



**Ch 4**  
Alternatives

## 4 Alternatives

### Introduction

- 4.1 This chapter examines the methodology and conclusions presented in the Alternative Sites report (Terence O'Rourke, June, 2019), which accompanies the planning application and also the other significant alternatives considered during the development of the replacement Lakeside EfW and HTI proposals, including site layouts, designs and technologies.

### Legislation and guidance

- 4.2 The consideration of alternatives is central to the EIA process. In many cases, adverse environmental effects can best be avoided through consideration of alternative means of achieving a development proposal, such as different sites, layouts, and / or means of access.
- 4.3 The EIA Regulations provide guidance on the need for and content of an EIA. With regards to alternatives, Schedule 4 (Part 2) of the EIA Regulations states that ESs should include:

*“A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.”*

- 4.4 Paragraph 035 (Ref ID 4-035-20170728) of the Ministry of Housing, Communities and Local Government's on-line EIA guidance states that:

*“Where alternative approaches to development have been considered, the Environmental Statement should include a description of the reasonable alternatives studied which are relevant to the proposed development and its specific characteristics and provide an indication of the main reasons for the choice made, including a comparison of the environmental effects (see [regulation 18\(3\)\(d\)](#)).*

### Alternative sites – the assessment process

- 4.5 Although it is not expressly required by the EIA Directive or the EIA Regulations, Lakeside EfW Ltd has followed what is considered to be good practice for a development proposal of this type by carrying out a detailed assessment of alternative sites. In compliance with the EIA Regulations and guidance, the following paragraphs summarise the main alternative sites that have been considered for the development of the replacement facilities.

### Methodology

#### *Defining the area of search*

- 4.6 As the EfW / HTI is an existing operational facility, the area of search for potential alternative sites was defined by its core catchment area. Ninety percent of local authority waste treated at the site is forecast to come from

authorities in Berkshire, the West London Waste Authority and Surrey (mainly north Surrey) by 2020. While the remaining 10% of waste will come from Wiltshire, this is considered to be too far from the existing facilities and centre of waste arisings to represent a realistic location. In addition, the existing facilities take commercial and industrial waste from the surrounding area, including Buckinghamshire. It was therefore considered that South Buckinghamshire should be included in the area of search because the existing facilities lie approximately 1 km south of the district's boundary.

4.7 The following boroughs and districts were therefore included in the area of search, effectively forming a corridor either side of the M4 between Berkshire and west London:

- West Berkshire
- Reading
- Wokingham
- Windsor and Maidenhead
- Slough
- Bracknell Forest
- South Buckinghamshire
- Runnymede
- Spelthorne
- Hounslow
- Richmond upon Thames
- Ealing
- Brent
- Harrow
- Hillingdon

*Long-list: sieving stage*

4.8 The first stage was to generate a long-list of sites from within the area of search. Sites were identified from the following data sources:

- Site search exercises undertaken by Vail Williams, Savills and GVL in 2016 and 2017 to find a new site for the facility
- Site search exercises carried out during the preparation of adopted and emerging waste local plans
- Land allocated in adopted or emerging waste local plans
- Current waste sites and sites with planning permission for waste management
- Land allocated for industrial or employment development in local plans
- Existing industrial estates and business parks

4.9 The aim has been to sieve out sites that:

- Are too small: if a site is of a size that cannot physically accommodate the replacement EfW / HTI then there is no basis for short-listing for further investigation
- Have over-riding constraints: if a site is allocated or has permission for some other incompatible use, or is subject to national or international environmental designations, then it is unlikely to be found suitable and should not be short-listed
- Are already occupied by other compatible uses, but where the occupier is known to be resistant to selling the site or where site assembly would be required: there is no merit in short-listing sites that cannot be guaranteed to be available to Lakeside EfW Ltd in a timescale that would provide an operational plant by 2023
- Are too distant from the primary road network: the existing site is adjacent to the A4, so sites that would lead to a significant increase in the transport of waste on more local roads are considered to be unsuitable for short-listing

4.10 On this basis, a sieving stage was undertaken on the long-list using the following criteria to exclude sites that are unsuitable as a result of one or more of the following absolute constraints (more detailed information is set out in the Alternative Sites report):

- (a) Size: a minimum site area of 3 ha is considered to be required to accommodate the EfW and HTI, ancillary buildings and structures, circulation space and car parking. Furthermore, sites must be of a suitable configuration that could realistically accommodate the replacement facilities. For example, sites that comprise long thin parcels of land would not be considered practical EfW development sites.
- (b) Uses: sites with an incompatible<sup>(1)</sup> allocation, permission or current use (such as residential, community use, schools and retail) are not considered suitable. This also includes sites in the area that would be required for the proposed expansion of Heathrow Airport and sites that fall within either the existing or future modelled public safety zone.
- (c) Environmental designations: sites with a national or international environmental designation within the site boundary (such as a site of special scientific interest or area of outstanding natural beauty) are not considered suitable.
- (d) Land ownership: sites with occupied buildings such that it would not be possible to obtain a 3 ha site for the facilities without displacing existing businesses not controlled by Lakeside EfW Ltd are not considered suitable. The criterion also includes sites with planning permission for minerals extraction that are either not yet excavated, or where the restored area is less than 3 ha.
- (e) Proximity to the primary road network: sites that are more than 2 km from the primary road network by road are not considered suitable. The

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<sup>1</sup> A compatible allocation, permission or use is deemed to be waste management (including transfer), wastewater treatment, minerals or industrial.

primary road network comprises motorways and A-roads designated by Highways England as primary routes.

4.11 All sites that are subject to one or more of the above constraints were excluded from further consideration. The remainder formed the short-list to be assessed further.

**Short list: detailed analysis**

4.12 The remaining short-listed sites were analysed against a range of criteria and ranked according to their performance in this analysis. A qualitative form of analysis was used, with sites categorised as ‘meeting’, ‘partially meeting’ or ‘not meeting’ each criterion. This approach is considered to be more objective and robust than the use of weighted, multi-scored analysis, as the use of weighting and a greater range of potential scores introduces a higher potential for subjectivity into the process.

