North London Waste Authority

North London Heat and Power Project

Fuel Management Assessment

AD05.17

The Planning Act 2008 The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 Regulation 5 (2)(q)

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NLWA

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north london waste authority

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i.i.i The Fuel Management Assessment report sets out how waste (which forms the fuel for the proposed Energy Recovery Facility) received onto the Edmonton EcoPark will be managed. The waste received into the site is considered to be potentially fuel, and therefore the report covers both the waste that is actually consigned to the ERF and the management of other waste coming to the Edmonton EcoPark. A waste mass balance for the Edmonton EcoPark has been produced in order to demonstrate how waste will be moved through the site and quantifies the expected tonnages of waste to be handled including inputs and outputs.

i.i.ii The north London area covers almost 30,000 hectares and has a residential population of around 1.9 million. Municipal waste arising in this area is collected by the seven waste collection authorities (Constituent Boroughs) which have responsibility for the collection of waste in the north London area. North London Waste Authority (NLWA) has a statutory responsibility to arrange for the disposal of waste collected by the Constituent Boroughs.

i.i.iii In 2012/13 the Constituent Boroughs collected around 827,000 tonnes of Local Authority Collected (LAC) waste[1]. Around 689,000 tonnes was household waste while around 102,000 tonnes was sourced from businesses across north London. The remaining waste (referred to as 'Other' waste) included waste other than household and business waste which is managed by north London including fly-tipping, grounds clearing waste, highways waste etc. The north London boroughs achieved a reuse, composting and recycling rate of around 32% in 2012/13.

i.i.iv A waste forecasting model has been developed to inform future waste arisings based on three scenarios: Low Recycling (40% household recycling by 2020/21 and static thereafter); Central Recycling (50% household recycling by 2020/21 and remaining static thereafter); and High Recycling – 50% household recycling by 2020/21, rising to 60% by 2031/32 and remaining static thereafter). For each scenario, the same growth rate as the household recycling has been applied to the business waste arisings to predict future tonnages of business recycling.

i.i.v Modelling indicates the Authority is expected to manage around 995,000 tonnes of Local Authority Collected (LAC) waste by 2024/25. This is expected to increase to over 1 million tonnes by 2050/51.

i.i.vi For the purposes of the Fuel Management Assessment total LAC residual waste forecast under the central recycling scenario has been assessed within the mass balance for the Edmonton EcoPark. In addition to LAC residual waste, third party residual waste (i.e. non-LAC waste) has been considered within the overall mass balance.

i.i.vii The capacity of the proposed Energy Recovery Facility (ERF) will be 700,000 tonnes and will treat predominantly LAC residual waste. In

[1] Local Authority Collected Waste refers to all waste collected by the local authority including household waste, business waste and other waste including, for example, flytipping, grounds waste and street cleansing.

2024/25 almost 572,000 tonnes will be sourced from LAC residual waste rising to around 611,000 tonnes by 2050/51 (based on the central recycling scenario).

i.i.viii The proposed ERF is expected to have spare capacity of around 128,000 tonnes in 2024/25 reducing to around 88,700 tonnes by 2050/51 based on forecasted LAC waste arisings (central recycling scenario). Therefore, the Applicant is proposing to treat a smaller amount of non-LAC residual waste (for example trade waste) in addition to LAC waste. Non-LAC waste will reduce proportionally in line with the additional capacity as LAC waste is expected to increase. The capacity of the proposed ERF and the need is discussed in the Need Assessment Report.

i.i.ix The total tonnage of waste delivered to the Edmonton EcoPark is expected to be around 837,700 tonnes by 2024/25 (inclusive of non-LAC residual waste). The delivered tonnage is greater than the amount of waste expected to be treated at the proposed ERF as some waste will be bulked and transported offsite for recycling. Some recyclable materials managed separately by the Constituent Boroughs will not be delivered to the EcoPark site and will be sent elsewhere for processing.

i.i.x The vast majority of the 837,700 tonnes waste expected to be received at the Edmonton EcoPark will be LAC waste (around 710,000 tonnes) from borough collections, transfer stations and Reuse and Recycling Centres (RRCs) located across north London. As mentioned previously, the remaining proportion of waste delivered to the Edmonton EcoPark will be sourced from non-LAC sources.

i.i.xi Waste (inclusive of recyclate not destined for energy recovery) delivered to the site will be directed as appropriate to one of the following facilities for processing:

- Delivery to the Resource Recovery Facility (RRF);
- Direct delivery to the proposed ERF (no pre-treatment in the RRF required); or
- Delivery to the Reuse and Recycling Centre (RRC) (public access).

i.i.xii Around 451,500 tonnes will be directly delivered to the proposed ERF without requiring pre-treatment in the RRF. The RRF is expected to handle around 386,200 tonnes of waste and recycling annually. This tonnage is inclusive of around 128,000 tonnes of non-LAC residual waste. This tonnage includes around 8,000 tonnes of waste and recycling from the RRC. The RRF serves a number of functions including bulking and waste pre-treatment such as sorting and shredding. The RRC is where members of the public and businesses may deposit waste for disposal or recycling.

i.i.xiii Outputs from the RRF include:

- Recycling: Around 135,700 tonnes of recyclate will be transferred off site for onward processing;

- Residual waste: Around 248,500 tonnes of residual waste will be bulked and/or processed (material separation/shredding) at the RRF and delivered internally within the Edmonton EcoPark for treatment in the ERF (451,000 tonnes will be delivered directly to the ERF); and
- Waste unsuitable for treatment via the ERF (around 2,000 tonnes of gully wastewater and minor waste unsuitable for treatment e.g. oversized items).

i.i.xiv The Edmonton EcoPark mass balance summarising the waste inputs and flows of waste through the site is provided in Section 2.6.

i.i.xv A number of solid outputs are produced as a result of the combustion and the flue gas cleaning process in the proposed ERF. This information is provided in Section 2.13.

Glossary

Term	Definition
ACC	Air cooled condenser
Authority	North London Waste Authority
BWRF	Bulky Waste Recycling Facility
Constituent Boroughs	The seven north London boroughs that make up the Authority: London Borough of Barnet, Camden, Enfield, Hackney, Haringey, Islington, Waltham Forest
C&I	Commercial and Industrial (also called: Third Party Waste)
DCO	Development Consent Order
DEN	Decentralised Energy Network
EfW	Energy-from-waste
ERF	Energy Recovery Facility
FGT	Flue Gas Treatment
FIDOR	Frequency of Detection; Intensity as perceived; Duration of exposure; Openess; and Receptor sensitivity
FPP	Fuel Preparation Plant
GJ/t	Gigajoules per tonne
GWh	Gigawatt hour
GWh_e	Gigawatt hour electricity
IBA	Incinerator bottom ash
IVC	In-vessel composting
kg	kilogram
km	kilometre
LB	London Borough
LVHN	Lee Valley Heat Network
LVRP	Lee Valley Regional Park
LVRPA	Lee Valley Regional Park Authority
LWL	LondonWaste Limited
m	Metre
MJ	Megajoule
MJ/kg	Megajoule per kilogram
mg	Milligram
MRF	Materials Recycling Facility
MSW	Municipal Solid Waste
MW	Megawatt
MW_e	Megawatt electricity
MWh	Megawatt hour
MW_{th}	Megawatt thermal
MWh_e	Megawatt hour electricity
MWh_{th}	Megawatt hour thermal
NLHPP	North London Heat and Power Project
NLJWS	North London Joint Waste Strategy
NLWA	North London Waste Authority
NLWA Area	North London Waste Authority's Administrative Area, comprising of the administrative area of the seven north London boroughs that

