Riverside Resource Recovery Facility

Riverside Optimisation Project

Environmental Impact Assessment Report
Volume 1: Main Report

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CORY
RIVERSIDE ENERGY

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1 Introduction

1.1 Project Background

1.1.1 The Riverside Resource Recovery Facility ('RRRF') operated by Riverside Resource Recovery Limited (part of Cory Riverside Energy group (Cory)) is an Energy Recovery Facility ('ERF') situated at Norman Road in Belvedere within the London Borough of Bexley ('LBB').

1.1.2 Operating since 2011, RRRF has recently been fitted internally with an upgraded operational control system that enables a more consistent level of operation. This technology enables RRRF to be operated more efficiently than its original design when first built.

1.1.3 In order to realise this increased efficiency in operations, the terms of the relevant permissions that RRRF currently operates under (as defined in **Section 1.2**) need to be amended.

1.1.4 Consequently, Riverside Resource Recovery Limited is submitting to the Secretary of State for the Department of Business, Energy and Industrial Strategy ('BEIS') an application ('the Application') under section 36C of the Electricity Act 1989 to:

- amend the power generation description of RRRF in the 2015 s.36 Variation (application reference GDBC/003/00001C-06) to change the energy generation limit from 'up to 72MW' to 'up to '80.5MW';
- request that the Secretary of State then gives a direction under section 90(2) of the Town and Country Planning Act 1990 ('TCPA 1990') varying the conditions attached to the 2017 Permission (application reference 16/02167/FUL), to increase the maximum waste throughput from 785,000 tonnes per annum (tpa) to 850,000 tpa; and
- amend the 2015 s.36 Variation and to incorporate into the new deemed planning permission the amendments authorised by the Secretary of State in the Riverside Energy Park ('REP') Development Consent Order ('DCO')[1] regarding the ash storage area for RRRF and use of the jetty by both RRRF and REP.

1.1.5 This is called the Riverside Optimisation Project, or 'ROP'. More information on RRRF's existing operations and ROP are provided in **Chapter 2 and Chapter 3** of this EIA Report.

1.1.6 ROP will not alter the physical built footprint or give rise to additional physical development of RRRF. Although ROP would result in an increase (of up to 65,000 tonnes) in the volume of waste throughput processed annually at the RRRF and would increase the facility's MW output, operations would follow the same procedures and remain fundamentally unchanged.

1.1.7 Whilst ROP does not involve any physical development, the proposed increase to the generating capacity and the increase in volume of waste throughput provide a change to or extension of a generating station, and as such we consider that ROP falls within Schedule 2, Part 3(a) of the Electricity Works (Environmental Impact Assessment) (England and Wales) Regulations 2017 (as amended) ('the EIA Regulations').

1.1.8 ROP is consequently considered to be EIA development, and therefore under the EIA Regulations, any formal application must be accompanied by an EIA report ('EIA Report') prepared in accordance with these regulations.

1.1.9 This EIA Report has been prepared by Stantec UK Ltd ('Stantec') a competent practitioner. This EIA Report documents the Environmental Impact Assessment ('EIA') and its findings, namely likely significant environmental effects of ROP and has been prepared following the

[1] The Riverside Energy Park Generating Station Order and described in more detail at section 2.2 and 3.1

advice contained in the Scoping Opinion received from the Secretary of State for BEIS, following consultation with key stakeholders, on 18 February 2021.

1.2 Planning History

1.2.1 Consent for RRRF was granted by the Secretary of State for the Department of Trade and Industry on 15 June 2006, under section 36 of the Electricity Act 1989 ('the Original s.36 Consent').[2] The Original s.36 Consent granted consent for the construction and operation of an energy facility generating 72MW of electricity from 670,000 tonnes of waste per year.

1.2.2 The Original s.36 Consent was accompanied by a Direction under section 90(2) of the TCPA 1990 ('the Original Deemed Planning Permission' or 'ODPP'). Both the Original s.36 Consent and condition 4 of the ODPP imposed a restriction on waste inputs to the facility of 670,000 tpa. This level of throughput reflected the design assumptions adopted at that time relating to the Net Calorific Value of the waste and the number of days per annum over which the facility was expected to operate. A worst-case scenario was, however, tested within the accompanying environmental statement to assess the likely impact of a throughput of 835,000 tpa of waste.

1.2.3 In November 2007 an application (07/11615/FUL) was made to the LBB under Section 73 of the TCPA 1990 to vary condition 40 of the ODPP to allow improvements to Norman Road to run in parallel with the construction of RRRF. This planning permission was granted by the LBB on 11 January 2008 with all other conditions remaining as per the ODPP.

1.2.4 On 13 March 2015, the Secretary of State for the Department of Energy and Climate Change approved the following two variations to the Original s.36 Consent:

- an increase in the annual waste throughput from 670,000 to 785,000 tonnes per annum; and
- the transfer of waste by river from the Port of Tilbury in addition to the riparian waste transfer stations in Greater London.

1.2.5 These changes were consented through:

- a variation under section 36C of the Electricity Act 1989 to the Original s.36 Consent ('the 2015 s.36 Variation'); and
- a direction under section 90(2) of the TCPA 1990 ('the 2015 Deemed Permission').

1.2.6 On 4 October 2017, the LBB granted planning permission under section 73 of the TCPA 1990 ('the 2017 Permission')[3], which varied various conditions attached to the 2015 Deemed Permission.

1.2.7 The 2017 Permission added the following conditions to the 2015 Deemed Permission:

- not more than 195,000 tonnes by road, and not more than 85,000 tonnes of waste from outside Greater London by road - except in the case of jetty outage (condition 26); and
- maximum of 90 two-way HGV movements to site per day – except in the case of jetty outage or with the agreement of the LBB (condition 28).

1.2.8 Currently, RRRF operates under the 2015 s.36 Variation and the 2017 Permission, by which RRRF can process 785,000 tonnes per annum of waste and can produce a maximum power

[2] Application reference: GDBC/003/00001C-06

[3] Application reference 16/02167/FUL.

output of 72MW. It should be noted that the Riverside Energy Park Order 2020 made some minor modifications to the 2015 s.36 Variation and the 2017 Permission in order to dovetail the co-existence of both RRRF and REP (see **Section 3.1** for further details).

1.3 Terms and Definitions

1.3.1 For ease of reference the following terms have been used in the EIA Report:

- The Application Site – land within the redline boundary as shown on the location plan provided in **Figure 1** in **Appendix A.1** and described in **Chapter 2**;
- The Applicant – Riverside Resource Recovery Limited;
- The Proposed Changes – the changes for which permission is sought which are summarised at paragraph 1.1.4 above;
- Riverside Optimisation Project ('ROP') – Name of the project; and
- Riverside Resource Recovery Facility ('RRRF') – the existing energy recovery facility owned and operated by Riverside Resource Recovery Limited.

1.3.2 A full glossary of terms and definitions is provided in **Chapter 11**.

1.4 The Environmental Impact Assessment Report

1.4.1 This EIA Report has been prepared in accordance with the Electricity Works (Environmental Impact Assessment) (England and Wales) Regulations 2017 (as amended). **Chapter 4** outlines the EIA methodology undertaken in accordance with the EIA Regulations.

1.4.2 An EIA Scoping Report was prepared in December 2020 and submitted to the Secretary of State for BEIS to determine the extent of issues to be considered as part of the EIA and reported in the EIA Report (see **Appendix A.2**). A Scoping Opinion was provided by the Secretary of State for BEIS in February 2021 (see **Appendix A.3**) which has formed the basis of this EIA Report.

1.4.3 The EIA Report comprises the following volumes:

- **Volume 1**: Main Report (this document);
  - **Chapter 2**: describes the Application Site and surrounding area;
  - **Chapter 3**: summarises the Proposed Changes;
  - **Chapter 4**: outlines the methodology adopted to undertake the EIA;
  - **Chapter 5**: Air Quality technical assessment
  - **Chapter 6**: Biodiversity technical assessment;
  - **Chapter 7**: Climate Change technical assessment;
  - **Chapter 8**: Accidents and Disasters technical assessment;
  - **Chapter 9**: provides an assessment of impact interactions;
  - **Chapter 10**: provides a schedule of mitigation and monitoring; and

- **Chapter 11**: glossary of abbreviations used in the EIA Report.

- **Volume 2**: Appendices to the Main Report; and
- **Non-Technical Summary**.

1.4.4 The other principal documents submitted with the planning application include the:

- Planning Supporting Statement (PSS), incorporating Needs Assessment, Statement of Community Involvement, and Combined Heat and Power study.

1.5 Project Team

1.5.1 The planning and EIA work has been undertaken by the following:

- **Hendeca** – Planning
- **Fichtner Consulting Engineers** – Climate Change
- **Stantec UK Limited** – EIA Co-ordination, Major Accidents and Disasters, Air Quality and Biodiversity

1.5.2 In accordance with Regulation 17 of the EIA Regulations, the EIA is accompanied by a statement outlining the relevant expertise or qualifications of such experts. **Appendix A.4** provides details of the organisations and individuals who have contributed to this EIA Report and an outline of their relevant expertise.

2 Site Description and Existing Operations

2.1 Site Location

2.1.1 The site covers approximately 6 hectares (ha) of land located at National Grid Reference (NGR) TQ 49683 80665, accessed off Norman Road, Belvedere, London DA17 6JY in LBB (the 'Application Site'). An Application Site location plan is provided as **Figure 1** in **Appendix A.1**.

2.1.2 The Application Site is slightly different from the site referred to in the Original s.36 Consent and 2015 s.36 Variation in that a square area of land on the western side of Norman Road is now omitted from the redline boundary. This land was proposed, approved, and utilised, as construction compound area for RRRF. RRRF is now constructed and operational and no construction is proposed as part of ROP. Consequently, this land is no longer required for this Application.

2.2 Application Site Description

2.2.1 The Application Site comprises RRRF, the existing ERF building, the stack, air cooled condensers, and other ancillary plant. Land uses immediately adjacent to the site include an existing electrical substation, internal road network, gate house, flood embankment, existing jetty, ecological mitigation area and areas of existing hardstanding (currently used as contractor maintenance and container storage).

2.2.2 RRRF is located adjacent to the site of the consented Riverside Energy Park ('REP'). A Development Consent Order ('DCO') to construct and operate REP was granted by the Secretary of State for BEIS on 9th April 2020.

2.2.3 The Application Site is bounded to the north by the River Thames and the adjacent Thames Path National Trail.

2.2.4 Further north, on the opposite bank of the River Thames is an area characterised by manufacturing, including the Ford Motor Company works, and associated car and lorry parking.

2.2.5 Immediately east of RRRF and Norman Road is a large strategic industrial area, accessed via a junction at the southern end of Norman Road. This includes two distribution centres and a document storage facility. East of these are further warehouses, distribution centres and similar commercial developments.

2.2.6 West of RRRF is the Crossness Local Nature Reserve ('LNR'), a 25.5 ha LNR, which is part of the Erith Marshes Site of Metropolitan Importance for Nature Conservation ('SMINC'), containing a number of ditches, watercourses and ponds. The site is owned and managed by Thames Water. Beyond this lies the Crossness Sewage Treatment Works ('STW'). This operational STW includes settlement and sludge tanks, as well as a sludge powered generator where sludge is thermally treated and used to generate electricity. The Grade I listed Crossness Pumping Station, built by Sir Joseph Bazalgette, is located at the western end of the STW.

2.2.7 South of RRRF, to the east of the Crossness LNR and to the west of Norman Road, is a site owned by the Applicant with planning permission for a data centre.[4] Power for the data centre is expected to be provided via a private wire connection along Norman Road from RRRF or REP.

[4] Application reference: 15/02926/OUTM

2.2.8 South of Norman Road is the A2016, formed by the dual carriageway Picardy Manor Way at its junction with Norman Road (North), and by the dual carriageway Eastern Way, south of Crossness LNR. South of Picardy Manor Way is a recent development consisting of a pub and a Travelodge hotel building, along with five residential blocks. South of this is a residential area centred on North Road and Norman Road (South). Further south is the main area of Belvedere comprising residential dwellings, Belvedere railway station and retail outlets.

2.2.9 RRRF is accessed by river via the existing jetty, and by pedestrians and vehicles from Norman Road, a single carriageway road linking to the dual carriageway A2016 Picardy Manor Way.

2.2.10 The whole of LBB is designated as Air Quality Management Area ('AQMA') with respect to Nitrogen Dioxide (NO_2) and Particulate Matter (PM_{10}). The Application Site is also within the boundary of the Low Emission Zone ('LEZ'), however it is not within the proposed expansion of the Ultra-Low Emission Zone ('ULEZ'), which is due for expansion in October 2021.

2.2.11 In addition to the Crossness LNR and Erith Marshes SMINC identified above, there are a range of other ecological designations located in proximity to the Application Site, including Inner Thames Marshes Site of Special Scientific Interest (SSSI)/ LNR and Ingrebourne Marshes SSSI/LNR which are located 2km and 3km from the Application Site, respectively. Further information on the ecological designations located within 15km of the Application Site that have been considered in this EIA is outlined in **Chapters 5** and **6**.

2.3 Existing Operations

2.3.1 RRRF comprises an important, strategic river-served residual waste management facility for London. It helps the Capital to manage its own waste, keeping over 100,000 HGVs off congested roads each year and makes a significant contribution to London's ability to meet its landfill diversion targets.

2.3.2 RRRF became fully operational in 2011. It currently operates under the 2017 Permission (see **Section 1.2**) recovering energy from both municipal waste and commercial and industrial waste, with a current maximum throughput of 785,000 tpa. RRRF operates 24 hours a day and seven days per week throughout the year.

2.3.3 The processing of 785,000 tpa of waste results in the generation of approximately 480,000 Mega Watt hours (MWh) of electricity annually.

2.3.4 Over 85% of the waste currently being delivered to the plant arrives on barges along the River Thames from four safeguarded riparian waste transfer stations at Smugglers Way, Cringle Dock, Walbrook Wharf and Northumberland Wharf. Incinerator bottom ash ('IBA') produced during the combustion process is removed by barge to a facility in the Port of Tilbury for processing.

2.3.5 RRRF's operations are underpinned by long-term contracts with Western Riverside Waste Authority ('WRWA') and LBB, which account for in excess of 60% of waste inputs. Municipal waste is also received from Westminster City Council and the City of London. In the case of all of these contracts, residual waste (the waste remaining once recycling has been removed from the waste stream) is processed at the waste transfer stations and transferred to RRRF. Separate to treating residual waste streams, Cory Riverside Energy also processes recyclable waste through a major materials recovery facility at Smugglers Way, Wandsworth.

2.3.6 IBA and Air Pollution Control Residues (‘APCR’) which are produced during the combustion process and as part of the processing of emissions to control air pollution are also recycled and reused. The IBA is processed and used as secondary (replacement for natural material) aggregates in the construction industry. Typical re-uses of IBA as secondary aggregate include road construction filling. The APCR are transferred to silos and stored before being

taken off-site in tankers for recycling at specialist treatment facilities. Uses after processing include manufacture of construction ‘breeze blocks’.

3 Proposed Changes

3.1 Overview

3.1.1 The Application that Riverside Resource Recovery Limited is submitting to the Secretary of State under section 36C of the Electricity Act 1989 intends to:

- amend the power generation description of RRRF in the 2015 s.36 Variation to change the energy generation limit from 'up to 72MW' to 'up to '80.5MW';
- request that the Secretary of State then gives a direction under section 90(2) of the TCPA 1990 varying the conditions attached to the 2017 Permission to increase the maximum waste throughput from 785,000 tpa to 850,000 tpa; and
- amend the 2015 s.36 Variation and to incorporate into the new deemed planning permission the amendments authorised by the Secretary of State in the REP DCO regarding the ash storage area for RRRF and use of the jetty by both RRRF and REP

together, the 'Proposed Changes'.

3.1.2 Upgrades to RRRF's operational control system mean that the facility can now process additional waste and recover more energy than was previously possible. This technical advancement makes RRRF more efficient. The Proposed Changes will ensure internal plant optimisation and can be undertaken without requiring any physical re-development on-site or changes to existing processes. No construction or demolition activities are required.

3.1.3 The upgrades comprise the implementation of an upgraded Combustion Control System (CCS) within the overall existing control system at RRRF. The CCS interacts with the existing operational control system, using an improved logic formula and allowing existing systems to operate more efficiently. The upgraded CCS will provide improved combustion controls, modifications to the steam circuit, and adjustments to the generator and turbine software. Further information on upgrades to the system is provided in **Chapter 8: Accidents and Disasters**.

3.1.4 The four riparian wharves (described at 2.3.4 above) all have the capability to handle larger quantities of waste than currently managed without variation to either the existing planning permissions or Environmental Permits. The river transport connecting the four riparian wharves to RRRF also has capacity to transport additional waste without increasing the number of river-borne movements. The ROP application proposes that the additional waste throughput will be delivered by one additional barge per week and requires no additional tug movements.

3.1.5 As a result of the increase in waste being treated, there will be a proportionate increase in the consumables/ process outputs that require transport into and out of RRRF:

- Air Pollution Control Residue ('APCR') – This would be transported by road for recycling. It is anticipated that this will result in an extra 90 movements per year, approximately 2 movements per week;
- Incinerator Bottom Ash ('IBA') – This would be transported by barge utilising existing tug movements to the Port of Tilbury. Therefore, no increase in existing tug movements would result from exporting additional IBA from the RRRF site;
- Powdered Activated Carbon ('PAC') – This would be transported by road and equate to 1 additional load per year (20 tonne tanker);

- Lime – This would be transported by road and equate to 25 additional loads per year (20 tonne tanker); and

- Ammonia - This would be transported by road and equate to 3 additional loads per year (20 tonne tanker).

3.1.6 The ROP application does not propose to amend any of the existing conditions attached to the 2017 Permission, including the vehicle movements restrictions. This is because the transport of any additional inputs and outputs to and from RRRF can be accommodated within the existing limits already imposed on road transport movements through the 2017 Permission. In addition to this, since the RRRF was opened in 2011, it is noted that there has not been a jetty outage that has required the transport of 100% of waste by road.

3.1.7 Consequently, ROP requires no change to the method of residual waste delivery to RRRF nor the method that post-combustion residues are exported from site.

3.1.8 Also included in this application is a request that the amendments made by the Secretary of State in the REP DCO to the 2015 s.36 Variation and the 2017 Permission are carried through into any new s.36 variation and deemed planning permission that the Secretary of State may grant having considered this application.

3.1.9 Article 6(3) of the REP DCO provides that the 2015 s.36 Variation and the 2017 Permission *"are to be amended for the purposes of this Order only as set out in Schedule 13 (modifications to the section 36 consent and RRRF planning permission)."* On a strict interpretation of this Article, the amendments provided for in Schedule 13 to the REP DCO have not been made in a general sense, rather they have only been authorised in the context of the REP DCO. Given the nature of the amendments in Schedule 13, there is no reason why those amendments should not be made directly into any new s.36 variation and deemed planning permission that the Secretary of State may grant.

3.1.10 The REP DCO authorised amendments in two areas:

A.1.1 **Ash storage** - When RRRF was applied for, the operating assumption was that there may be a requirement for bottom ash to be stored in both RRRF's bunker plus above ground in containers. For this reason, the plans (drawing number D2.4A of the original application (which is provided in **Appendix A.5** - see **Appendix A.6** for Drawing D1.2 which shows application boundary of the RRRF) and REP Works Plan Sheet 2 (provided in **Appendix A.7**)), identified a location for the above ground storage area and it formed part of the description of development on the 2015 s.36 Variation. However, since first operation, RRRF has operated by storing the bottom ash (before it is transported from RRRF) solely in its dedicated bunker. It was confirmed in the Examination to the REP DCO (see, for example, the Applicant's response to comments on the draft Development Consent Order (Examination Library reference REP5-025) that RRRF's bunker has the capacity to hold up to approximately 7 days' worth of ash and that no separate storage area has ever been used or required. As a result, the unused above ground ash storage area for RRRF formed part of the Order limits for REP, which has now been approved by the Secretary of State. With the above ground storage area being a redundant part of the 2015 s.36 Variation and the 2017 Permission, as has already been accepted by the Secretary of State in his determination of the REP DCO, the following amendments were authorised by the Secretary of State in the REP DCO to the 2015 s.36 Variation and the 2017 Permission. For the reasons expressed in paragraph 3.1.5 above, it is requested that these same amendments be made to any new s.36 variation and deemed planning permission that the Secretary of State may grant, being:

  - Delete "associated open storage areas for ash container storage" in paragraph 2(f) of the 2015 s.36 Variation;

  - For condition 23 in the 2017 Permission, substitute new condition 23 as follows "23. Bottom ash shall only be stored in the bunkers to the development hereby approved."

