

15.0 CLIMATE CHANGE

Introduction

- 15.1 This Chapter considers the possible climate change impacts derived from the proposed development. The proposed HWRC improvements will have no significant effects on climate change by virtue of its scale. In respect of the landfill this will have no greater impact than the currently consented scheme and landfill gas utilisation will continue using the existing facilities on the site to provide electricity to the grid. Therefore the assessment focuses on the additional impacts over the permitted baseline for the site caused by the construction and operation of the 'Energy from Waste' (EfW) facility at Ardley Landfill.
- 15.2 The proposed EfW facility will form an integral component of Oxfordshire County Council's waste management programme by reducing the total amount of waste that would otherwise be disposed of via landfill.
- 15.3 In December 2007, a supplement to Planning Policy Statement 1 (PPS1) 'Delivering Sustainable Development' was published. The supplement, 'Planning and Climate Change' sets out how planning should contribute to reducing emissions and stabilising climate change and also how new developments should be designed to reduce risk from climate change e.g. flooding.
- 15.4 SLR Consulting has been asked to assess the potential impact of the proposed EfW facility on climate change and global warming. The potential impact of the EfW facility on climate change, and the reduction of risk for the EfW facility from climate change have been considered throughout the design of the proposal, with particular regard to the following;
- Building Research Establishment Environmental Assessment Method (BREEAM) provisional document;
 - WRATE – Life cycle assessment of EfW facility;
 - Energy Plan – potential for the use of heat and power generated by the EfW facility;
 - Surface water management;
 - Design and materials used to minimise energy consumption and carbon dioxide emissions; and
 - Traffic – impact of emissions arising from traffic generation.

BREEAM Assessment

- 15.5 A BREEAM pre assessment has been undertaken by SLR Consulting. The

outcome of this consultation will advise the developer on the potential environmental impacts of the development, and the mitigation measures which can be employed to reduce them. The developers have expressed their intention to achieve a 'good' or 'very good' BREEAM rating. Further details of the BREEAM assessment can be found in Appendices D and E of the Sustainability Statement (See VOLUME 1).

WRATE

- 15.6 SLR has completed a Life Cycle Assessment, using the Environment Agency's modelling tool 'Waste and Resource Assessment Tool for the Environment' (WRATE), to assess the environmental impacts, including global warming potential, of the proposed EfW facility compared to a number of other waste management technologies.
- 15.7 The software was used to calculate the environmental impact of processing 300,000 tonnes of municipal solid waste through a number of waste treatment processes. The assessment concluded that the proposed EfW facility will result in a negative environmental footprint that is, an overall reduction in environmental impacts such as global CO₂ emissions. The results for Global Warming Potential (carbon footprint), expressed as kg CO₂ equivalent, are presented in Table 15.1.

Table 15.1: Global Warming Potential of Municipal Waste Treatment Technologies

Impact Assessment	Landfill	EfW	Advanced Thermal Treatment	Mechanical Biological Treatment Plant with EfW	Mechanical Biological Treatment Plant with Landfill
Global warming (GWP100)	54,981,787	-20,554,873	-2,106,445	-6,240,222	35,404,682

- 15.8 Table 1 clearly shows that EfW results in a negative carbon footprint which can be attributed to the generation of electricity from waste and the subsequent displacement of fossil fuel electricity generation.

Energy Plan

- 15.9 Oxfordshire County Council, has asked whether the carbon footprint can be further reduced by the utilisation of waste heat, and to quantify the additional carbon savings that may be achieved.
- 15.10 Most systems of energy generation in the UK produce greenhouse gases (GHGs). The quantity of GHGs generated per unit of energy depends both on the fuel used and the efficiency of the generation by the power stations used. The most efficient EfW plants are those which use the waste heat from the high pressure steam, after it has been used to generate electricity. This waste heat can be harnessed by a Combined Heat and Power (CHP) facility to transfer the heat to water. This heated water is then pumped through insulated pipes to nearby consumers.