Term	Definition
	make up the Authority: London Borough of Barnet, Camden, Enfield, Hackney, Haringey, Islington, Waltham Forest
NLWP	North London Waste Plan
PINS	The Planning Inspectorate
Project	The North London Heat and Power Project
RRC	Reuse and Recycling Centre (formerly referred to as HWRCs)
Site	Edmonton EcoPark
SCR	Selective Catalytic Reduction
t	Tonne (metric)

1 Introduction

1.1 Introduction

1.1.1 The North London Waste Authority (NLWA) is preparing an application for a Development Consent Order (DCO) pursuant to the Planning Act 2008 (as amended). The Application will be for the North London Heat and Power Project (the Project) comprising construction, operation and maintenance of an Energy Recovery Facility (ERF) of around 70 megawatts (MWe) and associated development, including a Resource Recovery Facility (RRC) at the Edmonton EcoPark site in north London. The proposed ERF will replace the existing Energy from Waste (EfW) and other facilities at the Edmonton EcoPark.

1.2 Purpose of this document

1.2.1 This Fuel Management Assessment has been prepared to support North London Waste Authority's (the Applicant's) application (the Application) for a Development Consent Order (DCO) made pursuant to the Planning Act 2008 (as amended).

1.2.2 The Application is for the North London Heat and Power Project (the Project) comprising the construction, operation and maintenance of an Energy Recovery Facility (ERF) of around 70 megawatts (MW_e) at the Edmonton EcoPark in north London with associated development, including a Resource Recovery Facility (RRF). The proposed ERF will replace the existing Energy from Waste (EfW) facility at the Edmonton EcoPark.

1.2.3 This Report should be read alongside the other information that has been submitted with the Application, in accordance with the statutory requirements set out in Regulations 5, 6 and 7 of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 (as amended).

1.3 Document structure

1.3.1 The Fuel Management Assessment Report is structured as follows:

- Section 1:Introduction
  - Over of the North London Waste Authority (Section 1.4)
  - Background to the Application Site, Surrounding Area and the Project (Section 1.5 through to Section 1.8)
- Section 2: Fuel Management Strategy including:
  - Waste Collection Logistics (Section 2.1 and 2.2): Provides an overview of how waste is managed in north London;
  - Expected Waste Arisings and Waste Composition (Section 2.3 and 2.4): A summary of the expected waste arisings and composition of the waste stream;
  - Edmonton EcoPark Mass Balance (Section 2.5 and 2.6);

- Reception of Waste and onsite Handling (Section 2.7 and 2.8): An explanation as to how waste will be received and managed on-site;
- Overview of the Combustion Process (Section 2.9 to 2.12): A description of how waste is managed in the bunker, through the combustion process and final treatment of the flue gases;
- Post Combustion Residue Handling (Section 2.13).

1.4 The North London Waste Authority

1.4.1 Established in 1986, the NLWA is a statutory authority whose principal statutory responsibility is the disposal of waste collected by the seven north London boroughs of Barnet, Camden, Enfield, Hackney, Haringey, Islington and Waltham Forest (the Constituent Boroughs).

1.4.2 The NLWA is the UK's second largest waste disposal authority handling approximately 3% of the total national municipal waste stream. Since 1994 the Authority has managed its waste arisings predominantly through its waste management contract with LondonWaste Limited (LWL) and the use of the EfW facility at the Edmonton EcoPark and landfill outside of London.

1.5 Application Site

1.5.1 The Application Site, as shown on the Site Location Plan (00_0001), extends to 22.2 hectares and is located wholly within the London Borough of Enfield (LB Enfield). The Application Site comprises the existing waste management site known as the Edmonton EcoPark where the permanent facilities will be located, part of Ardra Road, land around the existing water pumping station at Ardra Road, Deephams Farm Road, part of Lee Park Way and land to the west of the River Lee Navigation and land to the north of Advent Way and east of the River Lee Navigation (part of which will form the Laydown Area and new Lee Park Way access road). The post code for the site is N18 3AG and the grid reference for the proposed development is TQ 35750 92860.

1.5.2 The Application Site includes all land required to deliver the Project. This includes land that would be required temporarily to facilitate development.

Edmonton EcoPark

1.5.3 The Edmonton EcoPark is an existing waste management complex of around 16 hectares.

1.5.4 Current use of the Edmonton EcoPark comprises:

- An EfW facility which treats circa 540,000 tonnes per annum (tpa) of municipal waste and generates around 40MW_e (gross) of power;
- An In-Vessel Compositing (IVC) facility which processes food, landscaping and other green waste from kerbside collections and RRCs as well as local parks departments. . The facility currently manages around 30,000tpa;

- A Bulky Waste Recycling Facility (BWRF) and Fuel Preparation Plant (FPP) which receive bulky waste from RRCs and direct deliveries. These facilities respectively recycle wood, metal, plastic, paper, card and construction waste; and separate oversized items and shred waste suitable for combustion. These integrated facilities manage over 200,000tpa;
- An Incinerator Bottom Ash (IBA) Recycling Facility which processes ash from the existing EfW facility;
- A fleet management and maintenance facility which provides parking and maintenance facilities for the Edmonton EcoPark fleet of operational vehicles; and
- Associated offices, car parking and plant required to operate the facility.

1.5.5 In order to construct the proposed ERF, the existing IVC, BWRF, FPP, and IBA recycling operations will be decommissioned and/or relocated.

Laydown Area

1.5.6 The proposed temporary Laydown Area is an area of open scrubland located to the east of the River Lee Navigation and north of Advent Way.

1.5.7 In addition to the Laydown Area the Application Site includes land to the east of the existing Edmonton EcoPark which will be used for the new Lee Park Way access and landscaping along the eastern boundary.

1.6 Surrounding Area

1.6.1 The Application Site is located to the north of the A406 North Circular Road in an area that is predominantly industrial. The Lee Valley Regional Park (LVRP) is located to the east of the Application Site.

1.6.2 Land to the north and west of the Application Site is predominantly industrial in nature. Immediately to the north of the Edmonton EcoPark is an existing Materials Recycling Facility (MRF) which is operated by a commercial waste management company, alongside other industrial buildings. Further north is Deephams Sewage Treatment Works. Beyond the industrial area to the north-west is a residential area with Badma Close being the nearest street, approximately 600m from the Edmonton EcoPark and 60 m from the nearest part of the Application Site boundary.

1.6.3 Eley Industrial Estate located to the west of the Application Site comprises a mixture of retail units, industrial and warehousing uses.

1.6.4 Advent Way is located to the south of the Application Site adjacent to the A406 North Circular Road (Angel Road). Beyond the A406 North Circular Road are retail and trading estates; this area is identified for future redevelopment to provide a housing led mixed use development known as Meridian Water.

