



Ch 7

Community and health effects

7 Community and health effects

Introduction

- 7.1 This chapter has been prepared by Terence O'Rourke Ltd to analyse the community and health effects arising from the proposals. It has been informed by the health risk assessment (HRA) carried out by Fichtner Consulting Engineers Ltd and the health impact assessment (HIA) undertaken by ERM. These reports form technical appendices E and F to the ES. As set out in chapter 5 and technical appendix A, the scoping process determined that the assessment should focus on the potential for effects on health, as well as examining issues associated with public perception.

Legislation and policy

- 7.2 The following documents were examined for policies that relate to community and health issues associated with waste management, and particularly energy from waste (EfW) plants:
- *National Planning Policy for Waste* (2014)
 - National Planning Policy Framework (NPPF; 2019)
 - National Planning Practice Guidance: Waste (NPPG; 2015)
 - *Waste Management Plan for England* (2013)
 - *Our Waste, Our Resources: A Strategy for England* (2018)
 - Waste Local Plan for Berkshire (1998) saved policies
 - Slough Local Plan (2004) saved policies
 - Slough Core Strategy 2006-2026 Development Plan Document
 - Review of the Local Plan for Slough Issues and Options Consultation Document January 2017
- 7.3 Paragraph 5 of the *National Planning Policy for Waste* states that local planning authorities should take account of the cumulative impact of existing and proposed waste disposal facilities on the well-being of the local community, including any significant adverse impacts on environmental quality, social cohesion and inclusion, or economic potential. Paragraph 7 states that, when determining waste planning applications, waste planning authorities should consider the likely impact on the environment and amenity and the locational implications of any advice on health from the relevant health bodies.
- 7.4 The NPPF does not set out any specific waste policies, as national waste planning policy is contained in the above document. However, it states that, when determining applications for waste developments, authorities should have regard to the policies of the NPPF where relevant. The NPPF includes policies relating to promoting healthy and safe communities. The NPPG states that local planning authorities can ensure that waste is handled in a manner that protects human health and the environment by:
- Testing the suitability of proposed sites against criteria set out in the *National Planning Policy for Waste*
 - Putting in place suitable planning conditions and adequate enforcement and monitoring
 - Working closely with environmental health colleagues

- Consulting with Public Health England and the Environment Agency for advice on public health matters and pollution control

7.5 The *Waste Management Plan for England* and *Our Waste, Our Resources: A Strategy for England* do not contain any specific policies relating to the community and health impacts of waste management. However, the former highlights the need to “*protect the environment and human health by preventing or reducing the adverse impacts of the generation and management of waste and by reducing overall impacts of resource use and improving the efficiency of such use*” and that waste should be managed “*in a way that guarantees a high level of protection of the environment and human health.*”

7.6 Saved policy WLP30 of the Waste Local Plan for Berkshire requires proposals for waste management development to be assessed with regard to a number of factors, including the following:

- The need to safeguard health and living conditions
- The likely effects of the proposed development on the surrounding population and the environment, including the effect on living and working conditions
- The need to safeguard and enhance the character and use of sites used for recreation and public rights of way
- The need to safeguard aviation interests, including guarding against bird strike risks and safeguarding airfield protection zones, and to safeguard the interests of public utilities

7.7 The Slough Local Plan, core strategy and local plan review issues and options do not contain any policies relating to the potential community and health impacts of waste management facilities.

Methodology

7.8 A literature review was undertaken by Terence O'Rourke Ltd to examine the issues of public perception of waste management and the nature of the general public's concerns. The references and data sources used in the study are set out in table 7.1. In addition, this chapter summarises the findings of the HRA and HIA undertaken by Fichtner and ERM respectively.

Burnley, S. and Parfitt, J., 2000, Public Attitudes to Waste and Waste Management
Cluttons Estates Ltd, 2005, Evaluation of property and land values in the vicinity of three Hampshire ERFs
Defra, 2017, Local Authority Collected Waste Statistics – Local Authority data
Defra, 2014, Energy from waste: A guide to the debate
Defra, 2013, Incineration of Municipal Solid Waste
Defra, 2009, Local Authority Municipal Waste Statistics
Defra, 2004, Review of Environmental and Health Effects of Waste Management: Municipal Solid Waste and Similar Wastes. Extended Summary
DTZ Pleda Consulting, 2002, Impact of Major Waste Facilities on the Newhaven Economy
Environment Agency, 2009, Perceptions, attitudes and communication: their role in delivering effective environmental regulations for municipal waste incineration
Environment Agency, 2009, Human Health Toxicological Assessment of Contaminants in Soil
Health Protection Agency, 2005, Municipal Solid Waste Incineration
Lakeside EfW Ltd, 2018, Annual Performance Report For Lakeside EfW Ltd Permit EA/EPR/BT7116IW/V002 2018
MORI, 2002, Public attitudes towards recycling and waste management
National Society for Clean Air, 2001, The public acceptability of incineration
US Environmental Protection Agency, 2005, Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities
Table 7.1: References and data sources

7.9 A detailed HRA was carried out using the Industrial Risk Assessment Program-Human Health, which is based on the US Environmental Protection Agency's (2005) *Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities*. The outputs of the modelling were then assessed using the UK's approach, which is set out in the Environment Agency's (2009) *Human Health Toxicological Assessment of Contaminants in Soil*. This approach involves two types of assessment:

- For substances with a threshold level for toxicity, a tolerable daily intake (TDI) is defined. This is an estimate of the amount of a contaminant, expressed on a body weight basis, which can be ingested daily over a lifetime without appreciable health risk. A mean daily intake (MDI) is also defined, which is the typical intake from background sources across the UK. In order to assess the impact of the facilities, the predicted intake of a substance as a result of emissions from the facilities is added to the MDI and compared with the TDI
- For substances without a threshold level for toxicity, an index dose (ID) is defined. This is a level of exposure that is associated with a negligible risk to human health. The predicted intake of a substance as a result of emissions from the facilities is compared directly with the ID without taking account of background levels

7.10 The assessment examined the possible effects on human health at key receptors, where humans are likely to be exposed to the greatest impact from the facilities, and at the point of maximum impact of annual mean emissions. Full details of the assumptions and inputs used in the modelling are provided in technical appendix E.

