Development of Waste Treatment Facility, comprising Reception and Recycling Hall; Mechanical Biological Treatment (MBT) Facility; Advanced Conversion Technology (ACT) Facility; Power Generation and Export Facility; Education and Office Accommodation; Landscaping and, Access.

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Sinfin Lane, Derby

Resource Recovery Solutions (Derbyshire) Ltd

Environmental Statement

Chapter 4:

Description of Development

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Contents

Tables, Figures & Appendices

Tables

Figures

4 Description of Development

4.1 Introduction

4.1.1 This Chapter of the Environmental Statement describes the proposed development. The proposed development has been formulated through an iterative process of evaluation including assessment of likely significant effects arising from the scheme. The proposal incorporates features to mitigate the likely significant environmental effects identified during the course of the Environmental Impact Assessment.

4.1.2 The layout and design of the proposed facility is described in this chapter together with a description of the waste management process to be undertaken on the site.

4.1.3 In preparing the development proposals, consideration has been given to the following :

- Proximity to receptors and the likely environmental effects in terms of noise and air quality;
- Ecological considerations;
- Landscape and Visual Impact;
- Traffic;
- Hydrology and Flood Risk;
- Hydrogeology and Ground Conditions;
- Archaeology.

4.1.4 In summary, the proposed Waste Treatment Facility will comprise:

- Waste Reception and Recycling Hall
- Entsorga Mechanical Biological Treatment (MBT) Facility
- Energos Advanced Conversion Technology (ACT) Facility
- Education and Visitors Centre
- Landscaping and noise bund
- Access arrangement to and circulation within the site
- Boundary treatment

4.1.5 The construction period will be approximately 27 months in duration with an assumed start in April 2010.

4.2 Site Layout

Overview

4.2.1 The proposed site covers an area of approximately 3.4 hectares. Figure 4.1 details the proposal layout as follows which relates to the physical, environmental, and operational constraints of the site. Figure 4.2 details the location of plant components. In summary the primary features are:

Waste Treatment Facility

4.2.2 The new Waste Treatment Facility (WTF) building footprint takes up a large part of the site area and contains the Waste Reception Hall and Recycling Hall, Mechanical Biological Treatment (MBT) Facility, and Advanced Conversion Technology (ACT) Facility. Additionally, the building also provides ancillary office accommodation.

Education Centre

4.2.3 It is proposed to site the Education Centre adjacent to the Sinfin Lane frontage to the west of the WTF. The education centre will be accessed off the internal access road leading to an area of parking for cars and coaches. The Education Centre will be available for hire by the community as a meeting and function room.

Landscaping

4.2.4 Landscaping is proposed along the sites frontage with Sinfin Lane, and along its north, south and east boundaries. Additionally, a landscaped noise bund is proposed between residents along Sinfin Lane and the proposed education centre, and the WTF building.

4.2.5 To the east of the landscaped noise bund and adjacent to the principal internal access road is a wash-down and skip area.

Access

4.2.6 Access to and egress from the site is proposed to be taken from an improved access from Sinfin Lane in to the south of the position of the access previously consented to the south-west of the site. The principal access road into the site is aligned parallel to the site's southern access leading up to an 'In' weighbridge and then into the service yard.

4.2.7 This access road splits into three lanes at the approach to the weighbridge to allow separate access for cars and lorries. The lorry lane also combines a waiting lane to increase capacity for waiting vehicles within the site. Adjacent to the weighbridge is a gatehouse which will

accommodate an operative who will administer vehicles entering the site. To the south of the Gatehouse is the 'Out' weighbridge which will weigh vehicles leaving the service yard, along a single egress lane from the site parallel to the site's southern boundary.

4.3 The new Waste Treatment Facility (WTF)

Building Description

4.3.1 The overall internal arrangements for the WTF are shown in plan on Figure 4.3. Elevations are illustrated on Figures 4.4 to 4.8. The orientation of the building will be from east to west. The WTF will be housed within a single structure with a footprint which accommodates the key components of :

- Waste Reception and Recycling Hall;
- Mechanical Biological Treatment (MBT Facility); and,
- Advanced Conversion Technology Facility, and associated plant and equipment.
- The plant includes a stack 55m in height.

4.3.2 The Mechanical Biological Treatment (MBT) Facility Bio-oxidation Hall will be located within the west of the structure. The MBT structure will be 24.06m in width and 77.66m in length. This element of the building will have a mono-pitch roof sloping north to south and measuring 18.65m in height at the highest pitch and 16.55m in height at the lowest pitch. Table 4.1 summarises the dimensions of the Bio-Oxidation Hall.

Table 4.1 MBT building dimensions

Component	Length (m)	Width (m)	Height (m)
MBT Bio-Oxidation Hall	77.66	24.06	18.65 – 16.55

4.3.3 To the external south facing elevation will be located the MBT bio-filters in an enclosure measuring 4m in height, 12.75m in width and 66m in length.

4.3.4 The Waste Reception and Recycling Hall is situated to the east of the MBT Facilities Bio-Oxidation Hall will have plan dimensions of 39m in width, and 73.5m in length. This element of the building has two mono-pitch roofs with one extending from the ACT element of the WTF (18.65m in height at the highest pitch and 15.13m in height at the lowest pitch) and the other from the MBT element (12.87m at the highest pitch and 11.44m at the lowest pitch). This element of the building accommodates the MBT trommel, the Primary Screening and Secondary Separation operations, and the Waste Transfer component. Table 4.2 summarises the dimensions of the Waste Reception and Recycling Hall (WRRH).

Table 4.2 Waste Reception and Recycling Hall (WRRH) dimensions

Component	Length (m)	Width (m)	Height (m)
WRRH	73.5	39	15.13 -18.65

4.3.5 The Advanced Conversion Technology (ACT) Facility, which comprises the ACT Hall and Stack and Silo Enclose. This will be located to the north of the Waste Facility Reception and Recycling Hall, and would have plan dimensions measuring 46.3m in width and 73.5m in length. The ACT Hall element of the building has a pitch roof with a maximum height of 21.28m over the ACT Hall. Table 4.3 summarises the Dimensions of the ACT Hall.

Table 4.3 Advanced Conversion Technology (ACT) Hall dimensions

Component	Length (m)	Width (m)	Height (m)
ACT Hall	73.5	46.3	18.65-21.28

4.3.6 Part of the ACT Facility includes an enclosure to the north of the ACT Hall within which is located the stack, bag house filters and Flue Gas Cleaning System (FGCS) residue Silo's. This enclosure has walls rising from 19.6m in height adjacent to the ACT Hall to 21.37m in height. Beyond this are series of single storey buildings and enclosures housing the turbine, sub-station, and cooling system condensers associated with ACT Facility. Table 4.4 summarises the dimensions of the Stack and Silo enclosure.

Table 4.4 Stack and Silo enclosure dimensions

Component	Length (m)	Width (m)	Height (m)
Stack and Silo Enclosure	73.5	17.0	19.6-21.37

4.3.7 Additionally, provision has been made for a Fire Water Tank (10m in diameter and 5 m high), and a Fire Pumping Station (4mwide, 6m in length and 3m in height).