1.6.5 The LVRP and River Lee Navigation are immediately adjacent to the eastern boundary of the Edmonton EcoPark, and the Lee Park Way, a private road which also forms National Cycle Route no. 1, runs alongside

the Navigation. The LVRP is located to the east of the River Lee Navigation where the William Girling Reservoir is located along with an area currently occupied by Camden Aggregates which is used for the crushing, screening and stockpiling of concrete, soil and other recyclable materials. The nearest residential areas to the east of the Application Site and LVRP are located at Lower Hall Lane, approximately 550m from the Edmonton EcoPark and 150m from the eastern edge of the Application Site.

1.7 The Project

1.7.1 The Project would replace the existing EfW facility at Edmonton EcoPark, which is expected to cease operations in 2025, with a new and more efficient ERF which will produce energy from municipal waste, and associated development, including temporary works required to facilitate construction, demolition and commissioning. The proposed ERF would surpass the requirement under the Waste Framework Directive (Directive 2008/98/EC) to achieve an efficiency rating in excess of the prescribed level, and would therefore be classified as a recovery operation rather than disposal.

1.7.2 The main features of the Project once the proposed ERF and permanent associated works are constructed and the existing EfW facility is demolished comprise:

a. a northern area of the Edmonton EcoPark accommodating the proposed ERF;

b. a southern area of the Edmonton EcoPark accommodating the RRF, a visitor and education centre with offices, and a base for the Edmonton Sea Cadets (‘EcoPark House’);

c. a central space, where the existing EfW facility is currently located that would be cleared; and

d. a new landscape area along the edge with the River Lee Navigation.

1.7.3 The proposed development works for which consent will be sought are set out on drawings in the Draft Book of Plans. The description below refers to the works numbers (e.g. ‘ERF1’) identified on the drawings.

Principal Development

1.7.4 The principal development comprises development of an ERF generating electricity using residual waste as a fuel and capable of an electrical output of around 70 MW_e (gross). The principal development consists of the following development located within the Building Envelopes shown in Works Zone 1A and 1B on Drawings 00_0011 and 00_0012:

- tipping hall (ERF1) and one way access and exit ramps (ERF9);
- a waste bunker with two overhead cranes (ERF2 and ERF2a) and space to hold the equivalent of around seven days of processing capacity to provide sufficient space for mixing;

- two process lines (with each line having a capacity of 350ktpa) (ERF3), consisting of a moving grate, furnace, boiler and a flue gas treatment plant, stack (ERF6) and facilities for the recovery of incinerator bottom ash for recycling;
- a steam turbine for electricity generation (ERF3);
- heat off-take equipment within the ERF capable of supplying heat through a connection to a separate district heating energy centre (DHEC). This separate DHEC is not part of the Project and will be developed by LB Enfield;
- air or water cooled condenser(s) (ERF5); and
- plant control and monitoring systems and offices (ERF4).

Associated Development

1.7.5 Associated development is shown in the Book of Plans and comprises the following elements:

- construction and operation of plant and structures to support the operation of the proposed ERF;
- installation of a green roof and a brown roof over parts of the proposed ERF;
- observation platform at roof level above the tipping hall;
- replacement waste water treatment facility;
- the decommissioning and demolition of the existing EfW facility and installation of temporary hard landscaping in this area;
- construction and operation of a Resource Recovery Facility;
- construction of EcoPark House accommodating a visitor and education centre with offices, and a base for the Edmonton Sea Cadets;
- construction of a boat canopy alongside the River Lee Navigation to service the requirements of the Edmonton Sea Cadets;
- utility works;
- construction of surface water pumps, pipework and water attenuation tanks;
- permanent hard and soft landscaping;
- site circulation and parking works;
- artificial lighting, site security and means of enclosure works;
- creation of a temporary Laydown Area:
- works to reinstate the current landscaping in the area used for the temporary Laydown Area; and
- site access and highways improvements.

1.8 Stages of the Project

1.8.1 The proposed ERF is intended to be in place before the end of 2025, but with the precise timing of the replacement to be determined. In order to do this, the following key steps are required:

- obtain a DCO for the new facility and associated developments;
- obtain relevant environmental permit(s);
- identify a suitable technology supplier;
- agree and arrange source(s) of funding;
- enter into contract(s) for design, build and operation of new facility and associated development;
- move to operation of new facility; and
- decommissioning and demolition of the existing EfW facility.

1.8.2 Site preparation and construction will be phased over a number of years and it is expected that the earliest construction would commence is 2019/20, although this may be later. Construction will be implemented in a phased manner to ensure that essential waste management operations remain functioning throughout. This is especially relevant for the existing EfW facility and associated support facilities.

1.8.3 The stages of the Project are as follows:

- Phase 1a – site preparation and enabling works;
- Phase 1b – construction of RRF, EcoPark House and commence use of Laydown Area;
- Phase 1c – operation of RRF, EcoPark House and demolition/ clearance of northern area;
- Phase 1d – construction of ERF;
- Phase 2: commissioning of ERF alongside operation of EfW facility, i.e. transition period;
- Phase 3: operation of ERF, RRF and EcoPark House, demolition of EfW facility; and
- Phase 4: operation of ERF, RRF and EcoPark House, i.e. final operational situation.

2 Fuel Management Strategy

2.1 Existing North London Waste Collection Logistics

2.1.1 The north London area covers almost 30,000 hectares and has a residential population of around 1.9 million. Municipal waste arising in this area is collected by the seven waste collection authorities (Constituent Boroughs) which are;

- London Borough of Barnet;
- London Borough of Camden;
- London Borough of Enfield;
- London Borough of Hackney;
- London Borough of Haringey;
- London Borough of Islington; and
- London Borough of Waltham Forest.

North London Waste Authority (NLWA) has a statutory responsibility to arrange for the disposal of waste collected by the seven boroughs.

Figure 2.1: Map of the London and North London Waste Authority (highlighted)

2.1.2 Previously known as municipal waste, Local Authority Collected (LAC) waste is the term that is used to describe all wastes collected by the Constituent Boroughs. LAC waste includes all waste collected by the Constituent Boroughs for recycling, composting, recovery and disposal, both from households and from businesses (non-household) in the area.