4.13 The criteria used and an explanation of how the scores were applied are set out in table 4.1.

Criterion	Description
<b>Operational criteria</b>	
Proximity to existing facility	<p>The existing facilities have been operating successfully on its current site for nine years and is an established presence in the local context. The relocation of the facility has the potential to disrupt the existing established delivery arrangements for contract and other waste, as well as affecting staff employed at the plant. Such disruption would be reduced by siting the replacement facilities as close as possible to the existing location. This criterion was assessed as follows:</p> <ul style="list-style-type: none"> <li>• Meets criterion: the site is within 5 km of the existing facilities</li> <li>• Partially meets criterion: the site is between 5-10 km from the existing facilities</li> <li>• Does not meet criterion: the site is more than 10 km from the existing facilities</li> </ul> <p>The aim of this criterion was to minimise the disruption resulting from the relocation of the EfW and HTI. However, the size of the search area meant that a number of potential sites would be some distance from the existing site, albeit having potential merits when measured against other criteria. It was therefore also important to ensure that the criterion cut-off distance was not too tightly drawn, whilst recognising that sites that are further away ought not to be able to meet it. The selected distances of 5 and 10 km were considered to provide an appropriate balance between these two elements</p>
Potential to be served by rail	<p>Paragraph 5 of the National Planning Policy for Waste (NPPW) states that modes other than road transport should be used for the movement of waste when practicable and beneficial and refers to the need to consider the capacity of both existing and potential transport infrastructure. The potential to be served by rail therefore depends on a site’s location in relation to existing or planned future rail infrastructure. This criterion was assessed as follows:</p> <ul style="list-style-type: none"> <li>• Meets criterion: the site is immediately adjacent to an operational or planned future railway line</li> <li>• Partially meets criterion: the site is within 250 m of an operational or planned future railway line</li> <li>• Does not meet criterion: the site is more than 250 m from an operational or planned future railway line</li> </ul> <p>The ability to install the necessary arrangements for loading and unloading onto rail is most likely to exist at sites immediately adjacent to a railway line. Two hundred and fifty metres was considered to be a reasonable distance at which a rail link or rail sidings could be developed from a site to an existing or planned rail network</p>
Potential for combined heat and power (CHP)	<p>The ability of a plant to provide CHP is a key sustainability benefit and paragraph 4 of the NPPW highlights the siting of facilities to enable the utilisation of the heat produced as an energy source in close proximity to suitable potential heat customers. Areas with proposals for high density redevelopment or new development present the opportunity to ‘design in’ district-type heating infrastructure at the planning stage and are therefore</p>

Criterion	Description
	<p>considered to represent the most viable potential CHP clients. Retrofitting CHP infrastructure to existing uses is more complex, but existing buildings with significant demand for a constant supply of heat also represent potential clients. The cost of provision is a significant factor and increases with the distance and complexity of provision. In line with this, the criterion was assessed as follows:</p> <ul style="list-style-type: none"> <li>• Meets criterion: the site is within or adjacent to a regeneration / new development area identified in adopted or emerging development plan documents</li> <li>• Partially meets criterion: the site is within 1 km of a regeneration / new development area or adjacent to an existing potential CHP client</li> <li>• Does not meet criterion: the site is more than 1 km from a regeneration / new development area and not adjacent to an existing potential CHP client</li> </ul> <p>These cut-off distances were chosen to minimise costs associated with pipeline installation. Up to 1 km is considered to represent a reasonable distance for transporting heat to potential customers. It does not mean that CHP over longer distances would not be feasible, but that the best opportunities are those that are closest to the plant due to the additional costs of extended distribution networks, heat loss and reductions in efficiency</p>
<p>Potential for co-location with other waste uses</p>	<p>Paragraph 4 of the NPPW identifies the need to consider opportunities to co-locate waste management facilities together and with complementary activities. These are not defined by the NPPW, but are assumed to comprise land uses that have, or have potential to have, a waste management element, such as minerals sites or wastewater treatment plants. Given this policy context, the advantage of being adjacent to other waste management facilities, or complementary uses, is considered to be appropriate in examining the potential sites. This criterion was assessed as follows:</p> <ul style="list-style-type: none"> <li>• Meets criterion: the site is adjacent to an active waste management facility or a site in a complementary use</li> <li>• Partially meets criterion: the site is adjacent to a site allocated for potential future use as a waste management facility or complementary use in an adopted development plan</li> <li>• Does not meet criterion: the site is not adjacent to an active or allocated waste management site or site in a complementary use</li> </ul>
<p><b><i>Planning and environmental criteria</i></b></p>	
<p>Compatibility with planning policy</p>	<p>Compatibility with planning policy is an important factor in determining the deliverability of a site. An existing or allocated waste use is considered to provide the best policy basis for a new waste development, while an existing or allocated minerals or industrial use is considered likely to improve the suitability of the site for waste use. Waste uses are often compatible with industrial (B2 and B8) and minerals sites because they have similar traffic generation and building characteristics (such as type and size), and paragraph 4 of the NPPW confirms that industrial sites are potentially suitable for waste management uses. In line with this, the criterion was assessed as follows:</p> <ul style="list-style-type: none"> <li>• Meets criterion: the site is currently in waste use or is identified / safeguarded in an adopted development plan for this use</li> <li>• Partially meets criterion: the site is currently in minerals or B2 / B8 use or is identified / safeguarded in an adopted development plan for minerals or B2 / B8 use</li> <li>• Does not meet criterion: the site is not currently in waste / minerals / B2 / B8 use and is not identified / safeguarded in an adopted development plan for these uses</li> </ul>
<p>Re-use of previously developed land</p>	<p>Paragraph 4 of the NPPW states that priority should be given to the re-use of previously developed land when identifying sites for waste management facilities. The National Planning Policy Framework defines previously developed land as <i>"land which is or was occupied by a permanent structure, including the curtilage of the developed land...and any associated fixed surface infrastructure."</i> This definition excludes land that has been developed for minerals extraction or waste disposal by landfill, where provision for restoration has been made through development management procedures, and which is therefore regarded as greenfield land. This criterion was assessed as follows:</p> <ul style="list-style-type: none"> <li>• Meets criterion: the site is previously developed land</li> <li>• Partially meets criterion: the site is partially previously developed land</li> <li>• Does not meet criterion: the site is greenfield</li> </ul>