4.3.8 At the junction of the MBT Bio-oxidation Hall and ACT Hall, a two storey workshop, welfare, and control room is attached to the main building with a footprint 23m in length and 10m in width and 6.6m in height to the top of the mono-pitch roof. North of this is the proposed Bottom Ash Bunker with a footprint 10m in width by 12m in length and 11.68m in height to the top of the mono-pitch roof. Table 4.5 summarises the Dimensions of the Workshop and Welfare Room, and the Bottom Ash Bunker.

Table 4.5 Workshop, Welfare Room, and Bottom Ash Bunker dimensions

Component	Length (m)	Width (m)	Height (m)
Workshop, Welfare and Control Room	23	10	6.6
Bottom Ash Bunker	12	10	10-11.68

Stack

4.3.10 Each processing line will have a single chimney with a proposed height of 55m. The stack height has been calculated based on emission parameters to ensure optimum emission of flue gases and the successful operation of the plant. Much of the height of the stack will be supported by and concealed within the ACT building. The stack will have a diameter of up to 3.5m and will enclose three exhaust pipes. Table 4.6 summarises the Dimensions of the Stack.

4.3.11 Dispersion of pollutants is dependent on a number of factors including local land topography, emission rates and pollutant concentrations and the height of the new WTF buildings. The air quality and plume dispersion modelling used to identify the chimney height necessary form optimum dispersion is described in detail in Chapter 7.

4.3.12 The chimney has been designed to meet all climatic conditions. Inspection platforms and emissions monitoring systems will be located within the building. The outer surface of the chimney will have a non reflective goose wing grey matt finish further minimising visual impact effects.

Table 4.6 Stack height

Component	Height (m)	Diameter (m)
Stack	55	3.5

4.3.13 The stack will be positioned in the Stack and Silo enclosure to the north of the ACT Hall.

Materials

4.3.14 The WTF side panels will be constructed Corus Trisma panels coloured 'Goosewing Grey'. The WTF roof will be constructed of Corus Trisomet panels. Visualisations of the plant and

associated infrastructure are illustrated on Figures 4.11 to 4.13. The evolution of the design is described in more detail within the Design and Access Statement.

Education and Visitors Centre

4.3.15 Education and Visitors Centre will be provided in a single storey building located within the Sinfin Lane Frontage in landscaped grounds at an oblique angle to Sinfin Lane. The building will measure 12.81m in width, 24.83m in length. The building will have a mono-pitched roof measuring 4.99m high at the pitch and 3.48m high at the eaves. The highest point of the building will be adjacent to Sinfin Lane. The building will have a timber frame and be clad with facing bricks with a composite panel roof. This will be a 'green roof' with appropriate planting Plans and Elevations are provided in Figures 4.14 and 4.15. Table 4.7 summarises the Dimensions of the Education and Visitors Centre Building. Windows and Doors

4.3.16 It is envisaged that the education visitors centre will be used for presentations about integrated waste management activities in Derby and Derbyshire. It is anticipated that the facility will develop links with local educational establishments and become a valuable and well used teaching resource.

4.3.17 Visitor facilities will include a lecture and display areas and a visitor lobby and waiting area. Visits are expected from reference plant visitors, local authorities, liaison groups, schools and other interested parties.

Table 4.7 Education and Visitors Centre

Component	Length (m)	Width (m)	Height (m)
Education and Visitors Centre	24.83	12.81	4.99 – 3.48

4.3.18 The building comprises a Lecture and Display Area, Meeting Room, along with Office Accommodation, Reception, Kitchen and Washroom with Toilets.

Gatehouse and Weighbridges

4.3.19 A Gatehouse will be located at the entrance to the service yard to provide accommodation for operatives to direct incoming waste vehicles. The accommodation will include seating accommodation, WC and tea making area. The building will measure 11.51m in length, 5.01m in width, and will have a mono-pitch roof measuring 4.48m at the pitch and 3.33m at the eaves. Plans and Sections can be seen at Figures 4.16 and 4.17. Table 4.8 summarises the Dimensions of the Gatehouse.

Table 4.8 Gatehouse and weighbridges

Component	Length (m)	Width (m)	Height (m)
Gatehouse	11.51	5.01	4.48 – 3.33

4.3.20 Two 18 metres Weighbridges will serve the WTF; one dedicated to weighing incoming waste and the other to weighing outgoing vehicles. Details of the weighbridges are shown in Figures 4.1, 4.3. the weighbridges will be flush mounted level with the roadway and without raised kerbs. The works layout will allow vehicles that do not need to be weighed , to by pass the weighbridges. A 60 metres straight section of road is provided on access to allow for the alignment of vehicles.

Car parking

4.3.21 Car parking will be provided for 40 vehicles plus 5 disabled spaces. A further 15 car parking and 1 designated disabled space, and 2 coach spaces will be provided for the Education and Office Building. The parking layout can be seen in Figures 4.1 and 4.3.

4.3.22 Cycle racks will be provided close to the education centre and the facility car park. The racks will accommodate 6 cycles.

4.3.23 The proposed level of parking is based on staff numbers (including proposed shift arrangements) together with provision for unannounced regulatory authority visits and assumed visitor numbers.

External Lighting

4.3.24 Site lighting is proposed at all times during construction to ensure safety and security. Localised task lighting may be required after dark during the construction phase, particularly in the winter months. Lighting will be kept to a minimum with light trespass controlled by appropriate technology and directed way from sensitive receptors. The lighting design will be based on the use of appropriate energy efficient lighting to provide safe working conditions in all areas of the site whilst minimising light pollution and visual impact on the local environment.

4.3.25 During operation of the proposed development external lighting will be provided to ensure the safety of manoeuvring vehicles and pedestrians about the site. Lighting will provided in the form of flood lighting to all main turning areas and road ways wherever possible fixed to buildings or structures or alternatively on columns. Details of the proposed lighting scheme are set out in Figure 4.18.

4.3.26 The lighting will incorporate measures which:

- Minimise the potential for sky glow by reducing the potential for upward reflected light.
- Minimise light spread through directional lighting
- Use shielding to prevent glare.

4.3.27 Lighting will be generally installed along the walkways and staircases around the process equipment to provide illumination for safe access and operational tasks and at night will only be switched on when operators need access to a specific level.

4.3.28 For the visitors building, lighting will generally be switched off out of usual working hours unless access is specifically required.

Drainage

4.3.29 The proposed drainage scheme is shown on Figure 4.19 which sets out all the components which will form part of the scheme. These include connection to the public sewer, above and below ground rainwater harvesting and internal arrangements for the management of leachates arising from within the MBT process and external infrastructure.

Landscaping

4.3.30 The proposed landscaping scheme is shown on Figure 4.20 and 21 which sets out all the components which will form part of the scheme. The landscaping scheme sets out all the areas proposed to be landscaping and the species proposed. The overall landscape strategy is to retain existing trees where possible, and has been informed by an Arboriculture Assessment to the British Standard. Landscaping is proposed to each of the sites boundary with species selection informed by Chapter 9 of this ES, set out below. In addition, a noise bund of up to 4.1m in height is provided between the WTF and properties on Sinfin Lane which will be landscaped with native structure planting.