7.11 The HIA compiled an evidence base looking at the community profile, evidence from published literature, findings from limited stakeholder engagement and the results of the EIA and other supporting environmental studies. The evidence base was then used as the basis for assessing the likely health impacts of the replacement EfW and HTI.

Limitations and uncertainties

7.12 The HRA was based on the following conservative assumptions:

- The proposed development will operate continually at the draft European emission limits, i.e. at the maximum concentrations that it is expected it will be permitted to operate at. Where this assumption resulted in unrealistic impacts, further analysis was undertaken
- Exposure to emissions was based on lifetime exposure, assuming continual operation of the facility, whereas in reality the proposed development will have an operational lifetime of approximately 30 years
- The hypothetical maximum impacted receptor (an agricultural receptor at the point of maximum impact) only ingests food and drink sourced from the area with the maximum contribution from the facilities. This accounts for uncertainty in the modelling. To account for uncertainty in the dietary intake of a person, both residential and agricultural receptors were assessed

7.13 There were no major constraints in undertaking the HIA, although the community profile was only available at a ward level because smaller area statistics were not available. In addition, it was not possible to discuss the proposed project in detail with Slough Borough Council's public health service lead.

Background – public perception

Introduction

7.14 This section is based primarily on the research carried out for the National Society for Clean Air (NSCA) and Environmental Protection, reported in *The public acceptability of incineration* (2001), Defra's *Review of environmental and health effects of waste management: municipal solid waste and similar wastes* (2004) and the Environment Agency's *Perceptions, attitudes and communication: their role in delivering effective environmental regulation for municipal waste incineration* (2009). A more detailed review of literature on the potential health effects of waste management can be found in annex A of the HIA in technical appendix F.

Public perception of incineration / energy recovery

7.15 Research conducted by the Open University in 2000 found several areas of misunderstanding about waste issues, including the following:

- Nature of local waste disposal and other industrial plants
- Cost of waste collection and disposal
- Amount of waste that can be recycled
- Sources and effects on public health of dioxins

7.16 Change is often opposed because it causes uncertainty and is perceived as threatening. The public's broad dislike of change extends to every kind of waste treatment and disposal facility, as well as to other types of development such as housing estates, roads and shopping centres. Support for, or opposition to, all types of waste facilities can be split into two types: support / opposition in principle, and site-specific support / opposition (NSCA, 2001).

- 7.17 The roles of pressure groups, the importance of the increasing availability of scientific evidence (often via the internet) and the role of non-mainstream scientific thinking are also key in influencing public perception (Environment Agency, 2009). The Environment Agency's report identifies the following three points that are significant factors in discontent and opposition to waste disposal through incineration:
- Perception of lack of public involvement in the process
 - Distrust of expert opinions
 - Doubts over expert opinions relating to 'scientific uncertainty'
- 7.18 Concerns and distrust of expert opinions can take many forms, including:
- The intuitive feeling that experts are wrong
 - The existence of more than one expert opinion, resulting in the feeling that if the experts cannot agree then they obviously do not know the answer
 - The perception that experts have a vested interest and are therefore biased
 - The perception that not all the relevant evidence has been considered, arising from the increased availability of information (such as on the internet)
- 7.19 The report concludes that consultation is key in alleviating issues surrounding incineration projects. It is recommended that this should be carried out at an early stage and should involve local people and statutory consultees (often seen as guardians of public welfare).
- 7.20 Experience from public consultation undertaken by a number of local authorities has shown that the inclusion of informed debate in the consultation and discussion at strategic level has resulted in widespread acceptance of the need for EfW to form part of an integrated waste strategy. The NSCA report states that *"given factual background information about managing waste, and the alternatives available, most people reach similar conclusions to those of waste professionals in terms of what is theoretically the best way to deal with waste."*
- 7.21 However, the identification of sites for development of waste facilities leads to the support / opposition for a technology becoming a personal issue, rather than an 'in principle' opinion. Members of the public may oppose a site planned near their homes because it is perceived as a threat, even if they are not against EfW as part of an overall waste strategy. The NSCA report highlights that the public's anxiety is fed by campaign groups and the media. Concerned residents often form local lobby groups, which become the focus of media attention that attracts more support for their cause.
- 7.22 To manage the issue of local lobby groups and influence from campaign groups, the Environment Agency's report advises that applicants should undertake regular and early consultation and deal with concerns and evidence in an even-handed way, such that no points are suppressed or disregarded without due consideration.

The basis of public concern

- 7.23 There is no such thing as an ideal site, so a degree of compromise will almost always be necessary. Site selection for EfW facilities is the key focus of the majority of objections. Siting facilities away from housing reduces the potential for impacts on residents and thus the extent of opposition. However, this can lead to conflicts with countryside objectives and nature conservation and landscape designations, and may increase the traffic impacts associated with delivering waste and removing residues. The NSCA notes that siting facilities in industrial areas appears to be preferable, but such sites are not always available and other occupants of industrial estates have been known to object.
- 7.24 The specific concerns often expressed about EfW, as opposed to broad concerns regarding waste management as a whole, are summarised by the NSCA (2001) as follows:
- Emissions from the combustion process
 - Health impacts
 - Transport issues, including possible import of waste from other areas
 - Conflict with materials recycling
 - Local amenity issues
 - Effects on property values
 - Management and operational concerns, including odours
 - Disposal of residues
 - Outside company making a profit out of the community
- 7.25 There are no simple answers to these concerns, but all will be addressed during the planning and authorisation process. Each of these issues is considered in turn below.

Emissions from the combustion process

- 7.26 The main concern expressed about EfW is generally in relation to emissions to air. The European Industrial Emissions Directive (2010/75/EU), which replaced the Waste Incineration Directive (2000/76/EC), sets limits on emissions from waste incineration. The responsibility for enforcing these limits and the operating conditions of the facilities rests with the Environment Agency in England and Wales, under the terms of the Environmental Permitting Regulations 2016. The regulation of EfW is more comprehensive, and the limits tighter, than for most other industrial processes (NSCA, 2001). EfW emissions have reduced substantially over the past 25 years and most emissions are less than 10% of the level 25 years ago (Defra, 2013).
- 7.27 Operational permits for EfWs include site-specific emissions limits that take local conditions into account. In addition to announced and unannounced inspection visits, many facilities have online links to their local authority or Environment Agency office, which enables constant monitoring of the plant's performance on certain parameters. Continuous monitoring data for the existing Lakeside EfW are available online (www.lakesideefw.co.uk) and this arrangement will continue for the replacement facilities. For those emissions that cannot be continuously monitored because techniques are not available, such as dioxins and furans, three to six monthly testing is generally undertaken by an independent assessor.