These amendments were authorised through Article 6(3) of the REP DCO. Given the fact that these amendments simply reflect how RRRF currently operates, is an environmental improvement on what was originally assessed in the environmental statement to RRRF as the new condition 23 restricts the storage of bottom ash to the bunkers only, and the REP DCO authorises REP to be constructed on what would have been the area for above ground ash storage, it is considered entirely appropriate for the Secretary of State to incorporate these amendments into any new s.36 variation and deemed planning permission that the Secretary of State may grant. Failure to do so, would be to grant a new s.36 variation and deemed planning permission that is inconsistent with the current operations of RRRF and the extant planning position of the site.

A.1.2 **Use of the Jetty** – condition 7 of the 2017 Permission states:

"Except during periods of jetty outage or emergency the jetty and pier shall remain available at all times for tugs and barges transporting waste, residual materials following incineration, and consumables necessary for the operation of the development and for no other purpose unless with the prior written consent of the Council." (our emphasis)

To make it clear, at the request of the London Borough of Bexley during the Examination into the REP DCO, that the words underlined would not prevent the use of the jetty by REP, the REP DCO amends condition 7 of the 2017 Permission to make it clear that the restriction excludes REP. Article 6(3) of the REP DCO therefore amends condition 7 by inserting the words "(except for the development authorised by the Riverside Energy Park Order 2020)" after the words "for no other purpose." As the REP DCO has been made by the Secretary of State on the basis of an environmental assessment that assessed the use of the jetty by both RRRF and REP, it is requested in this application that the same amendment be made in any new deemed planning permission given that would reflect the extant planning position of the site.

3.1.11 The amendments described above that were authorised through the REP DCO have not been assessed as part of this EIA Report for ROP, and indeed do not need to be assessed, because they reflect the baseline for how the RRRF is currently operating given the current arrangements for ash storage at the RRRF, and the fact that the REP DCO was made by the Secretary of State based on an environmental assessment that assessed the use of the jetty by both RRRF and REP. Therefore, no environmental effects will arise as a result of these amendments that need to be assessed as part of this EIA Report.

3.2 Consideration of Alternatives

3.2.1 Schedule 4 of the EIA Regulations sets out the minimum requirements as to the content of an EIA Report. Paragraph 2 of this Schedule and Regulation 17(1)(d) require that details of the reasonable alternatives considered are set out. Paragraph 2 of Schedule 4 states that: *"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 development and its specific characteristics and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects".*

3.2.2 This legal requirement is expressed in general terms, requiring only the inclusion of *"reasonable"* alternatives that were considered and an *"indication"* of the *"main"* reasons for choosing one over others. Although a full description of alternatives and a full assessment of their likely environmental effects are not required, sufficient detail should be provided to allow for a meaningful comparison between the alternatives and the project.

3.2.3 It is a matter for the applicant to decide which alternatives it intends to consider and the EIA Regulations do not expressly require that an applicant considers alternatives, although it is a feature of EIA.

3.2.4 As outlined in **Section 3.1** above, there will not be any physical re-development on-site or changes to existing processes as a result of ROP, nor will it require any construction or demolition activities. The Proposed Changes relate to increasing the waste throughput and energy generation limit of the existing RRRF to take advantage of the internal upgrades to the operational control system that have happened since the current consents that RRRF operates under were granted, and as such no other alternatives have been considered. Given these circumstances, it is considered that there are no reasonable alternatives to the Proposed Changes being sought.

3.2.5 A Planning Support Statement including a Needs Assessment (Hendeca, 2021) has been prepared and submitted with the ROP application. The Need Assessment outlines the need for ROP and why this is a beneficial alternative to landfilling the waste.

4 Assessment Methods

4.1 Introduction

4.1.1 This Chapter describes the process by which the EIA has been carried out. It includes a discussion of the relevant regulations, the EIA process, consultation and the over-arching assessment methods applied. Details of the technical method followed for each topic are presented in each of the **Chapters 5-8** as appropriate.

4.2 EIA Regulations

4.2.1 The process of EIA is governed by the EIA Regulations. The EIA Regulations implement EC Directive 85/337/EEC, as amended, into domestic legislation. The initial Directive and its amendments have been codified by Directive 2014/52/EU. This Directive was enacted in the UK on 16 May 2017 to form the 2017 EIA Regulations.

4.2.2 The EIA Regulations set out the procedures for undertaking an EIA and the information which is required in an EIA Report. The procedure outlined in the EIA Regulations has been followed in this assessment.

4.2.3 In general terms, the main stages in the EIA process are as follows:

- Screening – determining the need for EIA;
- Scoping – identify significant issues, determining the scope of the EIA;
- Data review – draw together and review available data;
- Baseline surveys – undertake baseline surveys and monitoring;
- Assessment and iteration – assess likely significant effects of development, evaluate alternatives, provide feedback to design team on potential adverse impacts, modify development, incorporate mitigation (including potential monitoring and long-term management), assess effects of mitigated development; and
- Preparation of the EIA Report.

4.2.4 It should also be noted that consultation with relevant stakeholders has been undertaken within the EIA process, namely at the EIA Scoping stage (see **Section 4.4** below).

4.3 Screening and Scoping

4.3.1 No formal screening exercise has been undertaken. Riverside Resource Recovery Limited has voluntarily undertaken an EIA for ROP, which is documented in this EIA Report, in compliance with the requirements of the EIA Regulations.

4.3.2 An EIA Scoping Opinion was sought from the Secretary of State for BEIS on 18th December 2020. The request was supported by an EIA Scoping Report which set out information on the Application Site, ROP, the topics it was proposed would be assessed as part of the EIA, the methodology for the assessment and those topics that it was proposed would be scoped out of the EIA. A copy of the EIA Scoping Report is provided in **Appendix A.2**.

4.3.3 An EIA Scoping Opinion was received from the Secretary of State for BEIS on 18th February 2021 which is provided in **Appendix A.3**. In order to prepare the Scoping Opinion and in accordance with regulation 18 of the EIA Regulations, the Secretary of State consulted key stakeholders, a list of whom was provided by the Applicant when the request for an EIA Scoping Opinion was submitted. These consultees were:

- BEIS
- London Borough of Bexley (LBB)
- Greater London Authority (GLA)
- The Environment Agency
- Natural England
- The Port of London Authority
- Historic England
- The London Fire Service
- Highways England
- Public Health England
- Royal Borough of Greenwich
- London Borough of Havering
- London Borough of Barking and Dagenham
- London Borough of Tower Hamlets (LBTH)
- Kent County Council
- The Health and Safety Executive
- Thames Water Utilities (Crossness Nature Reserve)
- Historic England
- Friends of Crossness Nature Reserve
- Bexley Clinical Commissioning Group

4.3.4 **Table 4.1** below provides a summary of key issues raised by consultees and corresponding responses.

Table 4.1: Summary of EIA Scoping Responses

Consultee	Comment	Response
Historic England	Historic England have stated that they do not have any observations to make in relation to the Scoping Opinion submission.	Comment noted and welcomed.
Historic England (Archaeology	*"…Happy to support the archaeological assessment submitted within the EIA Scoping Report dated December 2020,*	Comment noted and welcomed.

Consultee	Comment	Response
only)	*Appendix B:* *"ROP would not result in physical changes to the existing RRRF footprint or involve any intrusive groundworks, it is therefore considered that there would be no new or different likely significant effects than as for the existing operational RRRF."*	
Highways England	*"…Having reviewed the scoping report, we note that Traffic and Transport has been scoped out of an EIA, on the basis that the movements required to remove the additional APCR of approximately 90 vehicle movements a year (1.73 movements a week) would not result in significant effects to the local road network.* *We understand the proposed development is not considered to give rise to significant environmental effects on the local population in relation to transport, noise, air quality, and /or accidents. Having reviewed the scoping note and the proposals it is unlikely that the development will negatively impact the SRN. We have no further comments on this proposal at this time and look forward to being consulted in future."*	Comment noted and welcomed.
LBTH	*"…LBTH considers that the effect of the Proposed Development on vehicle movements and the consequential effects on air quality, should be scoped into the ES, unless sufficient justification and evidence can be provided that the Proposed Development is unlikely to result in significant effects. LBTH consider this should include assessment of an 100% of waste delivered by road scenario."*	Air Quality has been scoped into the EIA in relation to consideration of stack emissions only and not in relation to vehicle movements (the justification for this is explained below). The assessment is presented in **Chapter 5: Air Quality**. As identified in the EIA Scoping Report, it is not proposed that any of the existing conditions attached to the 2017 Permission that restrict vehicle movements would be amended as part of ROP. This is because the transport of any additional inputs and outputs to and from RRRF can be accommodated within existing limits imposed on road transport movements by the 2017 Permission. As such transport

Consultee	Comment	Response
		has not been included in the scope of the EIA. Since the RRRF was opened in 2011, there has not been a jetty outage that has required the transport of 100% of waste by road and therefore it is considered that it would be disproportionate to include assessment of the 100% waste delivered by road scenario.
Health and Safety Executive	HSE has not commented on the scope of the EIA Report but has provided information to the Applicant. HSE has identified that there is one major accident hazard site within the proposed application boundary of RRRF. The major accident hazard site is H0260 operated by Nufarm UK Ltd, Crabtree Manorway	The location of ROP is the RRRF which is an existing operational EfW facility. ROP will not result in any construction of new development, only internal upgrades to systems, and will not result in any changes to existing processes and procedures (e.g. health and safety procedures) (see **Chapter 8: Accidents and Disasters** for further details).
The Port of London Authority	The Port of London Authority have confirmed that they agree with the assessment presented in the EIA Scoping Report that it is not considered that ROP would result in significant effects to the navigational safety of the River Thames.	Comment noted and welcomed.
GLA	The GLA has raised concerns regarding the need for more energy from waste incinerators and the impacts this may have on meeting recycling targets and energy and climate change policies in London. They have also noted the need for commitments to deliver a heat network. In relation to the EIA, they have also noted that “It is essential that the EIA includes a full assessment of the impact on local air quality as well as the additional carbon emissions resulting from the proposal in light of national and London’s own carbon budgets, and how the additional heat will be captured to enable a heat network allowing the facility to produce energy more efficiently and reduce carbon emissions.	The Planning Statement considers the need for ROP and its role within the waste hierarchy (i.e. EfW is considered to be preferable to landfill). As outlined in the Planning Statement, ROP is demonstrated to sit at the correct level of the waste hierarchy; diverting residual waste from landfill, the likely destination for such wastes after practicable opportunities for recycling. Evidence submitted to the REP DCO examination and discussed within the Planning Statement shows that, even following consent for REP, there remains a policy driven need for new residual waste management capacity to sustainably manage those wastes that remain after high recycling

Consultee	Comment	Response
	Furthermore, measures to ensure the additional waste throughput is truly non-recyclable and that the majority of the waste continues to be transported by river [sic].”	targets are assumed to have been met. ROP will make a significant contribution to enabling London to be self-sufficient, taking its waste out of landfill and into energy recovery, keeping those wastes at their highest value within the waste hierarchy for as long as possible. In addition to energy recovery, secondary materials (including metals and construction aggregates) are recovered at RRRF, reducing the need for raw supply and avoiding the associated burdens of the extraction industries. In relation to commitments to deliver a heat network, Cory has partnered with Vattenfall, with the aim of developing one of the largest district heating networks in the UK. The district heating network proposals were recently granted funding through the BEIS Heat Networks Investment Scheme and will connect RRRF with residential, commercial, retail and industry properties in the London Borough of Bexley and the Royal Borough of Greenwich. Over the long term, the scheme has the potential to deliver low to zero carbon heat supply to a network of up to 30km and with a heat scale equivalent of 75,000 homes. The air quality and climate change assessments are presented in **Chapter 5** and **Chapter 7** of this EIA Report, respectively. These assessments identify that no significant effects are anticipated in relation to air quality and climate change (as a result of carbon emissions). In relation to the additional waste throughput, the existing RRRF only processes residual waste and this will also be the case for the additional waste processed as part of ROP. As outlined in **Section 3.1** above, the ROP application does not propose to amend the existing

Consultee	Comment	Response
		vehicle movement restriction conditions attached to the 2017 Permission as waste can be transported within the existing transportation limits.
Friends of Crossness Nature Reserve	Friends of Crossness Nature Reserve noted that they consider most of the activities involve air quality/transmissions and some road traffic movements, none of which they consider will have a significant impact on the terrestrial bio-diversity of the nature reserve.	Comment noted and welcomed.
LBB	LBB noted that they are largely in agreement to the proposed scope of the EIA. LBB commented that Accidents and Disasters should be scoped into the EIA due to risks of pushing equipment well beyond their original design criteria. LBB also made reference to updates required in relation to Biodiversity assessment and Table 8.5: Identified Terrestrial Biodiversity Receptors of the EIA Scoping Report, to ensure that all local receptors have been considered	Further information on Accidents and Disasters is provided in **Chapter 8**. As identified in **Chapter 8**, given the proposed upgrades to the system, it is not anticipated that equipment will be pushed beyond their design criteria and it is not anticipated that this will result in likely significant effects in relation to major accidents and disasters. Biodiversity comments are addressed in **Chapter 6: Biodiversity**.

4.3.5 The EIA has given due regard to the issues raised by the consultees and the feedback provided by consultees is gratefully acknowledged.

4.4 Assessment Assumptions

4.4.1 The following assumptions have been used to ensure that the EIA provides a robust assessment of likely significant effects of ROP:

- throughput of RRRF would increase by approximately 8% from 785,000 tpa to 850,000 tpa;
- the physical massing and footprint of RRRF would remain unchanged;
- there would be no amendments to any emission abatement technology at RRRF;
- existing planning conditions attached to the 2017 Permission (as slightly modified by the Riverside Energy Park Order 2020) relating to vehicle movements (Condition 27 and Condition 28) would be retained;

- no additional tug movements will be required;
- the assessment of likely significant cumulative effects has assumed that the committed developments identified in **Section 4.7** will be built out as set out in the documents supporting these applications; and
- current planning conditions attached to the 2017 Permission (as slightly modified by the Riverside Energy Park Order 2020) will still be applicable, save in respect of Condition 4 (total tonnage limit).

4.5 Uncertainty and Limitations

4.5.1 The prediction of future effects inevitably involves a degree of uncertainty. Where necessary, the technical chapters describe the principal factors giving rise to uncertainty in the prediction of likely environmental effects and the degree of the uncertainty.

4.5.2 Confidence in the predictions has been achieved by employing accepted assessment methodologies, in particular the Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM, 2018). Uncertainty inherent within the predictions has been described in topic chapters.

4.5.3 Further limitations in preparing this EIA Report are noted in each of the technical chapters, as appropriate, in **section x.4** of each technical chapter.

4.6 Assessing Effects

Establishing Baseline Conditions

4.6.1 A range of data collection exercises have been used to identify environmental conditions at the Application Site and in the surrounding area to provide a basis for the subsequent assessment work. The surveys undertaken are reported in each of the technical topic chapters.

4.6.2 It should be noted however that some of the technical data and assessments on which this EIA is based are too detailed for incorporation into Volume 1 of this EIA Report (such as detailed air quality modelling results). In such instances, the technical data and assessment reports are provided in full as an appendix to this EIA Report (**Volume 2**), with a relevant summary and the reference for the full data set or assessment provided in Volume 1 of this EIA Report. The geographical scope of these data sources and assessments has been based on the likelihood for significant effects in accordance with the scoping exercise summarised in **Section 4.3** above, and in accordance with relevant guidance.

4.6.3 The EIA has assessed the likely significant effects of the ROP against baseline conditions in the same year (i.e. providing an assessment of the 'do something' scenario against a 'do nothing' scenario for the future baseline year of 2021). Each chapter has considered as appropriate the likely evolution of current baseline conditions should ROP not proceed and has therefore used future baseline conditions within the assessment of effects. The existing and future baseline conditions are described in **section x.5** of each technical topic chapter.

Assessing Operational Effects

4.6.4 Given the nature of ROP, no construction or demolition activities are required. There are no proposed changes to the decommissioning regime for RRRF and therefore the assessment of effects associated with decommissioning have been scoped out of the EIA.

4.6.5 The EIA will therefore only consider the potential for significant effects during the operation of ROP. Environmental effects that occur during the operation of ROP will typically be

permanent or “long-term”. The assessment has been undertaken for ROP on the assumption that it will be operational in 2021.

Assessment of Cumulative Effects

4.6.6 The EIA Regulations require the assessment to consider the likely significant effects of ROP in the context of other existing and/or approved projects, as well as the cumulative effects that may result from ROP and these other developments.

4.6.7 Schedule 4, paragraph 5(1)(e) of the EIA Regulations state that a description of the likely significant effects of the development on the environment from “*the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources”* should be included within an EIA Report.

4.6.8 Approved developments are considered to be planning permissions that are partially built out and extant planning permissions. When identifying approved developments that have the potential to result in significant cumulative effects with ROP, consideration has been given to the type of effects that have been identified as having potential for significant effects to occur and have been scoped into the EIA. The effects which have been scoped into the EIA are predominantly associated with the potential impacts of changes to the emission characteristics of the RRRF as a result of the Proposed Changes (e.g. in relation to effects on air quality, biodiversity, climate change).

4.6.9 As outlined above, the RRRF is located adjacent to the site of the consented REP. As such the cumulative effects of ROP and REP have been considered within this EIA Report. Likely cumulative effects are outlined in **section x.8** of each of the technical chapters. Only cumulative effects with REP have been considered given that other approved developments, such as the neighbouring approved application for a Data Centra (reference: 15/02926/OUTM), are not anticipated to cause emissions that would result in potential significant cumulative effects with ROP (e.g. in relation to air quality impacts) or result in significant effects in relation to accidents and disasters.

4.7 Mitigation and Enhancement

4.7.1 The incorporation of mitigation measures, which are measures to avoid, minimise or compensate for the adverse effects of a development, is an integral part of the design and EIA processes. The EIA Regulations (paragraph 7, Schedule 4) require an EIA Report to contain: *“a description of the measures envisaged to avoid, prevent or reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example, the preparation of post-development analysis)”*.

4.7.2 As part of the design process, suitable mitigation measures have been incorporated into the ROP to mitigate potentially significant environmental effects (such as in relation to air quality and emission limit values). This mitigation is termed "embedded mitigation" and has been considered within each of the topic chapters in this EIA Report. The embedded mitigation relevant to each topic is set out within each topic chapter.

4.7.3 Further mitigation measures have also been identified through the EIA process, where necessary and appropriate. Where required, such mitigation measures are identified in this EIA Report along with how it is proposed that they be secured.

4.7.4 A hierarchy of methods for mitigating significant adverse effects has been followed; these are, in order of preference:

- Avoidance – designing a development in such a way that avoids effects on the environment (e.g. siting development away from sensitive receptors);

- Reduction – designing the development such that significant effects identified are reduced (e.g. implementing emission limit values for pollutants);
- Compensation – providing off-site enhancement in order to compensate for where onsite mitigation has not been possible (e.g. provision of off-site habitat improvement measures); and
- Enhancement - opportunities that the development may provide to enhance the local and wider environment (e.g. measures included to support biodiversity net gain).

4.7.5 Environmental effects remaining after mitigation measures have been incorporated are termed "residual effects" and these are fully described in the EIA Report.

4.8 Impact Interactions

4.8.1 **Chapter 9** provides the assessment of impact interactions, i.e. receptors being affected by more than one environmental effect and therefore potentially being subject to a more significant combined effect than the individual effects reported in each of the topic chapters.

4.8.2 The approach adopted for the assessment is in accordance with the methodology set out above, with further details provided in **Chapter 9**.