4.3.31 Full details of the landscaping scheme are set out upon Figure 4.21 [drawing D124033-Sin-L-001] within Technical Appendix 4.1. The scheme provides details of tree, shrub and ornamental shrubs and grasses planting. The tree planting mixes are as follows:

Site wide and structure tree planting

- Quercus robur
- Fraxinus excelsior
- Tilia cordata
- Betula pendula

- Crataegus monogyna
- Prunus spinosa
- Salix caprea
- Sorbus aucuparia
- Malus sylvestris
- Acer campestre
- Corylus avellana
- Illex aquifolium
- Viburnum opulus

Education and visitors centre tree planting

- Alnus Cordata
- Betula utilis jacquemontis
- Salix cinerea
- Acer campestre

Management

4.3.32 A site management regime will be developed to ensure the establishment of the proposed landscape scheme and to ensure that a species mix appropriate to the setting is encouraged and maintained over future years. Management issues are likely to include:

- Future thinning of tree cover to encourage a diverse mosaic of habitats and vegetation types in keeping with the functional requirements;
- Occasional scrub clearance or mowing to maintain open grassland areas; and,
- Removal of invasive species that would not enhance landscaping designed.

Fencing and Security

4.3.32 The site will be fenced using a combination of new 2.4 metres high mesh weld and galvanised palisade security fencing. Existing 1.8 metre high palisade security fencing to the south of the site will be retained also as shown on Figure 4.21. Additional security will be provided by CCTV cameras and intruder alarms.

Vehicle wash down area

4.3.33 A vehicle wash down area (utilising a manually operated high pressure water jet unit) will be provided adjacent to the western bund and skip storage area. This is for the cleaning of vehicles where necessary prior to leaving the site. Effluent form this area will be drained to the foul sewer as shown on Figure 4.19

Skip storage area

4.3.34 An area for the storage of skips is located on an area of drained hardstanding to the immediate east of the landscape mound within the west of the site. Skips stored within this area will be specifically used for the removal of materials from the site either those arising from the management process of those which cannot be managed at the site.

Access Configuration

4.3.35 A new site access junction is proposed on the eastern side of Sinfin Lane at the south west corner of the site as shown on Figure 4.22, (Drawing Number D124019-SIN-3001 within Technical Appendix 4.1). The swept paths of vehicles using the proposed site access junction on Sinfin Lane enable large Articulated Vehicles to undertake the turning moves within the available carriageway and lane widths.

4.3.36 The access design was submitted to Derby City Council for their comment in advance of submitting the application and the layout of the proposed access has been agreed with Highways Development Control as a suitable means of access. Visibility splays of 2.4m x 80m can be achieved in both directions which is acceptable to Derby City Council.

4.3.37 The proposed access junction provides sufficient radii to allow HGVs to turn into and out of the access from each direction of Sinfin Lane. At its narrowest point the proposed site access has a carriageway width of 8 metres which is sufficient to allow two HGVs to pass as stated within Figure 7.1 of the Department for Transport publication *Manual for Streets (2007).*

4.4 Process Overview

Introduction

4.4.1 The new Waste Treatment Facility will utilise proven technology and has been designed to process 190,000 tonnes of residual municipal solid waste per annum via three line process. The ACT availability will be some 89% per year as a result of planned and unplanned downtime. The three line plant provides operational flexibility during periods of maintenance enabling one line to be shut down whilst the other two lines are operational. The MBT will shut down annually for a period of 15 days.

Waste Sources

4.4.2 The WTF will accept MSW from the eight District and Borough Councils of Derbyshire (Amber Valley, Erewash, Bolsover, Chesterfield, North East Derbyshire, High Peak, Derbyshire Dales, and South Derbyshire) and from Derby City Council.

4.4.3 The majority of MSW (approx 97,000 tonnes per annum) will be delivered to the site by Refuse Collection Vehicles with waste originating within Derby City Council, Erewash, South Derbyshire , Amber Valley and Derbyshire Dales. The remaining MSW will be delivered (approx 93,000 tonnes per annum) to the site in bulkers from Waste Transfer Stations at Melandra Rd, Glossop; Clover Nook Industrial Estate, Alfreton; Waterswallows, Buxton; and Chesterfield.

Waste Input

4.4.4 The proposed facility using Energos ACT technology and Entsorga MBT technology will have the capacity to treat approximately 190,000 tonnes per annum of residual Municipal Solid Waste (MSW) comprising. household waste, street cleaning waste, street litter. (The facility will have the capacity to receive 200,000 tonnes per annum). The contribution of the facility to in managing the Derbyshire and Derby City waste stream is set out in Figure 4.23 below.