Criterion	Description
Development of Metropolitan open land / green belt	<p>Paragraph 6 of the NPPW highlights that green belts have special protection in respect of development and planning authorities should first look for suitable sites outside the green belt for waste management facilities. However, the NPPW goes on to note that local planning authorities should recognise the particular locational needs of some types of waste management facilities. As the application site is in a green belt-designated area, it is important that other green belt sites are considered, as well as sites that are outside the green belt. National green belt policy provides for inappropriate development to be permitted in the green belt if there are very special circumstances. Demonstrating that there are very special circumstances at the planning application stage would include that there is a lack of alternative sites outside the green belt (a separate planning test applied in the planning statement). Given the above, a location within the green belt or Metropolitan open land has not been treated as an absolute constraint, so green belt and Metropolitan open land sites have not been sieved out from the long-list. In addition, rather than a simple pass / fail approach depending on whether a site is in the green belt or Metropolitan open land, a means of distinguishing between different green belt and Metropolitan open land sites has been included for consistency with the other assessment criteria. Green belt and Metropolitan open land covers a range of land uses, from relatively undisturbed public greenspace or countryside to areas currently in active uses such as waste management, mineral extraction or utilities. If a green belt or Metropolitan open land site must be used, it could be argued that it is better to use a site that is currently in active use for some form of development, rather than one that is an undisturbed open space or countryside use. It is considered that green belt / Metropolitan open land sites currently in active use, such as waste management, minerals extraction or utilities, are potentially more suitable for the replacement EfW / HTI facilities than sites that are currently not subject to such uses. Such sites, therefore, can be judged to partially meet the criterion on the grounds that, if land designated as green belt or Metropolitan open land must be used, sites in current active use for waste, utilities or minerals-related development are arguably more suitable than other sites, even if they are subject to restoration plans. As a result, this criterion was assessed as follows:</p> <ul style="list-style-type: none"> <li>• Meets criterion: the site is not within Metropolitan open land or the green belt</li> <li>• Partially meets criterion: the site is in active use within Metropolitan open land or the green belt</li> <li>• Does not meet criterion: the sites is an area of undisturbed open space within Metropolitan open land or the green belt</li> </ul>
Compatibility with surrounding land uses	<p>Paragraph 5 and appendix B of the NPPW highlight neighbouring land uses and the proximity of sensitive receptors as important considerations in examining the suitability of a site for waste management use. It is reasonable to expect that the magnitude of any potential impact decreases with distance from a site. This distance can be expected to vary for different topics, such as visual or noise impacts. The detailed technical assessment for individual topics that would be required for a planning application is not appropriate in comparing the alternative sites. Instead, the exercise used non-technical criteria definitions so that it could be easily replicated and allow broad comparisons to be made. It was therefore necessary to take a common sense approach that reflected the dropping off of impact with distance as a general and broadly acceptable principle. It is appropriate that sites located next to sensitive uses or receptors (such as residential properties, schools, health facilities etc) should fail to meet this criterion as they would be more likely to be incompatible with the adjacent sensitive use / receptors, while those further away would be more capable of meeting it on the principle that the potential for impact declines with distance. In this context, the actual distance used is less important than the principle, and the assessment used distances that seemed reasonable to apply. This criterion was assessed as follows:</p> <ul style="list-style-type: none"> <li>• Meets criterion: the site is more than 500 m from a sensitive land use</li> <li>• Partially meets criterion: the site is between 500 and 200 m from a sensitive land use</li> <li>• Does not meet criterion: the site is less than 200 m from a sensitive land use</li> </ul>
Potential for effects on residential amenity due to transport of	<p>There is the potential for the delivery of waste to the site to lead to adverse effects on local residential amenity as a result of increased HGV traffic passing residential areas. This is most likely to occur between the primary road network and the site, when HGVs may need to use more local roads to access the site. The magnitude of effect increases with the number of residential properties along the access route. This</p>

Criterion	Description
waste	<p>critereon was therefore assessed as follows:</p> <ul style="list-style-type: none"> <li>• Meets criterion: the access route to the site from the primary road network does not pass through residential areas or pass other sensitive uses such as schools</li> <li>• Partially meets criterion: the access route to the site from the primary road network runs through a residential area / past sensitive receptors for less than 50% of its length</li> <li>• Does not meet criterion: the access route to the site from the primary road network runs through a residential area / past sensitive receptors for more than 50% of its length</li> </ul>
Proximity to designated ecologically sensitive areas	<p>Appendix B of the NPPW identifies the potential for effects on sites of international or national importance for nature conservation as an important locational criterion when considering sites for waste management facilities. There is also a network of locally designated sites within the area of search that needs to be considered. Designated nature conservation sites covered by this criterion therefore included Ramsar sites, special protection areas, special areas of conservation, sites of special scientific interest, national nature reserves, local nature reserves and locally designated sites such as sites of importance for nature conservation and local wildlife sites. This criterion was assessed as follows:</p> <ul style="list-style-type: none"> <li>• Meets criterion: the site is more than 500 m from any designated nature conservation sites</li> <li>• Partially meets criterion: the site is within 500 m of a designated nature conservation site</li> <li>• Does not meet criterion: the site contains a designated nature conservation site</li> </ul> <p>This criterion also uses a broad approach that reflects the dropping off of potential impact with distance, although it is acknowledged that, in a detailed assessment, this would depend on the type of impact as well as the type of habitat potentially affected. Five hundred metres was considered to represent an appropriate cut-off distance beyond which the likelihood of significant indirect effects from disturbance or pollution was greatly reduced. Sites containing a designated nature conservation site fail to meet the criterion because of the potential for direct effects from habitat loss and the significantly greater potential for indirect effects</p>
Potential for landscape and visual effects (protected landscapes and open space)	<p>While sites within nationally designated landscapes were screened out at the long-list sieving stage, there is a need to consider the potential for effects on landscapes and areas of public open space that are protected at the local level in the analysis of short-listed sites. Such areas include locally designated areas of great landscape value and special landscape areas, and locally designated protected open spaces such as country parks, regional parks, green chains and green corridors. This criterion was therefore assessed as follows:</p> <ul style="list-style-type: none"> <li>• Meets criterion: the site is not within or adjacent to a protected landscape or designated public open space</li> <li>• Partially meets criterion: the site is adjacent to a protected landscape or designated public open space</li> <li>• Does not meet criterion: the site is within a protected landscape or designated public open space</li> </ul>
Potential for landscape and visual effects (views)	<p>While accepting that the visual impact of the EfW and HTI within a landscape / townscape is highly subjective, the exercise has sought to identify those sites on which the facilities are likely to be best assimilated. The actual visual impact of the plant will be dependent on many factors, such as the size of the buildings, the topography of the site and the surroundings, the degree to which opportunities exist for natural screening, and the wider setting of the site. Development of a waste management facility on a site that is already in an industrial context is likely to lead to a smaller change to views than development of a site within a residential or open setting. This criterion was therefore assessed as follows:</p> <ul style="list-style-type: none"> <li>• Meets criterion: the site is within a commercial / industrial setting</li> <li>• Partially meets criterion: the site is within a residential setting</li> <li>• Does not meet criterion: the site is surrounded by undisturbed rural or open land</li> </ul>
Potential for effects on archaeology and the historic environment	<p>Appendix B of the NPPW states the conservation of the historic environment should be examined when considering sites for a waste management facility. Factors that should be addressed include the potential effects on the significance of heritage assets, including any contribution made by their setting. While the NPPW recommends that both designated and undesignated heritage assets should be considered, it is difficult</p>