4.8.3 **Chapter 10** therefore provides an overall summary of the effects of the ROP during operation.

4.9 Type of Effects

4.9.1 In assessing the significance of effects identified during the EIA, account has been taken as appropriate as to whether effects are:

- Direct Effects – effects that are caused by activities that are an integral part of ROP;
- Indirect Effects – effects arising indirectly from the operation of ROP;
- Secondary Effects – are 'knock-on'/one-removed effects arising in consequence of indirect effects;
- Cumulative Effects – many effects that singly are not significant may be significant when assessed together with other effects. There may also be cumulative effects of ROP and other approved local developments;
- Short-Term and Medium-Term – environmental effects that would generally occur for 1-10 years will typically be Short or Medium Term;
- Long-Term – environmental effects that occur during the operation of a project or for a period of more than 10 years will typically be Long Term;
- Temporary Effects – environmental effects that occur for a set period of time that does not cover the entire project lifecycle will typically be temporary;
- Permanent Effects – environmental effects that occur during the operation of a project will typically be permanent;
- Positive Effects – effects that have a positive influence on the environment; and
- Negative Effects – effects that have a negative influence on the environment.

4.9.2 For clarity within the assessment, ‘impact’ has been used in relation to the outcome of the project (e.g. the generation of emissions to air), while the ‘effect’ has been the consequent

implication in environmental terms (continuing the above example, e.g. the reduction in local air quality).

4.10 Significance Criteria

4.10.1 The significance of an effect is typically the product of two factors: the sensitivity of the environmental resource affected; and the magnitude of the impact. Consideration may also need to be given to the likelihood of an effect occurring.

4.10.2 Specific significance criteria will be prepared for each specialist topic as appropriate, but will broadly be based on generic criteria set out in **Table 4.2** below.

Table 4.2: Significance criteria

	Significance Level	Criteria
Significant	Substantial	These effects are assigned this level of significance as they represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites and features of national or regional importance. A change at a borough scale site or feature may also enter this category.
	Major	These effects are likely to be important considerations at a local or district scale and may become key factors in the decision-making process.
	Moderate	These effects, while important at a local scale, are not likely to be key decision-making issues. Nevertheless, the cumulative effect of such issues may lead to an increase in the overall effects on a particular area or on a particular resource.
Not Significant	Minor	These effects may be raised as local issues but are unlikely to be of importance in the decision-making process. Nevertheless, they are of relevance in enhancing the subsequent design of the project and consideration of mitigation or compensation measures.
	Negligible	Either no effect or effect which is beneath the level of perception, within normal bounds of variation or within the margin of forecasting error. Such effects should not be considered by the decision-maker.

4.10.3 Effects that are described as ‘substantial’, ‘‘major’ or ‘moderate’ are determined to be *significant*; and effects that are described as ‘minor’ or ‘negligible’ are determined to be *not significant* in the context of the EIA Regulations.

4.11 Monitoring

4.11.1 The EIA Regulations introduce the requirement for the monitoring of significant adverse environmental effects where appropriate and require that proposed monitoring is set out in an EIA Report.

4.11.2 Each chapter of the EIA Report therefore identifies the proposed monitoring arrangements for that topic. As stated in Regulation 33(3) of the EIA Regulations *“the type of parameters to be monitored and the duration of the monitoring must be proportionate to the nature, location and size of the development and the significance of its effects on the environment.”*

4.11.3 A summary of mitigation and monitoring requirements identified in each topic chapter is provided in **Chapter 10**.

5 Air Quality

5.1 Introduction

5.1.1 This Chapter presents the findings of the assessment of the likely significant effects from the ROP (as outlined in **Chapter 3**) with respect to air quality. The purpose of this Chapter is to describe and evaluate any likely significant air quality effects and classify them according to relevant national, regional and local guidance and regulations.

5.1.2 As detailed in the Scoping Opinion, the ROP (as outlined in **Chapter 3**) is not anticipated to have the potential to result in likely significant effects as a result of emissions due to traffic movements or odour from waste handling. Therefore, this Chapter only considers the potential effect of changes due to ROP on the impact of emissions to air from the main stack serving the thermal waste treatment process.

5.1.3 This Chapter has been prepared by Stantec. In accordance with Regulation 17 of the Electricity Works (Environmental Impact Assessment) (England and Wales) Regulations 2017 (as amended) a statement outlining the relevant expertise and qualifications of competent experts appointed to prepare this EIA Report is provided in **Appendix A.4**.

5.2 Policy, Legislation, Guidance and Standards

Air Quality Regulations (AQR)

5.2.1 The Air Quality (England) Regulations 2000 defined National Air Quality Objectives (NAQOs); a combination of concentration-based thresholds, averaging periods and compliance dates for a range of pollutants. Subsequent amendments in 2001 and 2002 incorporated 'limit values' and 'target values' for a wider range of pollutants as defined in EU Directives.

5.2.2 These amendments were consolidated by the Air Quality Standards Regulations 2010 ('AQSR') (with subsequent amendments, most notably in 2016 and for the devolved administrations), which transposed the European Union's (EU) Directive on ambient air quality and cleaner air for Europe (2008/50/EC).

5.2.3 Following the Transition Period after the UK's departure from the EU in January 2020, the Air Quality (Amendment of Domestic Regulations) (EU Exit) Regulations 2019 (and subsequent amendments for the devolved administrations) have amended the AQSR 2010 to reflect the fact that the UK has left the EU. This does not change the pollutants assessed or the numerical thresholds.

National Air Pollution Plan for NO_2 in the UK

5.2.4 The National Air Quality Plan for NO_2 (DEFRA, 2018)[5] sets out how the Government plans to deliver reductions in NO_2 throughout the UK, with a focus on reducing concentrations to below the EU Limit Values throughout the UK within the 'shortest possible time'.

5.2.5 The plan requires all Local Authorities ('LAs') in England which DEFRA identified as having exceedances of the Limit Values in their areas after 2020 to develop local plans to improve air quality and identify measures to deliver reduced emissions, with the aim of meeting the Limit Values within their area within "*the shortest time possible*". Potential measures include changing road layouts, encouraging public and private ultra-low emission vehicle ('ULEV') uptake, the use of retrofitting technologies and new fuels and encouraging public transport. In

[5] Department of the Environment, Food and Rural Affairs (DEFRA) (2017). 'UK Plan for tackling Roadside Nitrogen Dioxide Concentrations: Detailed Plan'. Available at: https://www.gov.uk/government/publications/air-quality-plan-for-nitrogen-dioxide-no2-in-uk-2017

cases where these measures are not sufficient to bring about the required change within *'the shortest time possible'* then LAs may consider implementing access restrictions on more polluting vehicles (e.g. Clean Air Zones ('CAZs')). A CAZ is defined within the plan as being "*an area where targeted action is taken to improve air quality and resources are prioritised and coordinated in a way that delivers improved health benefits and supports economic growth*" and may be charging or non-charging.

Air Quality Management

The Air Quality Strategy

5.2.6 Part IV of the Environment Act 1995 required the Secretary of State to prepare and publish a 'strategy' regarding air quality.

5.2.7 The UK Air Quality Strategy ('UKAQS')[6] establishes the policy framework for ambient air quality management and assessment in the UK (DEFRA, 2007). The primary objective of the Air Quality Strategy is to ensure that everyone can enjoy a level of ambient air quality which poses no significant risk to health or quality of life. The Air Quality Strategy sets out the NAQOs and Government policy on achieving these.

5.2.8 The Clean Air Strategy[7] aims to lower national emissions of pollutants, thereby reducing background pollution and minimising human exposure to harmful concentrations of pollution. The Strategy aims to create a stronger and more coherent framework for action to tackle air pollution (DEFRA, 2019a).

Local Air Quality Management

5.2.9 Part IV of the Environment Act 1995 introduced a system of Local Air Quality Management ('LAQM') which requires LAs to regularly and systematically review and assess air quality within their boundary and appraise development and transport plans against these assessments.

5.2.10 Where a NAQO is unlikely to be met, the local authority must designate an Air Quality Management Area ('AQMA') and draw up an Air Quality Action Plan ('AQAP') setting out the measures it intends to introduce in pursuit of the NAQO's within its AQMA.

5.2.11 The Local Air Quality Management Technical Guidance 2016[8] (LAQM.TG)(16); DEFRA, 2018 provides advice on where the NAQOs apply. These include outdoor locations where members of the public are likely to be regularly present for the averaging period of the objective (which vary from 15 minutes to a year) as summarised in **Table 5.1**.

[6] Department of the Environment, Food and Rural Affairs (DEFRA) in partnership with the Scottish Executive, The National Assembly for Wales and the Department of the Environment for Northern Ireland (2007). 'The Air Quality Strategy for England, Scotland, Wales, Northern Ireland' HMSO, London

[7] Department of the Environment, Food and Rural Affairs (DEFRA) (2019). 'Clean Air Strategy 2019'

[8] Department of the Environment, Food and Rural Affairs (DEFRA) (2018). Local Air Quality Management – Technical Guidance (TG16), 2018.

Table 5.1: Relevant Public Exposure

Averaging Period	NAQOs should apply at:	NAQOs don't apply at:
Annual mean	All locations where members of the public might be regularly exposed. For example: Building façades of residential properties, schools, hospitals, care homes etc.	Façades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residences Kerbside sites Any other location where public exposure is expected to be short term.
24-hour mean and 8-hour mean	All locations where the annual mean NAQO would apply, together with hotels and gardens of residences.	Kerbside sites Any other location where public exposure is expected to be short term.
1-hour mean	All locations where the annual mean and 24 and 8-hour mean NAQOs apply as well as: Kerbside sites Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more. Any outdoor locations where members of the public might reasonably be expected to spend one hour or longer.	Kerbside locations where the public would not be expected to have regular access.
15-minute mean	All locations (including those above) where members of the public might reasonably be regularly exposed for a period of 15 minutes or longer.	Locations where members of the public would not reasonably expected to be regularly exposed for a period of 15 minutes or longer.

Terrestrial Biodiversity Sites

5.2.12 The Conservation of Habitats and Species Regulations (2017) 'Habitat Regulations', transposed the Habitats Directive (European Council Directive 92/43/EEC) in England and Wales. The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 (Statutory Instrument, 2019) amends the 2017 Regulations to reflect the UK's departure from the EU and came into force following the end of the Transition Period in December 2020.

5.2.13 The Habitats Regulations primarily provide measures for the protection of European Sites and European Protected Species, but also require local planning authorities to encourage the management of other features that are of major importance for wild flora and fauna. Special

Areas of Conservation ('SACs') are designated under these Regulations, as are Special Protection Areas ('SPAs').

5.2.14 The Habitats Regulations require the competent authority firstly to evaluate whether the development has the potential to give rise to a "*likely significant effect*" and where this is the case, an "*appropriate assessment*" is required to determine whether the development will adversely affect the integrity of the site.

5.2.15 Sites of national importance may be designated as Sites of Special Scientific Interest ('SSSIs') and improved provisions for the protection and management of SSSIs (in England and Wales) were introduced by the Countryside and Rights of Way ('CROW') Act 2000. If a development is "*likely to damage*" a SSSI, the CROW Act requires that a relevant conservation body (i.e. Natural England) is consulted. The CROW Act also provides protection to local nature conservation sites, which can be particularly important in providing 'stepping-stones' or 'buffers' to SSSIs and other sites designated under the Habitat Regulations.

Critical Levels

5.2.16 Critical levels are a quantitative estimate of exposure to one or more airborne pollutants in gaseous form, below which significant harmful effects on sensitive elements of the environment do not occur, according to present knowledge.

5.2.17 Critical levels for nitrogen oxides ('NOx') and sulphur dioxide (SO_2) for the protection of vegetation and ecosystems have been set by the UK Government within the AQSR. Natural England applies them to all internationally designated conservation Sites and SSSIs.

Critical Loads

5.2.18 Critical loads for nitrogen deposition onto sensitive ecosystems have been identified by the United Nations Economic Commission for Europe ('UNECE'). They are defined as the amount of pollutant deposited to a given area over a year, below which significant harmful effects on sensitive elements of the environment do not occur, according to present knowledge.

5.2.19 Empirical critical loads for eutrophication (derived from a range of experimental studies) are assigned for different habitats, including grassland ecosystems, mire, bog and fen habitats, freshwaters, heathland ecosystems, coastal and marine habitats and forest habitats. These can be obtained from the UK Air Pollution Information System ('APIS') website (APIS, 2020)

5.2.20 Critical loads for acidification have been set in the UK using an empirical approach for non-woodland habitats on a 1km grid square based upon the mineralogy and chemistry of the dominant soil series present in the grid square, and the simple mass balance ('SMB') equation for both managed and unmanaged woodland habitats. These can be obtained from the UK Air Pollution Information System ('APIS') website (APIS, 2020).

Environmental Permitting Regulations (EPR)

5.2.21 The Environmental Permitting Regulations 2010 ('EPR') transposed the Industrial Emissions Directive (2010/75/EU) ('IED') which incorporated the requirements of seven previous directives, including the Waste Incineration Directive (2000/76/EC). The EPRs were amended by The Environmental Permitting (England and Wales) (Amendment) (EU Exit) Regulations 2019 to reflect the UK's departure from the EU and came into force following the end of the Transition Period in December 2020.

5.2.22 The EPR require that the design and operation of all thermal treatment plants must ensure compliance with Emission Limit Values ('ELVs') as defined by the Regulations and subsequent 'Best Available Technique' ('BAT') conclusions.

5.2.23 BAT conclusions for activities regulated by the IED are published by the European IPPC Bureau ('EIPPCB') and a Waste Incineration Best Available Techniques Reference ('BREF')[9] was published in 2019 (European Union, 2019. This document sets out current BAT for reducing pollution from waste incineration plants and includes a number of BAT-AELs (emission levels associated with the best available techniques).

5.2.24 The BAT-AELs will be applied by the Environment Agency ('EA') for new plant and adoption of these BAT-AELs will be required for the existing plant by the EA from November 2023 (unless a derogation is granted). As a result of the Proposed Changes at the Application Site the Applicant is proposing to comply with these BREF BAT-AELs in advance of the EA's implementation date.

5.2.25 The ELVs applicable to the waste incineration processes at the Application Site are shown in **Table 5.2.**

Table 5.2 Emission Limit Values for Waste Incineration Plant (mg/Nm3)

Substance	**Daily Mean Emissions[(a)]**			**Half-hourly Mean Emissions[(a)]**	
	IED ELV	**BREF BAT-AEL (Existing Plant)**	**BREF BAT-AEL (New Plant)**	**100th percentile**	**97th percentile**
Total dust (Particles)	10	2 - 5	2 – 5	30	10
Nitrogen Oxides (NO and NO_2)	200	20 – 150[(f), (g)]	50 – 120[(f)]	400	200
Sulphur Dioxide	50	5 – 40	5 – 30	200	50
Carbon Monoxide	50	10 – 50	10 – 50	100[(b)]	150[(c)]
Hydrogen Fluoride	1	<1	<1	4	2
Hydrogen Chloride	10	2 – 8	2 – 6	60	10
Total Organic Carbon (TOC)	10	3 – 10	3 – 10	20	10
Group I metals – Cd and Tl [(d)]	0.05	0.005 – 0.02	0.005 – 0.02	-	-
Group II metals – Hg [(d)]	0.05	0.005 – 0.02	0.005 – 0.02	-	-
Group III metals – Sb, As, Pb, Cr, Co, Cu, Mn, Ni and V [(d), (h)]	0.50	0.01 – 0.03	0.01 – 0.03	-	-
Dioxins and Furans [(e)]	0.1 ng I-TEQ/Nm^3	0.01 – 0.06	0.01 – 0.04	-	-

a. Emissions are mg/Nm^3. Normalised to 273 K, 101.3 kPa, dry, and 11% O_2
b. 100th percentile of half-hourly average concentrations in any 24-hour period
c. 95th percentile of ten-minute average CO concentrations
d. Average over a sample period between 30 minutes and a maximum of 8 hours
e. Average over a sampling period of 6 to 8 hours and calculated by multiplying with their toxic equivalence factor

[9] European Union, 2019. Waste Incineration Best Available Techniques Reference, European IPPC Bureau

f. The lower range is appropriate where Selective Catalytic Reduction is used and the upper range is appropriate where Selective Non-Catalytic Reduction is used.
g. For existing plant where SCR in not applicable the higher end of the BAT-AEL range is 180mg/Nm^3.
h. Other metals consist of antimony (Sb), arsenic (As), lead (Pb), chromium (Cr), cobalt (Co), copper (Cu), manganese (Mn), nickel (Ni) and vanadium (V).

5.2.26 The daily mean emission limits have been used for the main assessment of the impacts of emissions from RRRF. There will however be short periods where the emissions could be higher over a half-hourly averaging period, albeit that the facility will be constrained to the daily emission limit values. For those pollutants (total dust, NOx, SO_2, CO, HF, HCl and TOC) with allowable short-term emissions, an assessment has also been undertaken against relevant short-term assessment levels.

5.2.27 It is also noted that a separate variation to the existing RRRF Environmental Permit is being made to the EA in parallel to the application to vary the S36 consent in order to take into account the proposed changes in the operational regime that would be brought about by ROP.

National Policy Statements (NPS EN-1, NPS EN-3)

5.2.28 As outlined in Chapter 5, the relevant National Policy Statements ('NPS') provide the primary basis for decisions by the Secretary of State on development consent applications for nationally significant infrastructure projects ('NSIPs'). ROP is not a NSIP and therefore a Development Consent Order ('DCO') is not being sought. However, NPS EN-1 and NPS-EN3 are material considerations relevant to the determination of the Proposed Changes.

5.2.29 In relation to the interaction between the planning and pollution control regimes, NPS EN-1 states:

> *4.10.1 Issues relating to discharges or emissions from a proposed project which affect air quality, water quality, land quality and the marine environment, or which include noise and vibration may be subject to separate regulation under the pollution control framework or other consenting and licensing regimes.*
>
> *4.10.2 The planning and pollution control systems are separate but complementary. The planning system controls the development and use of land in the public interest. It plays a key role in protecting and improving the natural environment, public health and safety, and amenity, for example by attaching conditions to allow developments which would otherwise not be environmentally acceptable to proceed and preventing harmful development which cannot be made acceptable even through conditions. Pollution control is concerned with preventing pollution through the use of measures to prohibit or limit the releases of substances to the environment from different sources to the lowest practicable level. It also ensures that ambient air and water quality meet standards that guard against impacts to the environment or human health.*
>
> *4.10.3 In considering an application for development consent, the IPC should focus on whether the development itself is an acceptable use of the land, and on the impacts of that use, rather than the control of processes, emissions or discharges themselves. The IPC should work on the assumption that the relevant pollution control regime and other environmental regulatory regimes, including those on land drainage, water abstraction and biodiversity, will be properly applied and enforced by the relevant regulator. It should act to complement but not seek to duplicate them."*

5.2.30 Specifically, in relation to air quality, NPS EN-1 states:

> *"5.2.1 Infrastructure development can have adverse effects on air quality. The construction, operation and decommissioning phases can involve emission to air which could lead to adverse impacts on health, on protected species and habitats, or*

on the wider countryside. Air emissions include particulate matter (for example dust) up to a diameter of ten microns (PM10) as well as gases such as sulphur dioxide, carbon monoxide and nitrogen oxides (NOx). Levels for pollutants in ambient air are set out in the Air Quality Strategy which in turn embodies European Union [EU] legal requirements. The Secretary of State for the Environment, Food and Rural Affairs is required to make available up to date information on air quality to any relevant interested party".

5.2.3 A particular effect of air emissions from some energy infrastructure may be eutrophication, which is the excessive enrichment of nutrients in the environment. Eutrophication from air pollution results mainly from emissions of NOx and ammonia. The main emissions from energy infrastructure are from generating stations. Eutrophication can affect plant growth and functioning, altering the competitive balance of species and thereby damaging biodiversity. …..