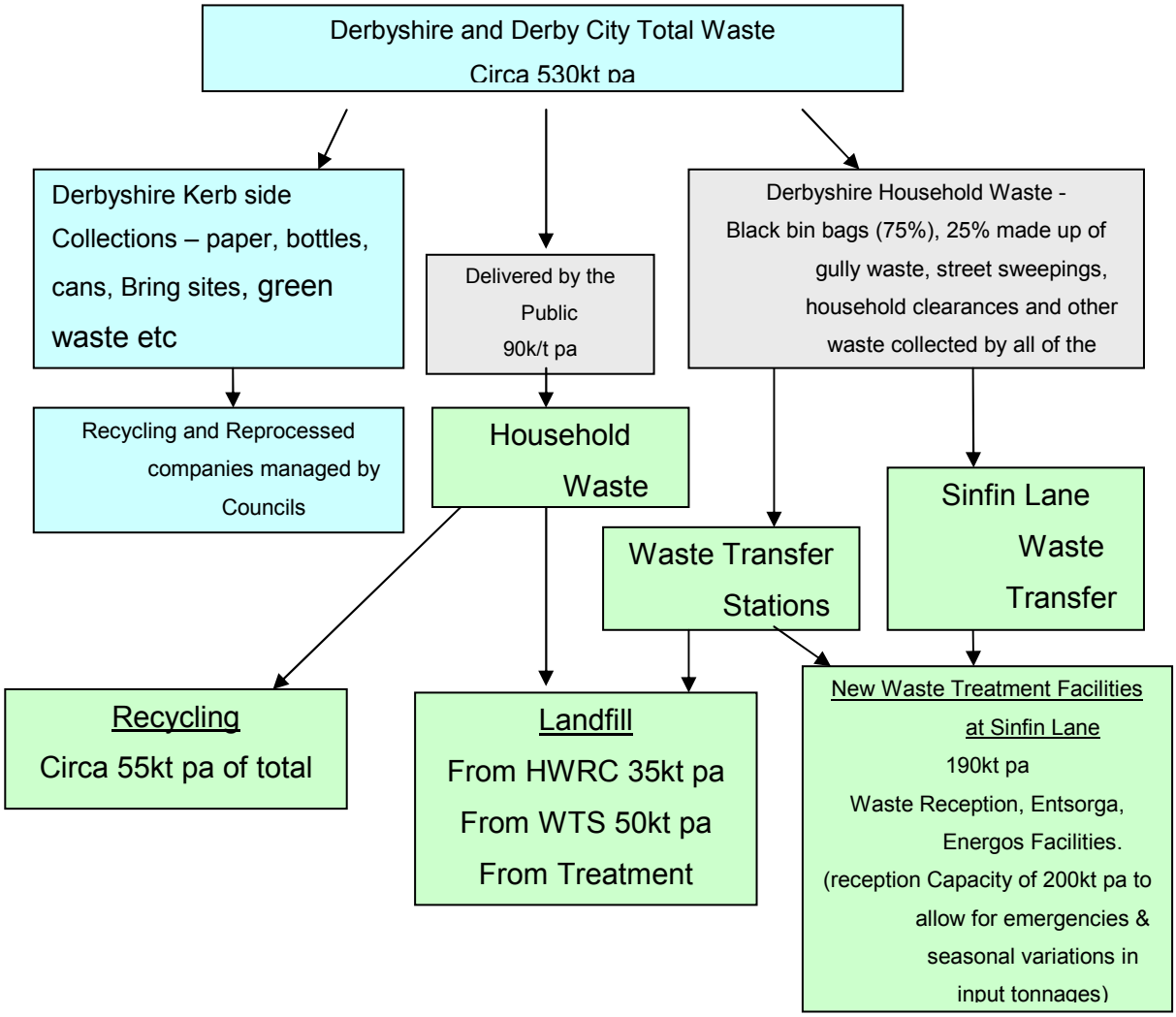

Figure 4.23 Derbyshire and Derby City waste management

4.4.5 Of the 190,000 tonnes per annum treated at the facility, typically, 6,000 tonnes per annum will be Bulky recyclates transferred off site for recycling, and 4,000 tonnes per annum will be items not suitable for the process. Of the remaining 180,000 tonnes per annum approximately following screening and separation, approximately 40,000 tonnes per annum will be processed through the MBT Facility and 140,000 tonnes per annum will be processed through the ACT Facility. In addition, it is anticipated that there will be 25,000 tonnes per annum of Recyclable material and 31,000 tonnes per annum of Recovered material derived from the process. The process throughput is summarised in the figure 4.24 below.

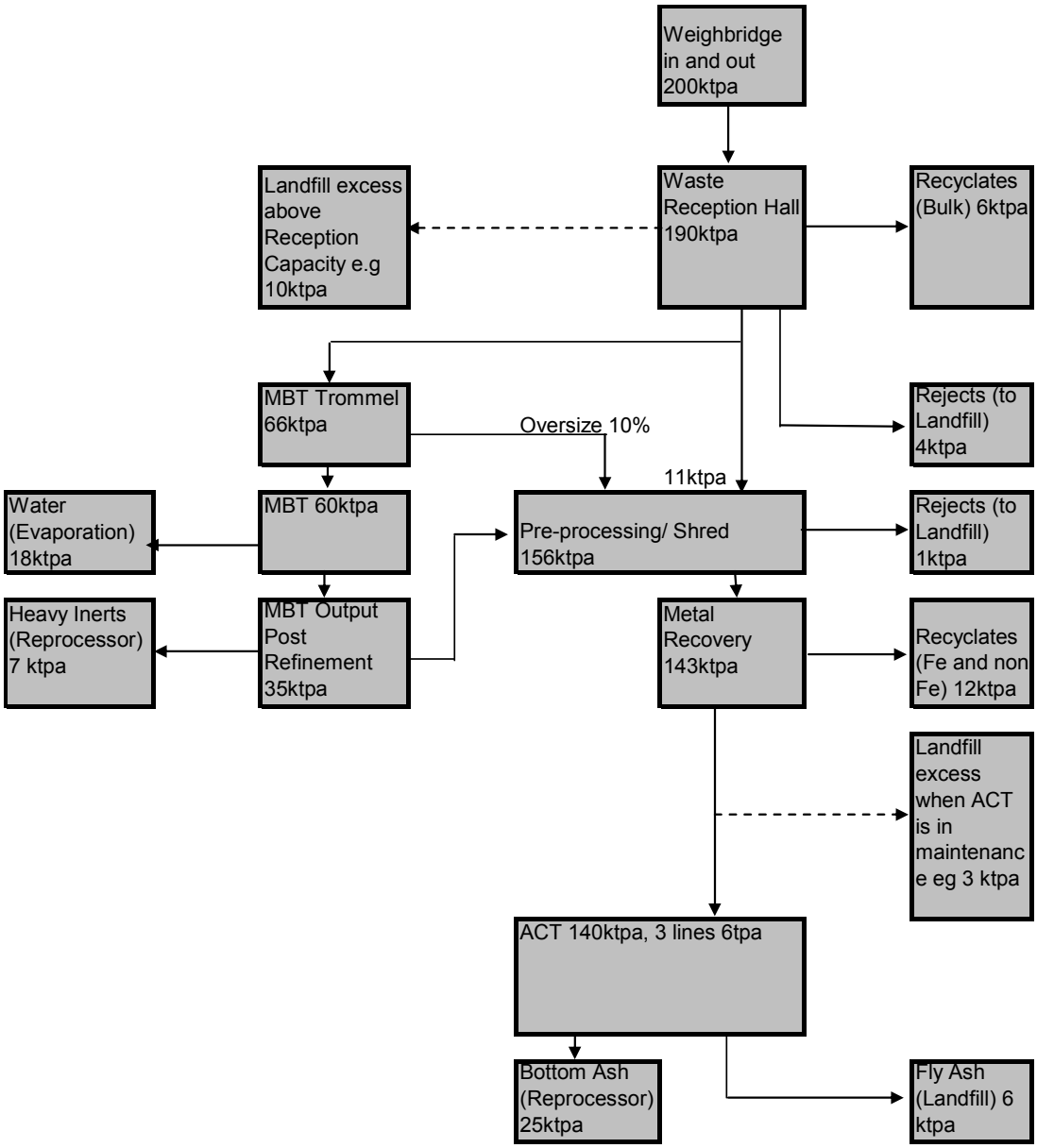

Figure 4.24 Waste Flow within Waste Transfer Facility

Waste Treatment Process

4.4.6 The proposed development is an Energy Recovery operation, but unlike Energy from Waste (EfW) Facilities which recover energy by simply incinerating raw waste, it will recover energy through the combustion of synthetic gas (also known as syngas) using Advanced Conversion Technology (ACT). The ACT produces power in the form of electricity through a two stage process which firstly produces the synthetic gas through drying and gasification and which is in turn combusted to recover energy.

4.4.7 In order to fuel the ACT, one third of the waste is fed through the MBT Facility which produces a high calorific Refuse Derived Fuel (RDF). This RDF is then mixed with the raw MSW which has been treated by screening and separation for recyclates, to produce a Mixed Waste Fuel (MWF). The MWF is then used by the ACT Facility to produce electricity, heat, and power.

