APPENDIX B: ALTERNATIVES

B1 INTRODUCTION

The EIA Regulations 1999 (Schedule 4, Part II, Paragraph 4) require an ES to include: *"An outline of the main alternatives studied by the applicant or appellant and an indication of the main reasons for his choice, taking into account the environmental effects."*

While the Regulations focus on the choice in terms of process, Circular 2/1999 and guidance published by the ODPM in February 2001 (*EIA Guide to Procedures*) bring in the question of alternative sites.

Accordingly, the following assessment of alternatives provides an outline of the alternative processes and sites considered by VESS - together with the reasons for its final choices.

It should be noted that this assessment is restricted to an assessment of the alternative technologies and sites for the treatment of residual municipal and similar wastes arising in Shropshire – having regard to the recycling and composting infrastructure that is already either in place or planned in the County. It does not consider:

- alternative options for the overall management of waste in Shropshire - as such issues have been fully addressed in the development plan and emerging planning policies; and
- landfill as one of the alternative methods for managing residual waste – since there is no landfill capacity remaining in Shropshire and the aim of local planning policies is to maximise the proportion of waste that is managed by more sustainable means. However, for the purposes of contrasting technology options with current practices for managing Shropshire's residual waste, landfill has been included within the assessment as a 'do nothing' scenario.

B2 PROCESSES

B2.1 Introduction

There are five main categories of technologies that can be considered for the treatment of residual MSW and similar forms of C&I waste:

- thermal treatment;
- advanced thermal treatment;
- mechanical biological treatment;
- anaerobic digestion; and
- autoclaving.

In addition, it is theoretically possible to convert methane and other gases derived from waste to hydrogen. To date this has only been demonstrated at pilot plant scale and in small scale applications. Accordingly this category (gas shift technology) is given no further consideration in this assessment.

The following outline of the technologies assessed by Veolia is based on a similar exercise carried out in connection with the Company's recent proposals for a comparable EWF development at Rufford in Nottinghamshire and comprises (i) description of each category, (ii) an appraisal of each (in terms of sustainability objectives) and (iii) the reasons for the choice made.

B2.2 Technologies

Thermal Treatment

Thermal treatment plants, including incinerators, are designed to burn waste under controlled conditions and at high temperatures. Energy from Waste Facilities (EWFs) provide added benefits by recovering the heat released from the combustion of the waste and using it to generate electricity and/or to provide steam or hot water. The majority of EWFs use an inclined moving grate design. Mixed waste is delivered into a reception hall or tipping bunker, then fed into a furnace feed hopper, usually by a mechanical grab. The waste falls onto the moving grate system, which keeps it travelling down a slope through the furnace as it burns. All combustible material is burnt and the unburned residue – bottom ash – is deposited into a quench tank. The hot gases from the combustion chamber are directed to a boiler, where heat is recovered as superheated steam through a series of heat exchangers.

The main output of a thermal treatment plant or an EWF plant is bottom ash, which is an inert material, following oxidation of the organic component of the waste stream. The volume of waste needing disposal following thermal treatment is reduced by up to approximately 90%, reducing the potential need for landfill. The bottom ash from which ferrous and non-ferrous materials are frequently recovered can be processed and recycled for use as a secondary aggregate in the construction industry and can be re-used as an aggregate for road base and other purposes. VESS is currently working with other mineral/secondary aggregate suppliers to establish the development of a network of specialist satellite incinerator bottom ash (IBA) processing plants where IBA can be prepared for re-use efficiently and cost effectively. VESS has access to a number of such operational facilities.

The combustion gases from the thermal treatment of waste are treated as part of the process by a flue gas treatment system (FGT) to remove contaminants such as particulates and heavy metals. The ash residue from the flue gas treatment system typically needs disposal at an appropriately engineered hazardous waste landfill or repository (such as VESS's new Minosus facility), mainly due to its excess alkalinity, although there are some market outlets in development for this material. Indeed, it is the practice of Veolia to use the alkaline nature of this residue to neutralise acids as part of its chemical treatment processing plant in the West Midlands.

Current "State of the Art" EWF technologies developed in response to tighter environmental regulation and enforcement have addressed previous concerns associated with plants operated prior to the 1970s. The technology is well proven, robust and can make a significant contribution to landfill diversion. Although there remains a public perception of public health risks associated with thermal treatment plants in the UK, the basis for such concerns is unproven and not shared by the Government and regulatory bodies. Strict permitting limits for air emissions from modern EWFs mean that air emissions are strictly controlled to very low levels. There have also been a large number of studies on the effects of emissions from EWFs. The Health Protection Agency and the Royal Commission on Environmental Pollution have separately confirmed that EWFs which meet current standards for emissions are an environmentally acceptable method of dealing with municipal waste streams and do not give rise to significant adverse heath and environmental effects.

EWFs have the potential to operate as combined heat and power (CHP) plants when fitted with a 'take off/pass out' from the turbine which enables a suitable feed to a residential or industrial outlet for the low grade steam/heat.

In contrast to the EWFs described above, some processes employ fluidised bed technology at the combustion stage. This technology requires the feedstock to be pre-treated and is generally viewed (when used for the treatment of municipal and similar wastes) as having greater technical and financial risks.

Advanced Thermal Treatment

Gasification and pyrolysis are two techniques in the group of processes collectively known as Advanced Thermal Treatment (ATT). Like thermal treatment processes advanced thermal treatment involves heating the waste to high temperatures to initiate chemical reactions within the waste. In the case of incineration and EWF processes, an excess of air ensures complete oxidation of the waste, whereas with pyrolysis there is an absence of oxygen.

Gasification involves the combustion of waste with some oxygen but not sufficient to enable complete oxidation. The temperature of combustion is typically greater than 750°C for gasification and somewhat lower for pyrolysis.

ATT uses processed waste or refuse-derived fuel as fuel in the combustion process. This generally generates energy from organic or hydrocarbon containing materials. The main product of pyrolysis and gasification is a syngas, which contains carbon monoxide, hydrogen and methane. The other main product is a solid residue of non-combustible materials (ash) which contains a relatively low level of carbon. There may also be a liquid residue stream.

It is possible to classify gasification and pyrolysis into three broad technology groupings;

- systems which produce an exhaust gas that is used to generate electricity using a steam turbine (typical capital cost is higher than EWF incineration, maximum capacity c. 200ktpa per unit);
- systems which produce a syngas for use in a boiler, gas turbine or gas engine (typical capital costs is 60% higher than EWF incineration, maximum capacity around 100ktpa per unit). To date the cleaning of syngas from mixed waste inputs to a sufficient quality for use in gas turbines (and subsequently to benefit from the increased efficiency of the combined cycle gas turbine energy recovery), has not been proven at a commercial scale and is therefore not given further consideration in this assessment; and
- systems which process the syngas to produce a fuel suitable for a fuel cell (unproven/novel technology and therefore not given further consideration in this assessment).

A further technology variant is plasma gasification. Of the marketed plasma gasification technologies, none are currently gasifiying the waste with a plasma torch and cleaning the syngas to produce a gaseous fuel that can be used in a combined cycle turbine or reciprocating engine. The plasma gasification alone (with subsequent combustion of off gases and conventional energy recovery boiler) offers no advantages over mass burn technology at this time, and indeed adds to plant parasitic power consumption. In addition, the application of plasma gasification to date has been limited to the small scale treatment of hazardous waste where the costs are not comparable. As a consequence no further consideration is given to this form of gasification technology in this assessment.

In general ATT systems generate electricity in one of two ways:

- the syngas is combusted and the hot gases are fed through a heat exchanger where steam is produced. This is used to generate energy in a steam turbine; or

- the syngas is refined to produce a high quality fuel which is typically used in a gas engine to produce electricity.

An advantage of ATT is that the syngas product can be used for a variety of purposes, which can offer greater flexibility in recovering value from waste than, for example, incineration. Another potential advantage is the production of hydrogen, which can be promoted by manipulating the incoming material and the chemical reaction within the unit to increase output.

ATT involves increased capital and operational costs as well as a higher level of technical experience to maintain a facility, compared to incineration or EWF. It also needs additional infrastructure (land, buildings, finances, air/odour treatment etc for the production of a refuse derived fuel prior to combustion in the ATT plant). There is likely to be a lower perceived health risk associated with pyrolysis and gasification plant when compared with other thermal treatment options, although this is not necessarily justified. Whilst emissions from gasification and pyrolysis combustion have the potential to be lower, both types of thermal treatment will still be required to manage their gaseous emissions so that they meet the strict targets required under the Waste Incineration Directive and the requirements of their Environmental Permit.

Gasification technology has been demonstrated commercially mainly in the far east where the objectives of the treatment are to reduce the waste volume and make an inert residue for landfill disposal and not the energy recovery imperative which is key to the UK scenario.

Furthermore, this gasification to date is limited to gasifying the waste in order to incinerate the off gases (dirty syngas), rather than cleaning the syngas for higher value use. Of the marketed plasma gasification technologies there are no commercially operating facilities currently gasifiying the waste (e.g. with a plasma torch) and cleaning the syngas to produce a gaseous fuel that can be used in a combined cycle turbine or reciprocating engine. The plasma gasification alone without this enhancement (thus with subsequent combustion of the off gases and conventional energy recovery boiler) offers no advantages over mass burn technology at this time, and indeed adds to plant parasitic power consumption - reducing environmental performance.

The technology is also known to have low availability and high operational and maintenance costs when compared to other thermal treatment technologies. Our estimate is a 30% premium without obvious benefits.

Further to this many pyrolysis processes have failed to continue operation at full scale despite long development plans and high investment (e.g. Thermoselect).

Veolia considers that currently there is no commercial demonstration that alternatives to mass burn and fluidised bed technology present any advantage in terms of environmental performance and this fact should not be overlooked. However, the enhancement of gasification technology to produce a cleaned transportable syngas presents a high level of environmental advantage and Veolia invest significant resources into evaluation and development of partnerships with technology suppliers to realise this future technology.

Mechanical Biological Treatment

Mechanical-Biological Treatment (MBT) is a generic term that covers a wide range of processes. It is also an intermediate treatment option for waste management, with the residual material being rendered more stable for deposit into landfill, and/or combustion in an EWF or other suitable power plant, such as ATT.