5.2.4 Design of exhaust stacks, particularly height, is the primary driver for the delivery of optimal dispersion of emissions and is often determined by statutory requirements. The optimal stack height is dependent upon the local terrain and meteorological conditions, in combination with the emission characteristics of the plant. The EA will require the exhaust stack height of a thermal combustion generating plant, including fossil fuel generating stations and waste or biomass plant, to be optimised in relation to impact on air quality. The [decision maker] need not, therefore, be concerned with the exhaust stack height optimisation process in relation to air emissions, though the impact of stack heights on landscape and visual amenity will be a consideration.5

5.2.6 Where the project is likely to have adverse effects on air quality the applicant should undertake an assessment of the impacts of the proposed project as part of the Environmental Statement (ES).

5.2.7 The ES should describe:

- *any significant air emissions, their mitigation and any residual effects distinguishing between the project stages and taking account of any significant emissions from any road traffic generated by the project;*
- *the predicted absolute emission levels of the proposed project, after mitigation methods have been applied;*
- *existing air quality levels and the relative change in air quality from existing levels; and*
- *any potential eutrophication impacts.*

5.2.9 The IPC should generally give air quality considerations substantial weight where a project would lead to a deterioration in air quality in an area or leads to a new area where air quality breaches any national air quality limits. However, air quality considerations will also be important where substantial changes in air quality levels are expected, even if this does not lead to any breaches of national air quality limits.

5.2.10 In all cases the IPC must take account of any relevant statutory air quality limits. Where a project is likely to lead to a breach of such limits the developers should work with the relevant authorities to secure appropriate mitigation measures to allow the proposal to proceed. In the event that a project will lead to non-compliance with a statutory limit the IPC should refuse consent."

5.2.31 In addition to the requirements of NPS EN-1, NPS EN-3 states:

"2.5.39 In addition to the air quality legislation referred to in EN-1 the Waste Incineration Directive (WID) is also relevant to waste combustion plant. It sets out specific emission limit values for waste combustion plants."

2.5.40 The applicant's EIA should include an assessment of the air emissions resulting from the proposed infrastructure and demonstrate compliance with the relevant regulations (see Section 5.2 of EN-1).

2.5.42 The pollutants of concern arising from the combustion of waste and biomass include NOx, Sox, particulates and CO_2. In addition, emissions of heavy metals, dioxins and furans are a consideration for waste combustion generating stations but limited by the WID and regulated by the EA.

2.5.43 Where a proposed waste combustion generating station meets the requirements of WID and will not exceed the local air quality standards, the IPC should not regard the proposed waste generating station as having adverse impacts on health."

National Planning Policy Framework

5.2.32 The following paragraphs of the NPPF are considered relevant from and air quality perspective.

5.2.33 Paragraph 170 on conserving and enhancing the natural environment states:

"Planning policies and decisions should contribute to and enhance the natural and local environment by: …

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land stability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans, and…"

5.2.34 Paragraph 180 within ground conditions and pollution states:

"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development."

5.2.35 Paragraph 181 states that:

"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."

5.2.36 Paragraph 182 states that:

"Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed".

National Planning Practice Guidance

5.2.37 Paragraph 005, Reference 32-005-20191101 (revision date 01.11.2019), of the PPG provides guidance on how considerations regarding air quality can be relevant to the development management process as follows:

"Whether air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to have an adverse effect on air quality in areas where it is already known to be poor, particularly if it could affect the implementation of air quality strategies and action plans and/or breach legal obligations (including those relating to the conservation of habitats and species). Air quality may also be a material consideration if the proposed development would be particularly sensitive to poor air quality in its vicinity.

Where air quality is a relevant consideration the local planning authority may need to establish:

- *The 'baseline' local air quality, including what would happen to air quality in the absence of the development;*
- *Whether the proposed development could significantly change air quality during the construction and operational phases (and the consequences of this for public health and biodiversity); and*
- *Whether occupiers or users of the development could experience poor living conditions or health due to poor air quality."*

5.2.38 Paragraph 006, Reference 32-006-20191101 (revision date 01.11.2019), of the PPG identifies what specific air quality issues need to be considered in determining a planning application:

"Considerations that may be relevant to determining a planning application include whether the development would:

- *Lead to changes (including any potential reductions) in vehicle-related emissions in the immediate vicinity of the proposed development or further afield. This could be through the provision of electric vehicle charging infrastructure; altering the level of traffic congestion; significantly changing traffic volumes, vehicle speeds or both; and significantly altering the traffic composition on local roads. Other matters to consider include whether the proposal involves the development of a bus station, coach or lorry park; could add to turnover in a large car park; or involve construction sites that would generate large Heavy Goods Vehicle flows over a period of a year or more;*
- *Introduce new point sources of air pollution. This could include furnaces which require prior notification to local authorities; biomass boilers or biomass-fuelled Combined Heat and Power plant; centralised boilers or plant burning other fuels within or close to an air quality management area or introduce relevant combustion within a Smoke Control Area; or extraction systems (including chimneys) which require approval or permits under pollution control legislation;*

- *Expose people to harmful concentrations of air pollutants, including dust. This could be by building new homes, schools, workplaces or other development in places with poor air quality;*
- *Give rise to potentially unacceptable impacts (such as dust) during construction for nearby sensitive locations; and*
- *Have a potential adverse effect on biodiversity, especially where it would affect sites designated for their biodiversity value."*

5.2.39 Paragraph 007, Reference 32-007-20191101 (revision date 01.11.2019), of the PPG provides guidance on how detailed an assessment needs to be:

> *"Assessments need to be proportionate to the nature and scale of development proposed and the potential impacts (taking into account existing air quality conditions), and because of this are likely to be locationally specific".*

and

> *"The following could form part of assessments:*
>
> *A description of baseline conditions and any air quality concerns affecting the area, and how these could change both with and without the proposed development;*
>
> - *Sensitive habitats (including designated sites of importance for biodiversity);*
> - *The assessment methods to be adopted and any requirements for the verification of modelling air quality;*
> - *The basis for assessing impacts and determining the significance of an impact;*
> - *Where relevant, the cumulative or in-combination effects arising from several developments;*
> - *Construction phase impacts;*
> - *Acceptable mitigation measures to reduce or remove adverse effects; and*
> - *Measures that could deliver improved air quality even when legally binding limits for concentrations of major air pollutants are not being breached."*

5.2.40 Paragraph 008, Reference 32-008-20140306 (revision date 01.11.2019), of the PPG provides guidance on how an impact on air quality can be mitigated:

> *"Mitigation options will need to be locationally specific, will depend on the proposed development and need to be proportionate to the likely impact. It is important that local planning authorities work with applicants to consider appropriate mitigation so as to ensure new development is appropriate for its location and unacceptable risks are prevented. Planning conditions and obligations can be used to secure mitigation where the relevant tests are met.*

Regional Policy

The London Plan 2021

5.2.41 The London Plan 2021 includes the following air quality related policies.

5.2.42 Policy Planning for Good Growth 3 on creating a healthy City states:

"*To improve Londoners' health and reduce health inequalities, those involved in planning and development must:*

… DB seek to improve London's air quality, reduce public exposure to poor air quality and minimise inequalities in levels of exposure to air pollution..."

5.2.43 The Plan includes Policy Sustainable Infrastructure 1 (SI1) Improving Air Quality which aims to:

"*...ensure that new developments are designed and built, as far as is possible, to improve local air quality and reduce the extent to which the public are exposed to poor air quality. This means that new developments, as a minimum, must not cause new exceedances of legal air quality standards, or delay the date at which compliance will be achieved in areas that are currently in exceedance of legal limits*".

5.2.44 Policy SI1 Improving Air Quality continues and states:

"A Development plans, through relevant strategic, site-specific and area-based polices should seek opportunities to identify and deliver further improvements to air quality and should not reduce air quality benefits that result from the Mayor's or boroughs' activities to improve air quality.

B To tackle poor air quality, protect health and meet legal obligations the following criteria should be addressed:

1) Development proposals should not:

a) lead to further deterioration of existing poor air quality.

b) create any new areas that exceed air quality limits, or delay the date at which compliance will be achieved in areas that are currently in exceedance of legal limits.

c) create unacceptable risk of high levels of exposure to poor air quality.

2) In order to meet the requirements in Part 1, as a minimum:

a) Development proposal must be at least air quality neutral.

b) Development proposals should use design solutions to prevent or minimise increased exposure to existing air pollution and make provision to address local problems of air quality in preference to post-design or retrofitted mitigation measures.

c) Major development proposal must be submitted with an Air Quality Assessment. Air quality assessments should show how the development will meet the requirements of B1.

d) Development proposals in Air Quality Focus Areas or that are likely to be used by large numbers of people particularly vulnerable to poor air quality such as children or older people, <u>should demonstrate that design measures have been used to minimise exposure.</u> (underlined text - Panel recommendations October 2019).

C Masterplans and development briefs for large-scale development proposals subject to an Environmental Impact Assessment should consider how local air quality can be improved across the area of the proposal as part of an air quality positive approach. To achieve this a statement should be submitted demonstrating:

a) How proposals have considered ways to maximise benefits to local air quality, and

b) *What measures or design features will be put in place to reduce exposure to pollution, and how they will achieve this.*

In order to reduce the impact on air quality during the construction and demolition phase development proposals must demonstrate how they plan to comply with the Non-Road Mobile Machinery Low Emission Zone and reduce emissions from the demolition and construction of buildings following best practice guidance.

E Development proposals should ensure that where emissions need to be reduced to meet the requirements of Air Quality Neutral or to make the impact of the development on local air quality acceptable, this is done on-site. Where it can be demonstrated that emission cannot be further reduced by on-suite measures, off-site measures to improve local air quality may be acceptable, provided that equivalent air quality benefits can be demonstrated within the area affected by the development."

5.2.45 Paragraph 9.1.2A defines 'Poor Air Quality':

"Where this policy refers to 'existing poor air quality' this should be taken to include areas where legal limits for any pollutant, or World Health Organization targets for Particulate Matter, are already exceeded and areas where current pollution levels are within 5% of these limits"

London Environment Strategy

5.2.46 Chapter 4 of the London Environment Strategy includes a series of objectives, policies and proposals to improve air quality. Several key issues have been highlighted to be addressed in the Strategy:

- Achieving legal compliance as quickly as possible.
- Diesel vehicles, especially cars and vans.
- Tackling all sources of pollution.
- Government action.
- Maximising co-benefits between air quality and climate change policies.
- Further reductions are needed in PM_{10} and $PM_{2.5}$, particularly from transboundary pollution, tyre and brake wear, and wood burning.

Local Policy

5.2.47 The Bexley Unitary Development Plan ('UDP') (2004) Saved Policies (2012) contains Policy ENV41 – 'Air Quality Strategies' which states:

- *The Council will require an applicant to prepare an Air Quality Assessment where proposals:*
- *−"include industrial activities with potentially significant air borne emissions;*
- *−have the potential to increase significantly the volume of traffic flows or the ratio of heavy goods vehicles, or the level of congestion so as to place air quality objectives at risk;*
- *−have the potential to increase the personal exposure of individuals at non-occupational locations to levels of air pollution which are likely to exceed objectives set in either national or local Air Quality Strategies; and/or*

- *−are located in (or are likely to effect) an Air Quality Management Area, which would significantly change the pattern of traffic flows or could lead to emissions of one or more of the pollutants specified in the national Air Quality Strategy."*

5.2.48 The policy also states the "*The Council may resist or impose conditions on applications where an air quality assessment shows that the proposed development will have an adverse effect on the achievement of national or local air quality objectives*".

Emerging Guidance and Standards

Environment Bill and $PM_{2.5}$ Standards

5.2.49 The 2019 Clean Air Strategy includes a commitment to set a "*new, ambitious, long-term target to reduce people's exposure to $PM_{2.5}$*" which the proposed Environment Bill 2019-2021[10] commits the Secretary of State to setting. Additionally, the Mayor of London[11] has committed to meeting the World Health Organisation ('WHO') guideline of 10 µg/m^3 by 2030. The implications of potential future changes to the applicable standard for $PM_{2.5}$ has been considered in this ES.

Guidance

Environment Agency Guidance

5.2.50 The Environment Agency air emissions risk assessment ('AERA') guidance for environmental permitting (EA, 2020)[12] provides information on Environmental Assessment Levels ('EALs') against which the impacts of emissions to air can be assessed.

5.2.51 **Table 5.3** contains relevant EALs for the protection of human health.

Table 5.3: Relevant EALs for the Protection of Human Health

Pollutant	Averaging Period	EAL	Source
Particulate matter <10µm (PM_{10})	24-hour mean	50 µg/m^3 not to be exceeded more than 35 times a year	UKAQS objective and AQSR limit value
	Annual mean	40 µg/m^3	UKAQS objective and AQSR limit value
Particulate matter <2.5µm ($PM_{2.5}$)	Annual mean	20	UKAQS objective and AQSR target value
Nitrogen dioxide (NO_2)	1-hour mean	200 µg/m^3 not to be exceeded more than 18 times a year	UKAQS objective and AQSR limit value
	Annual mean	40 µg/m^3	UKAQS objective and AQSR limit value
Sulphur dioxide (SO_2)	15 minutes	266 µg/m^3 not to be exceed more than 35 times a year	UKAQS objective

[10] Yet to be enacted
[11] Mayor of London (2018). 'London Environment Strategy'
[12] Environment Agency (2020). Air emissions risk assessment for your environmental permit. Air emissions risk assessment for your environmental permit - GOV.UK (www.gov.uk)

Pollutant	Averaging Period	EAL	Source
	1-hour	350 µg/m^3 not to be exceeded more than 24 times a year	UKAQS objective and AQSR limit value
	24-hour	125 µg/m^3 not to be exceeded more than 3 times a year	UKAQS objective and AQSR limit value
1,3-butadiene	Running annual	2.25 µg/m^3	UKAQS objective
Benzene	1-hour mean	195 µg/m^3	EA AERA EAL
Carbon monoxide (CO)	1-hour mean	30 mg/m^3	EA AERA EAL
	8-hour running mean	10 mg/m^3 maximum daily value	UKAQS objective and AQR limit value
Hydrogen fluoride (HF)	1-hour mean	160 µg/m^3	EA AERA EAL
	Monthly mean	16 µg/m^3	EA AERA EAL
Hydrogen chloride (HCl)	1-hour mean	750 µg/m^3	EA AERA EAL
Ammonia (NH_3)	1-hour mean	2,500 µg/m^3	EA AERA EAL
	Annual mean	180 µg/m^3	EA AERA EAL
Cadmium (Cd)	Annual mean	5 ng/m^3	AQSR Target Value
Mercury (Hg)	1-hour mean	7.5 µg/m^3	EA AERA EAL
	Annual mean	0.25 g/m^3	EA AERA EAL
Antimony (Sb)	1-hour running mean	150 µg/m^3	EA AERA EAL
	Annual mean	5 µg/m^3	EA AERA EAL
Arsenic (As)	Annual mean	3 ng/m^3	EA AERA EAL. The AQSR Target Value is 6ng/m^3.
Lead (Pb)	Annual mean	0.25 µg/m^3	UKAQS objective. The AQSR Limit Value is 0.5 µg/m^3.
Chromium (Cr III)	1-hour mean	150 µg/m^3	EA AERA EAL
	Annual mean	5 µg/m^3	EA AERA EAL
Hexavalent Chromium (Cr VI)	Annual mean	0.2 ng/m^3	EA AERA EAL
Copper (Cu)	1-hour mean	200 µg/m^3	EA AERA EAL
	Annual mean	10 µg/m^3	EA AERA EAL
Manganese (Mn)	1-hour mean	1,500 µg/m^3	EA AERA EAL
	Annual mean	0.15 µg/m^3	EA AERA EAL
Nickel	Annual	20 ng/m^3	AQSR Target Value
Vanadium (V)	1-hour mean	1 µg/m^3	EA AERA EAL

Pollutant	Averaging Period	EAL	Source
	Annual mean	5 µg/m^3	EA AERA EAL
Polyaromatic hydrocarbons (PAH)	Annual	1 ng/m^3 of benzo(a)pyrene (BaP) total content within the PM_{10} fraction	AQSR Target Value
	Annual	0.25 ng/m^3 of benzo(a)pyrene (BaP)	EA AERA EAL
Polychlorinated biphenyls (PCBs)	1-hour mean	6 µg/m^3	EA AERA EAL
	Annual mean	0.2 µg/m^3	EA AERA EAL

5.2.52 **Table 5.4** presents the relevant EALs for terrestrial biodiversity receptors.

Table 5.4: Relevant EALs (critical levels) for the Protection of Vegetation and Ecosystems

Pollutant	Time Period	EAL
Ammonia (NH_3)	Annual mean (lichens or bryophytes)	1 µg/m^3
	Annual mean	3 µg/m^3
Sulphur Dioxide (SO_2)	Annual mean (lichens or bryophytes)	10 µg/m^3
	Annual mean	20 µg/m^3
Oxides of Nitrogen (NO_x)	24-hour mean	75 µg/m^3
	Annual mean	30 µg/m^3
Hydrogen Fluoride (HF)	24-hour mean	5 µg/m^3
	Weekly mean	0.5 µg/m^3

The Greater London Authority's 'London Local Air Quality Management Technical Guidance (LLAQM.TG (19))'

5.2.53 LLAQM.TG (19) was published for use by London local authorities in their LAQM review and assessment work (Greater London Authority, 2019a). The document provides key guidance in aspects of air quality assessment, including screening, use of monitoring data, and use of background data that are applicable to all air quality assessments.

EPUK / IAQM 'Land-Use Planning & Development Control: Planning for Air Quality'

5.2.54 Environmental Protection UK ('EPUK') and the Institute of Air Quality Management ('IAQM') have together published guidance (the 'IAQM guidance')[13] to help ensure that air quality is properly accounted for in the development control process (EPUK / IAQM 2017). It clarifies when an air quality assessment should be undertaken, what it should contain, and how impacts should be described and assessed including guidelines for assessing the significance of impacts.

[13] Environmental Protection UK and the Institute of Air Quality Management (EPUK / IAQM) (2017). 'Land-use Planning & Development Control: Planning for Air Quality'. V1.2. The Institute for Air Quality Management, London

IAQM 'Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites'

5.2.55 The IAQM has published guidance[14] on the assessment of air quality impacts on designated nature conservation sites (IAQM, 2019) which adopts a similar procedure to that detailed in EA AERA guidance on the assessment of point source emissions.

5.2.56 In addition to the above guidance documents, a review of studies relating to energy recovery facilities and health has also been undertaken and is summarised in **Appendix B.4**.

5.3 Consultation

5.3.1 As described in **Section 4.3** of this EIA Report, a Scoping Report was submitted in December 2020 which set out the proposed scope of the air quality assessment to be undertaken for ROP. A subsequent telephone consultation was then undertaken between Stantec and the Environmental Health Department at LBB in February 2021 to determine if they had any further requirements relating to the assessment approach or receptor locations.

5.3.2 The Scoping Opinion did not identify any issues or gaps with the proposed air quality scope of work and LBB did not identify additional requirements.

5.4 Methodology

Study Area

5.4.1 The study area has been defined by the distances from the RRRF stack over which the greatest risk of potential significant effects is considered likely to occur, as follows:

- For human health receptors, a study area of 5 km from the Application Site has been considered. Human health receptor locations were chosen where the impacts of emissions were likely to be greatest, as identified by the initial dispersion modelling;
- Internationally designated terrestrial biodiversity sites (SAC, SPA, and Ramsar sites) and nationally designated biodiversity sites (SSSI) within 15 km of the Application Site; and
- Locally designated nature sites within 2 km (ancient woodland, local wildlife sites, Sites of Importance for Nature Conservation ('SINCs') and national and Local Nature Reserves ('LNR')).

Baseline Data Collection

5.4.2 Information on existing air quality has been obtained by collating the results of monitoring carried out by LBB, LBBD, and LBH for pollutants such as NO_2, PM_{10} and $PM_{2.5}$. Background pollutant concentrations for other pollutants have been gathered from published data and national monitoring networks.

5.4.3 Background concentrations for the study area have been defined using the national pollution maps published by DEFRA which cover the whole country on a 1x1 km grid (DEFRA, 2020b).

5.4.4 Existing critical levels and critical loads for habitats within the study area were collated from the Air Pollution Information System website (APIS, 2020).