United Utilities - SINFIN Lane - Process Flow Concept

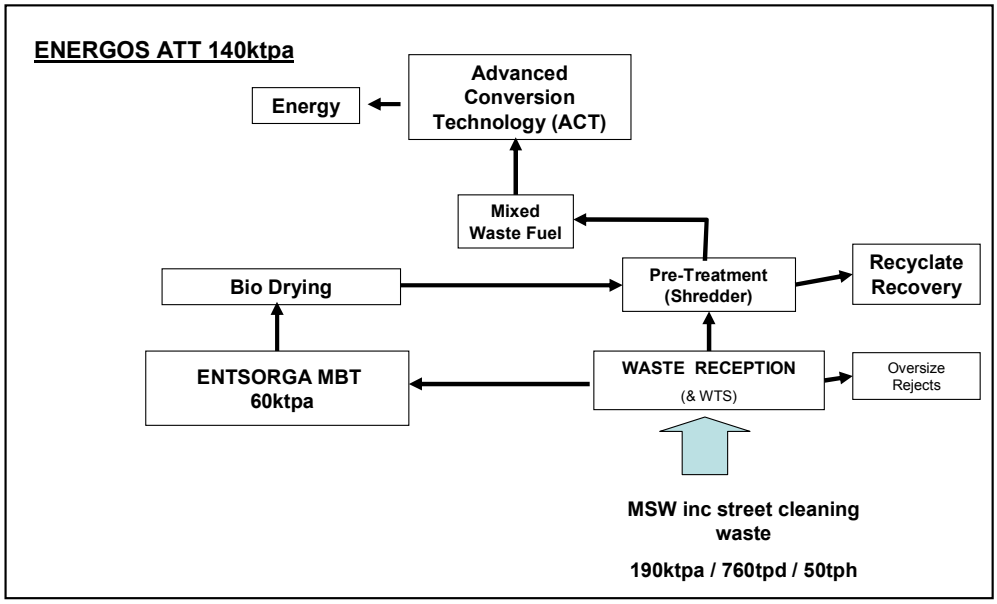

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Figure 4.25 Process Overview

4.5 Waste Reception and Recycling Hall (WRRH) Operations

Waste Reception

4.5.1 All vehicles carrying waste to the new Waste Treatment Facility will have to pass over the 'in' weighbridge before being allowed to the waste reception hall. Vehicles not pre registered on

the weighbridge system will not be allowed to progress to the waste reception hall until details have been obtained. Following weighing the waste vehicles will then be directed to the appropriate part of the Waste Reception Hall.

4.5.1 The Refuse Collection Vehicles (RCV's) delivering MSW will then reverse up to a designated bay, a green or red light will indicate which bay the vehicle is to enter. A total of 5 reception bays will be provided. The hall will be accessed through automatic fast-acting fabric doors which will close behind the vehicle prior to the waste been discharged into the Combined Reception Bunker. The reception bays are of sufficient length to allow for this process to be repeated for the bulk transport fleet. Further kerbing at the rear of the bays will prevent offload vehicles over running into the reception pit.

4.5.2 The reception pit has a storage capacity of some 3,780m^3 which equates to some 1.75 days of storage when the facility is working at full capacity.

4.5.3 The overhead gantry cranes above the Combined Reception Pit will enable onward movement of the waste allowing also the removal of large recyclables and non-processible objects from the waste stream and discharge them into skips ready for transfer off-site.

4.5.4 The remaining waste will then be discharged into one of three feed hoppers which will direct the waste for treatment. The receiving hoppers will have grizzly bars over them set at an angle to allow oversized material to roll off and not be forwarded to the shredder. One hopper will feed the MBT Trommel and two will feed the shredders associated with the Primary Screening and Secondary Separation.

4.5.5 Gully waste will be discharged into separate skips where free water will be drained off and discharged into an interceptor. The solid residual material will be transferred to a suitably licensed landfill.

4.5.6 Bulky waste will delivered to the site in larger vehicles and will be sorted into recyclable and non-recyclable material and discharged into the appropriate skip for transfer from the site.

4.5.7 Any clinical waste delivered to the site will be discharged into wheelie bins located within a steel lockable container prior to transfer to an appropriate disposal facility.

Primary Screening and Secondary Separation

4.5.8 Following transfer from the reception pit the waste will then pass through Primary Screening and Secondary Separation either directly or following on from the MBT operation.

4.5.9 Waste will be received into one of hoppers each of which has a shredder on its line and through which the waste will then be passed. Following shredding the waste will then pass through as series of equipment as appropriate on conveyors, including trommel's, overhead magnets, eddy current, flip-flop screen, hard particle separators, and air boxes. The process will remove both ferrous and non-ferrous metals, glass etc from the waste stream. Any metals recovered will be discharged to skips and transferred off site a recyclates.

4.5.10 The waste will then be transferred onto conveyors where it will be weighed and discharged in to the ACT bunker as the Mixed Waste Fuel.

4.6 Mechanical Biological Treatment Facility

MBT: Mechanical Treatment

4.6.1 All movement of waste within the MBT plant is carried out by automated overhead cranes. Prior to undertaking primary screening and secondary separating, approximately one third of the waste (it is anticipated approximately 60,000 tonnes per annum) will undertake the MBT process. The Mechanical element of the MBT process consists of the waste passing through the MBT trommel which will be located within the WRRH.

4.6.2 Waste will be directed from the waste reception bunker to a hopper which will discharge it to the MBT trommel. The MBT trommel will split any bags to allow the waste to pass through 160mm trommel apertures and on to a conveyor leading to the MBT reception bunker. This element of the process will remove inert oversized fractions form the waste such as plastic, paper and card, leaving behind only putrescent organic material and undersize dry biologically inert fractions. The bunker will have a slotted floor to allow warm air to pass through the waste and assist the biological process prior to discharge into the Bio-oxidation Hall.

4.6.3 The oversized material will not pass through the trommel's apertures and will be retained until discharged onto a conveyor that will feed the primary screening and secondary separation operation described above.

MBT: Biological Treatment

4.6.4 The purpose of the MBT process is to produce a Refuse Derived Fuel to be used in the ACT operation. Following the Mechanical element of the MBT process, the waste will then be transferred from the MBT bunker by overhead gantry crane to the Bio-oxidation Hall where the MSW will form ten windrows approximately 5 metres in height along the width of the Hall and retained for 10 to 14 days. There is one windrow for each day of loading and thus by loading at week days only.

4.6.5 The waste is then subject to a Bio-drying process which works by a series of external fans which draw air through the piles of waste via perforated pre-cast slabs and reversed according to the temperature of the waste as controlled by the air control system. Each windrow is controlled individually. Between the floor and the bottom of the building is a void that that enables a continuous air pressure to be applied, and allows a uniform distribution of air in the material.

4.6.6 The waste is subject to a period of forced aeration through the supply of oxygen that catalyses the aerobic reaction, which in turn produces heat which evaporates water content degrading the organic putrescible fraction stabilising the material.

4.6.7 The Bio-oxidation Hall will be operated under negative pressure. Any air leaving the building will be drawn through a bio-filter located adjacent to the fans to remove any odorous compounds prior to being discharged into the atmosphere.

4.6.8 Following the bio-drying process (10 to 14 days), the overhead cranes will unload the dried waste into an outlet hopper from which a conveyor will transfer the dried material (now the RDF) into the primary screening and secondary separation operation where it will be mixed with raw MSW to form the Mixed Waste Fuel.

4.6.9 The leachate discharged from the bio-drying process will be collected in a leachate holding tank prior to testing, and discharged to the sewer or collection by tanker for transfer off site. Waste handling always takes place in an enclosed building that is constantly kept at negative pressure, which avoids any odour escaping from inside. Negative pressure is maintained by the automatic control system even when air is being blown into the biomass, rather than sucked out by ensuring the volume of air removed is always greater than that blown in. The air removed is then treated by the biofilter so that all dust, odours and any bioaerosols that are potentially generated can be filtered out of the process air before being released into the atmosphere.