The purpose of MBT is to:

- reduce the volume of waste;
- where practical or beneficial, to provide a refuse derived fuel for use in EWFs or other suitable power plants or.
- reduce the environmental impact of residual waste deposited at landfills; and
- lengthen the useful life of landfills; and

It is typically a modular process that basically reduces the biodegradable components of a waste stream and extracts a proportion of recyclables. The components are initially broken up by a variety of mechanical means such as bag splitters or ball mills. The recyclables are extracted out through a series of further mechanical sorting processes such as air curtains, eddy current separators, trommels and magnetic separators.

A biological process may be used to stabilise the organic fraction of the waste stream. The biological process may consist of either an anaerobic or aerobic digestion process. The advantage of MBT is that it has the potential to stabilise the organic components and increase recycling opportunities for non source-segregated wastes. As there a large number of different processes that can be employed for MBT systems and configurations can vary widely, as can the quality of the output and products recovered, however it is an intermediate process that requires additional infrastructure to treat/manage the residues arising from the process.

By comparison with other waste treatment options, there is a large amount of residual material that results from the process which either requires disposal to landfill or further treatment to significantly reduce the volume or to recover energy from it. The fibre or “fluff” that exits MBT processes is typically used as a Refuse Derived Fuel for thermal treatment processes including EWF. MBT is common in Germany, Austria and Italy but is relatively new in the UK. It is also a capital intensive interim process and requires a larger site area compared to other processes handling equivalent throughputs. Further land take is required for the final treatment infrastructure.

Anaerobic Digestion

Anaerobic digestion (AD) is the biological treatment of biodegradable organic waste in the absence of oxygen, utilising microbial activity to break down the waste in a controlled environment. Anaerobic digestion results in the generation of:

- biogas, which is rich in methane and can be used to generate heat and/or electricity;
- fibre, (or digestate) which is nutrient rich and can potentially be used as a soil conditioner; and
- liquor, which can potentially be used as a liquid fertiliser.

In the UK, anaerobic digestion has been generally limited to small scale on-farm digesters treating agricultural, and sewage sludge. There are a limited number of trial facilities investigating the anaerobic digestion of different feedstocks, such as household kitchen waste and green waste and it offers a potentially useful opportunity to recover value from segregated waste streams with high organic matter.

Larger anaerobic digestion processes have been developed in Europe and North America, using feedstock from a number of sources. During the anaerobic digestion process between 30% and 60% of the feedstock is converted into biogas. This gas can be used to generate heat and power in a variety of processes. As more feedstock is introduced to the system, the digestate is pumped into a storage tank. This residual digestate can then be separated to produce a fibre and a liquor.

A major benefit of anaerobic digestion is that it contributes to a mass reduction of the waste stream. The biogas fuel can be used in place of fossil fuels and hence contribute to the reduction of greenhouse gases. The digestate could decrease synthetic fuel usage in fertiliser manufacturing (which is an energy intensive process) and the process can convert residues into potentially saleable materials: biogas, soil conditioner and liquid fertiliser, although the markets for these products are currently weak. Furthermore, where anaerobic digestion is used to treat residual MSW it is not possible to apply outputs to land.

Anaerobic digestion projects do have some risks and some potential negative environmental impacts. Anaerobic plants have significant capital and operational costs which are generally 10 – 20% more than aerobic composting systems. Like any organic degradation process, there is also the possible risk to human health from the potential release of pathogens during the process, although these can be avoided with appropriate plant design and feedstock handling procedures.

The quality of outputs from anaerobic digestion is entirely dependant on the quality of the input waste and it is therefore only suitable for the treatment of certain waste streams. Like MBT, the end product from anaerobic digestion does not reduce significantly in volume, in comparison to other treatment methods such as thermal treatment. Anaerobic digestion is well established for the treatment of sewage sludge and farm slurries, but is still in the early stages of full-scale implementation for municipal and industrial wastes.

Autoclaving

Autoclaving is the processing of shredded MSW in a pressurised sealed drum under the action of steam. After around an hour of processing the waste is reduced to a 'floc' like material, with metals and glass partially cleaned so that recyclables can be extracted. The process also deforms plastics (making them either more or less difficult to recycle, depending on the process and the polymer type). The remaining material may be sorted and the high calorific fraction used as a refuse derived fuel (RDF). There will typically be a residue for disposal from mixed MSW processing.

Autoclaving (or hydrolysis) is a batch process designed to ensure complete pathogen and virus removal. The processed waste is treated by a series of screens and recovery systems (e.g. debris roll screen, over-band magnet, eddy current separator and air classifier) to achieve secondary recycling, separation of the homogenous fibre for construction or energy recovery and residue for landfilling.

The products include:

- autoclave 'fluff' (cellulose fibre);
- clean, dry recyclables – depending on feedstock;
- effluent stream or condensate; and
- low calorific residues to landfill.

Autoclaving only sterilises the wastes and allows separation of the waste stream into fractions; it does not 'treat' the waste or reduce its volume. However, autoclaving is potentially beneficial as it substantially increases recycling opportunities compared to other technologies. This helps to diminish the potential for adverse impact on air emissions from combustion. There is a total volume reduction of up to 85-88% after all recyclables, inorganic, and organic, have been separated, and organic fuel has been burned as part of an integrated waste management system.

In summary, autoclaving is a specific application that is of some limited commercial interest. As outlets are however required for the outputs, this option is more appropriately assessed as a version of MBT-RDF.

B2.3 Sustainability Appraisal

Appraisal Framework

The approach taken in this comparison of the different treatment technology options is been based upon the typical method used for undertaking a sustainability appraisal.

Firstly, sustainability objectives have been identified i.e.

- sustainable consumption and production
- climate change and energy
- natural resource protection and environmental enhancement
- sustainable communities

Secondly, specific appraisal questions have been identified. The questions developed for each of the sustainability objectives have been based upon best practice and published guidance associated with the assessment of waste management options, including guidance published by the Office of Deputy Prime Minister (now Department for Communities and Local Government) in October 2002: "Strategic Planning for Sustainable Waste Management: Guidance on Option Development and Appraisal". Questions which would elicit the same response for different options have been excluded on the basis that they have no material effect in comparing different options. Table B2.1 sets out the full list of appraisal questions which have been identified for the purposes of this assessment.

Thirdly, a set of generic residual waste treatment options has been identified for comparison. Section B2 above discussed the key types of technology potentially available for treating the residual component of municipal solid waste. Within each of the broad technology types there is a diverse range of technology suppliers and potential components and configurations available. For the purposes of the comparison of alternative technology options, VESS have identified a set of generic options which is considered to represent the principal technology types and configurations available

The generic options selected are presented in Table B2.2 together with a summary of the key outputs and outlets for each option. In summary, two thermal treatment options and three mechanical biological treatment options have been identified. In addition, a 'do-nothing scenario' comprising landfill has been included in the assessment. Autoclave has not been included in the generic options, since (although this technology has some potential to form part of a treatment process) it has limited track-record in the UK in treating MSW and does not represent a stand alone technology.

Table B2.1: Appraisal Framework

Sustainability Appraisal Objective		Question
Sustainable Consumption and Production	Promote move up the waste hierarchy	What is the level of material recovery?
		What proportion of residues is disposed of to landfill?
		What level of biodegradable municipal waste (BMW) diversion is the option likely to achieve?
		What level of energy recovery does the option achieve?
	Ensure long term technical reliability	How reliable is the technology?
		How flexible is the technology to changes in waste composition?
Climate Change and Energy	Promote the prudent use of energy and encourage use of renewable energy.	What is the carbon impact of each technology?
Natural Resource Protection and Environmental Enhancement	Protect and enhance the landscape/townscape character	What is the landscape impact of each technology
	Maintain a high quality environment in terms of air, soil and water quality	What impact will odour, dust and noise emissions from the technologies have?
		What is the risk in terms of ground and surface water pollution?
	Reduce transport impacts	What are the transports impacts?
	Reduce land take	What is the footprint for each option?
Sustainable Communities	Improve links between society and waste management	What opportunities are there for public engagement?
	Maintain sustainable growth of employment	How many jobs will be created?
	Ensure economic viability and sustainability	What is the capital cost?
		What is the operational cost?

The generic options selected are presented in Table B2.2 together with a summary of the key outputs and outlets for each option. In summary, two thermal treatment options and three mechanical biological treatment options have been identified. In addition, a 'do-nothing scenario' comprising landfill has been included in the assessment. Autoclave has not been included in the generic options, since (although this technology has some potential to form part of a treatment process) it has limited track-record in the UK in treating MSW and does not represent a stand alone technology.

Note that these generic options represent a necessary simplification of operating facilities. However, they provide sufficient detail to enable their like-for-like comparison for the purposes of considering alternatives, allowing the key differences between these types to be considered. A more detailed discussion of the rationale used to select the options is provided below.

Mechanical Biological Treatment

A mechanical biological treatment facility may include an anaerobic or aerobic biological treatment stage, or in some cases both in sequence. It will also include a range of different mechanical treatment processes (e.g. trommels, overband magnets, shredders, etc) for refining the waste and removing valuable components. The particular configuration will depend upon the design objectives of the facility (e.g. to produce a fuel for use at an EWF or suitable power plant elsewhere, or to stabilise biodegradable material for disposal to landfill, or potentially both for different fractions of the residual waste). For the purpose of this comparison of options, three generic MBT options have been identified:

1) **MBT-biodegradation - a** MBT process which comprises mechanical processing to remove valuable fractions and an aerobic biological treatment stage for stabilising the biodegradable fraction of the waste prior to its disposal to landfill. The aerobic stage is likely to comprise some form of in-vessel composting process.

2) **MBT-AD - a** MBT process which comprises mechanical processing to remove valuable fractions and an anaerobic biological treatment stage to generate power from the digestible fraction of the MSW. It is assumed that the residues from this process would be landfilled so it is likely that this process would also include an aerobic biological stabilisation phase included in the process.

3) **MBT-RDF -** a MBT process which is configured to produce a low grade refuse derived fuel (RDF). The process will incorporate a mechanical treatment stage to extract valuable components and biological treatment stage to dry the waste rapidly so that it has improved quality as a fuel.