No instruments are able to monitor dioxins in the minute concentrations in which they are emitted from EfWs (NSCA, 2001).

- 7.28 Public concern in relation to incineration often centres on dioxins. These are widely present in the environment and are a family of approximately 200 chlorinated organic compounds, a few of which are known to be toxic. Dioxins are usually referred to in terms of the equivalent concentration (TEQ) of the most toxic form: 2,3,7,8-tetrachlorodibenzo para dioxin (TCDD). Dioxins are formed in all combustion processes where chlorine is present together with fuel and oxygen. Sources include power plants, buses, cars, cigarettes, crematoria, garden bonfires and barbecues.
- 7.29 In order to put the dioxin levels produced by an EfW plant into context, the NSCA cites the Swiss environment ministry's warning to householders in 2000 that burning domestic refuse in fireplaces or garden bonfires was the country's biggest source of dioxin pollution. According to the ministry, the total national emissions of dioxins from municipal incineration facilities was 16 g per year, while uncontrolled burning by householders emitted 27-30 g per year. This is despite the fact that only 1-2% of municipal waste was burned illegally, while 47% of waste was incinerated. The NSCA report also highlights that 30 g TEQ of dioxins were emitted in the UK during bonfire night in 1995.
- 7.30 A 2004 Defra review of the health effects of waste management found that managing municipal solid waste accounts for approximately 1% of UK emissions of dioxins, shared equally between incineration and emissions from burning landfill gas. Domestic sources such as cooking and burning coal for heating are the UK's single largest source of dioxins (18% of emissions). Transport and electricity generation account for 4% of emissions each. A number of other sources contribute to dioxin emissions to a similar or greater extent, including accidental vehicle fires, fireworks and bonfires, small scale waste burning (for example on building sites), incineration of other wastes, and the iron and steel industry. There has been a 99.8% reduction in emissions of dioxins and furans from incineration in the UK since 1990, following limits imposed in EC directives, an increased understanding of the factors that lead to dioxin and furan emissions and the development of improved ways of stopping their formation and removing them from flue gases.
- 7.31 EfW chimney gases also include other emissions that generate public concern, including particulates, heavy metals and acid gases. The permitted emission limits of these products are set at levels considered to protect public health. EfW plants are very small sources of these emissions when compared to sources such as road traffic (NSCA, 2001). Defra (2013) states that emissions from an EfW typical of those currently operating in the UK (230,000 tonnes per year) are approximately equivalent to:
- Oxides of nitrogen – emissions from a 7 km stretch of typical motorway
 - Particulate matter – emissions from a 5 km stretch of typical motorway
 - Dioxins and furans – emissions from accidental fires in a town the size of Milton Keynes
 - Cadmium – One-twentieth of the emissions from a medium-sized UK coal-fired power station

7.32 Lakeside EfW's 2018 annual performance report shows that average annual emissions from the existing EfW of all substances with set emissions limits (oxides of nitrogen, hydrogen chloride, sulphur dioxide, carbon monoxide, volatile organic compounds, dust and hydrogen fluoride) were well within those limits. There were two slight exceedances of the daily limits, one for carbon monoxide and one for oxides of nitrogen, as a result of very wet waste creating poor burning conditions. However, these issues were resolved by slowing grate speeds to allow waste to dry on the grate. ES chapter 6: Air quality contains further details of the strict limits for emissions set by the Industrial Emissions Directive.

Health impacts

7.33 EfW facilities emit a large number of different chemicals, the majority of which are already in the waste delivered to the plant. Humans are exposed to hundreds of thousands of chemicals daily through diet and in the air. It should be noted that the key factor in determining risk to health is the amount and toxicity of chemicals, not the number. All chemicals are toxic if the exposure is high enough and long enough. However, a threshold exists for most chemicals below which health impacts are very unlikely. When assessing exposure from an EfW plant, it is important to measure background levels already present in the air (NSCA, 2001).

7.34 The Environment Agency has estimated that 24,000 deaths are brought forward each year by air pollution, of which only three (0.01%) are caused by emissions of oxides of nitrogen from EfW facilities (NSCA, 2001). The estimates relate to deaths that occur earlier than would otherwise be the case, although the extent of the advancement cannot yet be calculated. The Institute for European Environmental Policy (IEEP) found that environmental concerns other than health are more important in the debate over which waste management option, or mix of options, is appropriate for long term waste management. The IEEP went on to state that *"no waste management option should now be operated in a way that poses more than minimal risks to health."*

7.35 The 2004 Defra report found that the weight of evidence from health studies indicates present day practice for managing municipal solid waste has at most a minor effect on health, particularly when compared with other health risks associated with ordinary day-to-day living. The total number of hospital admissions per year attributable to emissions to air from all facilities managing municipal solid waste in the UK is estimated as five, compared with 300,000 related to traffic accidents.

7.36 Defra's (2014) *Energy from waste: A guide to the debate* states that the government is advised by Public Health England (PHE) on the impact on health of emissions to air from EfW plants. PHE has reviewed research undertaken to examine the suggested links between emissions from municipal waste EfW plants and effects on health, and notes that *"modern, well managed incinerators make only a small contribution to local concentrations of air pollutants."* PHE's view is that, while it is possible that such small additions could have an impact on health, *"such effects, if they exist, are likely to be very small and not detectable."*

- 7.37 The potential for effects on health from the proposed replacement EfW / HTI is discussed in more detail later in this chapter.