Waste Feedstock

4.6.10 The waste feedstock of some 60,000 tonnes per annum will mostly comprise household waste but may include paper textile, wood and some plastics, an organic fraction together with grit, glass and any remaining ferrous and non ferrous metal. In respect to output from the MBT process approximately 53% will be refuse derived fuel (RDF) with some 18,000 tonnes per annum of water driven off. Some 6, 720 tonnes per annum will be a heavy inert material which will be exported to glass recycling contractor.

4.7 Advanced Conversion Technology Facility

4.7.1 The ACT plant is a triple line plant with a nominal fuel processing capacity of 18 tonnes per hour. The ACT plant consists of the following main systems:

- Fuel bunker and Transport system;
- Thermal conversion (gasification unit and high temperature oxidation unit);
- Heat recovery steam generator
- Steam turbine and air cooled condenser
- Flue gas treatment system
- Flue gas fan and flue gas stack; and Control and monitoring system.

4.7.2 The pre treatment process will secure a specific particle size of the fuel and remove non combustible materials such as metal objects. Differing waste fractions will be well mixed to ensure a homogenous fuel with respect to net calorific value and other properties.

4.7.3 The mixed waste fuel is discharged into the ACT fuel bunker by one of two conveyors. The two overhead gantry cranes will further mix the MSW in the bunker to ensure the feedstock is of consistent quality. The gantry cranes will feed waste into the three fuel inlet hoppers.

Thermal Conversion

4.7.4 The thermal conversion will take place through a two stage process. Firstly, drying and gasification of the Municipal Waste Feedstock is carried out in the gasification unit (primary chamber) under sub-stoichiometric conditions to produce synthetic gas.

4.7.5 The gasification unit will be equipped with a fixed horizontal oil-cooled grate that is divided into several sections, each with a separate air supply. The gasification units have a water cooled guillotine at the inlet to control the thickness of the fuel bed, and the fuel feeding rate is controlled by computer software.

4.7.6 The second stage involves the gas 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 a complete combustion of Carbon Monoxide, Total Organic Carbon with a final production of a flue gas with low NO*x* content. Figure 4.26 below shows an overview of the ACT process.

4.7.7 The gasification units are equipped with a fixed horizontal oil cooled grate that is divided into several separate sections, each with a separate air supply. A water cooled guillotine is installed at the inlet of each of the gasification units to control the thickness of the fuel bed.

Hydraulically operated water cooled scrapers transport fuel along the grate. The transport mechanism is designed so as to provide longitudinal transport and good local mixing of the moving fuel bed to enable good homogeneity.

4.7.8 The bottom ash is discharged 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.

Odour management

4.7.9 Potential odour and smell in the vicinity of the plant is avoided by using air from the fuel bunker hall as process air for the gasification and high temperature oxidation process.

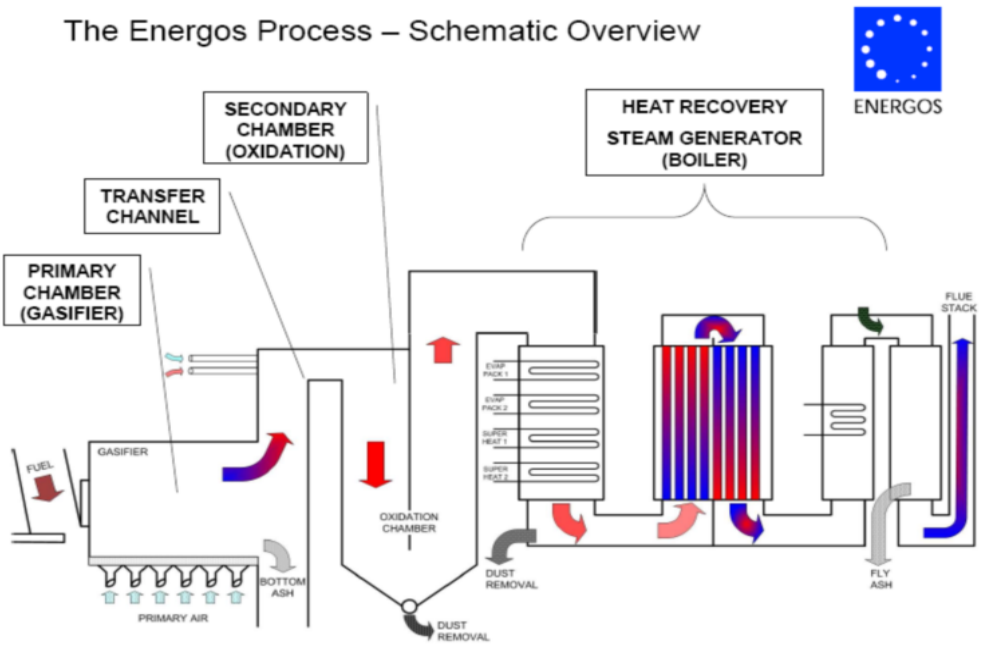

Figure 4.26 ACT Process Overview

Energy Recovery

4.7.10 Energy Recovery takes place when the Heat Recovery Steam Generators (HRSGs) connected to the High Temperature Oxidation Unit's convert the energy from the flue gas into steam which is in turn passed to the Air Cooled Condenser and a turbine which will generate electricity. The HSRGs are equipped with a feed water pump, a feed water tank, a make up water system, a blow down tank for blowing the boiler and facilities for cleaning of the heat transfer surfaces during operation.

4.7.11 In total it is estimated that the turbine will generate approximately 11 MW of electricity per hour (90,160MW per annum), of which 3MW per hour (23,400 MW per annum) would be used by the proposed development itself. The development would therefore be a net exporter of some 8 MW per hour (66,485per annum) of electricity to the national grid per annum. Enough to power 14,000 homes.

4.7.12 The condensed exhaust steam from the turbine will be converted to hot water through a boiler system, and re-directed to be used in the MBT bio-drying operation. Additionally, some of the exhaust steam or hot water could be supplied to adjacent consumers depending on the demand, location, and supply conditions. In this respect, preliminary studies have been commissioned and have indicated that potential heat and power customers exist in the vicinity of the site, and current market conditions suggest that waste heat from the WTF may assist these companies reduce energy costs and their Climate Change Levy liability on the use of gas and oil.

ACT Facility By-products

4.7.13 There are two types of solid by-products produced from the operation of ACT Facility. These are:

- Bottom Ash
- Flue Gas Cleaning System (FGCS) Residues

4.7.14 Bottom Ash is discharged from the gasification unit at the end of the grate where it is then cooled in a water basin and transported to the Bottom Ash Handling Facility. The Bottom Ash will then be recycled as an aggregate replacement material and transported in a covered skip to an aggregate recycler or concrete product manufacturer. Approximately 25,436 tonnes of bottom ash will be generated each year.

4.7.15 Following the HRSG process, the flue gas generated by the two stage gasification process enters a cleaning system which comprises a bag house filter, a storage silo, and an activated carbon and filter dust silo. The cleaning system works by injecting lime and carbon into the flue gas for the absorption of acid components and adsorption of heavy metals, mercury, TOC and dioxins. Fly ash and the adsorbents are removed from the flue ash as it passes through a bag house filter, leaving them behind as a Flue Gas Cleaning System (FGCS) residue. In turn this residue is recovered from the bottom of the filter and transported to the Filter Dust Storage Silo, from where it is then transported from the site to an identified cement manufacturer, where it is used as gypsum replacement. This material will otherwise be disposed of at landfill. Approximately 6,000 tonnes of flue gas residues will be generated each year.