- 15.11 The feasibility of CHP schemes relies on a consistent market for the heat supplied by the plant; the ideal consumer is located within 5km of the scheme and uses large amounts of heat e.g. hospitals, schools, hotels. Given the proximity of the Ardley EfW facility to the NW Bicester eco-town this is considered to offer significant potential for making use of CHP.
- 15.12 It is also considered that the horticultural industry could be one of the main users of the heat and energy produced. In addition to being cost effective, the use of this energy would minimise carbon emissions by reducing the amount of fossil fuel energy used for growing crops under cover.
- 15.13 Based on a maximum temperature differential of 20 °C between the growing area and external night time temperature, a commercial polytunnel of typical footprint 28 metres by 9 metres requires a heater sized at 56 kW¹.
- 15.14 The EfW could generate approximately 8000 kW of usable heat², which would be sufficient to heat 146 commercial polytunnels, covering a total area of 36,000 m² (36 Hectares). However, a more realistic floor area for a commercial horticultural business is 5,000 m² or 20 polytunnels. Based on the same assumptions, this would require a heating capacity of 1120 KW, utilising in the region of 15% of the total available heat from the EFW plant. Based on typical UK horticultural statistics, a business of this size could expect to produce 200 tonnes of tomatoes per annum³.
- 15.15 Assuming, on average that the heat was required 50% of the year, a boiler fuelled by heavy fuel oil would need to deliver 5 million kWh of heat⁴, resulting in emissions of 1.3 million kg of CO² per year⁵.
- 15.16 Thus, compared to a conventionally fuelled commercial horticultural business polytunnels heated by waste heat from the energy from waste plant would yield an additional carbon saving of 1.3 million kg of carbon dioxide, on top of the 20.5 million kg identified in Table 15.1.

Surface water management – attenuation features to accommodate climate change and flood risk.

- 15.17 In addition to the potential impacts of the EfW facility on climate change, climate change also has impacts on the design and operation of the EfW facility and landfill. For example, increased incidences of heavy and prolonged rainfall could increase flood risk from surface water, groundwater and drainage systems. Consequently, new developments must ensure that they are designed to deal with higher than average rainfall.
- 15.18 The site is located within Flood Zone 1 i.e. 'low' flood risk area except for a

¹ www.jungleseeds.co.uk/HeaterCalculator.htm

² Based on Coventry EfW and CHP scheme

³ Average yield for tomatoes in 2006 was 417 tonnes per hectare as reported in DEFRA Horticultural Statistics

⁴ Calculated as 1120 kW * 50% * 8760 hrs

⁵ Carbon emission factor for Fuel Oil, reported by DEFRA, is 0.268 kg CO₂ per kWh

small area of the south eastern part of the site which is within Flood Zone 3 i.e. 'high' risk, due to its proximity to the Gagle Brook. Re profiling of the eastern and south eastern parts of the site as part of the approved restoration scheme for the site will increase land levels alongside the Gagle Brook. The Flood Risk Assessment (FRA) concluded that due to this already approved increase in land levels, the entire application site will eventually be in Flood Zone 1.

- 15.19 Planning Policy Statement 25 (PPS25) 'Development and Flood Risk' states that all types of development are acceptable in Flood Zone 1 and the FRA confirmed that there would be no increased or residual flood risk from the EfW facility, subject to a surface water management scheme.
- 15.20 As all developments have the potential to increase surface water runoff, a surface water management scheme has been developed which accounts for increased rainfall. The scheme has been designed in accordance with current best practice as outlined in the Sustainable Urban Drainage Systems (SUDS) Manual. SUDS aim to manage surface water runoff to ensure reduced flood risk and improved water quality.
- 15.21 At Ardley, a number of attenuation ponds are proposed to ensure surface water drainage does not exceed the greenfield rate, thereby mitigating any potential increase in downstream flooding. It is proposed that all runoff is intercepted by perimeter drains which convey surface water to one of five ponds linked by open drainage ditches. The discharge from each pond is routed to the next pond downstream with final discharge into the Gagle Brook.
- 15.22 Full details of the FRA and surface water management scheme can be found in Appendix 9 of the ES Technical Appendices (SEE VOLUME 4).