Atmospheric Dispersion Modelling

[14] IAQM (2019) Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites

5.4.5 The ADMS 5 model has been applied for the atmospheric dispersion modelling assessment of the exhaust gases from the stacks serving the ERF at the Application Site, as summarised in the following sections.

Emission Discharge Characteristics

5.4.6 **Table 5.5** provides the physical emission discharge characteristics derived from monitoring data and design specifications.

Table 5.5: Emission Sources – physical discharge characteristics

Parameter	RRRF	
	Existing	Post ROP
Stack height (m)	90	
Internal Stack Diameter (m)	3.93[a]	
Flue gas velocity (m/s)	16.6	18.7
Oxygen (dry) (%v/v)	8.2	8.0
Moisture Content (%v/v)	19.8	20.4
Temperature (degrees Celsius)	126	129
Actual flow rate (Am^3/s)	201.7[b]	226.9[b]
Normalized flow rate, dry, 11% oxygen (Nm^3/s)	141.4[b]	160.0[b]

a) Combined stack diameter for 3 lines (2.27m individually)

b) Total flow rates for all 3 lines

5.4.7 The Proposed Changes result in an increased volumetric flow rate (by approximately 13%) of flue gas from RRRF; an accompanying increase in exit velocity and marginal changes in exit temperature, moisture and oxygen content.

Pollutant Emission Rates

5.4.8 The pollutant emission rates have been calculated from the 'normalised' volumetric flow rate (Nm^3) and corresponding daily average emission limits as presented in **Table 5.6**. It is assumed that there are no maintenance or shut-down periods and the source is emitting for 100% of the time at the applied emission limits.

Table 5.6: Applied pollutant emission rates

Pollutant	RRRF (current)				RRRF Post ROP (proposed)			
	Emission Limit		Emission Rate		Emission Limit		Emission Rate	
PM_{10} / $PM_{2.5}$	10	mg/Nm^3	1.41	g/s	5	mg/Nm^3	0.80	g/s
NOx	200	mg/Nm^3	28.3	g/s	180	mg/Nm^3	28.8	g/s
SO_2	50	mg/Nm^3	7.07	g/s	40	mg/Nm^3	6.40	g/s
CO	50	mg/Nm^3	7.07	g/s	50	mg/Nm^3	8.00	g/s
HCl	10	mg/Nm^3	1.41	g/s	8	mg/Nm^3	1.28	g/s
HF	1	mg/Nm^3	0.14	g/s	1	mg/Nm^3	0.16	g/s
TOC	10	mg/Nm^3	1.41	g/s	10	mg/Nm^3	1.60	g/s
NH_3	10	mg/Nm^3	1.41	g/s	10	mg/Nm^3	1.60	g/s
Hg	0.05	mg/Nm^3	7.07	mg/s	0.02	mg/Nm^3	3.20	mg/s
Cd & Tl	0.05	mg/Nm^3	7.07	mg/s	0.02	mg/Nm^3	3.20	mg/s
Group 3 Metals	0.5	mg/Nm^3	70.7	mg/s	0.3	mg/Nm^3	48.0	mg/s
Dioxins	0.1	ng I-TEQ/Nm^3	14.1	ng/s	0.06	ng I-TEQ/Nm^3	9.60	ng/s

Pollutant	RRRF (current)				RRRF Post ROP (proposed)			
	Emission Limit		Emission Rate		Emission Limit		Emission Rate	
PAH	0.21	µg/Nm^3	29.7	ug/s	0.21	µg/Nm^3	33.6	ug/s
PCBs	0.005	mg/Nm^3	0.71	mg/s	0.005	mg/Nm^3	0.80	mg/s

5.4.9 For the majority of pollutants, the Proposed Changes result in a decrease in the applicable emission limits) and a resultant decrease in calculated emissions compared to the current permitted ELVs, despite the increased volumetric flow rate. This is due to early adoption of the BREF BAT-AELs.

5.4.10 For some pollutants (NOx, CO, HF, TOC, NH_3, PAH and PCBs) the proportional decrease in applicable emission limits (again due to early adoption of the BREF BAT-AELs) is less than the proportional increase in volumetric flow rate; therefore the calculated emissions of these pollutants increases.

5.4.11 In relation to emission of PM_{10} and $PM_{2.5}$, whilst the EPR ELVs and BREF BAT-AELs relate to 'dust' or 'particulate' (i.e. no differentiation by particle size), for the purpose of this assessment it has been assumed that all particulate matter is both PM_{10} and $PM_{2.5}$ to ensure worst-case impacts are assessed.

5.4.12 The emission rate of each individual Group 3 metal has been calculated using the case specific screening approach within the EA guidance (EA, undated)[15] on releases from waste incinerators. Table A1 within the guidance contains a summary of 34 measured concentrations of metals between 2007-2015 at 18 municipal waste incinerators and waste wood co-incinerators in the UK. The maximum measured values for each metal have been used to calculate the emissions as shown in **Table 5.7**

5.4.13 It should be noted that whilst the BREF BAT-AEL for Group 3 metals is 40% lower (at 0.3mg/Nm^3) than the currently permitted ELV (at 0.5mg/Nm^3) calculated emission rates do not decrease. This is because the applied emission concentration for individual metals is based on measured data rather than the ELVs; therefore the calculated emission rate of individual Group 3 metals increases proportionally with volumetric flow rate.

Table 5.7: Group 3 Metals – Individual Emission Rates

Metal	EA measured maximum emission concentration (mg/Nm^3)	Current RRRF Emission Rate (mg/s)	RRRF post ROP Emission Rate (mg/s)
As	0.025	3.54	4.00
Cr	0.092	13.01	14.72
CrVI	1.30E-04	0.02	0.02
Co	0.0056	0.79	0.90
Cu	0.029	4.10	4.64
Pb	0.0503	7.11	8.05
Mn	0.06	8.48	9.60
Ni	0.22	31.11	35.19
Sb	0.0115	1.63	1.84
V	0.006	0.85	0.96

[15] Environment Agency (undated). Guidance on assessing group 3 metal stack emissions from incinerators. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/532474/LIT_7349.pdf

Model Domain Parameters

5.4.14 The ADMS 5 model also requires inputs for:

- Receptor locations;
- Building effects;
- Nature of the surface; and
- Meteorology.

5.4.15 A 10 km by 10 km Cartesian grid with 50 m spacing was used to predict the maximum predicted contribution to ground level concentrations. The pollutant concentrations were also predicted at specific human and terrestrial biodiversity receptor locations.

5.4.16 Buildings can influence the dispersion of pollutants from sources and can increase the maximum predicted ground level concentrations. The main effect of a building is to entrain pollutants into the cavity region in the immediate leeward side of the building, bringing them rapidly down to ground level. Therefore, concentrations near the building are increased but further away concentrations are decreased.

5.4.17 The buildings that are nearest (or attached) to the RRRF stack have been considered in the model. Buildings located horizontally within the distance equivalent to five stack heights of the stack and taller than approximately a third of the stack height have been included, in accordance with advice from the software provider. The building parameters used for the modelling are shown in **Table 5.8**.

Table 5.8: Buildings included within the model

Building	Coordinates (centre)	Length (m)	Width (m)	Height above Ground (m)
RRRF Building	549691, 180650	145	77	37

5.4.18 Terrain around the Application Site is relatively flat and is unlikely to influence the dispersion of pollutants. Previous modelling of the area was run with and without a digital terrain dataset and it was concluded that running the models with the terrain data does not influence the dispersion and ground level concentrations. For this reason, it has not been included in this model.

5.4.19 The nature of the surface may impact the dispersion of pollutants. The surface roughness length is a representation of the disruption of airflow close to the ground due to obstructions and protuberances, such as buildings, trees and hedges. To account for the surrounding nature of the Application Site, a surface roughness length of 0.5 m has been used, as recommended by the software provider for parkland, open suburbia.

Results Processing

5.4.20 Emissions of NO_x from combustion sources include both NO_2 and NO, with the majority being in the form of NO. In ambient air, NO is oxidised to form NO_2, and it is NO_2 which has the greater health impacts. For this assessment, the conversion of NO to NO_2 has been estimated using the worst-case assumptions set out in EA AERA guidance, namely that:

- For the assessment of long term (annual mean) impacts at receptors, 70% of NO_x is NO_2; and

- For the assessment of short term (hourly mean) impacts at receptors, 35% of NO_x is NO_2.

5.4.21 The oxidation of NO to NO_2 is not, however, an instantaneous process and where the maximum impacts occur within up to 1 km of the stacks, the EA assumptions lead to a conservative assessment.

5.4.22 In relation to 'Total Organic Carbon' ('TOC') as specified by the EPR and BREF, for the purposes of this assessment the predicted TOC impacts have been compared to the EALs for 1,3-butadine (annual average impacts) and benzene (hourly mean impacts).

5.4.23 The dry deposition velocities and conversion factors for NO_2, NH_3, SO_2, and HCl were taken from the EA's guidance document AQTAG 06 (EA, 2014)[16] and are set out in **Table 5.9**.

Table 5.9: Applied Deposition Velocities for Terrestrial Ecological Receptors

Substance	Habitat	Dry Deposition Velocity (mm/s)	Conversion µg/m²/s to kgN/ha/yr	Conversion µg/m²/s to keq/ha/yr
Nitrogen dioxide (NO_2)	Grassland	1.5	96.0	6.84
	Woodland	3.0		
Sulphur dioxide (SO_2)	Grassland	12.0	-	9.84
	Woodland	24.0		
Ammonia (NH_3)	Grassland	20.0	259.7	18.5
	Woodland	30.0		
Hydrogen Chloride (HCl)	Grassland	25.0	-	8.63
	Woodland	60.0		

5.4.24 In accordance with the EA's guidance document, wet deposition was only considered in the assessment for HCl and in accordance with their methodology, it was assumed to be twice the calculated dry deposition.

Limitations

5.4.25 There are many components that contribute to the uncertainty in predicted concentrations. The model used in this assessment is dependent upon the plant data that have been inputted which will have inherent uncertainties associated with them. There is then additional uncertainty as the model is required to simplify real-world conditions into a series of algorithms. However, these limitations are not considered to result in an inaccurate assessment or significantly effect the results of the modelling.

Reasonable Worst-Case Parameters Used for Assessment

5.4.26 The potential operational effects have been considered on a worst-case basis. Realistic maximum emission rates have been calculated from monitoring data from the current RRRF provided by the Applicant.

[16] Environment Agency (2014). AQTAG 06, Technical Guidance on Detailed Modelling Approach for an Appropriate Assessment for Emissions to Air, Ji Ping Shi, Environment Agency Air Quality Monitoring and Assessment Unit, Updated version

5.4.27 It is assumed that there are no maintenance or shut down periods and the source is emitting for 100% of the time. The emission rates have been calculated assuming that the source is emitting at full load at the emission limit value.

Significance Criteria

Human Receptors

5.4.28 There is no official guidance in the UK on how to assess the significance of the air quality impacts of a new development on existing receptors. The approach developed by EPUK and the IAQM (EPUK / IAQM, 2017), which considers the change in air quality as a result of a Proposed Development on existing receptors in combination with baseline concentrations at the receptors (to calculate the Predicted Environmental Concentration or PEC), has therefore been used. The guidance sets out three stages: determining the magnitude of change at each receptor, describing the impact, and assessing the overall significance.

5.4.29 Impact magnitude relates to the change in pollutant concentration. The impact description relates this change to the EAL and for annual average impacts is shown in **Table 5.10**.

Table 5.10: IAQM Annual Average Impact Significance Criteria

Long term average Concentration at receptor: Predicted Environmental Concentration (PEC)	**% Changes in Concentration with development in relation to EAL**			
	1*	**2-5**	**6-10**	**>10**
> 110 % [a]	Moderate	Substantial	Substantial	Substantial
>102% - ≤110% [b]	Moderate	Moderate	Substantial	Substantial
>95% - ≤102% [c]	Slight	Moderate	Moderate	Substantial
>75% - ≤95% [d]	Negligible	Slight	Moderate	Moderate
≤75% [e]	Negligible	Negligible	Slight	Moderate

Where concentrations increase the impact is described as adverse, and where it decreases as beneficial.
% change rounded to nearest whole number. Where the % change is 0 (i.e. Less than 0.5%) the impact will be Negligible.
[a] NO_2 or PM_{10}: > 44 µg/m^3 annual mean; $PM_{2.5}$ >27.5 µg/m^3 annual mean; PM_{10} >35.2 µg/m^3 annual mean (days).
[b] NO_2 or PM_{10}: > 40.8 – ≤ 44 µg/m^3 annual mean; $PM_{2.5}$ > 20.4 – ≤22 µg/m^3 annual mean; PM_{10} >32.64 – ≤35.2 µg/m^3 annual mean (days).
[c] NO_2 or PM_{10}: > 38 – ≤40.8 µg/m^3 annual mean; $PM_{2.5}$ >19 – ≤20.4µg/m^3 of annual mean; PM_{10} >30.4 – ≤32.64 µg/m^3 annual mean (days).
[d] NO_2 or PM_{10}: >30 - ≤38 µg/m^3 annual mean; $PM_{2.5}$ >15 - ≤19 µg/m^3 annual mean; or <24 - ≤ 30.4 µg/m^3 annual mean (days).
[e] NO_2 or PM_{10}: ≤30 µg/m^3 annual mean; $PM_{2.5}$ ≤15 µg/m^3 annual mean; PM_{10} ≤24 µg/m^3 annual mean (days).

5.4.30 In relation to peak short-term concentrations, the IAQM guidance identifies the following approach (**Table 5.11**).

Table 5.11: IAQM Impact descriptors for Short Term Impacts

Impact as % of EAL	**Impact Descriptor**	**Impact Severity**
> 50.5 %	Large	Major
>20.5% - ≤50.5%	Medium	Moderate
>10.5% - ≤20.5%	Small	Slight
≤10.5%	Negligible	Negligible

5.4.31 The IAQM guidance states that the overall assessment of significance should be based on professional judgement, taking into account factors including:

- the number of sensitive receptors affected by 'Slight', 'Moderate' or 'Substantial' adverse air quality impacts and a judgement on the overall balance;
- the magnitude of the changes and the descriptions of the impacts at the receptors;
- whether or not an exceedance of an NAQO or limit value is predicted to arise in the operational study area where none existed before, or an exceedance area is substantially increased;
- the uncertainty, comprising the extent to which worst-case assumptions have been made; and
- the extent to which an NAQO or limit value is exceeded.

5.4.32 In relation to the population exposure, Paragraph 7.8 of the IAQM guidance states:

> *'An individual property exposed to a moderately adverse impact might not be considered a significant effect, but many hundreds of properties exposed to a slight adverse impact could be. Such judgements will need to be made taking into account multiple factors and this guidance avoids the use of prescriptive approaches.'*

5.4.33 Paragraph 7.9 of the IAQM guidance goes on to state:

> *'A judgement of the significance should be made by a competent professional who is suitably qualified. The reasons for reaching the conclusions should be transparent and set out logically. Whilst the starting point for the assessment of significance is the degree of impact, as defined by Table 6.3, this should be seen as one of the factors for consideration, not least because of the outcome of this assessment procedure applies to a receptor and not to the overall impact.'*

5.4.34 Therefore, where impacts at an individual receptor are classified as 'Negligible' or 'Slight', effects would typically be considered 'not significant'. Conversely, where 'Moderate' or 'Substantial' adverse impacts are identified at individual receptors, the overall effect needs to be considered in the round taking into account the changes at all of the modelled receptor locations, with a judgement made as to whether the overall air quality effect of the development is 'significant' or not.

Ecological Receptors

5.4.35 In terms of the impact of emissions to air on ecological receptors, an impact of less than 1% of the critical level or load is accepted to be a pragmatic threshold for determining no likely significant effects (EA, 2020 & NE, 2018).

5.4.36 It should be noted that an impact of more than 1% is not, per se, an indication that a significant effect exists, only the possibility of one which would trigger the need for further, more detailed assessment of the ecological sensitivity and value of the habitat.

5.4.37 Where impacts cannot be classified as resulting in 'no likely significant effect' based solely on the PC, further consideration of the impacts and potential for likely significant effects will be undertaken by the Project Ecologist as reported in **Chapter 6**.

5.5 Baseline Conditions

Current Baseline

5.5.1 The whole of LBB, LBBD and RBG were designated as AQMAs with respect to NO_2 and PM_{10}, in 2007, 2008, and 2001 respectively. Where an AQMA is designated, LAs need to prepare Action Plans and work towards meeting the National Air Quality Strategy Objectives.

5.5.2 The Application Site is within the boundary of the Low Emission Zone ('LEZ') and more stringent requirements for HGVs will apply from March 2021. The Application Site is not however within the proposed expansion of the Ultra-Low Emission Zone ('ULEZ'), which is due for expansion in October 2021.

Measured Baseline Concentrations

5.5.3 A summary of the annual average measured concentrations of NO_2 measured at nearby automatic monitoring sites are presented in **Table 5.12** below:

Table 5.12: Local Authority Automatic Monitoring Stations – Annual Average NO_2 Concentrations

Monitoring Site	Site Type	Annual Mean µg/m^3				
		2015	2016	2017	2018	2019
Slade Green (BX1)	Suburban background	26	25	25	23	22
Belvedere Primary School (BX2)	Urban background	24	29	28	28	23
Bexley Business (BQ7)	Urban background	22	24	21	21	21
Scrattons Farm (BG2)	Suburban	29	32	29	26	Not measured
Rainham (HV1)	Roadside	32	34	34	30	29
NAQO/EAL		**40**				

5.5.4 The monitoring data indicates for at these monitoring locations the NO_2 concentrations are compliant with the AQR limit values and meet the NAQO.

5.5.5 Particulate Matter (PM_{10} and $PM_{2.5}$) monitoring is also undertaken within the Study Area. A summary of the annual average measured concentrations of PM_{10} and $PM_{2.5}$ measured at nearby automatic monitoring sites is presented in **Table 5.13** and **Table 5.14**.

Table 5.13: Local Authority Automatic Monitoring Stations – Annual Average PM_{10} Concentrations

Monitoring Site	Site Type	Annual Mean µg/m^3				
		2015	2016	2017	2018	2019
Slade Green (BX1)	Suburban background	14	18	17	18	17
Belvedere Primary School (BX2)	Urban background	14	14	17	19	19
Bexley Business (BQ7)	Urban background	18	15	15	15	14

Monitoring Site	Site Type	Annual Mean µg/m³				
		2015	2016	2017	2018	2019
Scrattons Farm (BG2)	Suburban	21	20	20	18	Not measured
Rainham (HV1)	Automatic Roadside	18	19	18	17	17
NAQO/EAL		**40**				

Table 5.14: Local Authority Automatic Monitoring Stations – Annual Average $PM_{2.5}$ Concentrations

Monitoring Site	Site Type	Annual Mean µg/m³				
		2015	2016	2017	2018	2019
Slade Green (BX1)	Suburban background	15	11	11	12	12
Rainham (HV1)	Roadside	11	12	12	11	11
NAQO/EAL		**20**				

Modelled Background Concentrations

5.5.6 Maps of annual mean background concentrations of NO_x, NO_2, PM_{10} and $PM_{2.5}$ are produced and are updated periodically by DEFRA (DEFRA, 2018)[17] for the purposes of the LAQM. They provide the estimates for present and future concentrations and are presented as 1 km x 1 km grid square averages. The most recent version of the background maps was released in 2018 (based on 2017 UK-wide modelling). Data for the Application Site location is presented in **Table 5.15**.

Table 5.15: DEFRA background map predicted annual average concentrations at the Application Site

Pollutant	Annual Average Concentration (µg/m³)		
	2018	2020	2022
NO_x	31.4	28.4	26.6
NO_2	21.1	19.5	18.5
PM_{10}	16.1	15.3	15.0
$PM_{2.5}$	11.0	10.5	10.2

Applied Baseline Concentrations

5.5.7 **Table 5.16** shows the baseline concentrations used in this assessment obtained primarily from monitoring networks operated by DEFRA and LAs.