Transport issues, including possible import of waste from other areas

- 7.38 Concerns relating to the transport of waste include noise, dust and traffic congestion associated with lorries delivering to a site. These concerns are often greater in areas of poor road infrastructure or high existing congestion. The existing EfW and HTI are served directly off the A4 Colnbrook bypass, which is part of the strategic road network. Weekday deliveries to the plant consist of 157 HGV movements each way per day. The proposed replacement facilities will also be served directly off the A4 Colnbrook bypass by a new access road that will not pass any residential properties, or other sensitive receptors such as schools. There will be no increase in HGV movements as a result of the relocation of the EfW / HTI and the existing waste delivery routes will be maintained.
- 7.39 The NSCA report highlights that waste imports are another frequently expressed concern. Residents living close to a proposed EfW may fear that neighbouring local authorities will contract to send their waste to the plant and thus increase the number of lorry movements. Local residents may find disposal of their own waste acceptable, or at least bearable, but resent the thought that waste from other areas may contribute to the provision of an EfW in their local area.
- 7.40 The existing EfW already receives waste from local authorities outside Slough, including the RE3 authorities (Reading, Bracknell Forest and Wokingham), the West London Waste Authority (the London Boroughs of Brent, Ealing, Harrow, Hillingdon, Hounslow and Richmond upon Thames) and Wiltshire. These arrangements, which have operated successfully since 2010, will continue at the replacement facilities.
- 7.41 Several consultations by waste disposal authorities have found that people express a preference for small scale local facilities over larger facilities serving a wider area, or transporting waste over long distances. However, it should be noted that there is little external difference in the size of a 200,000 tonnes a year plant and one able to process double the amount, such as the existing EfW. The proposed replacement EfW / HTI will have the same capacity as the existing plant.

Conflict with material recycling

- 7.42 Many people fear that waste incineration will discourage recycling, partly because the local authority will be tied into contracts that require fixed volumes of waste to be delivered to the incinerator. It is important to note, however, that there are practical limits to recycling and not everything potentially recyclable can realistically be recycled. Furthermore, as a result of the commitment to increase recycling, most local authority waste management contracts do not guarantee minimum levels of throughput to such plants.
- 7.43 Recycling levels in the UK have increased over time, but meeting the target for recycling 65% of municipal solid waste by 2035 set out in the government's (2018) *Our Waste, Our Resources: A Strategy for England* will still leave 35% of waste requiring an alternative form of management. An integrated waste

management contract is a useful vehicle through which an appropriate balance of facilities can be secured, enabling government targets for recycling, composting, recovery and landfill diversion to be met. In areas where landfill capacity is rapidly depleting, alternative proven and robust methods of managing residual waste will be an essential component of such a contract.

- 7.44 Another common concern is that the local authority will take the easy option of sending all waste to an incinerator, rather than developing recycling. However, all local authorities have statutory and locally adopted recycling targets, together with financial incentives and penalties aimed at landfill diversion. These factors work together to address this issue.
- 7.45 Defra (2014) states that “*Experiences in Europe show that high rates of recycling, composting and energy from waste can and do exist.*” The NSCA report notes that this is partly because some of the materials that are commonly recycled, such as metals and glass, are not combustible, while diverting wet organic wastes from kitchens and gardens for composting improves the calorific value of the remaining waste, despite reducing the mass.
- 7.46 Data from Defra’s local authority collected waste annual results tables show that the existing EfW facility has not prevented recycling rates from increasing in the local authorities that it serves. In 2008/09, before the facility became operational in 2010, 32% of waste in the local authorities that currently provide the majority of the facility’s annual waste throughput (Slough, the RE3 authorities and the West London Waste Authority) was recycled or composted. By 2016/17, this figure had risen to 36%. As the existing EfW has not reduced recycling rates, the replacement EfW is also not considered likely to have this effect.

Local amenity issues

- 7.47 The physical bulk of an EfW and its effect on a local area are often concerns for the public, although this applies to many forms of development. Modern facilities are usually designed by specialist architects, who take account of operational, locational and environmental considerations, and as a result the buildings are not necessarily unattractive.
- 7.48 Research by the Open University in 2000 found that 55% of people living close to municipal waste EfW facilities were not aware of the fact. Conversely, some people erroneously believed they lived near to a municipal waste EfW plant, when in fact they lived near a different type of waste management facility, a closed incinerator or an industrial process.
- 7.49 Twenty-nine percent of those living near an EfW reported no negative effects, while 49% reported some negative effects. However, it should be noted that 34% of those who mistakenly believed that they lived near a municipal waste EfW facility also reported negative effects from the plant. The main negative impacts reported by people living near an EfW were smoke emissions (EfW plants only produce steam plumes, not smoke) and bad smells (18% of respondents each). Of those who were correctly aware of living near an EfW, 82% said that they were ‘not at all’ or ‘not very’ worried about its proximity. Overall, the Open University survey found that 88% of respondents were either not aware of or not worried about a nearby EfW.

- 7.50 In relation to the proposed development, it is important to note that the EfW and HTI are already operational in the local area and the proposals will only move the facilities approximately 600 m from the existing site. The new site is approximately 400 m from the nearest residential properties, from which it is separated by the M4. The existing plant is approximately 50 m closer to its nearest residential properties.
- 7.51 Lakeside EfW's 2018 annual performance report shows that recorded noise levels from the plant did not exceed the permitted values at nearby sensitive receptors. The report also confirms that there were no odour releases from the site and no odour complaints were received in 2018. It is therefore unlikely that the relocated facilities will generate any new local amenity issues.

Property values / investment climate

- 7.52 Many people fear that property values and the investment climate will be damaged if an EfW is built nearby. Experience has shown that, as with many major waste management facilities or other types of development, property values can be affected while a project is being discussed and during the construction phase, but they recover once the plant is operating (NSCA, 2001). It should be noted that property values are influenced by many variables, including interest rates, confidence in the economy, local supply and demand factors and accessibility to amenities and facilities, and it is difficult to isolate the effect of one project.
- 7.53 A survey of property and land values before, during and after the construction stages of EfW projects in Hampshire undertaken by Cluttons (2005) supported the NSCA's conclusion. The study also showed that major investment decisions on industrial, commercial, residential and community facilities have not stalled as a result of plant development in the vicinity.
- 7.54 As discussed above, the EfW and HTI are already operational in the local area and the proposals will only move the facilities approximately 600 m from the existing site. This makes it even less likely that there would be a significant effect on property prices and investment in the area as a result of the proposals.