Criterion	Description
	<p>to determine the presence of undesignated heritage assets without a detailed heritage assessment, which is not appropriate at this high level analysis stage. As a result, the assessment has focused on designated heritage assets, including scheduled monuments, listed buildings, registered parks and gardens, and conservation areas. This criterion was assessed as follows:</p> <ul style="list-style-type: none"> <li>• Meets criterion: the site is more than 500 m from any designated heritage asset</li> <li>• Partially meets criterion: the site is within 500 m of a designated heritage asset</li> <li>• Does not meet criterion: the site contains a designated heritage asset or is within a locally identified area of archaeological importance</li> </ul> <p>Sites containing a heritage asset fail to meet the criterion because of the potential for direct effects on the asset's significance. Five hundred metres was considered to represent an appropriate cut-off distance beyond which the likelihood of significant setting effects was greatly reduced. Locally designated areas of archaeological importance were only considered when a site falls within them, as they relate to the potential for below-ground archaeological remains</p>
Potential for effects on air quality	<p>Defra's <i>Clean Air Strategy 2019</i> identifies air pollution as the top environmental risk to human health in the UK. While the emissions from EfW plants have been tightly controlled under the Waste Incineration Directive (2000/76/EC) and Industrial Emissions Directive (2010/75/EU) for many years, the importance of air quality as a national health issue and the prevalence of poor air quality in parts of the area of search meant that it was considered appropriate to include a criterion in relation to this issue. This criterion has been assessed as follows:</p> <ul style="list-style-type: none"> <li>• Meets criterion: the site is not within or adjacent to an air quality management area (AQMA)</li> <li>• Partially meets criterion: the site is adjacent to an AQMA</li> <li>• Does not meet criterion: the site is within an AQMA</li> </ul>
Potential for effects on water resources	<p>Appendix B of the NPPW identifies the protection of water quality and resources as an important consideration in the evaluation of locations for a waste management facility. The Environment Agency's source protection zones (SPZ) are considered to represent an appropriate indicator of the presence of vulnerable groundwater resources. While the Agency no longer automatically objects to a proposal for an EfW in SPZ1, it is considered that sites outside SPZs of any kind are preferable, and sites in SPZ1 remain the least favoured. This criterion was assessed as follows:</p> <ul style="list-style-type: none"> <li>• Meets criterion: the site is not within a groundwater SPZ</li> <li>• Partially meets criterion: the site is within SPZ2 or SPZ3</li> <li>• Does not meet criterion: the site is within SPZ1</li> </ul>
Proximity to areas likely to flood	<p>The potential for flooding is also identified in appendix B of the NPPW as an important locational criterion. The Environment Agency's flood zones were therefore used to determine the flood risk for the short-listed sites. This criterion was assessed as follows:</p> <ul style="list-style-type: none"> <li>• Meets criterion: the site has sufficient land within flood zone 1 to accommodate the development</li> <li>• Partially meets criterion: the area of the site within flood zone 2 means that there is insufficient land within flood zone 1 to accommodate the proposed development</li> <li>• Does not meet criterion: the area of the site within flood zone 3 means that there is insufficient land within flood zone 1 to accommodate the proposed development</li> </ul>
Presence of public rights of way	<p>The presence of a public right of way on site presents a potential constraint to development, as the right of way may require diversion to allow the construction of the facilities. For the purposes of this assessment, public rights of way will be taken to be those shown on Ordnance Survey maps, which are taken from local authority definitive maps. These include footpaths, bridleways, byways open to all traffic, and restricted byways. This criterion was assessed as follows:</p> <ul style="list-style-type: none"> <li>• Meets criterion: there are no public rights of way on site</li> <li>• Partially meets criterion: a public right of way runs along the edge of the site</li> <li>• Does not meet criterion: a public right of way runs through the site</li> </ul>
<b>Table 4.1: Short-list assessment criteria</b>	

- 4.14 The sites were ranked according to the number of criteria they met. If two or more sites met the same number of criteria, then the number of partially met criteria was considered.
- 4.15 The assessment of the short-listed sites against the criteria in table 4.1 provided a ranking of sites, with those towards the top having the best fit with the criteria and therefore being potentially best suited to accommodate the proposal. However, the availability of sites is a crucial consideration in the delivery of the relocation of the EfW and HTI. The plant needs to be able to be relocated quickly to enable the replacement facilities to be operational prior to the demolition of the existing plant. Therefore, if a site performs well against the criteria in the assessment but is not currently available for the development proposed then it is not deliverable and cannot be considered as a reasonable alternative to the application site.
- 4.16 The final stage of the assessment was therefore a review of the availability of the short-listed sites. A site was deemed to be available if it is owned or otherwise controlled by Lakeside EfW Ltd (or the owning Joint Venture Partners) with the intention of making it available for the development of the EfW and HTI, or if there is a third party land owner willing to make the land available subject to negotiations on price and planning permission being granted.