Table 5.16: Summary of background concentrations selected for use in the assessment

Pollutant	Long term Background Concentration		Short term Background Concentration		Source
PM_{10}	20	µg/m³ annual	23.6	µg/m³ 24hr	Scrattons Farm (BG2), maximum of past 3 years
$PM_{2.5}$	12	µg/m³ annual	N/A	N/A	Slade Green maximum of past 3 years

[17] Department of the Environment, Food and Rural Affairs (DEFRA) (2020). '2018 Based Background Maps

Pollutant	Long term Background Concentration		Short term Background Concentration		Source
NO_2	28	µg/m³ annual	56	µg/m³ 1 hour	Belvedere Primary School (BX2) maximum of past 3 years
SO_2	1.9	µg/m³ annual l	1.3	µg/m³ 24 hour	APIS 2016-2018 average
			2.3	µg/m³ 1 hour	
			2.7	µg/m³ 15 minute	
CO	173	µg/m³ annual	242	µg/m³ 8-hour	DEFRA 2001 based background maps projected to 2021
			346	µg/m³ 1-hour	
HF	0.5	µg/m³ annual	1	µg/m³ 1 hour	EPAQS Guidelines for Halogen and Hydrogen Halides in Ambient Air.
HCl	0.3	µg/m³ annual	0.6	µg/m³ 1 hour	Detling 2016 DEFRA UKEAP Acid Gases and Aerosol Network
TOC	0.13	µg/m³ annual (1,3 butadiene)	0.96	µg/m³ 1 hour (benzene)	DEFRA 2001 based background maps projected to 2021
NH_3	2.9	µg/m³ annual	5.9	µg/m³ 1 hour	APIS 2016-2018 average
Cd	0.34	ng/m³ annual	0.68	ng/m³ 1 hour	Chadwell St Mary 2019 DEFRA Heavy Metals Network
Hg	1.6	ng/m³ annual	3.2	ng/m³ 1 hour	Chilbolton Observatory 2016
As	0.92	ng/m³ annual	1.9	ng/m³ 1 hour	Chadwell St Mary 2019 DEFRA Heavy Metals Network
Cr	2.1	ng/m³ annual	4.2	ng/m³ 1 hour	Chadwell St Mary 2019 DEFRA Heavy Metals Network
CrVI	0.42	ng/m³ annual	0.83	ng/m³ 1 hour	20% of Total Cr as per EA guidance
Co	0.11	ng/m³ annual	0.21	ng/m³ 1 hour	Chadwell St Mary 2019 DEFRA Heavy Metals Network
Cu	10.7	ng/m³ annual	21.4	ng/m³ 1 hour	Chadwell St Mary 2019 DEFRA Heavy Metals Network
Pb	10.6	ng/m³ annual	21.2	ng/m³ 1 hour	Chadwell St Mary 2019 DEFRA Heavy Metals Network
Mn	5.9	ng/m³ annual	11.8	ng/m³ 1 hour	Chadwell St Mary 2019 DEFRA Heavy Metals Network
Ni	1.3	ng/m³ annual	2.5	ng/m³ 1 hour	Chadwell St Mary 2019 DEFRA Heavy Metals Network
Sb	1.3	ng/m³ annual	2.6	ng/m³ 1 hour	Detling 2013 DEFRA Heavy Metals Network
V	1.5	ng/m³ annual	2.9	ng/m³ 1 hour	Chadwell St Mary 2019 DEFRA Heavy Metals Network
PAH	0.16	ng/m³ annual (BaP)	0.32	ng/m³ 1 hour	London Marleybone Road DEFRA PAH Network, 2019
Dioxins	9.0	fgTEQ/m³ annual	18.0	fgTEQ/m³ annual	London Ashdown House 2017 TOMPS network
PCBs	22.2	pg/m³ annual	44.4	pg/m³ annual	London Ashdown House 2018 TOMPS network

5.5.8 The appropriate conversion factor for each averaging period has been used in accordance the EA guidance[12]:

- 1-hour mean background concentrations have been estimated by multiplying the annual mean by a factor of 2;
- 24-hour mean background concentrations have been estimated by multiplying the 1-hour mean by a factor of 0.59;
- 8-hour mean background concentrations have been estimated by multiplying the 1-hour mean by a factor of 0.7; and
- 15-minute mean background concentrations have been estimated by multiplying the 1-hour mean by a factor of 1.34.

Human Receptors

5.5.9 The selected discrete human receptor locations are summarised in **Table 5.17** and shown in **Figure 5.2**.

Table 5.17: Modelled Discrete Human Receptors Locations

ID	Easting	Northing	Height (m)	Description
R01	548447.0	179561.5	1.5	The Business Academy
R02	548203.1	179698.7	1.5	Education Facility
R03	547979.0	179882.7	1.5	St. Katherine's Road (3 floors)
R04	547366.1	180533.9	1.5	Jubilee Primary School
R05	548054.2	181106.3	1.5	Cherbury Close, Thamesmead
R06	548067.0	181169.5	1.5	Lytham Close
R07	547291.1	181297.5	1.5	Voyagers Close
R08	546381.9	181625.3	60	Plot 401 Barking Riverside
R09	547721.9	182293.4	15	Plot 306 Barking Riverside
R10	546450.6	182313.9	1.5	George Carey CofE Primary School
R11	543831.4	183642.6	75	Freshwharf, Highbridge Road
R12	544321.4	184325.6	75	Oculus House, Cambridge Road
R13	547208.9	182982.5	1.5	Sovereign Road, Barking
R14	548137.3	183304.9	1.5	Shaw Gardens, near Scrattons
R15	548855.9	183584.5	1.5	St. Peter's Primary School, Dagenham
R16	549054.1	183047.2	75	Chequers Corner
R17	549389.3	183527.9	1.5	Marsh Green Primary School, Dagenham
R18	550566.4	182760.5	1.5	Beam Park Residential Development GF
R18A	550566.4	182760.5	20	Beam Park Elevated
R19	550872.9	182891.9	1.5	Spencer Road, South Hornchurch
R20	552160.1	182010.9	1.5	Lapwing House, Capstan Drive (1st floor)

ID	Easting	Northing	Height (m)	Description
R20A	552160.1	182010.6	16.5	Lapwing House, Capstan Drive (5th floor)
R21	552403.3	182326.3	1.5	Rainham Village Childrens Centre
R22	552498.7	181693.6	1.5	52, Elizabeth Road
R23	553035.5	181752.2	1.5	Brady Primary School, Rainham
R24	550667.7	178833.1	1.5	65, Lower Road
R25	549736.3	179858.2	4.5	Hackney House Apartments (1st Floor)
R25A	549736.3	179858.2	18	Hackney House Apartments (6th Floor)
R26	547786.2	180715.8	1.5	10, Wallace Close
R27	549632.1	179716.4	4.5	Jutland House Apartments
R28	549597.7	179652.7	1.5	Belvedere Park housing development

Terrestrial Biodiversity Receptors

5.5.10 DEFRA's MAGIC website[18] was used to identify the international and nationally designated sites within 15 km of the Application Site and the LNRs within 2 km. In addition, locally designated sites were identified within 2 km of the Application Site as per EA AERA guidance. Existing nitrogen and acid deposition rates within the study area were determined from the Air Pollution Information System ('APIS') website[19].

5.5.11 The locations assessed in this study are set out in **Table 5.18** below and shown in **Figure 5.3 and 5.4**. Impacts have been modelled at discrete receptors at the location of maximum impact resulting from emissions from RRRF and assessed against relevant critical levels and loads for the most sensitive habitat type present within the area of impact.

Table 5.18: Modelled Terrestrial Biodiversity Receptor Locations

Receptor ID	Designated Site	Identified Habitat Type
ER1	Crossness LNR	Neutral Grassland Scrub and Rough Grassland
ER2	Lesnes Abbey Wood LNR	Broadleaved, mixed and yew woodland
ER3	Inner Thames Marshes SSSI / Rainham Marshes LNR	Saltmarshes
ER4	Oxleas Woodlands SSSI	Broadleaved, mixed and yew woodland
ER5	Gilbert's Pit (Charlton) SSSI	Geological
ER6	Epping Forest SSSI	Acid Grassland
ER7	Epping Forest SSSI and SAC	Acid Grassland
ER8	Ingrebourne Marshes SSSI	Fen, marsh and swamp
ER9	Thorndon Park SSSI	Broad-leaved, mixed and yew woodland
ER10	Hainault Forest SSSI	Broad-leaved, mixed and yew woodland
ER11	Curtismill Green SSSI	Neutral Grassland
ER12	Hornchurch Cutting SSSI	Geological

[18] Available at https://magic.defra.gov.uk

[19] Air Pollution Information System (APIS) . 'Site relevant critical loads'. Available at: http://www.apis.ac.uk/

Receptor ID	Designated Site	Identified Habitat Type
ER13	Purfleet Chalk Pits SSSI	Geological
ER14	West Thurrock Lagoon & Marshes SSSI	Littoral Sediment
ER15	Lion Pit SSSI	Geological
ER16	Grays Thurrock Chalk Pit SSSI	Broad-leaved, mixed and yew woodland
ER17	Hangman's Wood & Deneholes SSSI	Broad-leaved, mixed and yew woodland
ER18	Swanscombe Skull Site SSSI	Geological
ER19	Baker's Hole SSSI	Geological
ER20	Darenth Wood SSSI	Broad-leaved, mixed and yew woodland
ER21	Farningham Wood SSSI	Broad-leaved, mixed and yew woodland
ER22	Ruxley Gravel Pits SSSI	Standing Open Water and Canals
ER23	Wansunt Pit SSSI	Geological
BxB103	Franks Park (SBINC)	Broadleaved, Mixed and Yew Woodland
M039	Wennington, Aveley and Rainham Marshes (SMINC)	Coastal and Floodplain Grazing Marsh
M031	River Thames and tidal tributaries (SMINC)	Rivers and Streams
B&DB103	Dagenham Breach and the lower Beam River in Dagenham (SBINC)	Standing Open Water and Canals
HvBI18	Lower River Beam and Ford Works Ditches (SBINC)	Rivers and Streams
B&DBI07	Goresbrook and the Ship & Shovel Sewer (SBINC)	Rivers and Streams
BxL07	Crossway Park and Tump 52 (SLINC)	Wood-Pasture & Parkland
BxBII02	Southmere Park and Woodland Way (SBINC)	Standing Open Water and Canals
BxL16	The Ridgeway (SLINC)	Broadleaved, Mixed and Yew Woodland
Lesnes Abbey	Lesnes Abbey Woods and Bostall Woods (SMINC)	Broadleaved, Mixed and Yew Woodland
M041	Erith Marshes (SMINC)	Coastal and Floodplain Grazing Marsh
M041_A	Erith Marshes (SMINC)	Coastal and Floodplain Grazing Marsh
BxBI14	Thamesview Golf Course (SBINC)	Acid grassland
BxBI02	Belvedere Dykes (SBINC)	Standing Open Water and Canals
BxBII26	Church Manorway Nature Area (SBINC)	Standing Open Water and Canals
BxBII25	Crossness Sewage Treatment Works Pond (SBINC)	Standing Open Water and Canals

5.5.12 The existing background levels and loads for these receptor locations were obtained from the APIS (APIS, 2020) website and are provided in the **Table 5.19**. The sites for which are designated on the basis of their geological interest only or are not sensitive to air pollution (i.e. standing open water of littoral sediment) have not been included as they are not considered sensitive to the effects of air pollution.

Table 5.19: Baseline Levels and Deposition Rates at the Identified Terrestrial Biodiversity Receptors

Receptor ID	NO_x (µg/m^3)	SO_2 (µg/m^3)	NH_3 (µg/m^3)	Nitrogen (kg N/ha/yr)	N (keq/ha/yr)	S (keq/ha/yr)
ER1	34.39	1.69	1.92	17.50	1.25	0.17
ER2	28.99	1.69	1.92	30.80	2.20	0.21
ER3	39.11	2.18	2.23	18.34	1.30	0.20
ER4	31.23	1.46	1.98	31.08	2.20	0.21
ER6	40.67	1.72	2.48	20.16	1.40	0.20
ER7	42.21	1.69	2.67	21.42	1.50	0.20
ER8	32.41	1.87	2.23	18.34	1.30	0.20
ER9	19.68	1.06	1.60	28.00	2.00	0.20
ER10	21.26	1.41	1.69	28.70	2.05	0.19
ER11	34.62	0.94	1.68	16.94	1.20	0.10
ER16	37.09	1.92	1.40	26.46	1.89	0.24
ER17	29.65	1.92	1.40	26.46	1.89	0.24
ER20	33.49	1.57	1.53	27.30	2.00	0.20
ER21	33.00	1.12	1.61	29.40	2.10	0.20
BxB103	29.58	1.69	1.92	30.80	2.12	0.21
M039	9.11	1.87	2.23	18.34	1.13	0.19
BxL07	32.79	1.89	2.95	39.62	2.83	0.25
BxL16	34.21	1.89	2.95	39.62	2.83	0.25
Lesnes Abbey	28.99	1.69	1.92	30.80	2.20	0.21
M041	28.88	1.89	2.95	21.56	1.54	0.20
BxBI14	36.74	1.89	2.95	21.56	1.54	0.20

Current RRRF Impacts

5.5.13 **Table 5.20** presents the maximum predicted (long-term averaging period) ground level impacts of pollutants anywhere within the receptor grid for any of the five years' of meteorological data modelled. The results are for the current RRRF, operating at the maximum daily emission limit values currently permitted.

Table 5.20: Maximum Predicted Long-term Averaging Period Process Contributions from Existing RRRF

Pollutant	Long-term EAL (µg/m^3)	Averaging Period	Max PC (µg/m^3)	Max PC as % of EAL
PM10	40	Annual	0.13	0.3%
$PM_{2.5}$	20	Annual	0.13	0.7%
NO_2	40	Annual	1.86	4.7%
HF	16	monthly average	0.05	0.3%
TOC	2.25	annual (1,3-butadiene)	0.13	5.8%
NH_3	180	annual	0.13	0.1%
Cd	0.005	annual	6.64E-04	13.3%

Pollutant	Long-term EAL (µg/m^3)	Averaging Period	Max PC (µg/m^3)	Max PC as % of EAL
Hg	0.25	annual	6.64E-04	0.3%
As	0.003	annual	3.32E-04	11.1%
Cr	5	annual	1.22E-03	<0.1%
CrVI	0.0002	annual	1.73E-06	0.9%
Cu	10	annual	3.85E-04	<0.1%
Pb	0.25	annual	6.68E-04	0.3%
Mn	0.15	annual	7.97E-04	0.5%
Ni	0.02	annual	2.92E-03	14.6%
Sb	5	annual	1.53E-04	<0.1%
V	5	annual	7.97E-05	<0.1%
PAHs	0.001	annual (BaP)	2.79E-06	0.28%
	0.00025	annual (BaP)	2.79E-06	1.12%
Dioxins	N/A	annual	1.33E-09	N/A
PCBs	0.2	annual	6.64E-05	<0.01%

5.5.14 **Table 5.21** presents the maximum predicted (short-term averaging period) ground level impacts of pollutants anywhere within the receptor grid for any of the five years' worth of meteorological data modelled. The results are for the existing RRRF operating at the maximum daily emission limit values currently permitted.

Table 5.21: Maximum Predicted Short-term Averaging Period Process Contributions from existing RRRF

Pollutant	Short-term EAL (µg/m^3)	Averaging Period	Max PC (µg/m^3)	Max PC as % of EAL
PM_{10}	50	24-hr 90.41%ile	0.41	0.8%
NO_2	200	1-hour, 99.79%ile	8.81	4.4%
SO_2	125	24-hour 99.19%ile	4.12	3.3%
	350	1-hour 99.73%ile	6.10	1.7%
	266	15-min 99.9%ile	7.16	2.7%
CO	10000	8-hr running average	6.26	0.1%
	30000	1-hr max	8.02	<0.1%
HF	160	1-hr max	0.16	0.1%
HCl	750	1-hr max	1.60	0.2%
TOC	195	1-hr max (benzene)	1.60	0.8%
NH_3	2500	1-hr max	1.59	0.1%
Hg	7.5	1-hr max	8.02E-03	0.1%
Cr	150	1-hr max	1.48E-02	<0.1%
Cu	200	1-hr max	4.65E-03	<0.1%
Mn	1500	1-hr max	9.62E-03	<0.1%
Sb	150	1-hr max	1.84E-03	<0.1%
V	1	1-hr max	9.62E-04	0.1%
PCBs	6	1-hr max	8.02E-04	<0.1%

5.5.15 Detailed modelling of the calculated emissions from the current RRRF has been carried out to predict potential impacts of relevant pollutants at terrestrial biodiversity receptors. The results of the modelling are contained in **Appendix B.3**.

Baseline Evolution

5.5.16 Concentrations of the number of pollutants (particularly relating to emissions associated with fossil fuel combustion processes) are anticipated to decline over time due to compliance with national and international regulatory regimes.

5.5.17 For the purposes of this assessment, future baseline concentrations have not been predicted given that the earliest commencement year of the Proposed Changes is 2021.

5.6 Embedded Mitigation

5.6.1 This section describes the measures that are incorporated within the design of ROP to reduce or offset environmental effects. Embedded mitigation aims to design out adverse environmental effects where possible.

5.6.2 In terms of impacts on air quality, the following can be considered as embedded mitigation:

- **Site Location:** The Application Site is in an industrial location with the closest sensitive human receptors over 750 m to the south. This provides a buffer zone between the RRRF and sensitive human receptor locations.
- **Stack Height:** An elevated release height (90m) achieves better dispersion of air emissions resulting in lower concentrations at sensitive receptor locations.
- **Emission Limit Values:** Combustion emissions from RRRF are controlled by the requirements of the EPR and early adoption of the BREF BAT-AELs will reduce the maximum permitted emissions of many pollutants.

5.7 Assessment of Likely Effects

Long-term Averaging Period Impacts

5.7.1 **Table 5.21** provides the maximum predicted (long-term averaging period) ground level concentrations of pollutants anywhere within the receptor grid for any of the five years' of meteorological data modelled. The results are for the RRRF following implementation of ROP ('RRRF post-ROP') and operating at the maximum daily emission limit values from the BREF and compared to the maximum impacts from the existing RRRF (note this may not occur at the same location).

Table 5.22: RRRF Post- ROP Maximum Predicted Long-term Averaging Period Process Contributions

Pollutant	Max PC ($\mu g/m^3$)	Max PC as % of EAL	Change in Max PC ($\mu g/m^3$)	Change in Max PC as % of EAL
PM_{10}	0.07	0.2%	-0.065	-0.2%
$PM_{2.5}$	0.07	0.3%	-0.065	-0.3%
NO_2	1.70	4.2%	-0.163	-0.4%
HF	0.05	0.3%	0.001	+<0.1%
TOC	0.13	6.0%	0.003	0.1%
NH_3	0.13	0.1%	0.003	+<0.01%
Cd	2.69E-04	5.4%	-3.95E-04	-7.9%

Pollutant	Max PC (µg/m^3)	Max PC as % of EAL	Change in Max PC (µg/m^3)	Change in Max PC as % of EAL
Hg	2.69E-04	0.1%	-3.95E-04	-0.2%
As	3.37E-04	11.2%	4.54E-06	0.2%
Cr	1.24E-03	<0.1%	1.67E-05	+<0.01%
CrVI	1.75E-06	0.9%	2.36E-08	+<0.01%
Cu	3.91E-04	<0.1%	5.26E-06	+<0.01%
Pb	6.77E-04	0.3%	9.13E-06	+<0.01%
Mn	8.08E-04	0.5%	1.09E-05	+<0.01%
Ni	2.96E-03	14.8%	3.99E-05	0.2%
Sb	1.55E-04	<0.1%	2.09E-06	+<0.01%
V	8.08E-05	<0.1%	1.09E-06	+<0.01%
PAHs	2.83E-06	0.3%	3.85E-08	+<0.01%
	2.83E-06	1.1%	3.85E-08	+<0.01%
Dioxins	8.08E-10	N/A	-5.20E-10	N/A
PCBs	6.73E-05	<0.1%	9.07E-07	+<0.01%

5.7.2 The change in maximum long-term Process Contributions ('PC') resulting from the Proposed Changes are <1% of the EALs and considered to be 'negligible' for all pollutants except Cadmium where the decrease in impacts is over 1% of the EAL and is classified as 'slight beneficial'.