Management and operational concerns, including odours

- 7.55 The public is often concerned about the perceived day-to-day operations of an EfW and that, where permitted, management standards of the facilities should be high. This was reflected in the study by MORI (2002), which found that people want strict operating guidelines for such facilities and are more likely to trust incineration in the hands of a local authority, rather than a private contractor. The requirement for the Environment Agency to oversee a plant's performance and emissions through the enforcement of the pollution prevention and control (PPC) permit condition does not necessarily reassure people fully that a plant will be safe.
- 7.56 Lakeside EfW Ltd operates a 'good neighbour' culture at the existing EfW facility, which will continue at the replacement facilities. This includes a local liaison group, which meets on a regular basis to discuss the operation of the plant and any potential issues or queries from the local community. It provides a

forum for community stakeholders to be informed and consulted regarding site operations and procedures.

- 7.57 The existing EfW has been operating successfully in the area since 2010, while the HTI has been operational since 2006. As discussed above, stack emissions are continuously monitored by the Environment Agency at both plants and the Agency confirms that both have been continuously operating well within / below the permit limits. Lakeside EfW's 2018 annual performance report shows that the only emission exceedances related to one slight exceedance of the daily carbon monoxide limit and one slight exceedance of the oxides of nitrogen daily emissions limit. Both were quickly resolved and the average annual emissions were well below the daily limits.
- 7.58 Potential odours from prolonged storage of waste are sometimes a concern, but these can easily be addressed through technological means, good plant management and the imposition of conditions by the Environment Agency. Increased traffic congestion and noise are other concerns usually expressed by people when an EfW is proposed in their locality.
- 7.59 As discussed above, waste will be delivered to the proposed replacement facilities using the same routes as for the current site, so there will be no increase in traffic congestion as a result of the proposed development. Recorded noise levels from the plant in 2018 did not exceed the permitted values and no odour releases or odour complaints occurred. The replacement facilities will be operated to the same stringent standards, so no significant noise or odour issues are envisaged.

Disposal of residues

- 7.60 Incineration generally reduces waste to around 10% of its original volume. It should be noted that not all waste that is delivered to a plant is combusted. Mattresses, gas canisters and bicycle frames are among the materials occasionally removed from the waste before it is fed into the incinerator, as they are too big and could damage the equipment, or would not burn. The incidence of such items where the plant forms part of an integrated waste management strategy is likely to be relatively rare. About 10% by volume and 25-30% by weight typically remains of waste that is combusted (NSCA, 2001).
- 7.61 The main residue from the incineration process is bottom ash, approximately 10% of which is ferrous metal that can be separated magnetically for recycling. Bottom ash can be disposed of to landfill or used as an aggregate substitute in road building or construction. Tests on processed ash from a number of UK EfWs show that the levels of dioxins are similar to those in urban soils (NSCA, 2001).
- 7.62 The other main residue is ash from the emissions clean-up process. This includes airborne ash particles that are removed from the exhaust gases and the spent lime, activated carbon and other reagents that are used to clean the gases. These are collectively called air pollution control (APC) residues. Disposal of the APC residues is a tightly controlled process and APC residue is classified as a hazardous waste.

- 7.63 It should be noted that the by-products from combustion and gas clean-up at the existing EfW facility are recycled. The bottom ash is transported to Day Aggregates in Brentford, where it is used to make aggregates suitable for construction projects and asphalt for road surfacing. The APC residues are sent to Carbon8 Aggregates, where the material is recycled and used to create a carbon negative aggregate that is used to make carbon negative building blocks. The metals from the process are also recycled. These arrangements to treat and not landfill will continue for the replacement EfW. The bottom ash and APC residues from the existing HTI are sent to Wingmoor Landfill at Bishops Cleeve and this will continue for the replacement HTI.

Outside company making a profit out of the community

- 7.64 The final key concern identified by the NSCA report is resentment that an outside company is coming into the area to make a profit at the expense of the residents by charging large fees to handle their waste. The Environmental Protection Act 1990 effectively privatised waste management, requiring waste disposal authorities to form arm's length private sector companies (local authority waste disposal companies) to deal with waste. Successive changes have resulted in an almost entirely private sector-run waste management system.
- 7.65 Private waste management companies need to make profits to cover the cost of their investments and operations and to satisfy investors. However, the competitive nature of the bidding process for waste contracts means that developers are frequently required to take on the risks of the development. In order to win the contract, profit margins have to be as low as possible, while service quality is as high as possible. In the case of EfW facilities, a private sector company provides a service to the community that the local authority could not normally provide because of spending constraints and lack of specialist knowledge (NSCA, 2001).
- 7.66 It should be noted that the existing Lakeside EfW and HTI pays business rates annually to Slough Borough Council, which provides an economic benefit to the area. Similarly, the jobs provided by the existing plant contribute to the local economy. The management of local waste at the existing plant also benefits the area. It should also be noted that, since operations began at the existing EfW in 2010, some £7 million has been spent on improving the site's processes as part of Lakeside EfW Ltd's commitment to its continued improvement objectives.

Health

Background

- 7.67 Defra's 2004 review of the environmental and health effects of waste management found that health effects in people living near waste management facilities were either generally not apparent, or the evidence was not consistent or convincing. Where investigations had been carried out but no health effects found, Defra undertook further investigations in response to public concerns. The review did not find a link between the current generation of municipal solid waste incinerators and health effects. Adverse health effects were observed in populations living around older, more polluting incinerators and industrial areas.

However, the current generation of EfW facilities results in a much lower level of exposure to pollutants.

- 7.68 The study considered cancers, respiratory diseases and birth defects, but no evidence was found for a link between the incidence of disease and the current generation of facilities. The government's independent expert advisory committee on the Carcinogenicity of Chemicals in Food, Consumer Products and the Environment concluded within the study that *"any potential risk of cancer due to residency (for periods in excess of ten years) near to municipal solid waste incinerators was exceedingly low and probably not measurable by the most modern techniques."*
- 7.69 To put the effects of managing municipal solid waste into context, Defra reported that its management accounts for less than 2.5% of almost all quantifiable emissions in the UK. The exceptions to this were emissions of methane (nearly 30% of total emissions) and cadmium (10% of the national total). Almost all of the cadmium emitted to air from facilities managing municipal solid waste comes from landfill sites.
- 7.70 Defra also compared the hazards from municipal solid waste management with other health hazards. Fireworks resulted in over 1,000 hospital admissions in 2002. Traffic accidents result in over 3,000 deaths and over 300,000 hospital admissions every year. In comparison, managing municipal solid waste results in approximately five hospital admissions and one death brought forward per year. Defra concluded that, while the information on health and environmental effects of waste management is incomplete and not ideal, the weight of evidence from studies to date is that present-day practices for managing municipal solid waste have, at most, a minor effect on health and the environment.