#### **Results of the long-list sieving process**

- 4.17 Details of the 785 long-listed sites are provided in the Alternative Sites report. Three hundred and forty-seven sites were excluded on the basis that their area was less than the 3 ha necessary for the EfW / HTI and associated works. One hundred and two sites were excluded on the basis of an incompatible allocation, permission or current land use on site. Eleven sites were excluded because they contained a national or international environmental designation. Two hundred and seventy-two sites were excluded because of the presence of occupied buildings and existing businesses or permitted / operational minerals workings, either across the whole site or leaving a vacant area of less than 3 ha. Twenty-six sites were excluded because they were more than 2 km from the primary road network by road.
- 4.18 Twenty-seven sites remained following the sieving exercise. These formed the short-list that was taken forward to be assessed in more detail:
- Site 3: Land Between Sipson Road / Holloway Road / Harmondsworth Road, West Drayton
  - Site 41: Land to the East of Colnbrook / Sutton Lane
  - Site 42: Land South of Prologis Park, Heathrow
  - Site 44: Application site
  - Site 45: Rayner Land South of Colnbrook
  - Site 47: Western International Market South, Southall
  - Site 51: Sipson Quarry, West Drayton
  - Site 55: Land West of M4 Junction 8/9
  - Site 57: Land East of M4 Junction 8/9
  - Site 58: Land South of M4 Junction 8/9

- Site 63: Land Adjacent to Burchett's Green
- Site 65: Land Off A404 North of Burchett's Green
- Site 70: Greenham Common Airbase Area of Search
- Site 78: Smallmead, Reading
- Site 114: Land West of Murrell Hill and South of Foxley Lane
- Site 115: Easthampstead Park, Old Wokingham Road
- Site 124: Part of Former Berkshire Brewery Site, Reading
- Site 130: Land at Kirtons Farm Road, Pingewood
- Site 238: Asian Sky, Brent
- Site 290: Northolt Spirals, Ealing
- Site 336: Farmland South of Northolt Aerodrome
- Site 407: Wapseys Wood and Hyde Farm
- Site 417: Denham Quarry
- Site 419: Lake End Farm, Dorney
- Site 461: Staines Road Farm, Shepperton
- Site 556: Island Road A33 Frontage, Reading
- Site 645: Land North of Denham Roundabout

#### Detailed analysis of short-listed sites

4.19 The detailed analysis of the 27 short-listed sites against the assessment criteria is set out in the assessment sheets and figures 4.1 to 4.27 of the Alternative Sites report. The results of the detailed assessment and the ranking of the sites are summarised in table 4.2. The rankings are based on the number of criteria that are fully met. The site that fully meets the most criteria is ranked number 1. Where more than one site fully meets the same number of criteria, the one that partially meets more criteria is ranked highest of this group, and so on. A joint ranking is awarded if scores are identical.

Rank	Site	Criteria met	Criteria partially met	Criteria not met
1	556 – Island Road A33 Frontage, Reading	12	2	3
2	78 – Smallmead, Reading	9	4	4
3	44 – Application site	8	6	3
4	70 – Greenham Common Airbase Area of Search	8	5	4
5	124 – Part of Former Berkshire Brewery Site, Reading	8	4	5
6	51 – Sipson Quarry, West Drayton	7	7	3
7	238 – Asian Sky, Brent	7	5	5
8=	3 – Land Between Sipson Road / Holloway Lane / Harmondsworth Road, West Drayton	7	4	6
8=	41 – Land to the East of Colnbrook / Sutton Lane	7	4	6
10	407 – Wapseys Wood and Hyde Farm	6	6	5
11=	47 – Western International Market South, Southall	6	5	6
11=	130 – Land at Kirtons Farm Road, Pingewood	6	5	6
13=	42 – Land South of Prologis Park, Heathrow	6	4	7

Rank	Site	Criteria met	Criteria partially met	Criteria not met
13=	115 – Land at Parkview Farm and Easthampstead Park, Old Wokingham Road	6	4	7
15	336 – Farmland South of Northolt Aerodrome	6	3	8
16	417 – Denham Quarry	5	8	4
17=	45 – Rayner Land South of Colnbrook	5	5	7
17=	645 – Land North of Denham Roundabout	5	5	7
19=	57 – Land East of M4 Junction 8/9	5	2	10
19=	114 – Land West of Murrell Hill Lane and South of Foxley Lane	5	2	10
21	419 – Lake End Farm, Dorney	4	4	9
22	65 – Land off A404 North of Burchett’s Green	4	3	10
23	58 – Land South of M4 Junction 8/9	3	4	10
24	461 – Staines Road Farm, Shepperton	3	3	11
25=	63 – Land Adjacent to Burchett’s Green	3	2	12
25=	290 – Northolt Spirals, Ealing	3	2	12
27	55 – Land West of M4 Junction 8/9	2	3	12

**Table 4.2: Summary ranking of sites**

- 4.20 Table 4.2 shows that the application site was ranked third in the detailed analysis of the short-listed sites. The application site had four fewer ‘met’ criteria than the Island Road A33 Frontage, Reading site and one fewer ‘met’ criterion than the Smallmead, Reading site. This suggests that the use of the application site is reasonable and robust in the context of other potential sites in the study area in operational, planning and environmental terms. The four other sites ranked in the top five are a large distance (between 33 km and 56 km) from the existing facilities, meaning that relocation to one of these sites would necessitate considerable disruption to waste delivery arrangements and staffing. In addition, the relatively narrow dimensions of the Island Road A33 Frontage, Reading site mean that HGV turning space requirements would constrain the site layout.
- 4.21 The final issue to be considered is that of deliverability. As set out previously, this is an important consideration in the choice of site for the EfW and HTI, which are needed quickly to enable the replacement facilities to be operational prior to the demolition of the existing plant during the expansion of Heathrow Airport. The last section of the analysis examined the deliverability of the top five ranked sites.
- 4.22 The Island Road A33 Frontage, Reading site currently has outline planning permission for B1 office development as part of a wider mixed use development in the area (application reference 05/00548/OUT), the residential element of which to the east of the A33 has already been built. The site is seen as a gateway site into Reading by Reading Borough Council. The council owns the site and has leased it to a commercial and retail property company until the end of 2030. While the site is ranked first in the analysis, it is not considered to be available for delivery of the EfW / HTI within the required timescales.
- 4.23 The Smallmead, Reading site is owned by CEMEX and is not currently subject to any planning permission for redevelopment. While the site is allocated for waste use in the adopted Waste Local Plan for Berkshire (1998), this allocation has not been carried through to the Central and Eastern Berkshire Joint Minerals & Waste Plan Draft Plan (2018) and the site is instead allocated in the

Submission Draft Reading Borough Local Plan (2018) for industrial / warehouse use. This indicates that the landowner is likely to prefer an employment use on the site to a waste use and the site is not considered likely to be available for delivery of the EfW / HTI within the required timescales.