Thermal Treatment

There is less scope for variation in the overall design and configuration of thermal treatment facilities. All thermal facilities are essentially designed around ensuring efficient and effective combustion of the waste in the combustion unit. Whilst there are important technical differences between advanced thermal treatment (ATT) technologies and conventional incineration, or EWF plants, both technology types produce the same key outputs (i.e. heat, IBA and flue gas treatment residues) and will be required to meet the emissions limits imposed by the facility's Environmental Permit. Whilst ATT qualifies for potentially valuable Renewable Obligations Certificates (ROCs) the typically lower thermal efficiencies associated with these technology types and their reduced bankability result in similar overall operating costs and revenue income streams. Although it is important to note that there is limited operational data available regarding ATT due to its relative infancy in the UK. In short, it is difficult to draw a clear differentiation between ATT and conventional thermal treatment through incineration or EWF processes when considering generic options. As a result, two thermal treatment options for the purposes of the comparison of alternatives are considered:

1) a facility generating electrical power; and

2) a facility generating combined heat and power.

Table B2.2 below presents a summary of the generic list of technologies which is considered to represent the principal types of treatment facility.

Appraisal Methodology

Taking into account the timescale available, a range of qualitative and semi-quantitative methodologies have been used to assess each option in terms of the different appraisal questions and in the context of available final disposal options in Shropshire. Table B2.3 summarises the method used for each question.

To provide a like-for-like basis of comparing options, it has been assumed that each option comprises a full-scale facility accepting 90,000 tonnes of waste per year. The values used in the assessment are based upon those adopted in the equivalent appraisal carried out in connection with the Company's Rufford EWF proposal and published literature sources. They are intended to provide a representative assessment of different generic treatment technologies for the purposes of comparison and do not represent a detailed assessment of the potential impacts and benefits of different technology options. It is important to note that the performance and operational characteristics of different treatment technologies will vary considerably between different technology providers

Table B2.2 : Summary of Generic Technologies

No.	Option	Description	Key Outputs	Outlets
1	LF	Landfill. The do-nothing scenario.	Electrical energy generated by landfill gas engines.	National grid.
2	EWF	Energy from Waste Facility (EWF) generating electricity only.	Electrical power	National grid.
			Flue gas treatment residues	Hazardous landfill or specialist re-use.
			Bottom ash	Transfer to inert landfill for disposal or reprocessor for conversion into secondary aggregate.
			Ferrous and non-ferrous metals	Transfer off-site for recycling.
3	EWF-CHP	Energy from Waste Facility (EWF) generating Combined Heat and Power (CHP)	Electrical Power	National Grid
			Heat	Transfer to a heat user (e.g. district heating scheme or industrial heat off-take
			Flue gas treatment residues	Hazardous landfill or specialist re-use.
			Bottom Ash	Transfer to inert landfill for disposal or reprocessor for conversion into secondary aggregate
			Ferrous and Non Ferrous metals	Transfer off-site for recycling
4	MBT-AD	Mechanical biological treatment (MBT) facility including an anaerobic digestion (AD) process to stabilise and generate power from the digestible fraction of the waste. A mechanical is used to extract valuable components from the waste. The organic residues and rejected components are disposed of to landfill.	Bio-stabilised residues	Transfer to a non-hazardous landfill for disposal
			Electrical Power (from AD plant)	National Grid
			Low Grade plastics	Transfer off-site for recycling
			Ferrous and non-ferrous metals	Transfer off-site for recycling

No.	Option	Description	Key Outputs	Outlets
5	MBT-biodegradation	Mechanical biological treatment (MBT) facility based upon an aerobic process for stabilising the biodegradable component of the waste and biodegradation technology. A mechanical treatment process is used to extract valuable components from the waste. The organic residues and rejected components are disposed of to landfill.	Bio-stabilised residues	Transfer to a non-hazardous landfill for disposal
			Low Grade plastics	Transfer off-site for recycling
			Ferrous and non-ferrous metals	Transfer off-site for recycling
6	MBT-RDF	A mechanical biological treatment (MBT) facility producing a Refuse Derived Fuel (RDF) output to an Energy from Waste Facility	Refuse Derived Fuel	Transfer to EWF/ATT plant.
			Ferrous and non-ferrous metals	Transfer to off-site for recycling

The following mechanism has been used to provide a relative scoring of options for each question:

++ = Proactive enhancement/significant benefits

+ = Good mitigation/some enhancement or benefits

0 = Neutral impact

- = Minor adverse impacts, not wholly mitigated

-- = Significant adverse impacts, cannot be mitigated

? = Uncertain (insufficient information available)

Table B2.3: Summary of Appraisal Methodology

Question	Appraisal Method
Sustainable Consumption and Production	
What is the level of material recovery?	Mass balance information obtained from the technology providers and from published sources was reviewed to provide a basis for assessing these two factors.
What proportion of residues are disposed of to landfill?	It is important to note that the level of materials recovery and landfill diversion achievable by different technology options will depend upon a number of factors, including the technology applied, the waste composition and the precise configuration of the technology. For instance, mechanical biological treatment facilities can comprise a range of mechanical sorting processes for separating out valuable materials. Similarly, some forms of thermal treatment processes may have some form or pre-treatment process for removing materials such as metals whilst others do not. In this review, values have been identified which are considered to be representative of the generic treatment technologies being considered and which provide a basis for comparison of different generic technologies.
What level of biodegradable municipal waste (BMW) diversion is the option likely to achieve?	Guidance published by the Environment Agency sets out an assessment regime for determining the level of BMW diversion achieved by the stabilisation of organic wastes in MBT processes*. Due to the limited track-record of MBT processes operating under this regime, outputs from the biodegradation models used for the Rufford EWF appraisal have been used to provide an assessment of the level of BMW diversion which are likely to be achieved by different biological treatment technologies. The modeling is based upon data provided by a range of biological treatment technology suppliers as well as published literature sources. Note that mass balance estimation of BMW diversion achieved by thermal treatment processes is not necessary because these technologies divert 100% of BMW from landfill. The values used for the assessment as part of this study are considered to be representative of the generic treatment technologies considered. However, the level of BMW diversion achievable by different technologies will become clearer once these treatment technologies have a greater established operating track-record in England and Wales. *Environment Agency (2005) Guidance on monitoring MBT and other pre-treatment processes for the landfill allowances schemes (England and Wales).

Question	Appraisal Method
What level of energy recovery does the option achieve?	With the exception of the MBT-biodegradation option, all treatment technologies can potentially generate electrical power and/or heat. Information provided by technology suppliers and in published literature sources has been used to determine representative levels of thermal efficiency achievable by different generic technologies. The thermal efficiency represents the proportion of energy released in the treatment of the waste that is converted into usable power or heat.
How reliable is the technology?	A qualitative assessment of technology reliability based on deliverability and track record has been undertaken.
How flexible is the technology to changes in waste composition?	This issue is important in understanding how a treatment technology might respond to changes in waste composition, such as increases or decreases in calorific value, or reductions in the organic and putrescible component of the waste.
Climate Change and Energy	
What is the carbon impact of each technology?	The carbon impact of each option has been estimated.
Natural Resource Protection and Environmental Enhancement	
What is the landscape impact of each technology.	A qualitative assessment of the technology's likely impact on the local landscape has been undertaken given the typical characteristics, height and size of generic treatment technologies.
What impact will odour, dust and noise emissions from the technologies have?	A qualitative assessment of the typical amenity impacts of each generic technology has been undertaken.
What is the risk in terms of ground and surface water pollution?	A qualitative assessment of the typical surface and groundwater pollution risks associated with the generic technology options has been undertaken.

Question	Appraisal Method
What are the transports impacts?	The estimated road transport distance associated with the transport of residues and materials from the facility to the point of disposal or use was calculated to provide a proxy for the impacts associated with road transport and to allow consideration of their relative performance in terms of road miles. The key assumptions used in the study are provided in Table B2.4 below. The total annual road distances associated with the transport of residues for each option was then calculated to provide an overall cumulative distance associated with the management of 90,000 tonnes of waste (i.e. cumulative distance per year).
What is the footprint for each option?	Using information provided by technology suppliers and available from published sources representative site footprints for each type of residual treatment technology have been identified. Note that, with the exception of the landfill option, this footprint is purely that associated with the treatment facility itself. It does not include space for ancillary infrastructure such as transfer stations, off-site bottom ash plants or landfill space required for residues.
Sustainable Communities Performance	
What opportunities are there for public engagement?	A qualitative assessment of public perception for each option has been undertaken based upon the track record of other waste infrastructure development projects within the UK.
How many jobs will be created?	Using information provided by technology suppliers and from other published sources, an assessment of the number of full-time job equivalents (FTJE) created at the treatment facility has been undertaken. Note that this assessment excludes consideration of jobs created by ancillary infrastructure and services (e.g. jobs created for lorry drivers in the transport of residues or jobs created at ancillary infrastructure).
What is the capital cost? What is the operational cost?	Using information obtained from the market and other published sources the typical capital and operational costs for different residual waste treatment facilities have been assessed.

Table B2.4: Transport Model Assumptions

Assumption	Value
Materials Density	
Residual MSW	500kg/m3
MBT residues	500kg/m3
Bottom ash	1,500 kg/m3
Flue gas treatment residues	1,000kg/m3
Ferrous metals	1,200kg/m3
Recovered plastics	300kg/m3
Vehicle Types and Maximum Load	
Residual MSW	RCV(7.8 tonnes)
MBT residues	Medium lorry 1 (15 tonnes)
Bottom ash	Medium lorry 2(18 tonnes)
Flue gas treatment residues	Medium lorry 2 (18 tonnes)
Ferrous metals	Medium lorry 2 (18 tonnes)
Recovered plastics	Medium lorry 2 (18 tonnes)

The tables in the sections below illustrate the results of the appraisal process.

Appraisal of Sustainable Consumption and Production Performance

Promote Move up the Waste Hierarchy

Table B2.5: What Is The Level Of Material Recovery?