Health risk assessment

Introduction

- 7.71 The key issue for consideration in the HRA was the release of substances from the facilities to the atmosphere that have the potential to harm human health. Some pollutants, including dioxins, furans, dioxin-like polychlorinated biphenyls (PCBs) and heavy metals accumulate in the environment. This means that inhalation is only one of the potential exposure routes to these substances and impacts cannot be evaluated in terms of their effects on human health by simple reference to ambient air quality standards. An assessment needs to be made of the overall human exposure to the substances by the local population and the risk that this exposure causes. The following chemicals of potential concern were identified for the purposes of the assessment:

- Dioxins and dioxin-like PCBs
- Benzene
- Benzo(a)pyrene
- Mercury
- Mercuric chloride
- Cadmium
- Arsenic

- Chromium (trivalent and hexavalent)
- Nickel

7.72 The ground-level concentrations resulting from emissions from the replacement EfW / HTI will be highest in the vicinity of the plant. To account for this, notional adult and child receptors have been assessed at the point of maximum impact. The HRA in technical appendix E also assessed the potential effects at existing receptors in areas predicted to experience the greatest impacts.

7.73 This section focuses on the effects at the point of maximum impact, as these have the greatest potential to be significant. Where no potentially significant effects have been identified at the point of maximum impact, there is no potential for significant effects on existing receptors. However, where potentially significant effects have been identified for the theoretical receptors, details are also included of the assessment results at the most affected existing receptor. The full modelling results are presented in technical appendix E.

Assessment against the TDI at the point of maximum impact

7.74 Tables 7.2 (adult) and 7.3 (child) set out the impact of emissions from the EfW and HTI at the point of maximum impact for an agricultural receptor and a residential receptor. The former assumes direct inhalation and ingestion from soil, drinking water and home-grown eggs, meat and milk. The latter assumes that the person lives at the point of maximum impact and consumes home-grown produce. Exceedances of the TDI are shown in bold.

Substance	MDI (% of TDI)		Process contribution (% of TDI)		Overall (% of TDI)	
	Inhalation	Ingestion	Inhalation	Ingestion	Inhalation	Ingestion
Agricultural						
Cadmium	20.41%	53.17%	10.73%	0.30%	31.14%	53.47%
Chromium	-	60.48%	-	3.10%	-	63.57%
Chromium VI	-	6.05%	-	0.0012%	-	6.05%
Methyl mercury	-	3.11%	-	0.11%	-	3.22%
Mercuric chloride	-	0.71%	-	0.41%	-	1.13%
Mercury	1.19%	-	0.0010%	-	1.19%	-
Nickel	31.48%	68.37%	55.08%	5.72%	86.55%	74.08%
Dioxins and dioxin-like PCBs	35.00%		19.55%		54.55%	
Residential						
Cadmium	20.41%	53.17%	10.73%	0.19%	31.14%	53.37%
Chromium	-	60.48%	-	0.25%	-	60.72%
Chromium VI	-	6.05%	-	0.00009%	-	6.05%
Methyl mercury	-	3.11%	-	0.04%	-	3.15%
Mercuric chloride	-	0.71%	-	0.04%	-	0.76%
Mercury	1.19%	-	0.0010%	-	1.19%	-
Nickel	31.48%	68.37%	55.08%	0.53%	86.55%	68.90%
Dioxins and dioxin-like PCBs	35.00%		0.44%		35.44%	

Table 7.2: Impact analysis – adult TDI at point of maximum impact

Substance	MDI (% of TDI)		Process contribution (% of TDI)		Overall (% of TDI)	
	Inhalation	Ingestion	Inhalation	Ingestion	Inhalation	Ingestion
Agricultural						
Cadmium	52.86%	137.72%	13.52%	0.69%	66.38%	138.42%
Chromium	-	156.63%	-	4.99%	-	161.63%
Chromium VI	-	15.66%	-	0.0019%	-	15.67%
Methyl mercury	-	8.04%	-	0.23%	-	8.27%
Mercuric chloride	-	1.85%	-	0.65%	-	2.50%
Mercury	3.08%	-	0.0013%	-	3.08%	-
Nickel	81.52%	177.07%	69.40%	8.71%	150.92%	185.78%
Dioxins and dioxin-like PCBs		90.65%		27.63%		118.28%
Residential						
Cadmium	52.86%	137.72%	13.52%	0.46%	66.38%	138.18%
Chromium	-	156.63%	-	0.69%	-	157.32%
Chromium VI	-	15.66%	-	0.00%	-	15.66%
Methyl mercury	-	8.04%	-	0.11%	-	8.16%
Mercuric chloride	-	1.85%	-	0.18%	-	2.03%
Mercury	3.08%	-	0.0013%	-	3.08%	-
Nickel	81.52%	177.07%	69.40%	1.27%	150.92%	178.35%
Dioxins and dioxin-like PCBs		90.65%		1.36%		92.01%