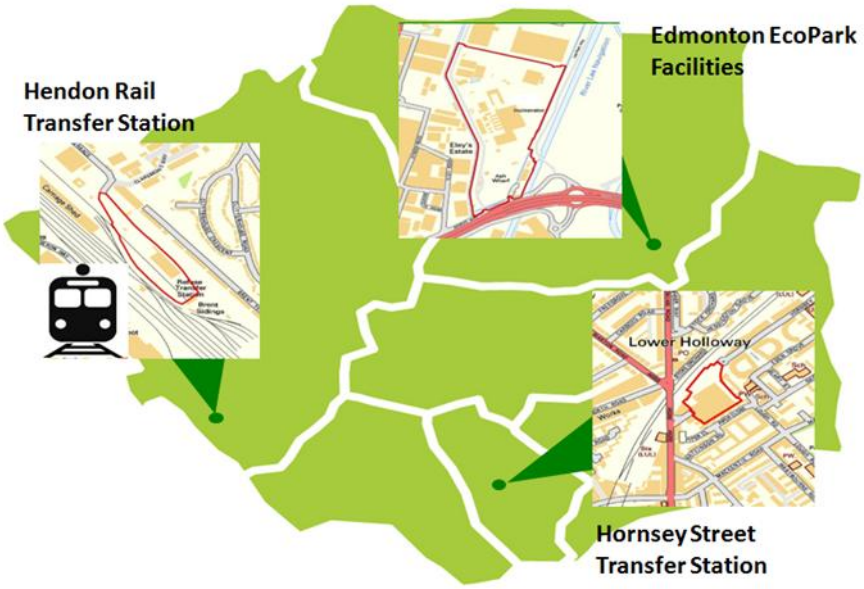
2.1.3 In 2012/13 the Constituent Boroughs collected around 827,000 tonnes of recyclable and residual waste comprising household waste (679,000 tonnes) and waste produced by businesses (102,000 tonnes). The remainder was made up of a variety of minor waste streams arising from

street cleaning, flytipping, construction and demolition, and highways cleaning.

2.1.4 LAC waste arisings in north London are handled through a number of facilities in north London. Waste is delivered by the boroughs to either the Edmonton EcoPark in Enfield for treatment at the existing Energy from Waste (EfW) facility or for bulking up at the onsite bulky waste facility.

2.1.5 Additionally, waste is delivered and loaded onto rail containers at the Hendon Rail Transfer Station or at the Hornsey Street Road Transfer Station for transport to landfills sites outside of London (locations provided in Figure 2.2 below). The purpose of the waste transfer stations is to bulk up LAC waste deposited by local borough collection operations for onward treatment or disposal; the transfer stations support the Applicant's waste transport logistics.

Figure 2.2: Geographical location of NLWA operated waste facilities in north London



2.1.6 Waste is delivered to the Edmonton EcoPark either directly via Constituent Borough waste collection operations or indirectly via the waste transfer stations post bulking.

2.1.7 The Edmonton EcoPark receives household kitchen and green waste which is composted at the in-vessel composting facility. The Applicant also manages seven Reuse and Recycling Centres (RRCs) across north London. Material from the RRCs is either: bulked at the transfer stations for onward treatment or recycling; or delivered to the Edmonton EcoPark for treatment.

2.1.8 All residents in the north London area have access to all of the RRCs. The level of provision has been approximately one site per 100,000 people.

2.1.9 In 2012/13 around 63,000 tonnes of waste was collected via the RRC network. Approximately 60% of the waste deposited at the sites was recycled. The remainder was taken into the Edmonton EcoPark for use in the EfW facility or landfill, as appropriate.

2.2 Existing Borough Collection Logistics

2.2.1 In 2012/13 around 438,600 tonnes of LACW delivered to the EcoPark by the Constituent Boroughs was treated in the existing Energy from Waste (EfW) facility. Each Constituent Borough is responsible for collecting local authority waste in their area and has tailored those collection services to the local requirements.

2.2.2 As a minimum, each Constituent Borough provides their residents with the following waste collection services:

1. residual waste service;
2. comingled recycling service; and
3. either mixed food waste/garden waste or separately collected food and garden waste.

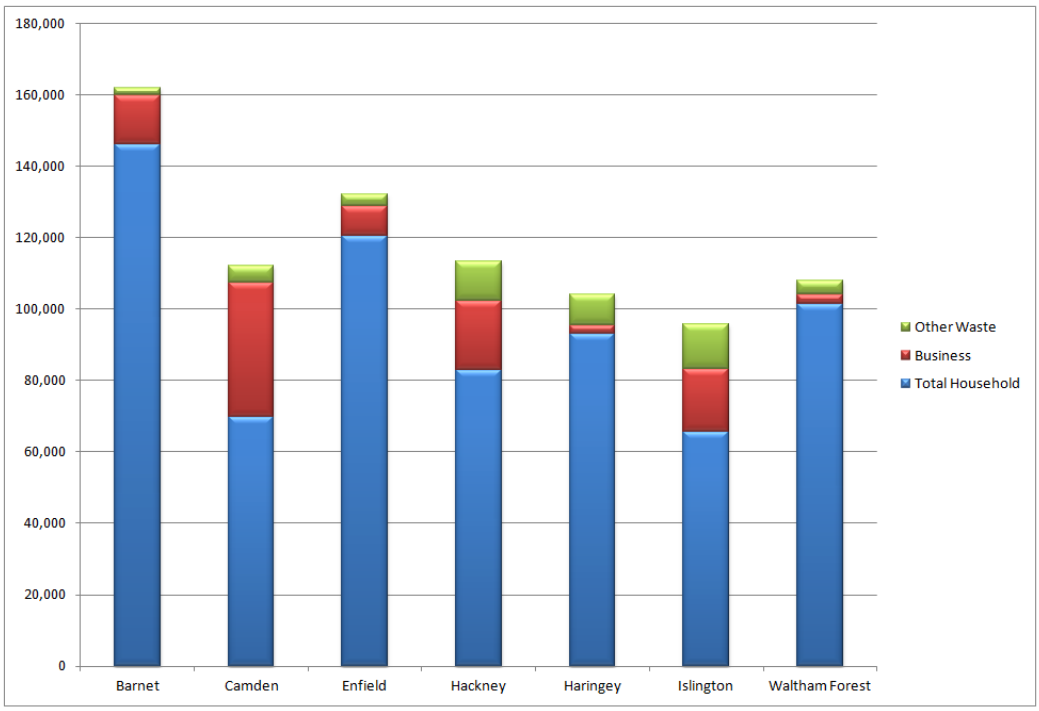
2.2.3 The extent of the service and the types of materials collected varies depending on the local circumstances. Residual waste collections are offered on a weekly basis and in some cases more often such as on main streets.

2.2.4 Similarly, the majority of properties receive a weekly recycling collection service, however, more frequent recycling collections are provided in busy areas or where space is limited for storage such as high streets. Food waste and mixed food/garden waste are generally collected on a weekly basis. Some fortnightly collections of garden waste are provided e.g. for suitable low rise properties.

2.2.5 NLWA managed around 827,000 tonnes of LAC waste in 2012/13. Figure 2.3 (below) shows the split between household, business and other waste for each of the Constituent Boroughs.

2.2.6 Around 689,000 tonnes was household waste while around 102,000 tonnes was sourced from businesses across north London. ‘Other’ waste includes waste other than household and business waste which is managed by north London such as fly-tipping, grounds clearing waste, highways waste etc.

Figure 2.3: North London Local Authority Collected Waste (household, non-household and other waste)



2.2.7 The Constituent Boroughs achieved a reuse, composting and recycling rate of around 32% in 2012/13. The recycling rate has increased from 23% in 2006/07.

