxygen environment and a chemical transformation takes place which releases synthesis gas from the fuel. The grate transport mechanism is designed so as to provide longitudinal transport and good local mixing of the moving fuel bed to enable good homogeneity.

5.26 The second stage involves the syngas being transferred to the High Temperature Oxidation Unit (secondary chamber) where a staged oxidation is facilitated by multiple injections of air and recycled flue gas. In the secondary chamber there is combustion of the syngas with a final production of a flue gas with low NOx content. Combustion within the second chamber takes place under conditions fully compliant with the Industrial Emissions Directive (IED).

5.27 The bottom ash is discharged direct from the gasification unit at the end of the grate. The discharged bottom ash is cooled in a water basin and transported to the bottom ash handling system.

5.28 The bottom ash will be recycled as an aggregate replacement material and conditioned as appropriate prior to being transported in a covered skip to an aggregate recycler or concrete product manufacturer.

5.29 The combustion products/gases discharged from the thermal oxidizer are routed to a cleaning system which comprises SNCR abatement technology including urea injection for
control of the oxides of nitrogen (NOx) and lime injection for control of acid gases. Bag filters containing activated carbon are included to control particulate emissions.

5.30 The solid residue, or Flue Gas Treatment Residue, from this process is transferred to a storage silo from where it is then transported from the Site to an identified re-processor for use in industrial applications.

5.31 All emissions from the gasification plant will be monitored using a Continuous Emissions Monitoring System (CEMS) located on the exhaust stack.

Electricity Generation

5.32 The steam from the boilers passes into a steam turbine and generator set which efficiently converts the heat energy in the steam into electricity which is then exported to the grid, less any electricity that is used in the operation of the plant. The gross electricity production is expected to be c16.4 MW.

5.33 A secondary valve will also be incorporated into the turbine to allow steam or hot water to be extracted for district heating purposes, i.e., the plant is CHP-ready.

5.34 An air cooled condenser then converts remaining low grade steam back into liquid water which is then recycled back into the boilers to minimize water usage through the process.

Hours of Operation

5.35 The facility will operate 24-hours per day.
DESCRIPTION OF BUILDINGS, TANKS & STRUCTURES

Main Processing building

5.36 The Proposed Development will incorporate the construction of a new building to accommodate an Energy Recovery Facility.

5.37 The main building is rectangular shaped, with a gross floor area of 12,875 sq. metres. It will comprise a single impermeable technically engineered portal framed structure 173m by 80.5m, at a height of 14m to the eaves and 22m to the ridge.

5.38 The building will be constructed with a proprietary curtain wall cladding system designed to ensure adequate air-tightness, acoustic and thermal performance.

5.39 The main building will house internal offices, meeting rooms and visitor education areas.

5.40 All aspects of the internal office areas have been designed to ensure compliant access in accordance to the requirements of the Disability and the Equality Act 2010 (DDA) (Ref 5.1).

5.41 The building will be subdivided internally to house the separate processes and be zoned to comply with relevant industrial safety regulation (i.e. gas safety regulations, explosive atmospheres etc).

5.42 The roof of the main building will incorporate approximately 1,750m$^2$ of solar photovoltaic panels.

5.43 There will be a stack associated with the gasification plant, which will be 45m in height.

5.44 Each gasifier will have a single exhaust stack which exits through the building to a height of 45m, all grouped together to appear as a single exhaust stack.

5.45 The air cooled condensers will sit outside the western end of the building and be around 14m tall, slightly lower than the building eaves height.
Building Construction

5.46 The building will be constructed around a structural steel frame which will support the cladding between the main structural members without secondary steel.

5.47 The floor slab will be generally designed to take 50kN/m² or to accommodate plant loading as required.

5.48 Further detail relating to the building construction is provided within Chapter 6. (Construction and Demolition).

Ancillary Buildings and Structures

5.49 A number of ancillary structures shall be located adjacent to the power generation building, including; two fire water tanks (c. 7.5m (d) x 6m (h)), and back-up generators.

5.50 Two small buildings of approximately 5m by 3m at a height of 3m will house the electricity sub-station and district heating connection and metering equipment serving the facility.

5.51 A small security / gatehouse building will be located adjacent to the Site access and exit.

5.52 The Site includes entry and exit weighbridges and a vehicle inspection area so that lorries are checked for debris before exiting the Site.

Roadways and external areas

5.53 An internal roadway system has been designed to give safe access to the building. Separate segregated pedestrian walkways and car parking areas have been provided to allow for safe access and egress of all personnel at site.

5.54 Details of the road access and transportation arrangement are provided in Chapter 7: Transport and Access.

5.55 Site layout, cross sections and building elevations relating to the Proposed Development are provided in Appendix 5.
Grid Connection

5.56 The facility will be connected to the national grid via the existing Corby 132/33kV sub-station. An Independent Connections Provider (ICP) has assessed the route of connection and confirmed that all necessary permissions for the laying of the cable are attainable and discussions with the Highways Agency will take place in due course to agree the timetable of works. The temporary works necessary to provide the connection are commensurate with those routinely carried out by service providers and are therefore considered unlikely to give rise to any potentially significant effects.
REFERENCES

Ref 5.1: From 1 October 2010, the Equality Act replaced most of the Disability Discrimination Act (DDA). However, the Disability Equality Duty in the DDA continues to apply.