- 4.24 The application site is owned by Goodman, which is known to be willing to make the site available to Lakeside EfW Ltd for the replacement facilities within the required timescales. The site is therefore considered to be deliverable.
- 4.25 The former Greenham Common Airbase is owned partly by West Berkshire Council and partly by The Greenham Trust. A local development order (LDO) has recently been granted for the development of the Greenham Business Park area in the south of the former airbase. The Greenham Common Airbase Area of Search site is outside the area covered by the LDO. The landowner has advised in the past that the site would not be made available for waste use. While the site is allocated for waste use in the adopted Waste Local Plan for Berkshire (1998), this allocation has not been carried through to the West Berkshire Minerals and Waste Local Plan (Preferred Options) (2017). This suggests that the land owner still does not envisage the site being developed for waste use, so it is not considered likely to be available for delivery of the EfW / HTI within the required timescales.
- 4.26 The Part of Former Berkshire Brewery Site, Reading currently has outline planning permission for B1 office development (application reference 09/00685/VARIAT). The site ranked fifth in the analysis is therefore also not considered likely to be available for delivery of the EfW / HTI within the required timescales.
- 4.27 The application site is the only deliverable short-listed site in the available timescale, as the landowner is known to be willing to make the site available to Lakeside EfW Ltd. It is therefore considered to be a robust location for the proposed EfW / HTI when compared with the alternatives. There are no other deliverable sites that would constitute a better location for this replacement waste management facility.

#### **Alternative combustion technology solutions**

- 4.28 The following alternative combustion solutions have been considered for both the HTI and the EfW:
- Advanced thermal treatment
  - Conventional combustion systems

#### ***Advanced thermal treatment***

- 4.29 With regard to pyrolysis and gasification there is limited experience of successfully using these technologies for the processing of residual waste at the scale proposed or for clinical waste. In addition, both technologies are sensitive to the nature and composition of waste being treated. In order to operate efficiently these technologies require both a consistent feed stock and a certain proportion of different waste types. Such limitations are especially relevant given the high recycling rates anticipated and therefore the likely changing composition of the residual waste following extraction of recyclable materials. As

such, these technologies are limited in their flexibility to deal with the potential variation in the composition of the residual municipal solid waste that would be treated at the EfW facility. In addition, advanced thermal treatment systems are not proven for the combustion of clinical waste in the UK.

- 4.30 In relation to experience in the UK there are only two functioning gasification plants treating mixed residual wastes. One facility is the first phase of New Earth's Avonmouth Advanced Thermal Treatment Facility. It was reported by New Earth to its investor shareholders as having: "...documented poor technical and financial performance...". The issues are such that New Earth has divested its energy (from waste) generation business from its other waste management activities and announced it will not build the other phases at Avonmouth or any other gasification facilities elsewhere. The second is a gasification facility developed in Milton Keynes to treat residual waste. The site experienced a number of problems during the commissioning of the facility and there are ongoing issues with the efficiency of the facility, resulting in it not meeting its performance specifications.
- 4.31 Other notable gasification failures include the Scotgen Dargavel batch oxidation gasification plant at Dumfries. This facility was built, failed to function, had its environmental permit withdrawn and the owning company went into liquidation. The facility has now been decommissioned. Air Products' Tees Valley (TV) 1 and 2 advanced plasma gasification plants at Teesside were planned to have a combined 750,000tpa capacity, however, in April 2016, after failing to rectify operational difficulties with the 'completed' TV1 (work on TV2 having already ceased at an advanced stage), Air Products announced it was exiting the EfW sector and making provision for a \$1 billion write down against the TV1 and TV2 assets.
- 4.32 Due to the historic delivery risks associated with advanced thermal treatment plants, there are significant issues with securing funding for large scale projects. This has been further compounded with the change in national funding subsidy arrangements (i.e. removal of Renewable Obligation Certificates contracts and replacement with Contracts for Difference) which due to the nature of awarding energy contracts through an auction process, coupled with a history of long delays between auctions and restricted funding for 'fuelled technologies', has introduced extreme funding uncertainty. Due to the combination of technology risks and issues with securing funding, Lakeside EfW Ltd has decided that advanced thermal treatment is unlikely to result in the delivery of a viable scheme and therefore the use of this technology was discounted.

#### *Conventional combustion systems*

- 4.33 Direct waste combustion in a modern thermal treatment EfW facility with combined heat and power (CHP) is a proven technology capable of delivering a flexible and sustainable waste management solution. EfW is used throughout the UK and Europe for the management of municipal solid waste (and similar commercial and industrial wastes) and is established as an efficient way to recover energy, especially where CHP can also be delivered from the plant. The technology is, by a very significant margin, the most widely deployed waste recovery solution in Europe (with over 500 operating plants). An EfW facility would be capable of managing the predicted waste volumes and would

effectively treat the likely composition of the waste predicted to be managed at the facility. Given the technology is well proven it is also significantly less complex to fund. On this basis, the use of a modern EfW facility was considered to be the most appropriate waste recovery technology option currently available.

- 4.34 Direct waste combustion EfW facilities can be delivered through a variety of sub-technologies and Lakeside EfW Ltd has considered these technologies, as summarised below.

*Fixed hearth*

- 4.35 This type of furnace is generally not considered to be suitable for the management of large volumes of mixed waste and is best suited to low volumes of consistent waste. As a consequence, this technology is not used for the combustion of municipal waste in the UK.