4.7.16 The Flue Gas Cleaning System will be housed in an area located to the rear of the ACT Hall. This is within Area P shown on Figure 4.3.

4.7.17 The enclosure will have motor driven Roller Shutter doors at either end to allow access to HGV's which will transport the FGCS Residue from the site. The HGV's will enter the enclosure from the west and exit to the east. The three bag house filters are also proposed to be located within the enclosure.

4.7.18 The Bottom Ash will be stored in a bunker located with an a building adjoined to the ACT Hall. The Bottom Ash will be transferred from the bunker with an Overhead Crane into lorries for transportation off the site (as identified above).

4.7.19 Raw materials used as part of the ACT process include:

- Hydrated Lime
- Active Carbon
- Oils, gases and lubricants
- Corrosion inhibitor
- Water.

4.8 Staffing

4.8.1 The total number of full time personnel will be 31 comprising the following roles;

- Operations Director
- Treatment manager
- Shift controllers
- Maintenance manager
- Waste Composition Technician
- Technical administrators
- Weighbridge operators
- Reception Hall operators
- Crane Operators
- MBT operators
- Maintenance Fitters
- ACT operators

4.9 Construction

4.9.1 The site will be subject to the following sequence of construction activities:

- Site Establishment including drainage and services;
- Preparation of site levels through earth moving,
- Construction of the Bio-Drying Hall and the Waste Reception and Recycling Hall including installation of process equipment;
- Construction of the ACT Facility and installation of process equipment concurrently;
- Completion of access and access road, service yard, car park, Gatehouse and Weighbridges;
- Provision of landscaping and boundary treatments;
- Start up and commissioning activities;
- Construction of Education Centre and Offices.

4.9.2 It is anticipated that the Construction period will be as follows:

- Construction to commence April 2010;
- By August 2011 the waste Bio-Drying operation will commence;
- By July 2012 the WTF will be fully operational.

4.9.3 Construction operations are likely to require a range of mobile and static plant including, but not limited to, the following equipment:

- Delivery Wagons;
- Excavators;
- Tipper Lorries;
- Dump trucks;
- Tamping Beams;
- Pumps for De- watering;
- Piling Rigs;
- Cranes;
- Mobile Hoists;
- Compactors;
- Concrete batching plant;
- Dozers;
- Loader;
- Breakers;
- Piling;
- Batching Plant;
- Truck Mixer Discharging;

- Poker Vibrators and beam tampers;
- Grinder;
- Compressor;
- Generator;
- Circular Saw;
- Tracked Excavators;
- Cranes;
- Water Pumps;
- Water Bowsers;
- Wheel Washes;
- Road Sweepers.

4.9.4 To control environmental issues during the construction process a Construction Environmental Management Plan (CEMP) will be developed and agreed with the Environment Agency. The CEMP will form part of the Project Management Plan (PMP), which integrates the core arrangements for health and safety, quality and environmental management for the project. This integrated approach ensures that environmental aspects are considered at all stages of the design and construction process.

4.9.5 The Construction Environmental Management Plan will describe:

- Details of the Environmental Management System (EMS);
- Details of the Sustainability Management System. (SMS). This section will be used to manage sustainability that can be influenced by the Contractor's integrated team.
- Organisation and staff responsibilities for implementing the mitigation measures across the site;
- Procedures for management of supply chain and other organisations working within the site;
- Compliance with legislation;
- Environmental aspects and proposed mitigation measures which are discussed in greater detail below;
- Monitoring, audit and reviews, identifying parameters to be measured, frequency, reporting mechanism and corrective actions; this will include inputs from the identified key stakeholders;
- Emergency arrangements, both site operational procedures and those addressing wider environmental impacts/effects on features such as watercourses, ground water protected species and adjacent habitats; and

- Details of the Site Waste Management Plan (SWMP), identifying specific requirements in relation to different elements of the work, backed up by statutory requirements and those of the Employer in respect of sustainable development

4.9.6 No construction or remediation activities will be required to take place from adjacent land outside the applicant's control.

4.10 Hours of Operation

Construction

4.10.1 Construction activities will mainly take place between 7am and 5 pm Monday to Saturday. Some activities are likely to occur outside these normal working hours. The chief constraint on working outside normal hours will be noise. Any activities likely to lead to an unacceptable level of noise at sensitive receptors during night time (see Chapter 12, Noise) will be avoided.

4.10.2 In general, activities such as electrical fit out, installation of small equipment, inspections, meetings and site office based work may take place 24 hours a day, 7 days a week. Appropriately silenced generators and other plant may also be running continuously. Noisy activities such as piling, unloading and erection of steel work, and activities requiring the use of tower cranes will be avoided, where possible, outside normal working hours unless supported by a noise assessment and appropriate mitigation measures.

Operation

4.10.3 During normal operational the ACT Facility will operate 24 hours a day, 7 days a week except during periods of planned maintenance. Planned maintenance will take place on a sequential basis with all three lines are planned to operate 83% of the year, and two of the 3 lines planned to operate just 6% of the year, and one line planned to operate just 3% of the year. It is anticipated that the ACT Facility will not operate in only 8% of the year.

4.10.4 The remainder of the proposed development will operate the following hours:

1) Weighbridge

• Monday – Friday	: 7am	to	5pm
• Saturday	: 7am	to	1pm
• Sunday	: 7am	to	9am (street cleansing waste only)

2) Waste Reception area:

• Monday – Friday	: 6am	to	10pm (2 shifts)
• Saturday	: 7am	to	3pm
• Sunday	: 7am	to	9am (street cleansing waste only)

3) Pre-Processing lines:-

• Monday – Friday : 6.30am to 10.30pm (2 shifts)

4) MBT:-

• Monday – Friday : 6am to 10pm (2 shifts)

4.11 Traffic

4.11.1 The following section details the proposed traffic associated with the development proposals. The basis for these estimates, as well as an assessment of their potential impacts and effects, are set out in more detail within Chapter 6 of this Environmental Statement. At the current time the frequency and type of construction vehicles is unknown since this is dependent upon a detailed method statement to be produced by the chosen contractor. The number of construction vehicles will however be lower than the number of operational vehicles In Summary the operation of the facility will generate traffic movements as highlighted in Table 4.9 below

Table 4.9 Proposed WTF Total Vehicle Movements on a Typical Day

Generated Vehicles (Daily)					Two-Way Vehicle Movements (Daily)	
Waste Inputs	**Waste Exports**	**Staff/ Visitors**	**Total**	**HGVs**	**Total**	**HGVs**
118	28	38	184	146 (82)	368	292 (164)

* For the purposes of this assessment HGVs are considered as all waste vehicles however the more likely HGV figure is provided within brackets.

4.12 Incorporated Mitigation

Traffic

4.12.1 The proposed new access junction (Figure 4.22) will incorporate an on-road cycle lane along the northbound and southbound carriageways of Sinfin Lane. This will improve and build upon the existing cycle network in the local area and improve the safety of cyclists along Sinfin Lane by separating the road surface for vehicles and cyclists.

4.12.2 The proposed access junction will require a vertical realignment of the southbound carriageway together with its resurfacing. This will also require new white lining along Sinfin Lane, thus offering an improvement over the existing lining.