Option	Discussion	Score
Option 1 - Landfill	There would not be expected to be any materials recovery associated with the management of residual waste under the do-nothing scenario option.	0
Option 2 - EWF	Materials recovery level of up to 27% would be anticipated from an EWF. This equates to the proportion of the waste stream mass which would be recovered as ferrous and non-ferrous metals (2%) and bottom ash for use as secondary aggregate (25%). Re-use of FGT residues may also prove to be practical prior to disposal.	++
Option 3 - EWF-CHP	Materials recovery level of up to 27% would be anticipated from an EWF. This equates to the proportion of the waste stream mass which would be recovered as ferrous and non-ferrous metals (2%) and bottom ash for use as secondary aggregate (25%). Re-use of FGT residues may also prove to be practical prior to disposal.	++
Option 4 - MBT-AD	Materials recovery of up to 10% would be anticipated via the mechanical stage of treatment. A typical MBT process will typically recover metals and low-grade plastics and films. Inert material such as glass may also be recovered. Stabilised biological matter from MBT processes cannot be used as a soil improver due to concerns over contaminant content.	+
Option 5 - MBT-biodegradation	Materials recovery of up to 10% would be anticipated via the mechanical stage of treatment. A typical MBT process will typically recover metals and low-grade plastics and films. Inert material such as glass may also be recovered. Stabilised biological matter from MBT processes cannot be used as a soil improver due to concerns over contaminant content.	+
Option 6 - MBT-RDF	Unlike a conventional MBT process, paper and plastics would not be separated from the waste as these form a key component of the fuel. However, some separation of metals and inert material (e.g. glass) could be undertaken allowing up to approximately 10% recovery. Additional materials recovery is also possible if the IBA from the EWF/ATT were reprocessed for use as a secondary aggregate. Overall, therefore this option is considered to provide similar levels of recovery as the other MBT options.	+

Table B2.6: What proportion of residues are disposed of to landfill?

Option	Discussion	Score
Option 1 - Landfill	By definition 100% of residual waste is disposed of to landfill under this option.	--
Option 2 - EWF	A small proportion (equivalent to approximately 4%) of the treated mass, in the form of flue gas treatment (FGT) residues, will require landfill disposal as hazardous waste. Although prior to disposal it should be noted that Veolia uses the alkaline nature of FGT residues to neutralise acid waste at its west midlands waste treatment plant.	++
Option 3 - EWF-CHP	A small proportion (equivalent to approximately 4%) of the treated mass, in the form of flue gas treatment (FGT) residues, will require landfill disposal as hazardous waste. Although prior to disposal it should be noted that Veolia uses the alkaline nature of FGT residues to neutralise acid waste at its west midlands waste treatment plant.	++
Option 4 - MBT-AD	Available data suggests that diversion will vary considerably between different technology types and configuration, however, an MBT process based upon an anaerobic treatment process would be expected to reduce the mass requiring landfill to approximately 75% through recovery of materials and stabilisation of the biodegradable material. The reduction in waste mass is associated with the separation of valuable materials (low grade plastics, metals, etc) and the loss of moisture content.	+
Option 5 - MBT-biodegradation	Typical performance of an MBT facility using an aerobic stabilisation process would be expected to reduce the mass requiring landfill to approximately 65% through recovery of materials and stabilisation of the biodegradable material. As with MBT-AD, the reduction in waste mass is associated with the separation of valuable materials (i.e. low grade plastics and metals) and the loss of moisture content. MBT-biodegradation typically achieves higher levels of diversion than MBT-AD because the quantity of ‘rejects’ in the waste stream which cannot go through the treatment process is higher in the case of MBT-AD. The rejects must be disposed of to landfill.	+
Option 6 - MBT-RDF	The MBT process is likely to produce a small quantity of rejected material which will require landfill. In addition, the incineration of the RDF (for which an additional EWF/ATT facility will be required) will produce approximately 4% by mass of flue gas treatment (FGT) residues. These will require landfill disposal as hazardous waste.	++

Table B2.7: What level of biodegradable municipal waste (BMW) diversion is the option likely to achieve?

Option	Discussion	Score
Option 1 - Landfill	By definition, this option does not divert any residual BMW from landfill.	--
Option 2 - EWF	This option potentially diverts almost 100% of residual BMW from landfill.	++
Option 3 - EWF-CHP	This option potentially diverts almost 100% of residual BMW from landfill.	++
Option 4 - MBT-AD	The precise levels of BMW diversion performance achievable via MBT processes are currently uncertain due to the limited track-record of this technology in the UK. However, current estimates indicate that typical MBTAD processes are capable of diverting between 35% and 75% of BMW (depending on footprint) from landfill through stabilisation of biodegradable matter. On a similar sized footprint for all facilities in this assessment, 50% BMW diversion is estimated.	+
Option 5 - MBT-biodegradation	As with MBT-AD, the precise levels of BMW diversion performance achievable via MBT processes are currently uncertain due to the limited track-record of this technology in the UK. However, current estimates indicate that typical MBT-biodegradation processes are capable of diverting between 35% and 75% of BMW (depending on footprint) from landfill through stabilisation of biodegradable matter. On a similar sized footprint for all facilities in this assessment, 50% BMW diversion is estimated.	+
Option 6 - MBT-RDF	Although, the MBT process may generate a small quantity of biodegradable material in the form of rejects, this option would be expected to divert over 90% of residual BMW from landfill, as the majority of the BMW would be contained in the RDF and combusted.	++

Table B2.8: What level of energy recovery does the option achieve?

Option	Discussion	Score
Option 1 - Landfill	Landfill gas is extracted from all modern UK landfills and used for energy generation. It is very difficult to estimate the level of potential power generation from landfill gas extraction. However, 90,000 tonnes of waste landfilled per annum would potentially be capable of generating approximately of the order of 90kW.	-
Option 2 - EWF	For this option, all residual waste is used for energy generation. A thermal efficiency level of approximately 23% would be expected for an EWF producing electrical power only. This would be expected to equate to a power output of between 7 and 8MW for a 90,000 tonne per year EWF. Around 1MW produced by the process would be for beneficial use by the EWF.	+
Option 3 - EWF-CHP	For this option, all residual waste is used for energy generation. A combined heat and power (CHP) facility would be expected to achieve a thermal efficiency level of approximately 65%. This would be expected to equate to a combined useful electricity and heat output of approximately 12MW of which 1MW electricity is for beneficial use by the EWF. It is important to note that this level of thermal efficiency and useful power output can only be achieved if a customer for the sale of heat can be found.	+ +
Option 4 - MBT-AD	Methane gas produced by the anaerobic digestion process would be used to generate power at a typical thermal efficiency level of 30%. Although this represents a higher thermal efficiency than an EWF producing electrical power, the overall power output would be expected to be considerably lower as the energy is generated from only the digestible component of the waste (i.e. biodegradable material). A facility handling 90,000 tonnes per year would be expected to generate approximately 2.5MW of useful power.	0
Option 5 - MBT-biodegradation	This option does not provide any energy generation.	--
Option 6 - MBT-RDF	For this option approximately 65% of the waste mass would typically be converted into a RDF for use in energy generation with an efficiency of approximately 23%. The remainder of the waste mass comprises either rejected components (approximately 10%) or moisture (approximately 25%). The overall power output of the option would be similar to that from the EWF option because, although the waste mass is reduced, its calorific value is actually increased through the MBT process.	0

Ensure Long Term Technical Reliability

Table B2.9: How reliable is the technology?

Option	Discussion	Score
Option 1 - Landfill	Landfill is a proven and reliable technology option with a long track record. However, there is no long term landfill capability within Shropshire and this is the least favoured solution in environmental terms.	++
Option 2 - EWF	Thermal treatment of waste is a proven and well-established technology with a high level of reliability.	++
Option 3 - EWF-CHP	Thermal treatment of waste is a proven and well-established technology with a high level of reliability.	++
Option 4 - MBT-AD	MBT-AD technologies are not yet well established in the UK and as a result this option has been given a lower score than for the more proven options of landfill and EWF.	0
Option 5 - MBT-biodegradation	As with MBT-AD, MBT-biodegradation technologies are not yet well established in the UK and as a result this option has been given a lower score than for the more proven options of landfill and EWF.	0
Option 6 - MBT-RDF	MBT-RDF technologies have a limited track-record in the UK. However, the thermal treatment of refuse derived fuel is well-established so this option has been given a moderate score.	+

Table B2.10: How Flexible Is The Technology To Changes In Waste Composition?

Option	Discussion	Score
Option 1 - Landfill	Landfill is very flexible at adapting to changes in waste composition, subject to Environment Agency permitting.	++
Option 2 - EWF	Thermal treatment can adjust relatively well to changes in waste composition within the limit of the firing diagram. However significant change in the calorific value will affect the throughput capacity of the plant	++
Option 3 - EWF-CHP	See above.	++
Option 4 - MBT-AD	MBT-AD is considered to have least flexibility of the options given the need to maintain a reasonably high degree of balance across the process to meet the design criteria to ensure the correct breakdown is achieved given the fixed capacity of digesters and other equipment. Changes to waste composition could therefore have a significant effect on the performance. Additional capacity could be provided more easily than, say, EWF provided there is sufficient space available.	-
Option 5 - MBT-biodegradation	Whilst typically MBT-biodegradation technologies carry a high degree of flexibility, as a biological process it is subject to getting the correct balance of organics. Should the quantity of organic materials fall below a certain level within the waste stream (which might result with very successful separate collections of organic waste) then the process might be unable to operate to the correct conditions. Additional capacity could be provided more easily than, say, EWF provided there is sufficient space available. In general, MBT-biodegradation is able to accept a broader range of organic waste composition than MBT-AD so has been given a moderate score for this question.	+
Option 6 - MBT-RDF	The MBT component of this option should be able to adapt to changes in composition. Similarly, the thermal treatment component should be able to adjust relatively well. However, changes in calorific value will potentially affect the throughput capacity of the plant.	+

Climate Change and Energy

Table B2.11: What Is The Carbon Impact Of Each Technology?

Option	Discussion	Score
Option 1 - Landfill	The landfill option results in the highest overall carbon footprint. The landfilling of MSW generates a greater quantity of carbon emissions than all other options other than MBT-AD. However, whilst the impact of the latter is off-set by the benefits of power generation, the landfill options has a much higher overall carbon impact.	--
Option 2 - EWF	The EWF option generates carbon emissions both during the transport phase and the combustion process. However, this impact is off-set by the benefits of generating power from the biogenic component of municipal waste and the benefits of recovering valuable materials from the process. As a result, the EWF results in a small overall carbon benefit (i.e. the option results in a reduction in carbon emissions in comparison to the generation of power from conventional fuel sources).	+
Option 3 - EWF-CHP	The EWF-CHP option also results in an overall net carbon benefit. Due to the CHP component of the process, this option results in larger overall net carbon benefit than the electricity only EWF option and is the best performing option in terms of carbon impact.	++
Option 4 - MBT-AD	The MBT-AD option results in an overall net carbon benefit. Whilst the transport and treatment processes results in a carbon impact due to emissions of carbon from the treatment of waste and the transfer and landfill of residues, there is a significant benefit associated with the generation of power as part of the AD process and the recovery of materials.	+
Option 5 - MBT-biodegradation	The MBT-biodegradation option results in the second highest net carbon benefit. This is due to the benefits associated with the recovery of materials.	++
Option 6 - MBT-RDF	This option also generates a net carbon benefit, primarily due to the benefits associated with the generation of power from the RDF (i.e. the RDF displaces conventional non-renewable power sources).	+

Appraisal of Natural Resource Protection and Environmental Enhancement

Protect and Enhance the Landscape/Townscape Character

Table B2.12: What Is The Landscape Impact of Each Technology?