2.3 Forecast Residual Waste

Local Authority Collected Waste

2.3.1 A waste forecasting model has been developed in order to estimate the amount of LAC waste likely to be produced over the anticipated operational life of the facility (up to 2051). The model is based on three scenarios:

- Low Recycling (40% household recycling by 2020/21 and static thereafter);
- Central Recycling (50% household recycling by 2020/21 and remaining static thereafter); and
- High Recycling – 50% household recycling by 2020/21, rising to 60% by 2031/32 and remaining static thereafter).

2.3.2 For each scenario, the same growth rate as the household recycling is applied to the business waste arisings to predict future tonnages of business recycling.

2.3.3 For the purposes of the Fuel Management Assessment and mass balance, waste arisings forecasted from the central recycling scenario are assessed. Further details and assumptions relating to the modelling methodology are available in the Waste Forecasting Project Report as an appendix to the Interim Need Assessment.

2.3.4 The results of the model indicate the Authority is expected to manage around 995,000 tonnes of LAC waste by 2024/25 (based on the central recycling scenario). This is expected to increase to over 1 million tonnes by 2050/51. Waste arisings forecast as part of the central scenario are provided in Table 2-1.

2.3.5 On average the proposed ERF will be expected to treat almost 572,000 tonnes of LAC residual waste in 2024/25 rising to around 611,000 tonnes by 2050/51.

Table 2-1: Waste Forecast Modelling Results (Central Recycling Scenario)

Waste Managed (thousand tonnes)	2012/13	2020/21	2024/25	2036/37	2050/51
Recycling	229,570	418,169	422,853	438,153	457,185
Residual	597,717	566,872	571,615	588,914	611,277
Total	827,288	985,041	994,469	1,027,067	1,068,462

2.3.6 The majority of the waste delivered to the proposed ERF will be household waste (around 404,000 by 2050/51). By 2050/51, the remaining LAC residual waste is expected to include around 160,000 tonnes of waste collected from business waste and other waste (around 46,000 tonnes) which includes materials such as highways waste, ground waste and flytipping.

Non-local Authority Collected Waste

2.3.7 Potential sources of non-LAC residual waste may include:

- NLWA area non-LAC commercial and industrial (C&I) waste;
- Other London LAC municipal solid waste (MSW); and
- Non-London LAC MSW and C&I waste

2.3.8 The composition of the non-LAC waste is expected to be of a similar composition to LAC waste arisings in north London (waste composition is discussed in Section 2.4).

2.3.9 The Applicant considered the availability of residual commercial and industrial (C&I) waste within a 50 mile radius of the Edmonton EcoPark. The study showed that total C&I waste within the boundary amounts to around 2.5 million tonnes in 2012/13 reducing to around 1.7 million tonnes by 2050/51. The result was an estimation that currently (on 2014/15 modelled figures) around 565,000 tonnes of residual C&I waste could be available for disposal at the Edmonton EcoPark

2.3.10 Around 128,000 tonnes of non-LAC residual waste will be sourced in 2024/25 reducing to around 89,000 tonnes by 2050/51 in proportion to the forecasted increase in LAC residual waste. In total, the facility is expected to treat 700,000 tonnes of LAC and non-LAC residual waste.

2.3.11 The factors influencing sizing and the associated risk to the Authority are discussed in details in the Need Assessment Report.

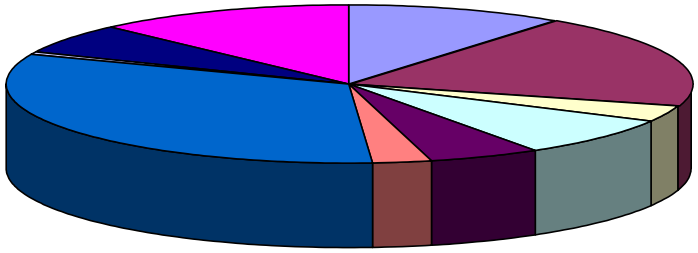
2.3.12 A mass balance was developed in order to demonstrate how the tonnages of waste delivered to the Edmonton EcoPark will be managed. This is discussed in Section 2.5.

2.4 Incoming Waste Composition

2.4.1 The predominant source of waste to be supplied to the proposed ERF will be household waste, along with smaller amounts of waste collected from businesses of a similar composition to household waste) and 'other' wastes such as street cleaning, gully waste etc.

2.4.2 The most recent waste composition survey for north London was conducted in 2010 and the analysis is shown in Figure 2.4 below.

Figure 2.4: Local Authority Collected Waste Composition in north London (2010)



Key

- Glass (10.4%)
- Paper (19.1%)
- Metal (3.3%)
- Dense plastic (8.1%)
- Film plastic (5.3%)
- Textiles (2.8%)
- Organics (32.3%)
- WEEE (0.4%)
- Other combustibles (6.2%)
- Miscellaneous (12.2%)

2.4.3 The existing EfW facility is used to treat small amounts of the clinical waste arising from north London (just over 400 tonnes in 2012/13). The new ERF will be designed to manage a similar amount of clinical waste. A description of how this waste will be managed in the new facility is provided in Section 2.10.

2.5 Waste Deliveries to the EcoPark Site

2.5.1 The total tonnage of waste delivered to the EcoPark is expected to be around 837,700 by 2024/25 (inclusive of LAC and non-LAC collected waste). The majority of this (around 710,000 tonnes) will be LAC waste from borough collections, transfer stations and RRCs across north London. As shown in Table 2-1, total LAC waste is expected to be around 995,000 tonnes in 2024/25; around 285,000 tonnes will be recyclable material which is managed separately by the boroughs.

2.5.2 The remaining proportion of waste delivered to the Edmonton EcoPark (around 128,000 tonnes) is expected to be sourced from non-LAC sources as discussed in Section 2.3. This proportion of non-LAC residual waste will reduce to around 88,700 tonnes by 2050/51 as total LAC waste is expected to decrease overtime.

2.5.3 Material delivered to the site will be directed as appropriate to either one of the following facilities for processing:

1. Direct delivery to the ERF (no pre-treatment required);
2. Delivery to the Resource Recovery Facility (RRF); or
3. Delivery to the Reuse and Recycling Centre (public access)

2.5.4 A more detailed description of these facilities and how the waste is processed is described in Section 2.7 onwards.

2.5.5 Around 451,500 tonnes will be directly delivered to the proposed ERF without requiring pre-treatment in the RRF. The material delivered to the ERF will largely be the normal borough household waste collections.

2.5.6 The RRF is expected to handle around 386,200 tonnes of waste and recycling annually (inclusive of around 128,000 tonnes non-LAC waste). This tonnage also includes around 8,000 tonnes of waste and recycling from the on-site RRC. The RRF serves a number of functions including bulking and pre-treatment such as sorting and shredding. The RRC is where members of the public and waste from small businesses may deposit waste for disposal or recycling.

2.5.7 Outputs from the RRF include:

- Recycling: Around 135,700 tonnes of recyclate will be sent off site for onward processing;
- Residual waste: Around 248,500 tonnes of residual waste will be bulked and delivered internally within the EcoPark site for treatment in the ERF; and
- Waste unsuitable for treatment via the ERF (around 2,000 tonnes of gully wastewater and minor waste unsuitable for treatment e.g. oversized items).