5.7.3 The overall long-term impact of RRRF following the implementation of ROP is <1% of the EAL for most pollutants. Where the maximum total PC from RRRF post ROP exceeds 0.5% of the EAL, further consideration of the long-term impacts at discrete receptors is presented in **Appendix B.1** and **Appendix B.2**. for key pollutants (PM_{10}, $PM_{2.5}$, NO_2, TOC, cadmium, arsenic, chromium VI, nickel and PAHs).

5.7.4 In terms of PM_{10} and $PM_{2.5}$ impacts, the overall PC at discrete receptors due to RRRF post-ROP is presented in **Figure 5.5 (Appendix B.1**) and **Table B.2.1 (Appendix B.2)** and does not exceed 0.5% of the relevant EALs and total concentrations are well below the EALs. In relation to the WHO guideline value for $PM_{2.5}$ (of 10 µg/m^3), overall PC at receptors locations would be <0.5% of this guideline. Therefore, based on the IAQM significance criteria the impacts are classified as **Negligible**.

5.7.5 The overall PC for nitrogen dioxide (NO_2) at discrete receptors due to RRRF post-ROP is presented in **Figure 5.6 (Appendix B.1)** and **Table B.2.2 (Appendix B.2)** and ranges from 0.1% to 1.8% of the annual EAL. Once background concentrations are considered, the PEC does not exceed 75% of the EAL and therefore based on the IAQM significance criteria the impacts are classified as **Negligible** at all receptor locations.

5.7.6 The overall PC for TOC at discrete receptors due to RRRF post-ROP is presented in **Figure 5.7 (Appendix B.1)** and **Table B.2.3 (Appendix B.2)** and ranges from 0.2% to 2.6% of the EAL for 1,3-butadiene. Once background concentrations are considered, the PEC does not exceed 10% of the EAL and therefore based on the IAQM significance criteria the impacts are classified as **Negligible** at all receptor locations.

5.7.7 The overall PC for cadmium (Cd) at discrete receptors due to RRRF post-ROP is presented in **Figure 5.8 (Appendix B.1)** and **Table B.2.4 (Appendix B.2)** and ranges from 0.2% to 2.3% of the EAL. Once background concentrations are considered, the PEC does not exceed 10% of the EAL and therefore based on the IAQM significance criteria the impacts are classified as **Negligible** at all receptor locations.

5.7.8 The overall PC for arsenic (As) at discrete receptors due to RRRF post-ROP is presented in **Figure 5.9 (Appendix B.1)** and **Table B.2.5 (Appendix B.2)** and ranges from 0.3% to 4.8% of the EAL. Once background concentrations are considered, the PEC does not exceed 40% of the EAL and therefore based on the IAQM significance criteria the impacts are classified as **Negligible** at all receptor locations.

5.7.9 For Chromium VI, the overall PC at discrete receptors due to RRRF post-ROP is presented in **Figure 5.10 (Appendix B.1)** and **Table B.2.6 (Appendix B.2)** and is below 0.5% of the EAL at all receptors; therefore based on the IAQM significance criteria the impacts are classified as **Negligible** at all receptor locations. Whilst the PEC exceeds the EAL, this is due to the high background concentration applied, which is based on very limited guidance as ambient monitoring of Chromium VI is not routinely undertaken in the UK.

5.7.10 The overall PC for nickel (Ni) at discrete receptors due to RRRF post-ROP is presented in **Figure 5.11 (Appendix B.1)** and **Table B.2.7 (Appendix B.2)** and ranges from 0.4% to 6.3% of the EAL. Once background concentrations are considered, the PEC does not exceed 15% of the EAL and therefore based on the IAQM significance criteria the impacts are classified as **Negligible** at all except 3 discrete receptor locations (R20, R20A and R22) where impacts are classified as **Slight Adverse** as the post-ROP PC marginally exceeds 5% of the EAL.

5.7.11 The overall PC for PAHs at discrete receptors due to RRRF post-ROP is presented in **Figure 5.12 (Appendix B.1)** and **Table B.2.8 (Appendix B.2)** and does not exceed 0.5% of the EAL for BaP. Once background concentrations are considered, the PEC does not exceed 65% of the EAL and based on the IAQM significance criteria the impacts are classified as **Negligible.**

Short-term Averaging Period Impacts

5.7.12 **Table 5.23** presents the maximum predicted ground level short-term averaging period concentrations of pollutants anywhere within the receptor grid for any of the five years' worth of meteorological data modelled. The results are for the RRRF post-ROP operating at the maximum daily emission limit values from the BREF and compared to the maximum impacts from the existing RRRF.

Table 5.23: RRRF post-ROP Maximum Predicted Short-term Averaging Period Process Contributions

Pollutant	Max PC (µg/m^3)	Max PC as % of EAL	Change in Max PC (µg/m^3)	Change in Max PC as % of EAL
PM_{10}	0.21	0.4%	-0.201	-0.4%
NO_2	7.96	4.0%	-0.85	-0.4%
SO_2	3.34	2.7%	-0.78	-0.6%
	4.88	1.4%	-1.21	-0.3%
	5.85	2.2%	-1.32	-0.5%
CO	6.36	0.1%	0.10	+<0.1%
	8.20	<0.1%	0.18	+<0.1%
HF	0.16	0.1%	0.005	+<0.1%
HCl	1.31	0.2%	-0.29	-<0.1%
TOC	1.64	0.8%	0.052	+<0.1%
NH_3	1.64	0.1%	0.052	+<0.1%
Hg	3.28E-03	<0.1%	-4.74E-03	-0.1%
Cr	1.51E-02	<0.1%	3.32E-04	+<0.1%
Cu	4.76E-03	<0.1%	1.05E-04	+<0.1%
Mn	9.84E-03	<0.1%	2.16E-04	+<0.1%
Sb	1.89E-03	<0.1%	4.14E-05	+<0.1%

Pollutant	Max PC (µg/m^3)	Max PC as % of EAL	Change in Max PC (µg/m^3)	Change in Max PC as % of EAL
V	9.84E-04	0.1%	2.16E-05	+<0.1%
PCBs	8.20E-04	<0.1%	1.80E-05	+<0.1%

5.7.13 The change in maximum short-term PC resulting from the Proposed Changes is <1% of the EAL and is therefore considered to be 'Negligible' for all pollutants.

5.7.14 None of the predicted short-term PCs associated with the overall impact of RRRF post-ROP are greater than 10% of the assessment level at the point of maximum concentration and based on the IAQM significance criteria the impacts are therefore classified as **Negligible.**

5.7.15 The EPRs allows for elevated emissions over half hourly periods, although compliance with the daily mean emission limit must be maintained. An assessment of the short-term impacts has been undertaken assuming that these allowable higher short-term emissions occur all year round; the predicted concentrations are therefore highly conservative.

Table 5.24: RRRF Post-ROP Short Term Impacts at half-hourly mean 100th percentile ELVs

Pollutant	Half hourly mean 100th percentile ELV (mg/Nm^3)	Max Process Contribution (PC) µg/m^3	PC as % of EAL
Nitrogen dioxide	400	15.9	8.0%
Sulphur dioxide (15 minute)	200	23.4	8.8%
Sulphur dioxide (hourly)	200	19.6	5.6%
Carbon monoxide	100	16.4	0.1%
Hydrogen chloride	60	7.9	1.0%
Hydrogen fluoride	4	0.7	0.4%
TOC	20	3.3	1.7%

5.7.16 None of the predicted short-term PCs associated with the half hourly emission limits of RRRF post-ROP are greater than 10% of the assessment level at the point of maximum concentration and based on the IAQM significance criteria the impacts are classified as **Negligible.**

Assessment of Significance of Air Quality Effects

5.7.17 In relation to the change in predicted impacts due to the Proposed Changes, for all pollutants and averaging periods assessed, these are classified as **Negligible** in accordance with the IAQM methodology based on the low additional (or reduction) in impacts.

5.7.18 It is therefore considered that the effect of the Proposed Changes on air quality can be classified as **Not Significant**.

5.7.19 In relation to the overall predicted impacts of RRRF post-ROP, for a majority of the pollutants and averaging periods assessed, the maximum impacts or those at receptor locations are classified as **Negligible** in accordance with the IAQM methodology. This is due to either the low contribution of the emissions compared to the EAL and/or the baseline air quality being well below the EAL. In these cases it is considered that the effect of RRRF post ROP on air quality can be classified as **Not Significant**.

5.7.20 The predicted impacts of some 'group 3' metals (specifically arsenic, chromium VI and nickel) are not classified as **Negligible** at all locations, although impacts of arsenic and chromium VI are classified as **Negligible** at all discrete receptor locations.

5.7.21 In relation to arsenic and nickel, as presented in **Figure 5.9** and **Figure 5.11 (Appendix B.1)** and **Table B.2.5 (Appendix B.2)** whilst the maximum predicted PC exceeds 5% of the EAL this extends over a limited area and the overall PEC is <50% of the EAL at all locations

5.7.22 In relation to Chromium VI, the predicted PC does not exceed 1% of the EAL at any location and whilst the PEC exceeds the EAL this is due to the applied background concentration, for which is based on very limited information as Chromium VI is not routinely monitored in the UK.

5.7.23 Furthermore, it is important to note that the modelled emission rate of these pollutants is based on the highest measured values from similar plant and does not fully reflect the application of the lower BAT-AELs.

5.7.24 It is therefore considered that effect of the emissions of these metals associated with RRRF post ROP can also be classified as **Not Significant**.

Terrestrial Biodiversity Receptors

5.7.25 Detailed modelling has been carried out to predict the PCs and PECs associated with RRRF post-ROP of relevant pollutants at the identified terrestrial biodiversity receptors. The results of the modelling are contained in **Appendix B.3.**

5.7.26 For all Terrestrial Biodiversity Receptors, the change in annual average impacts resulting from the Proposed Changes is <1% of the relevant critical levels or loads (or 10% of the short-term critical levels) and therefore considered **Negligible**.

5.7.27 Further discussion of the overall potential indirect effects of air quality on terrestrial biodiversity receptors of RRRF post-ROP is presented within **Chapter 6** as annual average impacts at some receptors exceed the 1% screening threshold.

5.8 Cumulative Effects

5.8.1 The potential for cumulative air quality effects is considered to be limited to the main stack emissions from the thermal waste treatment process at the adjacent Riverside Energy Park ('REP') given the similar pollutant emissions and discharge characteristics.

5.8.2 The cumulative impacts have therefore been quantified through atmospheric dispersion modelling with the following discharge characteristics applied to REP (**Table 5.25**).

Table 5.25: Cumulative Emission Sources – REP physical discharge characteristics

Parameter	REP
Stack height (m)	90
Internal Stack Diameter (m)	3.11[a]
Flue gas velocity (m/s)	19.6
Oxygen (dry) (%v/v)	6.4
Moisture Content (%v/v)	21.4
Temperature (degree C)	120
Actual flow rate (Am^3/s)	149.0[b]
Normalized flow rate, dry, 11% oxygen (Nm^3/s)	119.1[b]

a) Combined stack diameter for 2 lines (2.2m individually)
b) Total flow rates for all 2 lines

5.8.3 The following pollutant emission rates have been applied to REP based on the maximum daily average ELVs set in the Environmental Permit for the facility.

Table 5.26: REP Applied pollutant emission rates

Pollutant	REP			
	Emission Limit		Emission Rate	
PM_{10} / $PM_{2.5}$	5	mg/Nm^3	0.6	g/s
NOx	75	mg/Nm^3	8.9	g/s
SO_2	30	mg/Nm^3	3.6	g/s
CO	50	mg/Nm^3	5.9	g/s
HCl	6	mg/Nm^3	0.7	g/s
HF	1	mg/Nm^3	0.12	g/s
TOC	10	mg/Nm^3	1.2	g/s
NH_3	10	mg/Nm^3	1.2	g/s
Hg	0.02	mg/Nm^3	2.4	mg/s
Cd & Tl	0.02	mg/Nm^3	2.4	mg/s
Group 3 Metals	0.3	mg/Nm^3	35.7	mg/s
Dioxins	0.06	ng I-TEQ/Nm^3	7.1	ng/s
PAH	0.21	$\mu g/Nm^3$	9.5	ug/s
PCBs	0.005	mg/Nm^3	25.0	mg/s

Long-term Averaging Period Cumulative Impacts

5.8.4 **Table 5.27** presents the maximum cumulative (RRRF post-ROP + REP) ground level concentrations of pollutants for long-term averaging periods anywhere within the receptor grid for any of the five years' of meteorological data modelled. The results are for both RRRF post-ROP and REP operating at the relevant maximum daily emission limit values.

Table 5.27: RRRF Post-ROP + REP Maximum Predicted Long-term Averaging Period Process Contributions

Pollutant	Max long term PC ($\mu g/m^3$)	Max PC as % of EAL
PM_{10}	0.12	0.3%
$PM_{2.5}$	0.12	0.6%
NO_2	2.18	5.5%
HF	0.07	0.5%
TOC	0.23	10.4%
NH_3	0.23	0.1%
Cd	4.69E-04	9.4%
Hg	4.69E-04	0.2%
As	5.86E-04	19.5%
Cr	2.16E-03	<0.1%
CrVI	3.05E-06	1.5%
Cu	6.80E-04	<0.1%
Pb	1.18E-03	0.5%
Mn	1.41E-03	0.9%

Pollutant	Max long term PC (µg/m^3)	Max PC as % of EAL
Ni	5.15E-03	25.8%
Sb	2.69E-04	<0.1%
V	1.41E-04	<0.1%
PAHs	4.92E-06	0.5%
	4.92E-06	2.0%
Dioxins	1.41E-09	N/A
PCBs	1.17E-04	0.1%

5.8.5 The overall long-term cumulative impact of RRRF post-ROP and REP is <1% of the EALs for a majority of pollutants and further consideration of the long-term impacts at discrete receptors is presented in **Appendix B.2** for the following key pollutants: NO_2, PM_{10}, $PM_{2.5}$, TOC, cadmium, arsenic, chromium VI, nickel and PAHs.

5.8.6 The overall cumulative PC for nitrogen dioxide (NO_2) at discrete receptors ranges from 0.2% to 2.5% of the annual EAL. Once background concentrations are considered, the PEC does not exceed 75% of the EAL and therefore based on the IAQM significance criteria the cumulative impacts are classified as **Negligible** at all receptors.

5.8.7 In terms of cumulative PM_{10} and $PM_{2.5}$ impacts, the overall PC at discrete receptors is below 0.5% of the relevant EAL at all receptors and total concentrations are well below the EAL. In relation to the WHO guideline value for $PM_{2.5}$ (of 10 µg/m^3), the cumulative PC at receptors locations would be <0.5% of this guideline. Therefore based on the IAQM significance criteria the cumulative impacts are classified as **Negligible** at all receptors.

5.8.8 The overall cumulative PC for TOC at discrete receptors ranges from 0.3% to 4.7% of the EAL for 1,3-butadiene. Once background concentrations are considered, the PEC does not exceed 11% of the EAL. Therefore, based on the IAQM significance criteria the cumulative impacts are classified as **Negligible** at all receptors.

5.8.9 The cumulative PC for cadmium (Cd) at discrete receptors ranges from 0.3% to 4.3% of the EAL. Once background concentrations are considered, the PEC does not exceed 12% of the EAL. Therefore based on the IAQM significance criteria the cumulative impacts are classified as **Negligible** at all receptors.

5.8.10 The cumulative PC for arsenic (As) at discrete receptors ranges from 0.6% to 8.9% of the EAL. Once background concentrations are considered, the PEC does not exceed 45% of the EAL. Therefore based on the IAQM significance criteria the cumulative impacts are classified as **Negligible** at all except 6 receptors (R20, R20A, R21, R22, R23 and R26) where cumulative impacts are classified as **Slight Adverse** as the cumulative PC exceeds 5% of the EAL.

5.8.11 For Chromium VI, the cumulative PC at discrete receptors only exceeds 0.5% of the EAL at 4 receptors (R20, R20A, R21 & R22) and the PEC exceeds the EAL at all receptors due to the high background concentration applied, which is based on very limited information as chromium VI is not routinely monitored in the UK. Therefore, the cumulative impacts at these receptors are classified as **Moderate Adverse** based on the IAQM methodology and **Negligible** at all others.

5.8.12 The cumulative PC for nickel (Ni) at discrete receptors ranges from 0.8% to 11.7% of the EAL. Once background concentrations are considered, the PEC does not exceed 20% of the EAL. Therefore based on the IAQM significance criteria the cumulative impacts are classified as **Negligible** at all except 9 receptors (R03, R04, R18, R18A, R19, R21, R22, R23 & R26) where cumulative impacts are classified as **Slight Adverse** (as the cumulative PC exceeds

5% of the EAL**)** and as **Moderate Adverse** (as the cumulative PC exceeds 10% of the EAL) at 2 receptors (R20 & R20A).

5.8.13 For PAHs, the cumulative PC at discrete receptors does not exceed 1.0% of the EAL for BaP and the PEC does not exceed 65% of the EA. Therefore, based on the IAQM significance criteria the cumulative impacts are classified as **Negligible** at all receptors.

Short-term Averaging Period Cumulative Impacts

5.8.14 **Table 5.28** presents the maximum predicted cumulative ground level short-term averaging period concentrations of pollutants anywhere within the receptor grid for any of the five years' worth of meteorological data modelled. The results are for both RRRF post-ROP and REP operating at the applicable maximum daily emission limit values.

Table 5.28: RRRF Post-ROP + REP Cumulative Maximum Predicted Short-term Averaging Period Process Contributions

Pollutant	Max short term PC (µg/m^3)	Max PC as % of EAL
PM_{10}	0.34	0.7%
NO_2	9.93	5.0%
SO_2	4.28	3.4%
	7.23	2.1%
	8.16	3.1%
CO	9.91	0.1%
	15.22	0.1%
HF	0.30	0.2%
HCl	2.11	0.3%
TOC	3.05	1.6%
NH_3	3.05	0.1%
Hg	6.09E-03	0.1%
Cr	8.40E-03	<0.1%
Cu	2.65E-03	<0.1%
Mn	5.48E-03	<0.1%
Sb	1.05E-03	<0.1%
V	5.48E-04	0.1%
PCBs	1.52E-03	<0.1%

5.8.15 None of the predicted cumulative short-term PCs are greater than 10% of the assessment level at the point of maximum concentration and based on the IAQM significance criteria the impacts are classified as **Negligible.**

Assessment of Significance of Cumulative Air Quality Effects

5.8.16 In relation to the predicted cumulative impacts of RRRF post ROP + REP, for a majority of the pollutants and averaging periods assessed, the maximum impacts or those at receptor locations are classified as **Negligible** in accordance with the IAQM methodology. This is due to either the low contribution of the emissions compared to the EAL and/or the baseline air quality being well below the EAL. In these cases it is considered that the cumulative effect of RRRF post ROP + REP on air quality can be classified as **Not Significant**.

5.8.17 The predicted cumulative impacts of some 'group 3' metals (specifically arsenic, chromium VI and nickel) are not classified as **Negligible** at all locations and therefore further consideration

is required to make a judgement as to the potential significance of their effect as per paragraph 7.7 of the IAQM guidance which states:

'Any judgement on the overall significance of effect of a development will need to take into account such factors as:

- *The existing and future air quality in the absence of the development;*
- *The extent of current and future population exposure to the impacts; and*
- *The influence and validity of any assumptions adopted when undertaking the prediction of impacts.'*

5.8.18 In relation to arsenic and nickel, whilst the predicted cumulative PC exceeds 5% or 10% of the EAL over a limited area (and therefore impacts classified as **Slight Adverse or Moderate Adverse** at locations within these areas), the overall PEC remains below 50% of the EAL at all locations.

5.8.19 In relation to Chromium VI, the predicted cumulative PC does not exceed 1% of the EAL at any receptor location and whilst the PEC exceeds the EAL this is due to the applied background concentration, for which there is very limited information as chromium VI is not routinely monitored in the UK.

5.8.20 Furthermore, it is important to note that the modelled emission rate of these pollutants is based on the highest measured values from similar plant and therefore does not fully reflect the typical emission rates or the application of the lower BAT-AELs to both RRRF post ROP and REP.