Option	Discussion	Score
Option 1 - Landfill	The overall landscape impact of the landfill option is considered to be the most significant. Whilst landscape impacts can be mitigated with good design when the landfill is completed, the presence of a landfill will permanently alter the landscape. Also, landfill represents a significant impact during their operational phase and frequently covers a significant footprint.	--
Option 2 - EWF	An EWF typically has a smaller building footprint than an MBT facility and occupies a smaller area overall. A facility managing 90,000 tonnes per year would be expected to comprise a building within an overall site of approximately 1.2 hectares. The building itself would typically be high due to the dimensions of the treatment plant that it must house (25-35m) and the facility would possess a chimney of 55-70m height. However, good architectural design can mitigate many of these impacts to integrate an EWF into the landscape.	-
Option 3 - EWF-CHP	Although there would be some additional above-ground infrastructure associated with CHP, this option would be expected to create a similar level of landscape impact as would be expected for the EWF option discussed above.	-
Option 4 - MBT-AD	MBT-AD processes are typically housed within standard industrial buildings approximately 15-20m in height with external anaerobic digestion tanks and maturation areas for aerobic stabilisation of organic matter. The building footprint would be larger than EWF (estimated at 1-2 hectares for a 90,000 tonne per annum) within an overall site of up to 4 hectares. An emissions chimney of up to 35m in height would also be a feature of the MBT process. However, with good architectural design and associated landscaping, impacts can be minimised.	-
Option 5 - MBT-biodegradation	MBT-biodegradation facilities are similar in nature to MBT-AD facilities, without the presence of external digestion tanks. Overall, this option is considered to result in a similar level of impact as MBT-AD.	-

Option	Discussion	Score
Option 6 - MBT-RDF	A MBT-RDF facility would be housed within a standard industrial building of a similar size to the other MBT options. However, the overall site footprint would be expected to be lower due to the absence of external maturation areas for stabilising organic residues (estimated at 5 hectares for a facility of this size). However, the footprint impact associated with development of a compatible EWF/ATT facility also needs to be considered (as described above). As a result, this option is considered to result in a moderate landscape impact	-

Maintain a high quality environment in terms of air, soil and water quality

Table B2.13: What Impact Will Odour, Dust And Noise Emissions From The Technologies Have?

Option	Discussion	Score
Option 1 - Landfill	Landfill operations are typically associated with significant odour, dust and noise emissions during their operational phase.	--
Option 2 - EWF	EWF operations are typically enclosed, with combustion air drawn under negative pressure from the tipping hall. As a result, potential odour, noise and dust emissions are significantly reduced. The EP process requires a high degree of protection for the environment, such that no significant effect on amenity would be expected.	0
Option 3 - EWF-CHP	The impact for a EWF-CHP is considered to be similar to an electricity only EWF.	0
Option 4 - MBT-AD	Much of the MBT process is enclosed resulting in reduced odour, noise and dust emissions. However, areas for the maturation are likely to be required, resulting in some odour impacts. This option has been given a moderate score.	-
Option 5 - MBT-biodegradation	This option is considered to typically result in the same impact as for an MBT-AD option.	-
Option 6 - MBT-RDF	As with the other MBT facilities, the MBT-RDF process is typically enclosed within a building, resulting in reduced odour, noise and dust emissions. External maturation areas are typically not required in the production of an RDF, however it is likely that odour will be emitted during unloading operation of the tunnels. The amenity impacts associated with the EWF/ATT component of this option are not likely to be significant due to the enclosed nature of the operations however they need to be considered cumulatively with the plant in environmental impact terms. Overall, the impact is considered to be similar to that for the other MBT options, plus EWF.	0

Table B2.14: What Is The Risk In Terms Of Ground And Surface Water Pollution?

Option	Discussion	Score
Option 1 - Landfill	Modern landfills are engineered to reduce the risk of surface and groundwater pollution. However, there are still considered to be significant long-term pollution risks associated with the landfill of waste. As a result, this option scores lowest.	--
Option 2 - EWF	Thermal options pose a low risk of surface water and groundwater pollution. Waste will be stored within an engineered containment area and processed within 1-2 days of arrival at the facility. The surface and groundwater risks associated with the process outputs are very low.	0
Option 3 - EWF-CHP	The surface and groundwater risks associated with a EWF-CHP facility are similar to a EWF without CHP.	0
Option 4 - MBT-AD	The design of an MBT facility will incorporate appropriate measures to reduce surface waste and groundwater pollutions risks. However, the storage of materials during the maturation period does pose a slightly elevated risk of pollution to these media. As a result, this option is considered to result in a moderate overall impact for this question.	-
Option 5 - MBT-biodegradation	An MBT-biodegradation facility is considered to result in a similar overall level of risk as an MBT-AD facility.	-
Option 6 - MBT-RDF	The MBT-RDF process is considered to pose a low risk of surface water and groundwater pollution. Waste will be stored within engineered containment areas. There is no maturation process associated with the production of an RDF. The risks associated with the EWF/ATT component of this option are low (as described above).	0

Reduce Transport Impacts

Table B2.15: What Are The Transports Impacts?

Option	Discussion	Score
Option 1 - Landfill	The calculation of transport distances indicates that this option would result in approximately 599,825 kilometres each year. This mileage is associated with the situation in the medium/longer term where waste from transfer facilities and HRCs is likely to be transported to a strategic landfill site operated by Veolia near Rugby, as there are no realistic landfill solutions in Shropshire.	**--**
Option 2 - EWF	The calculation of mileage distances indicates that this option is associated with a total vehicle movements of approximately 203,870 kilometres per year (based on the same assumption as to the availability of landfill capacity used in Option 1). This distance relates to vehicle movements transferring waste to the EWF and to vehicles transferring residues (e.g. Bottom Ash and FGT) and materials (e.g. recovered metals) from the facility to appropriate recovery, treatment or disposal points.	-
Option 3 - EWF-CHP	The cumulative transport distance associated with the transfer of waste to the EWF-CHP and residues and materials from the EWF-CHP is considered to be approximately the same as for the EWF without CHP option (above).	-
Option 4 - MBT-AD	The cumulative transport distance associated with this option is estimated to be 466,784 kilometres per year (based on the same assumption as to the availability of landfill capacity used in Option 1). This distance relates to vehicle movements transferring waste to the facility and to vehicles transferring residues and materials away from the facility. This cumulative distance is significant higher than for EWF options because the MBT option generates greater quantities of residues which require landfill disposal.	-
Option 5 - MBT-biodegradation	The cumulative distance calculated for MBT-biodegradation is 384,317 kilometres per year (based on the same assumption as to the availability of landfill capacity used in Option 1). This is slightly lower than MBT-AD because MBT-biodegradation processes typically generate slightly lower quantities of residues requiring landfill disposal. In terms of overall impact this option has been given the same score as MBT-AD.	-

Option	Discussion	Score
Option 6 - MBT-RDF	The estimated cumulative transport distance associated with the MBT-RDF option is 296,254 kilometres per year (based on the same assumption as to the availability of landfill capacity used in Option 1). This is higher than the estimated distance for EWF because of the vehicle movements associated with the transfer of the RDF from the BMT facility to an EWF/ATT facility. Although overall it results in slightly less road transport than the other MBT options, it is of a similar magnitude, so this option has been given the same score as the other MBT options.	-

Note 1: This estimated transport distance calculated for each option was used a proxy to reflect the impacts associated road transport and to allow consideration of the relative performance of different options in terms of road miles. The results presented in Table B2.15 above represent the total estimated cumulative vehicle miles associated with: 1) the movement of waste to the facility from transfer stations and HRC's; 2) the transfer of residues to away from the facility to appropriate disposal points; and 3) the transfer of valuable materials to appropriate locations for reprocessing.

Reduce Land-Take

Table B2.16: What Is The Footprint For Each Option?

Option	Discussion	Score
Option 1 - Landfill	The landfilling of 90,000 tonnes of waste would typically require approximately 0.5 -0.75 hectares per year, depending upon the design and characteristics of the landfill. This figure is not directly comparable with the site footprint of a waste treatment facility because it relates to a single year's waste, whereas a treatment facility will treat waste for its operational lifetime. If an operational lifetime of 25 years is assumed for comparative purposes a landfill footprint of between 12.5 and 18.75 ha can be assumed. This is the largest of all options and so scores lowest.	--
Option 2 - EWF	The typical land take of a facility of this size is 1.2 hectares.	+
Option 3 - EWF-CHP	The typical land take of a facility of this size is 2 hectares. District heating infrastructure is also likely to require additional space. However, overall this option is considered to represent a similar level of impact to EWF without CHP.	+
Option 4 - MBT-AD	A typical MBT-AD facility of this capacity is estimated to occupy up to 5 hectares.	-
Option 5 - MBT-biodegradation	A typical MBT-biodegradation facility of this capacity is estimated to occupy 5 hectares.	-
Option 6 - MBT-RDF	A typical MBT-RDF facility is estimated to occupy 5 hectares. In addition the footprint associated with the EWF/ATT (1.2 to 3 ha) at which the RDF is to be used should be added.	-

Appraisal of Sustainable Communities Performance

Improve Links between Society and Waste Management

Table B2.17: What Opportunities Are There For Public Engagement?

Option	Discussion	Score
Option 1 - Landfill	There is the potential for public engagement as part of landfill development. However, there are limited opportunities for using the option to illustrate and encourage participation of the community in sustainability issues. This option is, therefore, considered to score moderately. However, opportunities for the community to benefit through the Landfill Communities Fund should be recognised.	+
Option 2 - EWF	The development of a waste treatment facility provides an opportunity for encouraging public engagement in sustainability issues. The facility itself will serve as an important way of illustrating resource recovery in action, particularly if a visitor centre is incorporated.	++
Option 3 - EWF-CHP	As above.	++
Option 4 - MBT-AD	As above.	++
Option 5 - MBT-biodegradation	As above.	++
Option 6 - MBT-RDF	As above.	++

Maintain Sustainable Growth of Employment

Table B2.18: How Many Jobs Will Be Created?