*Pulsed hearth*

- 4.36 Pulsed hearth technology has been used for municipal waste in the past, as well as other solid wastes. However, there have been difficulties in achieving reliable and effective burnout of waste and it is considered that the burnout criteria required by the Industrial Emissions Directive (IED) would be difficult to achieve.

*Rotary kiln*

- 4.37 Rotary kilns have achieved good results with clinical waste, but they are not commonly used in the UK for municipal solid waste (or similar wastes). There is a rotary kiln in use for municipal waste at Grimsby, which has a design throughput of 56,000 tpa. In general, this technology is only suitable in the throughput range of 40,000 - 80,000 tpa and thus would not be appropriate for this facility. The energy conversion efficiency of a rotary kiln is lower than that of a moving grate (see below) due to the large areas of refractory lined combustion chamber.

*Fluidised bed*

- 4.38 Fluidised bed technology has been used for municipal waste at a few sites in Europe. In the UK, there are only two operating facilities which are located in Dundee and at Allington in Kent. The former has a long history of significant operational difficulties.
- 4.39 Fluidised bed technology has a number of advantages over moving grate technology, including lower nitrogen oxide (NO<sub>x</sub>) formation, slightly higher thermal efficiency and the lack of moving parts within the combustion chamber. However, there are also a number of disadvantages:
- The waste stream needs to be homogenised and therefore would need to be pre-treated before feeding to the fluidised bed. This would lead to additional energy consumption and a larger building. The additional energy consumption tends to outweigh the combustion efficiency advantage.
  - High fluidisation velocities can lead to the carryover of fine particulate material. This can lead to a higher particulate loading in the flue gases, so leading to higher quantities of flue gas treatment residues, which need to be

disposed of as waste. However, the bottom ash tends to be of better quality.

- Although less NO<sub>x</sub> would be formed, additional NO<sub>x</sub> abatement equipment would still be required to meet the limits imposed by the IED. Therefore, there would be very little difference in NO<sub>x</sub> levels overall.
- The operational and capital costs of a fluidised bed are higher than the equivalent costs for a moving grate incinerator.
- Reliability in UK fluidised bed plants is lower than for other EfW options.

#### *Moving grate*

- 4.40 This is the leading technology in the UK and Europe for the combustion of municipal and other similar wastes, being installed on approximately 90% of UK incinerators and some 98% of European incinerators. It is a proven and developed design, with a number of suppliers available. The various designs are proven to achieve the burnout requirements for IED compliance.
- 4.41 For the reasons set out above Lakeside EfW Ltd has selected moving grate technology for the chosen plant at the replacement EfW facilities. At the time of writing, a decision had not been taken on the specific technology for the HTI, however, the plant will be a like-for-like replacement of the existing in terms of throughput, waste handling ability and high temperature capabilities.

#### **Alternative site layouts**

- 4.42 A number of site layout options were explored. The initial design proposal showed the main EfW building running on a north east to south west axis, with ancillary structures placed along the northern boundary. It was considered that this site layout was not efficient in terms of movement and resulted in poor spatial relationships between the various elements. It would also be difficult to have a rationalised transport route around the plant to serve the various elements.
- 4.43 The relationship between buildings and rationalisation of transport routes became the key principles in the design in terms of their form and layout on site. Orientating the EfW building north - south and locating it closer to the built-up structures of Thames Water's sludge dewatering centre with an access route around the perimeter, allowed for the placement of ancillary buildings in a more regimented layout. Having a north - south orientation for the plant also minimises the outline of the main EfW building when viewed from Richings Park to the north and Colnbrook to the south.
- 4.44 Functionally, the HTI building needs to be located near the end of the main EfW process so that it can share the same vertical stack array. The turbine hall and the air-cooled condensers need to be located adjacent to the boilers in order to maximise the energy efficiency of the plant. It was also considered desirable to locate the air-cooled condensers, which are the noisiest elements of the process, to the south west, so they are as far away as possible from the existing properties along Old Slade Lane. In early designs, these principles are all adhered to, with the addition of the visitor centre located on a new man-made lake, forming a buffer between the site perimeter and the main EfW building.

- 4.45 In addition to the EfW, HTI, turbine hall and air-cooled condensers, the site also needs to include ancillary buildings such as a maintenance workshop and a maintenance village, which comprises dedicated site accommodation for maintenance contractors. The site also needs to allow for vehicles to enter the main EfW building in a number of locations for the delivery of chemicals, removal of IBA and APCr, and to accommodate an access ramp up to the tipping hall. To allow for the latter, the visitor centre was removed from the man-made lake in the previous design iteration and located to the south east corner of the site, which also helped to separate heavy and light vehicle movements.
- 4.46 Further refinement in terms of access routes around the buildings led to the main entrance being re-located to the south west corner of the site to suit the proposed access road direction of flow and the HTI was more closely integrated with the EfW building. The air-cooled condensers were also rotated north - south and were aligned with the turbine building. The maintenance workshop was relocated adjacent to the turbine hall, with a drop-down area and storage yard located between it and the maintenance village. The education / visitor centre was then incorporated into the EfW building due to space restrictions. By evaluating the site, the requirements of the technical processes, vehicle routing practicalities, potential noise and visual impacts, the final siting and orientation of the facilities was determined.

#### **Alternative building designs**

- 4.47 The building design was developed so the main EfW building outline was as small as possible when viewed from the villages of Colnbrook, Iver and Richings Park, whilst taking into account site constraints of the existing tree line and M4. Various building forms were investigated during the design process and a key design driver which heavily influenced the evolution of the existing Lakeside Road facility was its surroundings. The curved building / roof profile was seen as being less obtrusive within the landscape context compared to other architectural forms. This approach was considered to be relevant at the replacement site and was therefore adopted accordingly.
- 4.48 The design of the HTI building was developed closely alongside the EfW building. In addition to being immediately adjacent (with roof forms overlapping) and a significantly sized structure in its own right, the HTI also shares design elements such as the use of the same chimney stack array. The design of both the EfW and HTI buildings was refined to ensure that the proposed building forms were structurally and economically viable by ongoing consultation with the plant and technical specialists, whilst also exploring and evaluating the curved forms in terms of visual impact, aesthetic quality and volume in relation to the plant equipment.
- 4.49 The visual impact of sun reflection on the walls and roofs of buildings was also given careful consideration. For the roofs this potential problem has been avoided by adopting gentle curved roof profiles. Materials have been selected for the walls of the main process buildings that will absorb light, whilst also providing contrasting texture, natural weathering and visual softening to the scale of the building.