2.5.8 The capacity of the proposed ERF is 700,000 tonnes. As described in Paragraph 2.5.3 the waste will be delivered to the ERF either directly via boroughs collections (451,500 tonnes) or indirectly via the RRF (248,500 tonnes). This is illustrated in the Edmonton EcoPark mass balance (Figure 2.5).

2.5.9 In 2024/25, in addition to the LAC waste delivered to the site, around 128,000 tonnes of material is likely to be sourced from third party sources. This tonnage is included within the total tonnages expected to be treated at the ERF. As discussed, by 2050/51, the amount of non-LAC waste sourced for treatment at the proposed ERF is expected to reduce to around 88,700 tonnes.

2.5.10 The Edmonton EcoPark mass balance shown at Figure 2.5 illustrates how the tonnages of waste received on-site is expected to be managed.

2.5.11 A more detailed description of each stage in the movement of waste through the ERF is provided in the following sections.

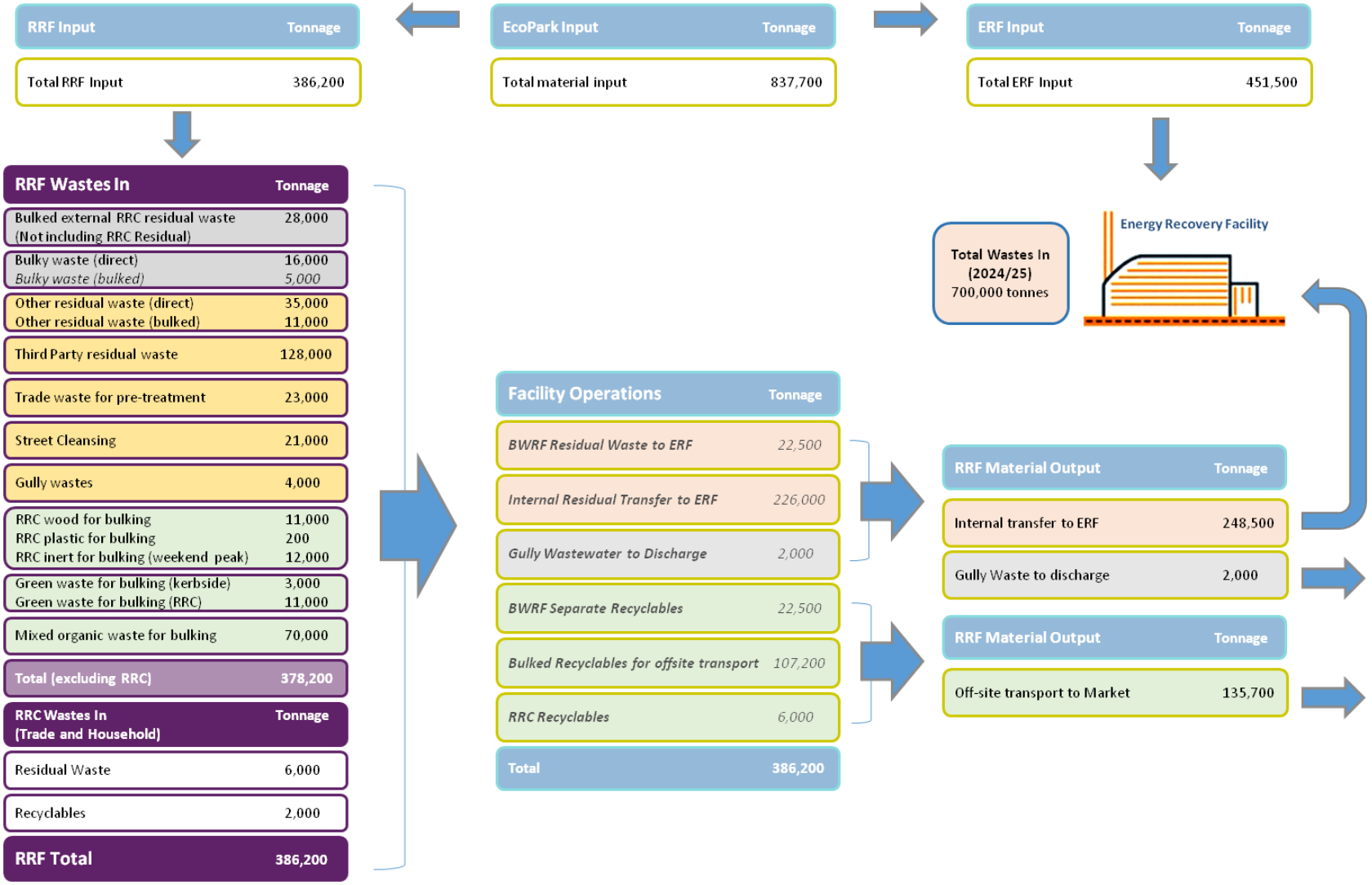
2.6 Edmonton EcoPark Mass Balance

2.6.1 The Edmonton EcoPark mass balance was produced in order to demonstrate how waste entering the Edmonton EcoPark will be managed. The main management routes include:

- Direct delivery to the ERF for treatment;
- Direct delivery to the RRF for bulking or treatment prior to combustion;
- Internal delivery from of waste from the RRF to the proposed ERF for treatment; and
- Removal of recyclates and waste unsuitable for treatment from the Edmonton EcoPark.

2.6.2 The mass balance is shown overleaf. Outputs from the ERF are described in Section 2.13.

Figure 2.5: Edmonton EcoPark Mass Balance



2.7 Reception

2.7.1 Each vehicle entering the Edmonton EcoPark will be weighed on entering and exiting the site. Weighing the vehicles allows the amount of waste delivered to be accurately captured.

2.7.2 The weighbridges will be positioned at specific locations around the site to aid the flow of traffic and prevent excessive queuing; weighbridges will be located north of the site serving the ERF and south of the site adjacent to the RRF.

2.7.3 Vehicle movements in and out of the site will be controlled by staff at the weighbridges. Vehicles will be directed to the ERF or the RRF as appropriate to deposit their waste loads.

2.7.4 Operational vehicles intending to deliver waste to the proposed ERF may enter through either the main access gate (Advent Way) or through the proposed north western access point (Western Farm Road). Vehicles may access the RRF off the main spine road (which runs the western edge of the site) by taking a left turn when coming from the north western entrance or by taking a right turn when coming from the main entrance.

2.7.5 Public vehicles will be kept separate from operational traffic and will enter the site through the proposed new entrance off Lee Park Way. The route will provide a separate road for public vehicles, pedestrians and cyclist wishing to access the RRC or EcoPark House.

2.7.6 The internal circulation strategy of the RRF was developed to take account of the Edmonton EcoPark's circulation arrangements so as to maximise the efficiency of site vehicle movements and improve site safety.

2.7.7 Materials which are not suitable for direct tipping to the waste bunker (e.g. bulky waste) will be deposited in the RRF.

2.8 On-site handling and fuel preparation

2.8.1 The RRF is designed to manage a range of waste streams which require either bulking for onward deliveries (e.g. green waste) or pre-treatment prior to delivery to the ERF. The capacity of the RRF will be 386,200 tonnes.