Option	Discussion	Score
Option 1 - Landfill	A typical landfill operation is estimated to generate approximately 5 full time equivalent jobs associated with its operation. This is the lowest of all options so scores moderately.	0
Option 2 - EWF	An EWF would be expected to generate approximately 21 long term jobs.	+
Option 3 - EWF-CHP	An EWF with CHP would be expected to generate a similar number of long term jobs as an EWF without CHP.	+
Option 4 - MBT-AD	An MBT-AD facility would be expected to generate approximately 25 long term jobs.	+
Option 5 - MBT-biodegradation	An MBT-biodegradation facility would be expected to generate 20 long term jobs. This is slightly lower than MBT-AD due to the lower requirements for process monitoring and management.	+
Option 6 - MBT-RDF	Due to the need to essentially operate two separate facilities, associated with treatment and combustion, this option would be expected to generate approximately 25 jobs.	+

Ensure Economic Viability and Sustainability

Table B2.19: What Is The Capital Cost?

Option	Discussion	Score
Option 1 - Landfill	Landfill represents the lowest option in terms of capital cost.	-
Option 2 - EWF	EWF options are typically one of the highest in terms of capital cost for a single 'stand alone' facility.	--
Option 3 - EWF-CHP	EWF options are typically the highest in terms of capital cost for a single 'stand alone' facility due to the high infrastructure costs of CHP.	--
Option 4 - MBT-AD	MBT options are typically slightly lower in terms of capital cost than EWF options and so have been scored slightly higher.	-
Option 5 - MBT-biodegradation	MBT options are typically slightly lower in terms of capital cost than EWF options and so have been scored slightly higher.	-
Option 6 - MBT-RDF	The capital costs for the MBT-RDF will be similar to that of the other MBT options but overall costs are likely to be significantly higher where the cost of an EWF/ATT component is added.	--

Table B2.20: What Is The Operational Cost?

Option	Discussion	Score
Option 1 - Landfill	Landfill costs are currently low. However, in the longer term, costs are likely to significantly increase as landfill tax continues to rise and the availability of landfill void space reduces. Although not strictly an operational cost, it should also be noted that this option would give rise to additional costs for the WDA under the LATS.	--
Option 2 - EWF	Whilst EWF options have higher running costs than MBT options, the revenues associated with the sale of power and potentially heat means that they have similar overall operating cost.	-
Option 3 - EWF-CHP	See above.	-
Option 4 - MBT-AD	There is limited track record of operational costs for MBT options in the UK, however, they are considered to have similar operating costs to EWF options. Whilst the running costs are typically lower than EWF, the revenues associated with the sale of power and recovered materials are not as high as EWF options.	-
Option 5 - MBT-biodegradation	See above.	-
Option 6 - MBT-RDF	This option is considered to possess a similar overall operating cost to the EWF and other MBT options discussed above although this will be increased when the operational costs of EWF/ATT is included.	-

B2.4 Reasons for the Choice

Sustainability Appraisal Findings

Analysis of the results of this study indicates the following key findings:

- with exception of landfill i.e. the ‘do nothing’ scenario, all options perform well against the Sustainable Consumption and Production objective. Each results in a greater level of materials recovery and potentially energy recovery than the do-nothing scenario case (landfill). Overall, the thermal treatment options (EWF and EWF-CHP) tend to perform best against the waste hierarchy and technical reliability questions. This is due to the higher overall level of materials recovery associated with the processing of bottom ash to extract metals and produce an aggregate, together with the relatively high level of energy recovery achieved;

- all options result in some level of impact in terms of the Natural Resource Protection and Environmental Enhancement objective. However, the effect varies between different options. For instance, MBT options occupy a larger building footprint and achieve a much lower reduction in the volume of residues requiring disposal. Chimneys for the dispersal of emissions are also typically required although of a lesser height than for thermal treatments. Landfill tends to result in the highest level of visual impact during its operational lifetime. For non-landfill options, good architectural design and landscaping should serve to mitigate negative landscape and visual impacts, although some residual effects are unavoidable for all options. MBT options typically result in higher levels of amenity impacts than thermal options due to the presence of external waste handling areas and the need for an organic matter maturation area in the process. Similarly, the transport distances associated with the MBT options are typically higher due to the mileage associated with the transport of stabilised organic residues to their points for further treatment or disposal; and

- in terms of the Sustainable Communities objective, all the options are likely to create sustainable employment and provide potential opportunities for public engagement. Each option is also likely to result in a net cost (capital and operational costs). Net operational costs are generally higher for MBT options as a result of the need for two treatment facilities (i.e. MBT and AD or MBT and biodegradation) and higher landfill disposal residue tonnage in the end. In the case of MBT – RDF both the operating and capital costs are higher, particularly when the cost of EWF/ATT provision is included. Direct comparison of the economic cost of different options is difficult due to the different cost profiles for different technologies and are further complicated if consideration is given to the likely effects of the LATS. For instance, thermal options are typically associated with a high capital costs but low operational costs due to the potential to sell power and heat. Conversely, other MBT options are typically associated with lower capital costs but with significantly higher operational costs due to the lower revenues associated with materials and energy use for these options.

Technology Advantages and Disadvantages

Thermal treatment technologies are considered by Veolia to offer the advantage of being proven, capable of significant volume reduction and relatively low overall cost. The disadvantage identified is that they are associated with perceived health risks - leading to public opposition.

Advanced thermal treatment technologies are considered by Veolia to offer the advantage of being capable of significant volume reduction, having the potential for reduced air emissions (relative to incineration or EWF) and of producing syngas (which has high flexibility for recovering value. The disadvantages identified is that they are unproven technology (for treating MSW), have higher capital and operating costs (relative to incineration or EWF) and are associated with perceived health risks, albeit lower than those typically associated with EWF.

MBT technologies are considered by Veolia to offer the advantage of stabilising the organic component and increasing the recycling opportunities for non-source segregated waste streams. The disadvantage is that MBT is an intermediate process that does not significantly reduce waste volume and still requires either landfill disposal of residues or further treatment of residues via e.g. EWF or ATT. Further disadvantages include the need for technology and operating controls to mitigate risks of odours and bio aerosol emissions, the significant electricity consumption during the operating period and the fact that the process is capital and land intensive.

Anaerobic digestion technologies are considered by Veolia to offer the advantage of some volume reduction, a stabilised organic component and increased recycling opportunities. The disadvantages are that anaerobic digestion does not significantly reduce waste volume, it poses a risk of human health, release of pathogens and there are few proven facilities for MSW operating at large commercial scale. Further disadvantages include the operating and capital costs of digestate stabilization and the uncertainty of a long term outlet for disposal of stabilized digestate.

Autoclaving technologies are considered by Veolia to offer the advantages of upfront recovery of recyclables from MSW and stabilisation of the organic component. The disadvantages are that they are a pre-treatment method that achieves low volume reduction on its own. Further disadvantages include operating and capital costs of stabilization of the floc and uncertainty on long term outlet for disposal of floc. Autoclaving is also more expensive than incineration or EWF when the full treatment cycle is taken into account.

Conclusions

This sustainability appraisal has compared the implementation of a range of waste technologies and an option of 'do nothing' against a defined set of sustainability criteria following a scoring mechanism. The high-level comparison of different generic technology options confirmed that all of the options are associated with some level of detrimental impact in certain areas (e.g. energy use, residues disposal quantities and economic cost) and that all options also provide the potential for significant potential benefits, particularly in terms of sustainable consumption and production and sustainable communities objectives.

The do-nothing scenario is however not a sustainable option, since it is principally dependent on out of county landfill (a factor which, applies to other solutions which, whilst higher up the waste hierarchy, are heavily dependent on landfill for the disposal of residuals.

The Company's assessment of the advantages and disadvantages of each of the main MSW treatment technology categories is cost constrained, it serves to emphasise that in the case of Shropshire, thermal technologies are the only category which can be considered as proven and to offer a complete solution for the management of residual waste.

These were the principal reasons for VESS's choice of EWF as its preferred technology for the management of Shropshire's residual waste. Furthermore, the relatively small throughput capacity of the facility, when coupled with other components of the integrated waste management service being provided by VESS, are considered to represent a robust, flexible and affordable solution which reduces overall transport movements and exports from the County.

B3 SITES

B3.1 Background

VESS began its consideration of alternative sites by reviewing the waste transfer and recovery site search and selection exercise undertaken by Shropshire County Council during the course of preparing the Shropshire Waste Local Plan 2002 – 2014 (WLP).

(In addition to the above, the County Council has also undertaken a desk top study in an attempt to identify strategic sites for non-hazardous waste landfill in the Shrewsbury area. Since this exercise was not intended to find suitable sites for building waste management facilities and the WLP included no allocations as a consequence of this work (in accordance with the Planning Inspector's recommendations), this County Council study was not taken into account by VESS.)

In reviewing the waste transfer and recovery site search and selection exercise carried out by the County Council, the Company noted that the exercise has been held up as an example of best practice by Government (see inset panel 30 on page 78 of the Companion Guide to PPS 10).

As the exercise undertaken by the County Council was mainly carried out during 2002/03, the Company also took into account:

- the assessment of alternative sites made in the ES that accompanied planning application number MS03/0985/SY (for the HWRC/WTS facility at Battlefield Enterprise Park, Shrewsbury); and

- sites allocated for employment use in the local plans adopted by the planning authorities in Shropshire since 2002/3.

Finally, the Company has also given consideration to the other potential sites suggested during the consultation it undertook in the period leading up to the submission of the application for planning permission (to which this ES relates).

Scott Wilson has tested the appraisal of these sites using a number of selection criteria relevant to the development proposed.

B3.2 Shropshire Waste Local Plan

Site Identification

The waste transfer and recovery site search and selection exercise carried out by the County Council during the course of preparing the WLP took account the guidance on identifying potentially suitable land provided in paragraph A51 of PPG 10. The County Council applied the following search criteria:

- previously used land or buildings;
- allocated employment land;
- existing mineral and waste management sites;
- existing or proposed livestock markets and sewage treatment works;
- land adjoining such locations;
- sites in or adjacent to main towns; and
- sites in strategic locations with good access to the primary highway network.