4.12.3 A pedestrian refuge will be provided within the site access, thus maintaining the pedestrian route along the eastern side of Sinfin Lane. In addition, a 2.0m wide footway will be provided directly into the site from Sinfin Lane.

4.12.4 The proposals will remove the existing access to the site, which is located on the southbound carriageway of the railway bridge to the north of the proposed access. Although currently not in use, it is a consented access junction and its removal will complete the pedestrian route over the bridge and remove an access with sub-standard visibility.

4.12.5 The internal site layout has been designed so as vehicles can enter and wait (if required) without blocking back onto Sinfin Lane. Indeed, the weighbridge has been located approximately 120m within the site and there is a further waiting lane of approximately 60m if required.

4.12.6 A Travel Plan has been prepared to accompany the proposals and this will seek to reduce the number of trips made by private car. This has been prepared in accordance with current guidance and in particular seeks to reduce the number of staff trips. The Travel plan is set out within the Appendix 6 of the technical appendices.

Air Quality

4.12.7 Ground-level concentrations of pollutants from the operational-phase of the Facility (stack and MBT) have been shown by the assessment to meet all the relevant air quality acceptance criteria. No further mitigation is required other than that incorporated into the design of the scheme. The operation of the facility will be strictly controlled though conditions attached to the Permit that will be required under the Environmental Permitting Regulations and will be enforced by the Environment Agency. The Air Quality Assessment is et out within Chapter 7 of the Environmental Statement.

Landscape

4.12.8 The main elements of the scheme design which seek to address landscape and visual issues include the following concepts:

Careful siting and massing of the proposed built form.

4.12.9 The main structure is set back from Sinfin Lane and avoids being an overly dominant feature of the existing streetscape by means of the proposed site mounding which has been designed as part of the scheme proposals. The lower structure of the education centre has been designed at a more domestic scale.

Zoning of the site to reduce the impact on the adjoining land uses.

4.12.10 The main bulk of the structures are located to the rear of the site and allowance has been made to includes buffers on all boundaries between the new structures and adjacent land uses. The public zone is focused on the street frontage with an allowance for parking and outdoor space for use as part of the education centre.

Choice of materials to ensure integration.

4.12.11 The main structure is designed to reflect its surroundings and blend with the local industrial buildings. The choice of 'Goose Wing Grey' is compatible with the adjacent properties and is more recessive in views. This is intended to reduce the visual impact of the structure particularly in more distant views. The education centre has a greater variety and range of colours and materials to appeal on a more domestic scale as a publicly accessible building.

4.12.12 The layout retains the strongest area of planting already present on the site which provides an important buffer between the industrial land to the south and the recreational uses to the north. The existing woodland is associated with the railway line and comprises both on and off-site planting to provide additional benefit. The landscape proposals build upon the existing landscape structure to integrate and enhance. The Landscape and Visual impact Assessment is set out within Chapter 8 of the Environmental Statement.

Ecology

4.12.13 Ecologically, measures have been built into the design of the site. These include the habitat creation proposals which relate to specific impacts that have been predicted to arise as a result of the construction stage and operational stage of the development. The Ecology Assessment is set out within Chapter 9 of the Environmental Statement.

Surface Water Quality

4.12.14 Water quality interceptors and/or sumps will be included as an incorporated enhancement and mitigation measure for the drainage of surface waters from hard standing areas prior to their release from the Site. These measures are designed for the volumes and rates of surface water runoff at design return period events. The measures will have an appropriate design and classification for the potential polluting nature of materials. The surface water drainage network will also be fitted with a means of isolation at appropriate locations in the drainage network, notably at release points for surface waters from the proposals site. The Hydrology Assessment is set out within Chapter 10 of the Environmental Statement.

Ground Conditions

4.12.15 Although the risk to controlled water is low, agreement for a groundwater management plan shall be sought with the regulator and planning authority to minimise potential contact between site construction workers and perched waters in Made Ground during the construction phase. This shall include safe handling, storage and disposal of shallow groundwater where encountered, following UK best practice. The Ground Conditions Assessment is set out within Chapter 11 of the Environmental Statement.

4.12.16 Chemicals, oil and fuel used on the operational site will be stored in bunded structures. The bunds will be designed and constructed in accordance with the latest regulatory guidance in order to contain 110% of the tanks maximum capacity with impermeable bases, which will mitigate impacts to soil and groundwater resulting from leakage.

4.12.17 Materials transported to site for processing will be contained within appropriately constructed structures with impermeable bases, which will mitigate impacts to soil and groundwater resulting from leakage.

4.12.18 Foundations and services will be designed and constructed to minimise the creation of pathways for the migration of contaminants, principally from the Made Ground to the underlying bedrock. The method of design and construction will be determined following an assessment of the results of further geotechnical site investigation to be undertaken. The controlled waters risk assessment shall be reviewed at this stage should this be deemed necessary. This will help to reduce the potential contamination of groundwater.

4.12.19 All vehicles will be covered and waste handling processes undertaken inside a purpose built unit thereby limiting the contamination potential.

4.12.20 During the construction phase all waste soils shall be tested and classified prior to disposal offsite to an appropriately licensed facility.

4.12.21 Construction Environmental Management Plan (CEMP) will be prepared that would include details of measures to be undertaken to minimise the impact of construction noise in accordance with Best Practicable Means (BPM).

4.12.22 The project includes a 4 m high bund in the north western corner of the site adjacent to the rear gardens of 1 – 5 Railway Cottages that will reduce noise effects to these Noise Sensitive Receptors during construction and operation of the facility.

Litter

4.12.23 The following control measures will reduce the potential amenity impacts from wind blown litter:

- All vehicles delivering waste to or removing waste from the site will be required to ensure that loads carried in open vehicles or containers are secured with a net or tarpaulin to prevent items falling or being blown from the load.
- All waste treatment and transfer operations that may be susceptible to problems from windblown litter (i.e. the storage and processing of wastes containing paper, cardboard and plastics) will be conducted inside the enclosed building. Storage of segregated/processed materials of a similar nature will either be inside or if outside, on the impermeable hard standing in enclosed or sheeted skips/containers
- The facility will be inspected at daily intervals for litter. Any litter that is blown form the site into adjoining parts of site or onto the hard standing area will be collected at least once per week.
- Use of fast closing doors when waste is delivered which will shut prior to unloading in the waste reception area.

Vermin and Other Pests

4.12.24 The following control measures will reduce the potential amenity impacts from vermin and other pests:

- Undertaking all waste reception and storage operations involving biodegradable waste within the enclosed building
- Minimising the time between initial collection of waste, and treatment or transfer
- Negative pressure within the building
- Ensuring that kitchen and green waste delivered to the facility is not retained on the site for long periods and is transported off-site without delay. The maximum retention for such waste will be 1 day or 3 days over bank holiday weekends
- Regular inspections and treatment by pest control specialists and use of pesticides and rodentiscides
- Inspection and treatment of areas where rats are likely to live such as drains, and culverts.

Mud

4.12.25 The following measures will reduce the potential amenity impacts from Mud:

- Water sprays, wheel washing facilities and road sweeping

4.12.26 The master plan indicates that landscaping and planting will mitigate any adverse indirect effects on potential cultural heritage receptors

4.13 References

4.13.1 Department for Transport publication *Manual for Streets (2007).*