- 4.50 It was considered important for the design of the other buildings on site to be informed by the architecture of the main EfW and HTI buildings. The use of materials such as split face blockwork and metal cladding, alongside design cues from the form of the main buildings, such as the curved roof shapes and curved walls in plan and elevation, inform the designs of the ancillary buildings and structures. This holistic design approach for all the buildings across the site provides a consistent design language throughout.
- 4.51 In addition to aesthetics, the need to minimise dust, noise and odour resulted in the containment within the main building enclosures of almost all the different elements of plant, thereby minimising external services and other associated equipment that would otherwise detract from the appearance of the building.
- 4.52 Further details on the design approach are set out in the design and access statement that supports the EfW and HTI planning application.

#### **Alternative drainage strategies**

- 4.53 The use of sustainable drainage systems (SuDS) is mandatory for most new surface water drainage systems. SuDS can be used as source control (interception of surface water) conveyance, storage and discharge, depending on site conditions.
- 4.54 During the development of the drainage strategy for the replacement site the following techniques were considered but rejected due to space constraints: balancing ponds, extended wetlands / wetland channels, filter trenches / drains, detention basins and enhanced swales. Green / brown roofing systems were rejected due to the building heights, steepness of the roof of the EfW and the structural weight demands on buildings of these sizes. Filtration was also rejected due to the existing underlying London Clay.
- 4.55 The following SuDS were, however, considered potentially suitable:
- Subsurface storage (and infiltration) - achieved through oversized pipes, tank systems and modular geocellular systems that are used to create below ground storage structures.
  - Porous paving - paving with sub-surface storage, which reduces the rate of run-off, effectively removes pollutants and contributes to groundwater recharge.
  - Soakaway / infiltration tanks (in a modular geocellular system) - surface water runoff drains directly to ground for infiltration by soakaways, basins or trenches (dependent on both ground and groundwater conditions).
  - Rainwater harvesting - using the rainwater coming from the roofs to supply site activities / processes where appropriate.
- 4.56 Of the above, the sub-surface storage in the form of ground attenuation crates was considered most practical at the site, together with rainwater harvesting. The design of the former will ensure that surface water from the site will be attenuated prior to discharge at greenfield runoff rates (i.e. 5.3 l/s). Further details on the drainage strategy proposed are set out in chapter 3 and the Drainage Strategy Report that forms part of the application suite of documents.

### **Alternative access strategies**

- 4.57 At the preliminary design stages four options were examined for access to the site.
- 4.58 The first option looked at a junction off the A4 Colnbrook by-pass, approximately 950m to the west of the existing Lakeside Road traffic light-controlled junction and a route to the site that ran close to an area of woodland by the A4 and the pylons that run north east to south west across the rough grazing land, then crossed the grazing land to the south of Old Wood to the entrance to the replacement site. This route was discounted following receipt of baseline ecology data that highlighted Brown long eared bat activity in the vicinity of the woodland near the A4. It was considered that the proposed route of the road would impact unnecessarily on bat activity.
- 4.59 A second option explored the potential to use the existing traffic light-controlled junction off the A4 to Lakeside Road (which is private for the majority of its length) and cross Thames Water's causeway over Orlitts Lake. From the causeway two sub-options were considered: (1) cross the bridleway that connects Richings Park to Colnbrook and access the site from the south east, across the rough grazing land or (2) utilise Thames Water's entrance and access road, and construct a new section of road to the south, then west, that routes across the rough grazing land to the replacement site. Sub-option 1 was discounted due to the need to divert the bridleway and sub-option 2 is not considered acceptable to the owner of the land.
- 4.60 The third option considered use of the existing traffic light-controlled junction off the A4 to Lakeside Road, then taking the access road to the existing EfW visitor centre that is situated between Colnbrook Water and Orlitts Lake. Consideration was given to the provision of a bridge across the Colne Brook and the construction of the access road from there, through the woodland / scrub, across the existing footpath and bridleway to the rough grazing land beyond, then route north adjacent to the footpaths as far as Thames Water's treatment works site, then west as far as the proposed replacement site. This option was considered to lead to the loss of an area of the woodland / scrub habitat, unnecessary disturbance to birds using the lakes, possible impacts on the water quality of the Colne Brook and the need to cross two rights of way. For these reasons this option was discounted.
- 4.61 The fourth option involved a new junction off the A4 Colnbrook by-pass, approximately 650m to the west of the existing Lakeside Road traffic light-controlled junction and situated midway between the existing public footpath and bridleway. The access road then routes from the junction in a north easterly direction across the rough grazing land, crossing bridleway 2a once, then directly northwards to the proposed replacement site. While this option requires a new junction off the A4 and crosses a bridleway, it was considered to have limited ecological impacts and less impact on the local public rights of way. For these reasons, option four was selected.

### **Conclusion**

- 4.62 This chapter has summarised the alternatives considered during the development of the replacement EfW and HTI facilities:

- The thorough analysis of alternative sites has led to the identification of a robust location for the replacement facilities.
- A number of alternative combustion solutions have been considered for both the EfW and HTI, including both advanced thermal treatment and conventional combustion systems (i.e. fixed hearth, pulsed hearth technology, rotary kilns, fluidised bed technology and moving grate). As moving grate is a leading technology with a proven track record for achieving the burnout requirements for IED compliance, it has been selected for the replacement EfW facilities. A decision on the technology for the HTI has yet to be made.
- A review of alternative layouts has led to the selection of one that meets the operational requirements of the technical processes, is practical in terms of vehicle routing, avoids potential noise impacts and reduces visual impacts.
- Consideration of alternative building designs has led to the selection of a curved building / roof profile which is seen as less obtrusive within the landscape context, materials that avoid reflection while providing texture and contrast, and a design and pallet of materials that provides a unifying theme on site.
- The review of alternative SuDS has led to the selection of below ground attenuation crates and rainwater harvesting for dealing sustainably with surface water at the site.
- Working through alternative access strategies has also led to a solution that limits ecological impacts and reduces impacts on local public rights of way / recreation (in comparison with the other feasible options).