Using these criteria, the County Council assembled a ‘long list’ of sites by:

- requesting proposals from over 200 waste management and property stakeholders;
- working closely with District Council officers to identify potentially suitable land; and
- carrying out a desk based study to identify potential land raising sites near Shrewsbury.

These actions generated a ‘long list’ of 79 candidate sites which were then subject to further assessment.

Site Assessment

The sites proposed by the County Council for selection in the WLP were assessed using a desktop evaluation. The key features of the methodology employed by the County Council are summarised in section 5.9 of the WLP and are described in detail at WLP Technical Appendix 2. Broadly the issues considered comprised:

- access and highways;

- environmental and landscape;
- residential and general amenity;
- local plan/planning context; and
- technical.

Site Evaluation

Taking the above issues into account, the proposed sites were evaluated by the County Council in terms of the following questions:

- what are the main factors in favour of the site (i.e. good location in relation to waste sources, distance from residential property and other sensitive land uses; proximity to major road network; ability to screen effectively etc) ?
- can any obvious factors be identified which may limit development of the site (i.e. poor access; in floodplain; slope; close to houses; environmental sensitivity etc) ?
- what are the main impacts associated with the development of the site and can they be satisfactorily mitigated ?
- how does the site compare to other sites in the local area in terms of the above criteria ?

Site Selection

In order to reflect the principles in national policy guidance and the objectives of the WLP, the following categories of site were excluded by the County Council:

- sites of recognised international or national importance;
- landfill or landraising proposals on major aquifers;
- sites where an acceptable highway access cannot be achieved; and
- sites where the a waste management use would result in impacts on the amenity of residential or other sensitive land uses which cannot be satisfactorily mitigated.

The site selection process resulted in the initial ‘long list’ of 79 sites being reduced to 28 ‘preferred sites’ and 3 ‘preferred areas’ in the First Deposit Draft of the WLP.

Further site assessment was undertaken by the County Council to inform the preparation of the Revised Deposit Draft WLP and as a result of the Planning Inspector's recommendations following the WLP Inquiry.

Preferred Sites

The preferred sites for waste transfer and recovery identified by the County Council following the above identification, assessment, evaluation and selection processes are identified in Chapter 6 of the WLP (Schedules 1):

- Stanmore Industrial Estate, Bridgnorth;
- land adjacent to Market Drayton livestock market, North Shropshire;
- Harry West, Lower Prees Heath, North Shropshire;
- Sandford Industrial Estate, North Shropshire;
- Wood Lane Quarry, Ellesmere, North Shropshire;
- Ifton Industrial Estate, Oswestry;
- Tudor Griffiths Waste Transfer Station, Maesbury Road, Oswestry;
- land off Mile Oak Industrial Estate, Oswestry;
- land at Battlefield Enterprise Park, Shrewsbury;
- land adjacent to Blackmore Haulage, Calcot Lane, Bicton Heath, Shrewsbury;
- land adjacent to Poultry Unit, Ford, Shrewsbury;
- land north of Sheet Road, Ludlow, South Shropshire; and
- Plot B, Coder Road Industrial Estate, Ludlow, South Shropshire.

B3.3 Planning Application MS03/0985/SY

The ES that accompanied planning application number MS03/0985/SY (for the HWRC/WTS facility at Battlefield Enterprise Park, Shrewsbury) included an account of alternative sites considered for this development.

The alternative sites considered were limited to the four preferred sites in Shrewsbury & Atcham Borough identified in the Schedule 1 and Appendix 1 of the WLP Revised Deposit Draft i.e.

- land at Battlefield Enterprise Park, Shrewsbury;
- land adjacent to Atcham Industrial Estate, Shrewsbury;
- land adjacent to Blackmore Haulage, Calcot Lane, Bicton Heath, Shrewsbury; and
- land adjacent to Poultry Unit, Ford, Shrewsbury.

B3.4 Recent Allocations

In undertaking its search for potentially suitable sites, the Company undertook a review of the employment land allocations made in the Local Plans adopted in Shropshire since 2002/03. This established that the following plans were adopted after that time:

- North Shropshire Local Plan (2000 – 2011);
- South Shropshire Local Plan (2004 – 2010);
- Bridgnorth District Local Plan (1996 – 2011)

North Shropshire District Council

The North Shropshire Local Plan (2000 – 2011) was adopted in December 2005 and included eight new allocations of land for employment uses:

- land east of Tern Valley Business Park, Market Drayton;
- land north of Tern Valley Business Park, Market Drayton;
- land at Sych Farm Phase 1, Market Drayton;
- land north of the A53, Market Drayton;
- Sandford Industrial Park, Phase 1, Prees;
- land south of Civic Industrial Park / Whitchurch Business Park Extension Whitchurch;
- land adjacent to A525 bypass / Nantwich Road, Whitchurch; and
- land off Heath Road, Whitchurch.

South Shropshire District Council

The South Shropshire Local Plan (2004 – 2010) was adopted in 2005 and included two new allocations of land for employment uses:

- The Sheet (North), Ludlow; and
- Newington Farm, Craven Arms.

Bridgnorth District Council

The Bridgnorth District Local Plan (1996 – 2011) was adopted in July 2006 and both carried forward previous allocations of land for employment uses and included new allocations as follows:

- Alveley Industrial State, Alveley;
- Stanmore Industrial Estate, Bridgnorth;
- Faraday Drive, Bridgnorth;
- Stourbridge Road, Bridgnorth;
- land adjoining Industrial Estate, Ditton Priors;
- land adjoining Netherton Workshops, Highley;
- Stretton Road, Much Wenlock; and
- Lamledge Lane, Shifnal.

B3.5 Other Suggested Potential Sites

Other potential alternative sites drawn to the Company's attention during the course of its consultations on the planning application to which this ES relates are:

- land at or adjacent to Betton Abbots Landfill Site, Shrewsbury;
- land at or adjacent to Granville Landfill Site, Telford;
- the former British Sugar Beet Factory at Allscott, near Telford; and
- Ironbridge Power Station, Ironbridge near Telford.

B3.6 Reasons for the Company's Choice

Selection Criteria

Given:

- the Company's choice of technology (see B2.4 above);
- that the proposal is for the development of a facility to treat residual municipal and similar wastes arising across the whole of Shropshire;
- that a network of waste recycling and transfer facilities designed to, inter alia, feed residual waste for treatment at a core facility, is in the process of being established across the County; and
- 40% of the County's waste is generated in Shrewsbury (see WLP paragraph 5.11);

VESS considered it appropriate to assess each of the sites referred to above in terms of three key questions/criteria:

- is the site in Shropshire;
- is the area sufficient (i.e. a minimum net developable area of approximately 1.20ha); and
- is the site in a central location i.e. within approximately 12 km of Shrewsbury.

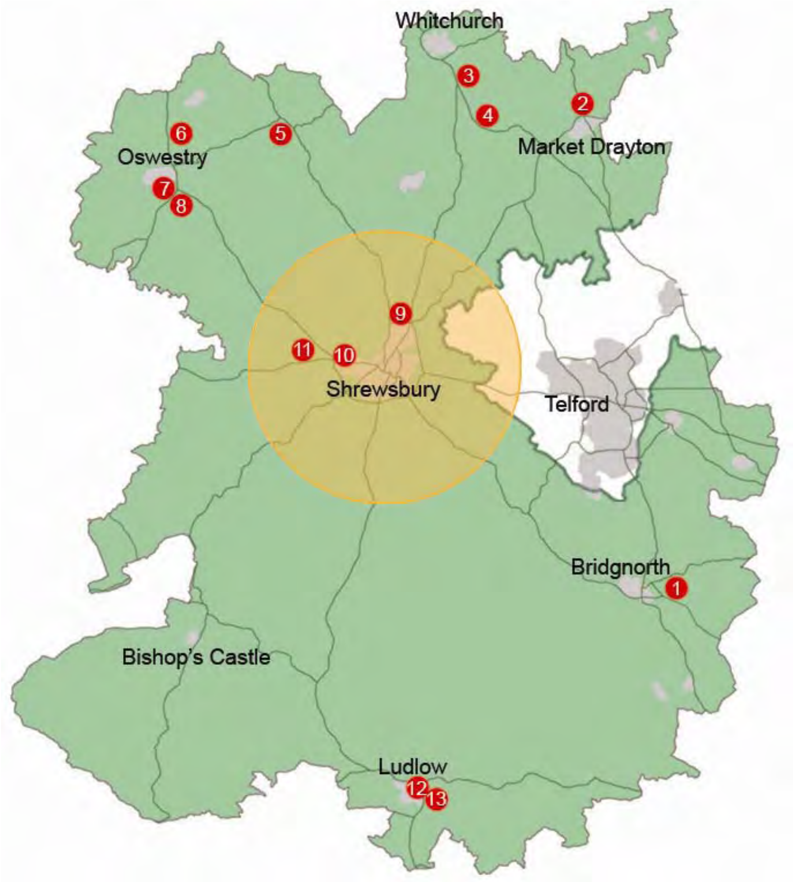
In addition (and where appropriate), the Company had regard to further relevant information contained in the adopted Local Plans and/or the WLP Inspector's report, the quality of the access to the primary road network, site availability and proximity to potential future heat users.

The appraisal of the recently allocated sites (see B13.4 above) did not repeat the approach taken by the County Council in identifying transfer and recovery sites for inclusion in the WLP, since it was judged that the process used by the District Councils used to assess the suitability of the sites for employment uses would have applied similar tests.