2.8.2 As identified in the Edmonton EcoPark mass balance (Figure 2.5) the RRF will be designed to manage a number of waste types including:

- RRC wastes from direct deliveries by public/trade;
- RRC residual waste from other sites;
- RRC recyclates (e.g. green, wood, hard plastics) bulked from other RRC sites;
- Third party residual waste from direct delivery Refuse Collection Vehicles (RCV) and bulkers;
- Trade waste from direct delivery borough RCVs that requires pre-treatment;

- Bulky wastes from direct delivery RCV and small vehicles (e.g fly tips);
- Other residual wastes from direct delivery RCV and bulkers requiring pre-treatment;
- Gully waste for dewatering; and
- Food & garden wastes from direct delivery RCVs (household and trade).

2.8.3 The RRF will have a number of distinct areas where waste may be tipped including:

- Publically accessible RRC;
- Bulky Waste Recycling Facility;
- Waste fuel preparation area;
- Non-LAC (or Third party) waste transfer;
- Organic waste transfer; and
- RRC waste transfer.

2.8.4 The facility will use movable push walls for long-term design flexibility.

2.8.5 The majority of business waste collected by the boroughs will be delivered directly to the ERF for thermal treatment. However, if the vehicle driver is aware that a load contains waste requiring pre-treatment (e.g. bulky items, removal of reyclates) the material will be diverted to the RRF for pre-treatment (e.g. shredding).

2.8.6 The RRF will be used as a central bulking point for some recyclates from the RRC network in order to achieve more economical loads for bulking to off-takes. Organic waste (food and garden waste) collected by the boroughs and green waste bulked from the network of RRCs will be bulked at the RRF for onward transport to off-takers.

2.8.7 Other waste which will require reception and handling at the RRF will include: highways waste, grounds waste and flytipping.

2.8.8 The proposed RRC is expected to handle approximately 8,000 tonnes per year in the medium to long term. Waste is likely to arise from householders and small businesses. It is envisaged that the new site would accept all materials taken by other RRCs plus some other material which are likely to arise from commercial sources. Around 6,000 tonnes of material from the RRC will be processed as recyclable material.

2.8.9 An overview of the materials expected to be received at the RRF and the tonnages modelled are provided in the mass balance in Figure 2.5.

2.9 Waste Bunker Management

2.9.1 The proposed ERF tipping hall will be a fully enclosed building maintained under negative pressure to ensure that no odours, dust or litter can escape the building. Vehicles will tip into the waste bunker by reversing into one of the available tipping bays.

2.9.2 The waste storage bunker is an important area of the proposed ERF and serves a number of purposes as follows:

- receive waste and enable mixing of wastes to create a homogeneous fuel;
- Maintain sufficient fuel in the bunker for continuous plant operations; and
- Enables continued waste reception in the event of plant shutdown, both planned and unplanned.

2.9.3 The proposed bunker will be sized to store waste for a duration corresponding to 6.8 days operating both lines at full capacity, or for the duration of 14 days with one line out of operation (servicing or maintenance).

2.9.4 The tipping hall, as well as access and queuing areas will be capable of accommodating anticipated variations in traffic flows during peak periods, inclement weather, and around public holidays.

2.9.5 Furthermore, deliveries typically vary over a week or day. The majority of the waste will be delivered during weekdays with peaks in the morning and smaller peaks in the afternoon.

2.9.6 The sizing of the bunker supports the optimal requirements for waste reception and mixing of waste. The aim is to produce a homogeneous fuel which is critical for promoting stable plant operations resulting in lower gaseous emissions and reduced operating and maintenance costs.

2.9.7 Therefore, the depositing of waste into the bunker will be managed such that the front area of the bunker (closer to the east side) will be designated for receiving waste while the back end (closer to the feed hopper) will be designated for mixing waste via the overhead cranes.

2.9.8 Waste at the bottom of the bunker will be regularly moved/turned as it will otherwise decompose. The sizing of the bunker also minimizes the risk of excessive compaction of waste within the bunker under the weight of overlaying waste layers. Prolonged storage or stockpiling can be managed by good bunker management including entailing the regular movement of waste from one area to another.

2.10 Clinical Waste Management

2.10.1 The proposed ERF will be designed to accommodate and treat small amounts of non-hazardous/non-infectious clinical waste (Grade E Clinical Waste[2]). In 2012/13 the existing facility treated around 420 tonnes and the proposed ERF is expected to treat similar amounts. Hazardous / infectious clinical waste will not be treated at the facility.

2.10.2 Clinical waste will be received at the Edmonton EcoPark and managed separately to household, business and other waste streams. The waste

[2] Wastes whose collection and disposal is not subject to special requirements in order to prevent infection (for example dressings, plaster casts, linen, disposable clothing, diapers) – European Waste Catalogue.

will be delivered to the site in clinical waste bags which have been separately collected by the boroughs.

2.10.3 The clinical waste will be received in a dedicated area at the base of the crane deck adjacent to the bunker. A lift will provide access to the feed hopper where the clinical waste will be directly deposited. The feed hopper will lead to the combustion chamber where the waste will be treated. This dedicated area will avoid any mixing of the clinical waste stream with the LAC waste stream in the bunker.

2.11 Combustion Process

2.11.1 The proposed ERF will be comprised of two lines, each having a processing capacity of 350,000 tonnes per annum at a waste fuel design calorific value (CV) of 10 Gigajoules (GJ) per tonne to give a thermal rating of 122 Megawatts (MW). The ERF will be expected to manage an average annual throughput of 700,000 tonnes. The design CV is based upon operational experience from the existing EfW facility.

2.11.2 Waste will be deposited into the feed hoppers by the grab cranes. From there, waste will be guided from the hopper into the incinerator through the feed chutes. The feed chutes will be hydraulically operated and feed waste onto the grates in an even layer drawing the waste across the grate to ensure complete combustion.

2.11.3 Hot combustion gases will rise up above the grate into a post-combustion chamber for the final combustion of gases and suspended fuel. These chambers will be sized such that the plant meets the requirements of the Industrial Emissions Directive (IED) exposing the flue gases to a temperature exceeding 850°C for at least two seconds in the presence of sufficient oxygen. This will ensure the proper burnout of partially combusted gases (like Carbon Monoxide) and minimise production of harmful emission products including dioxins and furans.

2.12 Flue Gas Cleaning

2.12.1 The proposed ERF will be equipped with sophisticated flue gas treatment (FGT) systems in order to minimise emissions into the atmosphere which are strictly controlled. NLWA is proposing to use a wet FGT system to remove pollutants from the flue gas. A wet FGT system consists of a packed column designed to mix the combustion gases with a lime solution.

2.12.2 In a wet flue FGT system HCl is separated simultaneously with hydrogen fluoride (HF) and mercury (Hg) in an acidic scrubber. The sulphur dioxide (SO2) content and remaining hydrogen fluoride (HF) content is removed in a caustic or neutral scrubber.

2.12.3 Wet FGT systems require dust in the flue gas to be removed in a primary particle separator (e.g. electrostatic precipitator) to minimize the particle load at the acid scrubber stage. The process stage for the removal of dioxins is a secondary particle filter (e.g. a bag house filter).