Table 7.3: Impact analysis – child TDI at point of maximum impact

- 7.75 Table 7.2 shows that the overall impact on a notional adult receptor at the point of maximum exposure (including the contribution from dietary intakes) is predicted to be below the TDI for all chemicals of potential concern. There will therefore not be an appreciable health risk to adults from the proposed development and no further consideration is required.
- 7.76 For a notional child receptor at the point of maximum impact, the total ingestion of cadmium, chromium and nickel, total inhalation of nickel and the total intake of dioxins exceed the TDI. These substances were therefore considered further.
- 7.77 The prediction that the total ingestion of cadmium will exceed the TDI for the child receptor is a reflection of the fact that the MDI is already over 100% of the TDI. The process contribution is predicted to be small, at only 0.69% (agricultural receptor) of the ingestion TDI. The key determinant of cadmium's toxicity potential is its chronic accumulation in the kidney. The Environment Agency states that chronic exposure to levels in excess of the TDI might be associated with an increase in kidney disease in a proportion of those exposed, but small exceedances lasting for shorter periods are of less consequence. When lifetime exposure is assessed (i.e. being a child and then an adult), the overall intake is predicted to be well below the TDI. Therefore, there will not be an appreciable health risk based on the emissions of cadmium over the lifetime of an individual.
- 7.78 Concentrations of total chromium in emissions from municipal waste incineration processes are typically 2.80% of the European emission limit, with only a fraction of this being in the hexavalent form (chromium VI). Using the worst case assumption that emissions of chromium are the maximum monitored from an existing facility (30.67% of the European emission limit), the process contribution is predicted to be 4.99% of the TDI for an agricultural child receptor. If emissions are taken to be the average emission concentration, the process contribution is only 0.46% of the TDI.

- 7.79 Almost all toxicological opinion is that chromium III compounds are of low oral toxicity and the World Health Organization states that *“in the form of trivalent compounds, chromium is an essential nutrient and is relatively non-toxic for man and other mammalian species.”* While the TDI is predicted to be exceeded, this is as a result of existing dietary intake rather than the proposed development. The TDI is based on the US Environmental Protection Agency’s reference dose for chromium VI. Assessing the total dietary intake of chromium against this TDI is therefore highly conservative. As the process contribution is predicted to be small, the existing levels of chromium do not represent a toxicity problem, and the TDI is highly conservative, there will not be an appreciable health risk based on the emissions of chromium over the lifetime of an individual.
- 7.80 The prediction that the total ingestion of nickel will exceed the TDI for the child receptor is a reflection of the fact that the MDI is already over 100% of the TDI. The process contribution is predicted to be 8.71% of the TDI, using the conservative assumption that it is based on emissions of nickel at 73.3% of the draft group 3 metals emission limit. This is the maximum of the monitoring data and is an outlier. If it is assumed that the facilities operate at 5% of the draft group 3 metals emission limit, the process contribution will be only 0.59% of the ingestion TDI for the agricultural child receptor. On this basis, it is considered that the replacement facilities will not significantly increase health risks for children from the ingestion of nickel.
- 7.81 The total inhalation of nickel exceeds the TDI for the child receptor and the process contribution is predicted to be 69.4% of the TDI. However, applying the same assumption as above that the facilities operate at 5% of the emission limit, reduces the process contribution to 4.7% of the TDI and the total inhalation to 86.3% of the TDI. As the total inhalation is not predicted to exceed the TDI under this scenario, it is considered that the replacement facilities will not significantly increase health risks for children from the inhalation of nickel.
- 7.82 The total ingestion and inhalation of dioxins is predicted to exceed the TDI for a child agricultural receptor at the point of maximum impact. However, this is based on the child receptor being exposed to the maximum airborne concentrations and consuming produce, eggs, milk and meat grown at the point of maximum impact, which is not realistic. The impact at the maximum affected existing receptor has therefore also been examined. This found that the overall impact (including the contribution from existing dietary intakes) is predicted to be 92.17% of the TDI, so no appreciable health risks are predicted.
- 7.83 The total accumulation of dioxins in an infant via breast milk (the only ingestion pathway for an infant receptor), based on an adult agricultural receptor at the point of maximum impact feeding an infant, is predicted to be 3.034 pg WHO-TEQ⁽¹⁾ / kg body weight / day, which is 151.7% of the TDI. For a residential receptor, it is only predicted to be 0.056 pg WHO-TEQ / kg body weight / day, which is 2.8% of the TDI. However, as for the child receptor discussed above, this hypothetical infant receptor does not exist in reality. The impact at the maximum affected existing receptor has therefore also been examined. This found that the total accumulation of dioxins is predicted to be 0.167 pg WHO-TEQ / kg body weight / day, which is 8.33% of the TDI. As the process

¹ World Health Organization Toxic Equivalent – a universally accepted system for expressing the toxicity of dioxins, furans and PCBs.

contribution is well below the TDI, it is considered that the replacement facilities will not significantly increase health risks from the accumulation of dioxins in infants.

Assessment against the ID at the point of maximum impact

7.84 Tables 7.4 (adult) and 7.5 (child) set out the impact of emissions from the proposed development for an agricultural and a residential receptor at the point of maximum impact as a percentage of the ID (the level of exposure that is associated with a negligible risk to human health).

Substance	Inhalation (% of ID)	Ingestion (% of ID)
Agricultural		
Arsenic	18.78%	1.52%
Benzene	10.73%	2.47%
Benzo(a)pyrene	0.86%	1.80%
Chromium	138.19%	-
Residential		
Arsenic	18.78%	0.56%
Benzene	10.73%	2.62%
Benzo(a)pyrene	0.86%	0.02%
Chromium	138.19%	-
Table 7.4: Impact analysis – adult ID at point of maximum exposure		

Substance	Inhalation (% of ID)	Ingestion (% of ID)
Agricultural		
Arsenic	23.66%	2.65%
Benzene	13.52%	5.80%
Benzo(a)pyrene	1.08%	2.60%
Chromium	174.12%	-
Residential		
Arsenic	23.66%	1.35%
Benzene	13.52%	4.65%
Benzo(a)pyrene	1.08%	0.05%
Chromium	174.12%	-
Table 7.5: Impact analysis – child ID at point of maximum exposure		

7.85 Tables 7.4 and 7.5 show that the process contribution is predicted to be well below the ID for all pollutants except chromium for both adults and children at the point of maximum exposure. This is based on the worst case assumption that emissions of chromium are the maximum monitored from an existing waste incineration facility (30.67% of the European emissions limit). If emissions are taken to be the average emissions concentration from an existing facility (2.80% of the emissions limit), the process contribution is predicted to be only 12.6% of the ID for an adult receptor and 15.9% of the ID for a child receptor. Under this assumption, the process contribution will be well below the ID and the emissions from the replacement facilities are considered to have a negligible impact on human health.