Evaluation of the WLP Preferred Sites

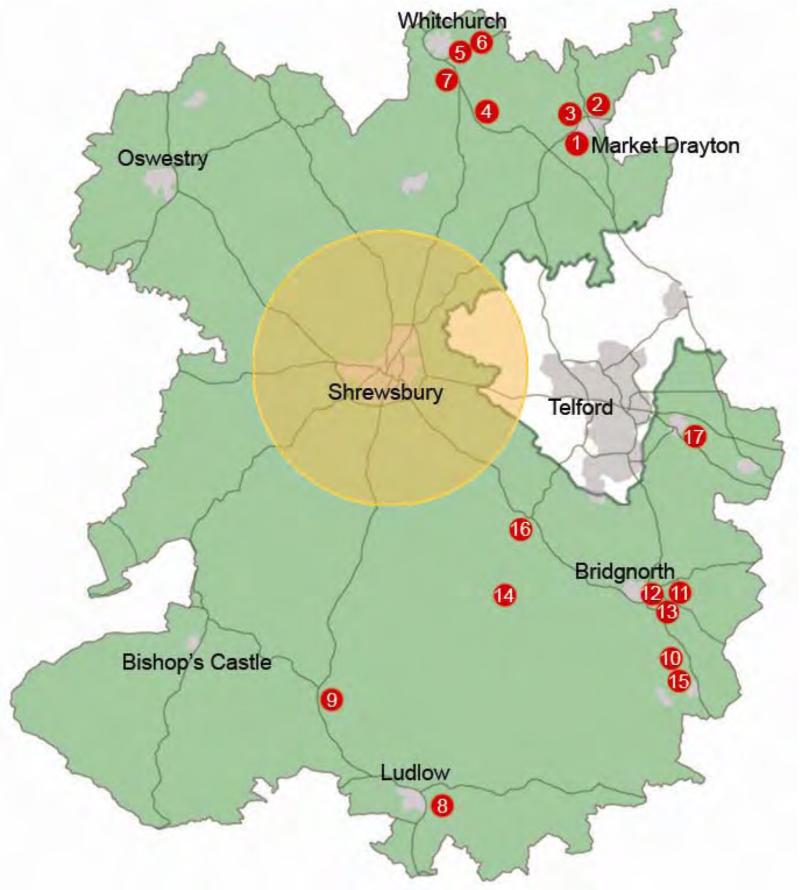
The distribution of the WLP Preferred Sites in relation to the 12km radius from Shrewsbury is illustrated in Figure 3.1 below and the results of the Company's assessment of the preferred sites included in the WLP are presented in Table B3.1.

Figure 3.1: Location of WLP Preferred Sites in Shropshire in Relation to Shrewsbury (12km radius highlighted)



1. Stanmore Ind. Est. Bridgnorth
2. Land adj. Market Drayton Livestock Market
3. Harry West, Lower Prees Heath
4. Sandford Ind. Est. North Shropshire
5. Wood Lane Quarry, Ellesmere
6. Ifton Ind. Est. Oswestry
7. Tudor Griffiths WTS Maesbury Rd. Oswestry
8. Land off Mile Oak Ind. Est. Oswestry
9. Land at Battlefield Ent. Pk. Shrewsbury
10. Land adj. Blackmore Haulage, Bicton Heath
11. Land adj. Poultry Unit, Ford, Shrewsbury
12. Land nth. Sheet Rd. Ludlow
13. Plot B Colder Rd. Ind. Est. Ludlow

Figure 3.2: Local Plan Allocations Since 2002/2003 in Shropshire in Relation to Shrewsbury (12km radius highlighted)



1. Land N & E Tern Valley Bus. Pk. Market Drayton
2. Land at Sych Fm. Phase 1, Market Drayton
3. Land N of A53 Market Drayton
4. Sandford Ind. Pk. Phase 1 Prees
5. Land S Civic Ind. Pk. Whitchurch
6. Land adj. A525 by-pass Whitchurch
7. Land off Heath Rd. Whitchurch
8. The Sheet Ludlow
9. Newington Fm. Craven Arms
10. Alveley Ind. Est. Alveley
11. Stanmore Ind. Est. Bridgnorth
12. Faraday Drive Bridgnorth
13. Stourbridge Rd. Bridgnorth
14. Land adj. Ind Est. Ditton Priors
15. Land adj. Netherton Workshops Highley
16. Streeton Rd. Much Wenlock
17. Lamledge Lane Shifnal

Table B3.1: Evaluation of WLP Preferred Sites

WLP Preferred Site	Developable Area (ha)*	Central Location	Potentially Suitable (Y/N)
Stanmore Industrial Estate, Bridgnorth	Two separate areas totaling 3.7ha	No	No
land adjacent to Market Drayton livestock market, North Shropshire	8.5ha	No	No
Harry West, Lower Prees Heath, North Shropshire	0.94ha	No	No
Sandford Industrial Estate, North Shropshire	3.2ha	No	No
Wood Lane Quarry, Ellesmere, North Shropshire	3.4ha	No	No
Ifton Industrial Estate, Oswestry	1.0ha	No	No
Tudor Griffiths Waste Transfer Station, Maesbury Road, Oswestry	0.2ha	No	No
land off Mile Oak Industrial Estate, Oswestry	3.6ha	No	No
land at Battlefield Enterprise Park, Shrewsbury	1.2ha	Yes	Yes
land adjacent to Blackmore Haulage, Calcot Lane, Bicton Heath, Shrewsbury	0.6ha	Yes	No
land adjacent to Poultry Unit, Ford, Shrewsbury	0.6ha	Yes	No
land north of Sheet Road, Ludlow, South Shropshire	6.7ha	No	No
Plot B, Coder Road Industrial Estate, Ludlow, South Shropshire	0.6ha	No	No

* assumed to be the same as the site area stated in WLP Appendix 1 – Site Profiles

Evaluation of Sites in the Application MS03/0985/SY ES

Three out of the four alternative sites considered in the ES that accompanied planning application number MS03/0985/SY were also WLP Preferred Sites. It follows that the VESS's evaluation of these sites is given in Section B3.6 above.

The exception to this is the fourth preferred site identified in Shrewsbury & Atcham Borough at the WLP Revised Deposit Draft stage, namely land adjacent to Atcham Industrial Estate, Shrewsbury.

In making its assessment of the land adjacent to Atcham Industrial Estate site, the Company had regard to the fact that, whilst the site area of 1.2ha met the Company's minimum net developable area requirement):

- the WLP Inquiry Inspector recommended that this site be deleted from the list of preferred sites in Schedule 1 '*in view of the general conflict with local planning policies and the potential adverse impact on the surrounding countryside and the setting of Attingham Park*'; and

- the County Council resolved to accept the Inspector's recommendation and modified the WLP accordingly.

Recent Allocations

The distribution of the employment land allocations made since 2003/04 in relation to the 12km radius from Shrewsbury is illustrated in Figure 3.2. The results of the Company's assessment of these sites ae presented in Table B3.2 below. Some of these sites also appear on Shropshire County Council's WLP long list referred to in Section B3.2 above.

Table B3.2: Evaluation of Recent Allocations

WLP Preferred Site	Developable Area (ha)*	Central	Other Factors	Potentially Suitable (Y/N)
land east of Tern Valley Business Park, Market Drayton, North Shropshire	5.5ha	No	-	No
land north of Tern Valley Business Park, Market Drayton, North Shropshire	2.5ha	No	-	No
land at Sych Farm Phase 1, Market Drayton, North Shropshire	4.0ha	No	-	No
land north of the A53, Market Drayton	8.5ha		Allocated for the expansion of Molkerie Alois Müller GmbH	Discounted
Sandford Industrial Park, Phase 1, Prees, North Shropshire	2.9ha	No	-	No
land south of Civic Industrial Park / Whitchurch Business Park Extension Whitchurch	5.9ha	No	Reserve site	Discounted
land adjacent to A525 bypass / Nantwich Road, Whitchurch, North Shropshire	2.1ha	No	-	No
Land off Heath Road, Whitchurch	2.1ha	No	Reserve site - for high technology business development only	Discounted

WLP Preferred Site	Developable Area (ha)*	Central	Other Factors	Potentially Suitable (Y/N)
The Sheet (North), Ludlow, South Shropshire and Newington Farm, Craven Arms, South Shropshire	12.0	No	-	No
Alveley Industrial State, Alveley Bridgnorth	0.12ha	No	-	No
Stanmore Industrial Estate, Bridgnorth	2.9ha	No	-	No
Faraday Drive, Bridgnorth	1.4ha	No	-	No
Stourbridge Road, Bridgnorth	5.19ha	No	-	No
land adjoining Industrial Estate, Ditton Priors	0.86ha	No	-	No
land adjoining Netherton Workshops, Highley, Bridgnorth	0.59ha	No	-	No
Stretton Road, Much Wenlock, Bridgnorth	1.60ha	No	-	No
Lamledge Lane, Shifnal, Bridgnorth	3.77ha	No	-	No

* assumed to be the same as the site area stated in the relevant Local Plan

Other Sites

The Company's assessment of the other potential alternative sites drawn to the Company's attention during the course of its pre-application consultations is as follows:

Betton Abbots Landfill Site

- conflict with general planning policies;
- unsatisfactory access link to the A458; and
- possible technical issues (landfill gas migration)

Granville Landfill Site

- outside Shropshire;
- outside 'central area'
- possible technical issues (past mining/landfill gas migration)

Former British Sugar Beet Factory, Allscott, Telford

- outside Shropshire;
- outside 'central area'
- no direct access to the primary highway network; and
- site is being promoted by the landowner for redevelopment primarily as residential use.

Ironbridge Power Station, Ironbridge near Telford

- outside Shropshire;
- outside 'central area'
- adjacent to the Ironbridge Gorge World Heritage Site;
- adjacent to the Ironbridge Conservation Area; and
- Site of Special Scientific Interest directly to the south.

B3.7 Conclusions

WLP Preferred Sites

Of the 13 preferred sites for waste transfer and recovery identified by the County Council only the site at Battlefield Enterprise Park, Shrewsbury satisfies the key selection criteria adopted by VESS (see Section B3.6 above).

Planning Application MS03/0985/SY

In terms of the other alternative site considered in the ES that accompanied planning application MS03/0985/SY (Atcham Industrial Estate), it is clear from the WLP Inquiry Inspector's recommendations (and the County Council's decision to modify the WLP in line with the Inspector's recommendations) that this site is very unlikely to be considered as suitable for the development of an EWF.

Recent Allocations

The Company's assessment of the employment land allocations made since 2003/04 demonstrates that no sites have come forward that satisfy the Company's key selection criteria since the County Council completed its search for waste transfer and recovery sites in 2002/03.

Other Suggested Potential Sites

The other suggested potential sites at Betton Abbots and Granville Landfill Sites, the former British Sugar Beet Factory at Allscott and Ironbridge Power Station are all considered to be unsuitable.

Overall

This assessment serves to demonstrate that the site at Battlefield Enterprise Park, Shrewsbury is the only one assessed that satisfies both the key selection criteria and the other factors taken into account (see Section B3.6 above). Accordingly this site was selected by VESS as its preferred site for the development of an EWF to fulfil the contract awarded to it by the SWP.