2.12.4 Wet FGT systems produce wastewater that requires treatment before discharge (around 40 metre cubed (m^3) per hour for the proposed ERF). Furthermore, a solid residue in the form of gypsum, a non-hazardous output, is produced. An additional residue is small amounts of dewatered hydroxide sludge which is considered as hazardous waste and disposed of separately. Hydroxide sludge contains high amounts of heavy metals in its precipitated form. Therefore, treatment is usually not considered as an option and it is managed as a hazardous waste.

2.12.5 The use of a wet FGT plant requires an outlet for the saline effluent produced by the process. As an alternative to a wet FGT system, a combined FGT system may be proposed as part of the application. The combined system operates in a similar manner to the wet FGT system achieving the same emissions performance; the key difference being a liquid effluent is not produced. The outcome will be dependent on further engagement with Thames Water.

2.12.6 In addition to a wet and combined FGT system, the Applicant proposes to install a selective catalytic reduction (SCR) process which is effective at reducing emissions of NOx.

2.12.7 The consumable utilise in the flue gas cleaning process are listed in Table 2-2:. These inputs are used to remove impurities in the flue gases and are removed as either solid or liquid outputs.

Table 2-2: Typical consumption data (1 x 350 ktpa line)

Mass flows	Unit	Combined	Wet
Limestone $CaCO_3$ (95 %)	kg/h	-	410
Caustic Soda NaOH (27 %)	kg/h	30	20
Burnt lime (88%) (Hydrated lime (91%) is also an alternative)	kg/h	430	-
Sodium bicarbonate	kg/h	-	-
Activated carbon / lignite coke (HOK)	kg/h	22	22
TMT-15	kg/h	-	1.9
$FeCl_3$	kg/h	-	3
Flocculent	kg/h	-	0.6

2.12.8 The solid outputs resulting from combustion and the flue gas cleaning process are discussed in the following sections. A table summarising the estimates for the expected tonnage outputs from the ERF is provided in Section 2.13.

2.13 Post-Combustion Residue Handling

Bottom Ash

2.13.1 An inert material, namely bottom ash, is produced as part of the combustion process. After complete burn-out of the waste the bottom ash will be cooled and metals (ferrous and non-ferrous) will be recovered.

2.13.2 The ash will fall from the grate into a discharger comprising a water bath and an inclined chute. The water serves to quench the ash and makes it possible to remove the bottom ash without dust or odour issues.

2.13.3 Ferrous and non-ferrous metals will be removed from the bottom ash for recycling. The removal of the metals from the bottom ash will occur off-site. Small volumes of boiler ash from the boiler outlet (excluding “boiler fly ash” from boiler hoppers) will be combined with the bottom ash as part of the process.

2.13.4 The ash will be conveyed to a covered storage area and transported by moving belts into dedicated bunkers. The bottom ash is removed from site, metals recyclate will be removed and the remaining material will be processed into an approved aggregate material for road building and construction.

2.13.5 As a result of the incineration process up to 20% by weight of the input materials will become ash which will require further treatment. Approximately 140,000 tonnes per annum is expected to be produced based on a residual waste input of 700,000 tonnes. Bottom ash will be recycled by a specialist contractor. The solid residues produced by the process and the quantities will depend on the ash content of the waste feed material.

2.13.6 Approximately 8,000 tonnes of boiler fly ash from the boiler outlet is expected to be produced in addition to bottom ash.

2.13.7 Around 14,000 tonnes of metal will be removed from the bottom ash which may be sold as a product for recycling.

Boiler Fly ash

2.13.8 Fly ash from the boiler will be removed from the flue gas by an Electrostatic Precipitation (ESP) or by a fabric filter.

2.13.9 The fine particles of fly ash will be combined with the Air Pollution Control (APC) residues and managed accordingly. By 2050/51 the quantity of fly ash produced will be around 14,000 tonnes (approximately 2% of input tonnage).

Air Pollution Control

2.13.10 The combustion of waste results in the production of gases consisting of water vapour, carbon dioxide and excess air. A very small proportion referred to as “flue gas” carries components including acid gases, organic substances, heavy metals and fly ash particles.

2.13.11 A wet or combined flue gas treatment system in combination with Selective Catalytic Reduction (SCR) will be installed to remove pollutants from the flue gas. FGT systems using a reagent such as lime results in the production of solid residues know as air pollution control residues (APC).

2.13.12 Based on a throughput of 700,000 tonnes the facility is expected to produce around 14,000 tonnes of APC residues.

2.13.13 The APC residues are a hazardous material and will be managed appropriately. The residues will be stored on site in sealed silos prior to removal. The residues will be removed in enclosed bulk powder tankers by specialist contractors.

2.13.14 APC residues will be sent to a permitted hazardous waste landfill site for disposal as hazardous waste. If it is feasible the residue may be sent to an effluent treatment contractor to be used to neutralise acids and similar materials. This is the management route for APC residues produced at the current facility.

Other Outputs

2.13.15 In addition to the other solid outputs mentioned above other minor outputs will be produced as part of the treatment process.

2.13.16 Wet flue gas treatment produces a solid residue in the form of gypsum, a non-hazardous output. By using a fabric filter, relatively clean gypsum can be produced that is suitable for reuse. A centrifuge separates the gypsum from the slurry as a dry product that is stored in a container for transport and reuse. Gypsum can be used in the production of building materials, plaster blocks and plasterboard walls. Around 1,700 tonnes of gypsum is expected to be produced.

2.13.17 Wet FGT systems produce wastewater that requires treatment before discharge. Small amounts of dewatered hydroxide sludge which is considered as hazardous waste is produced and which can be mixed with fly ash. Hydroxide sludge contains high amounts of heavy metals in its precipitated form. Therefore, treatment is usually not considered as an option and it is managed as a hazardous waste. Less than 1,000 tonnes of hydroxide sludge is expected to result from the treatment process.

2.14 ERF Output Summary

2.14.1 Table 2-3: provides an estimate of the expected tonnages of solid outputs as a result of the combustion and FGT process. The expected removal frequency for each output is also provided below.

2.14.2 If a wet FGT plant is installed around 40m^3 per hour of effluent from the process will be produced. The ability of Thames Water to accept the saline effluent has not yet been determined. The choice of FGT technology is dependent upon further discussion with Thames Water. Notwithstanding the combined FGT system operates in a similar manner to the wet FGT system achieving the same emissions performance levels but without the production of a wastewater.

Table 2-3: Estimated ERF solid outputs for wet and combined flue gas treatment (based on a 700,000 tonne per annum input)

	Combined Flue Gas Treatment	Wet Flue Gas Treatment Annual Tonnages	Expected Removal Frequency
Metals	14,000	14,000	Removal offsite from IBA
Bottom Ash	140,000	140,000	Daily/weekly
Fly ash at the boiler outlet (excluding “boiler fly ash” from boiler hoppers)	8,160	8,160	Weekly
Boiler Fly Ash	14,000	14,000	Weekly
APC Residues including carbon, excluding fly ash	14,080	-	Weekly
Gypsum	-	1,760	Weekly
Hydroxide sludge	-	960	Weekly