7.86 In conclusion, the HRA found that the operation of the replacement EfW / HTI will not result in significant adverse effects on human health.

Health impact assessment

- 7.87 The HIA considers how a range of socio-economic, physical, mental and community health outcomes might be affected by activities associated with the construction and operation of the replacement EfW and HTI.
- 7.88 Health impacts associated with socio-economic issues centre on employment, income and housing. The limited number and duration of the construction jobs that are likely to be available to local residents mean that there are unlikely to be any effects on the health of the local community. Post-construction, the replacement facilities will employ the staff currently working at the existing EfW / HTI, so no new health benefits are predicted.
- 7.89 The likelihood of health effects arising from accidents during construction is considered to be low, given the relatively short construction period, the nature of the works being undertaken and the implementation of health and safety procedures. There will be no effects on the population health of the local community or on health services.
- 7.90 Post-construction, all operational activities will take place within the site boundaries, where access will be controlled. Therefore, any incidents involving a member of the local community would be likely to result from trespass. Should an incident occur, it would be unlikely to have any health effects on the community as a whole, as there is sufficient capacity within the health service to deal with such an event without negatively impacting on access to healthcare or the health of others in close proximity to the site. Opportunities for trespass will be limited by security fencing and CCTV, as at the existing facilities. Raw materials and waste products will be securely stored, limiting the potential for harmful chemicals to impact the health of the local community as a result of vandalism.
- 7.91 The HIA also examines the potential for social capital effects relating to social networks and quality of life. As construction workers are likely to remain within the site, and a proportion of the workforce is likely to be sourced locally, the HIA concludes that they are not likely to significantly affect social networks and quality of life in the area. While noise and visual effects associated with construction activities can reduce people's enjoyment of living in an area, the local communities are accustomed to the existing EfW / HTI and the nearby Heathrow Airport. The HIA notes that stress and annoyance from changes to traffic flows and the fear of perceived health effects associated with increased construction activity can make individuals more susceptible to mental health issues. However, once construction ends, the associated noise, traffic and visual effects will lessen, so any potential health effects during construction will be temporary.
- 7.92 The HIA concludes that the operation of the replacement EfW / HTI is not likely to affect social capital in communities close to the site, as the existing employees will be relocated to the new site and the number of vehicle movements generated will be similar to the existing facilities.
- 7.93 The potential health implications of air quality, noise, traffic and visual effects of the proposal are also examined in the HIA. The stand alone TA submitted in support of the planning application states that construction traffic will access the

site via the A4 Colnbrook bypass, London Road and the M4 / M25. No construction vehicles will pass through the village of Colnbrook. The TA concludes that the increase in traffic during construction will not affect the main A4 Colnbrook bypass or other local roads.

- 7.94 The HIA states that vulnerable groups have the greatest potential to be affected by increased traffic levels. The elderly may experience annoyance from increased noise, while young children are at higher risk of road accidents and health effects associated with potential air pollution. Concerns over road safety could cause stress and anxiety among those in the local area. In addition, cyclists and pedestrians using the local road network may experience increased fear of accidents and injuries. Increases in traffic will increase the risk of accidents for all road users. Post-construction, the operational phase traffic will be effectively the same as for the existing EfW / HTI and no adverse effects on health are expected.
- 7.95 As set out in chapter 6, the potential for a significant increase in dust and vehicle emissions during construction will be mitigated through the construction environmental management plan and the HIA does not predict any significant adverse effects on health or amenity. Chapter 6 also states that no significant adverse air quality effects are predicted post-construction. Therefore, it is not likely that there will be any measurable change in health outcomes for local communities.
- 7.96 The stand alone noise report submitted in support of the planning application states that there will be no significant adverse effects as a result of increased noise, either during or post-construction. The HIA concludes that potential health effects on residents as a result of increased noise are unlikely. However, it notes that elevated noise levels in the immediate vicinity of the site may discourage the use of public footpaths and open spaces in the local area, potentially affecting the physical health of local people.
- 7.97 The potential visual effects of the proposal are examined in chapter 10 of the ES. Temporary moderate, significant adverse visual effects during construction are identified on visual amenity for residents of Old Slade Lane and The Poynings, as well as users of public rights of way in the vicinity of the site. Visual disturbances can affect quality of life and cause community disturbance, anxiety and concern, although only a small number of people will be temporarily affected. However, once completed, the proposed development is predicted to lead to moderate significant adverse effects on visual amenity for the same receptors. The HIA notes that permanent visual disturbance can become a focus of concern and anxiety, as there is a strong link between the visual environment and people's mental and physical health.

Mitigation and monitoring

- 7.98 In addition to the measures that are integral to the design and management of the plant, as set out in chapter 3, the HIA recommends the following mitigation measures are put in place:
- Establish a community complaints procedure during the construction phase that should be advertised widely, including the steps that will be

taken once a complaint is received and the timescale in which a response and resolution can be expected

- Communicate information regarding construction activities throughout the construction period to the most local communities via channels such as a liaison group or a website
- Ensure the construction site is secure and not vulnerable to trespass through adequate fencing and, if appropriate, the use of security guards
- Implement a traffic management plan during construction, working closely with Slough Borough Council and the local highways authority to implement measures to deal with unusual traffic movements (such as large loads), consult with the council to evaluate the need to install traffic calming and control measures, and adopt procedures for liaison with the local emergency services in case of accidents
- Inform police and emergency services of any issues relating to site safety and access post-construction
- Encourage local employment and procurement during construction. If feasible and available, local suppliers should be used for goods and services. Jobs created during construction should also be advertised and made available in the local area initially
- Ensure open communication and sharing of information (as occurs for the existing facilities), including the display of emissions data on a website, in a form that is accessible and as close to real time as possible
- Implement a traffic management plan during operation

7.99 As no significant adverse effects are predicted, no monitoring is required.

Residual effects

7.100 No significant residual community and health effects are predicted as a result of the proposed development.

Cumulative effects

7.101 The distance of most of the other projects in the area from the site means that there is no potential for significant cumulative community and health effects. If construction of the M4 Smart Motorway works to the north of the site overlaps with the construction of the replacement facilities, there may be some potential for additional health effects associated with increased noise, traffic and visual disturbance. However, these would be temporary and are not likely to be significant.