Design and Materials

- 15.23 In accordance with the guidance set out in PPS1, the design of the EfW facility has been developed to maximise the use of natural light and ventilation and minimise carbon dioxide emissions.
- 15.24 The materials proposed for the facility, such as steel, glass and aluminium can be recycled with almost no loss of performance. Materials which contain CFCs or use them in their manufacture will be avoided. Recycled aggregate and masonry will be used where practicable, including base material for the construction of the access road for the EfW facility.
- 15.25 Ground Granulated Blast Furnace Slag (GGBS) will be considered for all concrete works as a replacement for Portland cement in concrete mixes to reduce carbon emissions.
- 15.26 Established principles of low energy design have been used in the design of The offices and Visitor Centre. These include;
- maximising potential for natural light and ventilation;
 - glazed curtain wall for west and south façade will act as a passive solar collector in colder months. The shading louvres to this façade will reduce

cooling requirements in hotter months by protecting the glazed façade from excessive solar gain. The eastern wall of the offices will be heavily insulated;

- rain water will be collected for use in the process plant; and
- energy requirements of the offices will be generated on site by the EfW facility. Surplus energy will be exported to National Grid.

Climate change impacts of traffic generation

- 15.27 Current expectations are that the EfW facility would import and process around 300,000 tonnes of waste material from Oxfordshire, per annum. The incineration process would create around 75,000 tonnes of incinerator bottom ash (IBA), which would need to be exported for use in the construction industry.
- 15.28 It is anticipated that of the 300,000 tonnes of waste imported to the EfW facility, 180,000 tonnes would be municipal waste and 120,000 tonnes would be commercial and industrial waste. Of the municipal waste, 135,000 tonnes would be brought to the site by 8 tonne Refuse Collection Vehicles (RCVs) and the remainder by Heavy Goods vehicles (HGVs) in 20 tonne loads. The remaining 120,000 tonnes of industrial and commercial waste would be brought in on 20 tonne HGVs.
- 15.29 It is estimated that the operation of the EfW facility would generate 222 HGV movements per day. An assessment of traffic emissions arising from the development was undertaken. The emissions monitored were nitrogen dioxide (NO₂), which plays a role in the formation of tropospheric ozone (a greenhouse gas) and fine particles (PM₁₀).
- 15.30 The air quality assessment concluded that NO₂ emissions from vehicle movements associated with the EfW facility would result in a 'negligible' impact. The additional PM₁₀ generated by the EfW facility was also calculated to have a 'negligible' impact.
- 15.31 Whilst the location of the site does not allow for waste to be imported by means other than road, the operators will endeavour to minimise vehicle movements generated by the site. To ensure vehicles bringing waste to the site are fully laden, it is proposed to make maximum use of waste transfer stations to bulk up waste from the surrounding area.
- 15.32 It is anticipated that of the total 300,000 tonnes of waste imported to the site, 165,000 tonnes of waste would come from waste transfer stations in 20 tonne loads. The balance would be delivered direct to the site by 8 tonne Refuse Collection Vehicles (RCVs). Vehicles leaving the site with recycled IBA will also be fully laden.
- 15.33 The applicants will develop a Staff Travel Plan to encourage car sharing, thereby reducing the number of private cars journeys generated by the development.

CONCLUSIONS

15.34 This Chapter has been prepared to assess the climate change impacts of the EfW facility and also the potential impact of climate change on the facility.

The findings are summarised as follows.

- The WRATE assessment concluded that the EfW facility will result in a negative environmental footprint that is, an overall reduction in environmental impacts such as global CO₂ emissions. This can be attributed to the generation of electricity from waste and the subsequent displacement of fossil fuel electricity generation;
- The EfW facility will produce carbon emissions but these are less harmful greenhouse gases than methane, which would be produced if the waste was landfilled;
- The EfW facility and offices will be powered by energy produced on site and the surplus energy will be exported to the National Grid. Recovered energy avoids the need to produce electricity from non renewable (fossil) sources, which in turn reduces emissions associated with the extraction and combustion of fossil fuels;
- In accordance with the supplement to PPS1, the EfW facility has been designed to minimise energy use and carbon emissions during construction and operation;
- The site has been designed to attenuate surface water runoff and ensure that the EfW facility would not give rise to additional surface water runoff or down stream flooding;
- The EfW facility will have the potential to provide heat and energy to existing and future development in a 5km area; and
- New development in the vicinity of the EfW facility could be future proofed by ensuring the infrastructure is in place to allow CHP system to be retro fitted.

Having regard to the above, it is considered that the EfW technology is likely to have a significant beneficial impact on climate change when compared to the current waste management practices in Oxfordshire.