5.8.21 It is therefore considered, taking into account these factors that the cumulative effect of the emissions of these metals associated with RRRF post-ROP plus REP can also be classified as **Not Significant**.

Terrestrial Biodiversity Receptors

5.8.22 Detailed modelling has been carried out to predict the cumulative impacts of relevant pollutants at the identified terrestrial biodiversity receptors. The results of the modelling are contained in **Appendix 5.2.**

5.8.23 Further discussion of the potential cumulative indirect air quality effects on terrestrial biodiversity receptors of RRRF post-ROP and REP is presented within **Chapter 6** as annual averages impacts at some receptors exceed the 1% screening threshold.

5.9 Further Mitigation and Enhancement

5.9.1 No requirement for further mitigation or enhancement has been identified.

5.10 Residual Effects

5.10.1 The residual air quality effects due to the Proposed Changes are considered to be **Not Significant.**

5.10.2 The residual cumulative air quality effects due to the Proposed Changes and REP are considered to be **Not Significant.**

5.11 Monitoring

5.11.1 No monitoring of air quality effects will be necessary as no significant residual adverse effects have been identified. However, it should be noted that there are already existing air quality emission monitoring processes in place at the RRRF which are required as part of the Environmental Permit for the RRRF. The Applicant also has an agreement LBB in relation to wider ambient air quality monitoring.

5.12 Summary

5.12.1 A detailed air quality assessment utilising atmospheric dispersion modelling has been undertaken of the potential impact of emissions to air from the operation of the RRRF both before and after the Proposed Changes, and cumulatively with REP.

5.12.2 There are not considered to be any potentially significant air quality effects resulting from minor changes to vehicle movements or odour from waste handling associated with the Proposed Changes.

5.12.3 The current emissions to air from RRRF have been quantified from monitoring data (flow characteristics provided by the Applicant) and emission limits for individual pollutants from the Environmental Permit for the site. The emissions from RRRF post ROP have been calculated from design data (flow characteristics provided by the Applicant) and the application of the BAT-AELs that the Applicant will adopt prior to the EA's implementation date.

5.12.4 In relation to the change in predicted impacts due to the Proposed Changes, for all pollutants and averaging periods assessed, these are classified as **Negligible** in accordance with the IAQM methodology based on the low additional (or reduction) in impacts.

5.12.5 It is therefore considered that the effect of the Proposed Changes on Air Quality can be classified as **Not Significant**.

5.12.6 In relation to the overall predicted impacts of RRRF post ROP, for a majority of the pollutants and averaging periods assessed, the maximum impacts or those at receptor locations are classified as **Negligible** in accordance with the IAQM methodology. This is due to either the low contribution of the emissions compared to the EAL and/or the baseline air quality being well below the EAL.

5.12.7 Whilst for some metals (arsenic, chromium VI and nickel) the predicted impact is not classified as **Negligible** at all locations, this is based on conservative assumptions as to their emissions and the magnitude and extent of the impacts are not considered to be Significant.

5.12.8 It is therefore considered that the effect of the emissions associated with RRRF post ROP on air quality can be classified as **Not Significant**.

5.12.9 For all Terrestrial Biodiversity Receptors, the change in annual average impacts resulting from the Proposed Changes is <1% of the relevant critical levels or loads (or 10% of the short-term critical levels) and therefore considered **Negligible**.

5.12.10 Further discussion of the overall potential indirect air quality effects on terrestrial biodiversity receptors as a result of emissions from RRRF post-ROP are presented within **Chapter 6** as annual average impacts at some receptors exceed the 1% screening threshold.

5.12.11 In relation to the predicted cumulative impacts of RRRF post ROP + REP, for a majority of the pollutants and averaging periods assessed, the maximum impacts or those at receptor locations are classified as **Negligible** in accordance with the IAQM methodology. This is due to either the low contribution of the emissions compared to the EAL and/or the baseline air quality being well below the EAL.

5.12.12 Whilst for some metals (arsenic, chromium VI and nickel) the predicted cumulative impact is not classified as **Negligible** at all locations, this is based on conservative assumptions as to their emissions and the magnitude and extent of the impacts are not considered to be significant.

5.12.13 It is therefore considered that the cumulative effect of the emissions associated with RRRF post ROP + REP on air quality can be classified as **Not Significant**.

5.12.14 Further discussion of the potential cumulative indirect air quality effects on terrestrial biodiversity receptors as a result of emissions from RRRF post-ROP and REP is presented within **Chapter 6** as annual averages impacts at some receptors exceed the 1% screening threshold.

5.13 References

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- Statutory Instrument 2016, No. 1184, 'The Air Quality Standards (Amendment) Regulations 2016' HMSO, London.
- Statutory Instrument 2019, No. 74. 'The Air Quality (Amendment of Domestic Regulations) (EU Exit) Regulations 2019', HMSO, London.
- Statutory Instrument 2017, No. 1012, 'The Conservation of Habitats and Species Regulations 2017' HMSO, London.
- Statutory Instrument 2019, No. 579, 'The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019', HMSO, London.
- Statutory Instrument 2010, No. 675. 'The Environmental Permitting (England and Wales) Regulations 2010', HMSO, London.
- Statutory Instrument 2019, No. 39. 'The Environmental Permitting (England and Wales) (Amendment) (EU Exit) Regulations 2019', HMSO, London.

6 Biodiversity

6.1 Introduction

6.1.1 This Chapter has been prepared by Stantec UK. In accordance with Regulation 17 of the Electricity Works (Environmental Impact Assessment) (England and Wales) Regulations 2017 (as amended) a statement outlining the relevant expertise and qualifications of competent experts appointed to prepare this EIA Report is provided in **Appendix A.4**.

6.1.2 The purpose of this chapter is to identify whether ROP (as outlined in **Chapter 3**) is likely to result in likely significant effects to biodiversity.

6.2 Policy, Legislation, Guidance and Standards

Legislation

Conservation of Habitats and Species Regulations 2017 (as amended)

6.2.1 Under the Conservation of Habitats and Species Regulations 2017[20] (the 'Habitats Regulations'), an HRA is required for all plans and projects which may have likely significant effects on European sites, such as Special Areas of Conservation ('SACs'), and are not directly connected with, or necessary to, the management of the European site.

6.2.2 The HRA for ROP is set out within *Riverside Optimisation Project: Habitats Regulations Assessment* (Stantec, 2021) submitted alongside this EIA Report.

Wildlife and Countryside Act 1981 (as amended)

6.2.3 The Act[21] further provides for notification and confirmation of Sites of Special Scientific Interest (SSSI) for their flora, fauna, geological or physiographical features. It also contains measures for the protection and management of SSSIs.

The Natural Environmental and Rural Communities Act 2006 ('NERC')

6.2.4 The NERC Act[22] imposes a duty on public bodies (including government departments) to have due regard for habitats and Species of Principal Importance for biodiversity in England when carrying out their duties.

6.2.5 Section 41 (S.41) of the NERC Act requires the Secretary of State to publish a list of habitats and species which are of principal importance for the conservation of biodiversity in England. The list is used by decision-makers in implementing their protection duties under this Act when carrying out their functions.

National Policy and Guidance

6.2.6 The relevant National Policy Statements ('NPS') provide the primary basis for decisions by the Secretary of State on development consent applications for nationally significant infrastructure projects ('NSIPs'). ROP is not a NSIP and therefore a Development Consent Order (‘DCO’) is

[20] HMSO (Her Majesty's Stationary Office): The Conservation of Habitats and Species Regulations 2017 (as amended) (the Habitat Regulations)

[21] HMSO (1981): Wildlife and Countryside Act (as amended by the Countryside and Rights of Way Act 2000).

[22] HMSO (2006): Natural Environment and Rural Communities Act

not being sought. However, NPS EN-1[23] is a material consideration relevant to the determination of the proposed development.

6.2.7 **Section 5.3** of NPS EN-1 (Biodiversity and geological conservation) states that:

"Where the development is subject to EIA the applicant should ensure that the ES [Environmental Statement] clearly sets out any effects on internationally, nationally and locally designated sites of ecological or geological conservation importance, on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity…

6.2.8 The document goes on to reiterate the Government's biodiversity strategy, its aim being to ensure:

"a halting, and if possible a reversal, of declines in priority habitats and species, with wild species and habitats as part of healthy, functioning ecosystems; and

the general acceptance of biodiversity's essential role in enhancing the quality of life, with its conservation becoming a natural consideration in all relevant public, private and non-governmental decisions and policies."

6.2.9 The policy goes onto say:

"…development should aim to avoid significant harm to biodiversity and geological conservation interests, including through mitigation and consideration of reasonable alternatives… where significant harm cannot be avoided, then appropriate compensation measures should be sought."

6.2.10 The current National Planning Policy Framework ('NPPF')[24] was published by Ministry of Housing, Communities and Local Government in February 2019. Policies of relevance to ROP include: Paragraph 8 (Achieving sustainable development); 170 and 172 (Conserving and enhancing the natural environment); 175, 176 and 177 (Conserving and enhancing the natural environment – Habitats and biodiversity); 180 (Conserving and enhancing the natural environment: Ground conditions and pollution); and, associated Planning Practice Guidance: Air Quality (2019), Natural Environment (2019).

Regional Policy

6.2.11 The London Plan: The Spatial Development Strategy for Greater London was published by the GLA in March 2021[25]. Policies of relevance to ROP include: Policy G6 (Biodiversity and Access To Nature), which sets out the mechanism for protection of nature conservation areas.

Local Policy

6.2.12 Bexley Core Strategy (2012)[26] presents the policy framework for development within the Borough over a 15 year period to 2027. Policy CS18 (Biodiversity and Geology) sets out the mechanism for protection of nature conservation areas within the borough.

6.2.13 This chapter has been prepared with reference to the following industry standard guidelines:

[23] Department of Energy and Climate Change (2011): Overarching National Policy Statement for Energy (EN-1)

[24] Department for Communities and Local Government (2019). National Planning Policy Framework

[25] Greater London Authority (2021). The London Plan: The Spatial Development Strategy for Greater London.

[26] London Borough of Bexley (2012). Bexley Core Strategy.

- Guidelines for Ecological Impact Assessment in the UK and Ireland, CIEEM 2018. (the 'EcIA Guidelines')
- Advice on Ecological Assessment of Air Quality Impacts, CIEEM, 2021.
- A guide to the assessment of air quality impacts on designated nature conservation sites – version 1.1, Holman et al, 2020.

6.3 Consultation

6.3.1 A request for an EIA Scoping Opinion was submitted to the Secretary of State for BEIS on 18th December 2020 (Riverside Optimisation Project Environmental Impact Assessment Scoping Report (Stantec, 2020)).

6.3.2 A response was received from London Borough of Bexley on 27th January 2021. The comments relevant to this chapter are set out below in **Table 6.1**, along with a response.

Table 6.1: Scoping responses received and project response

LBB Comment	Project Response
The following [receptors] are missing from the [Scoping Report] Table: - Lesnes Abbey Wood (SSSI) - M015 Lesnes Abbey Woods and Bostall Wood site of Metropolitan Importance for Nature Conservation	Lesnes Abbey Wood is a geological SSSI, and has been scoped out of the assessment due to lack of habitats which could be affected through emissions from ROP. Lesnes Abbey Woods and Bostall Wood SMINC has been included in the assessment below.
The table includes reference BxB103- The reference should include an I rather than a 1, ie BxBI03 Franks Park	Noted. The reference has been amended within this EIA Report.
Paragraph 8.36 states that "One area of ancient woodland, Lesnes Abbey Woods, is presently approximately 1.9km south of RRRF." London Borough of Bexley has also determined that Franks Park is Ancient Woodland.	Noted. The presence of ancient woodland within Franks Park has been acknowledged within this EIA Report.

6.4 Methodology

Study Area

6.4.1 As identified in the EIA Scoping Report, ROP has the potential to result in indirect effects to biodiversity through a change in emission levels from RRRF and resultant deposition of airborne pollutants to nearby designated areas, and therefore this is what has been considered within the scope of this EIA.

6.4.2 As there is no physical development associated to ROP, no mechanism exists for direct physical impacts to biodiversity receptors, and therefore direct effects have been scoped out of the EIA.

6.4.3 In line with standard guidance for assessing effects from emissions (Holman et al, 2020[27]) the biodiversity receptors assessed include:

- internationally and nationally designated areas such as Special Areas of Conservation ('SACs') and Sites of Special Scientific Interest ('SSSIs') within 15km;
- locally designed statutory areas such as Local Nature Reserves ('LNRs') and locally designated non-statutory designated areas such as Sites of Importance for Nature Conservation ('SINCs') within 2km; and,
- Ancient woodland within 2km.

Baseline Data Collection

6.4.4 Information on statutory designated areas within the Study Area identified above, has been obtained from Multi Agency Geographic Information for the Countryside website (www.magic.gov.uk - MAGIC), JNCC and Natural England websites.

6.4.5 Data in relation to non-statutory nature conservation areas within 2 km was obtained from Greenspace Information for Greater London ('GiGL').

6.4.6 Sites of Special Scientific Interest ('SSSIs') designated for geological interest have been excluded from the assessment as habitats are not a designating feature.

Assessment

6.4.7 The assessment of effects to biodiversity receptors will follow industry standard approach as set out in the EcIA Guidelines (CIEEM, 2018). The EcIA Guidelines state that “EcIA is a process of identifying, quantifying and evaluating the potential effects of development-related or other proposed actions on habitats, species and ecosystems”. It requires an assessment of likely significant effects on important ecological features, and as such, does not require consideration of effects on every species or habitat that may be present within the Study Area.

6.4.8 In order to determine whether there are likely to be significant effects, it is first necessary to identify whether a receptor is ‘important’, and therefore whether an effect upon it could be significant, and thus, material in decision-making. As the scope of this assessment has been focused on designated areas and ancient woodland, it is considered that all receptors which have been identified are considered important, and therefore fully considered within the impact assessment.

6.4.9 This assessment follows the EcIA Guidelines and values the importance of ecological features with reference to a geographical framework. The geographical framework will assign a level of importance to ecological features, as below:

- International (e.g. SAC)
- National (e.g. SSSI)
- Metropolitan (e.g. Sites of Metropolitan Importance for Nature Conservation, LNR)
- Local (e.g. Sites of Borough or Local Importance for Nature Conservation)

6.4.10 Assessment of impacts on designated sites from increased emissions has been undertaken in line with *Advice on Ecological Assessment of Air Quality Impacts* (CIEEM, 2021), and *A guide*

[27] Holman et al, 2020. A guide to the assessment of air quality impacts on designated nature conservation sites – version 1.1. Institute of Air Quality Management, London.

to the assessment of air quality impacts on designated nature conservation sites – version 1.0 (Holman et al, 2020).

6.4.11 In terms of the potential impact of emissions on designated areas, concentrations and deposition rates have been calculated and compared against site relevant critical levels and loads for the habitats in question. An impact of less than 1% of the applicable annual average critical level or load is accepted to be a pragmatic threshold for determining no likely significant effects from a stack source. For pollutants modelled over short-term periods (weekly or over a 24-hour period), a 10% threshold is used. It should be noted that an impact of more than 1% (or 10% for pollutants modelled over short-term) is not, per se, an indication that a significant effect exists, only the possibility of one, which would trigger the need for further, more detailed assessment of the ecological sensitivity and value of the habitat.

6.4.12 Where the predicted annual average impact exceeds 1% (or 10% for pollutants modelled over short-term), consideration needs to be given to the overall critical level or load. Where the critical level or load is exceeded, further ecological assessment is required to ascertain the potential significance of the impact and resultant effects.

6.4.13 Critical loads (to be used as standards for the assessment of significance) have been obtained from the Air Pollution Information System ('APIS') website. Further details of the air quality modelling which has been used to inform the assessment of effects to biodiversity receptors can be found in **Chapter 5: Air Quality**.

6.4.14 The assessment examines effects on receptors with reference to the extent, magnitude, duration, timing, frequency, and reversibility of the impacts. For each receptor, relevant impacts during operation are then characterised. Effects are then defined, taking into account embedded mitigation, and then their significance assessed. Where relevant any further mitigation identified and residual impacts reported.

6.4.15 The EcIA Guidelines (Section 5.24) state that an effect should be determined as being significant when it “either supports or undermines biodiversity conservation objectives for important ecological features”. It relates to the weight that should be afforded to effects when decisions are made, and to the consequences, in terms of legislation, policy and/or development control. Therefore, a significant negative effect on a feature of importance at one level would be likely to trigger related planning policies and, if permissible at all, generate the need for development control mechanisms, such as planning conditions or legal obligations, as described in those policies. In determining significance, consideration will be given to aspects of the structure and function of the biodiversity receptor, and the likely resilience to change.

6.4.16 An effect on an important ecological feature may be significant at the same geographic scale at which the feature is determined to be important, or at a lesser geographical scale, depending on the characterisation of the impact. By way of example, limited impacts on a woodland of county importance might be assessed as being significant at a local level of importance.

6.4.17 Whilst the approach outlined above expresses the significance of ecological effects with reference to a geographic frame of reference, as advocated in the EcIA Guidelines; within **Section 6.11 (Residual Effects)**, significance is also expressed using the generic significance criteria used for other topics within this EIA Report. This approach has been taken in order to allow integration with the assessment of all environmental impacts in other chapters.

6.4.18 The generic criteria used are based on an expression of severity, to describe the significance of environmental impacts. For ease of reference, **Table 6.2** below provides a means of relating the two approaches and is provided in order to allow this Chapter to be integrated into the wider EIA Report, without compromising the CIEEM best practice approach.

Table 6.2: Comparison of Significance Criteria

CIEEM EclA Guidelines Approach	ES Approach	
Significance Level	**Significance Level**	**Criteria**
Effects assessed as being significant at an international or national level.	Substantial	These effects are assigned this level of significance as they represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites and features of national or regional importance. A change at a district scale site or feature may also enter this category.
Effects assessed as being significant at a metropolitan level.	Major	These effects are likely to be important considerations at a local or district scale and may become key factors in the decision-making process.
Effects assessed as being significant at a local level	Moderate	These effects, while important at a local scale, are not likely to be key decision-making issues. Nevertheless, the cumulative effect of such issues may lead to an increase in the overall effects on a particular area or on a particular resource.
Effects assessed as being significant at a local level	Minor	These effects may be raised as local issues but are unlikely to be of importance in the decision-making process. Nevertheless, they are of relevance in enhancing the subsequent design of the project and consideration of mitigation or compensation measures.
Effects assessed as being not significant	Negligible	Either no effect or effect which is beneath the level of perception, within normal bounds of variation or within the margin of forecasting error. Such effects should not be considered by the decision-maker.

Cumulative Assessment

6.4.19 **Sections 4.6.6 – 4.6.8** of this EIA Report set out the methodology used to identify 'Other Developments' which were considered to have the potential for likely significant cumulative effects with ROP. The only Other Development considered likely to interact with ROP is the adjacent Riverside Energy Park (REP) development. Further air quality modelling of cumulative effects from ROP and REP was undertaken to inform the assessment. Where residual effects to a receptor were identified, the potential for cumulative effects with REP were assessed. These are discussed in **Section 6.9**.

Limitations

6.4.20 The information presented in this chapter is based on the information available at the time of writing.

6.4.21 The prediction of impacts and effects inevitably involves a degree of uncertainty. Where necessary, the ecological assessment will describe the principal factors giving rise to

uncertainty in the prediction of effects and the degree of uncertainty. Confidence in predictions is engendered by employing accepted assessment methodologies.

6.5 Baseline Conditions

Current Baseline

6.5.1 One international statutory designated nature conservation area and thirteen nationally designated nature conservation areas are present within 15 km of ROP. These are set out in **Table 6.3** below, along with their nature conservation importance classification. SSSI designated for geological interest have not been included in the list of receptors below.

Table 6.3: Internationally and nationally designated areas within 15 km of ROP.

Designated Area	Approximate distance from ROP (km)	Description	Nature Conservation Importance
Epping Forest Special Area of Conservation (SAC)	12	Beech forests, wet and dry heathlands, the presence of stag beetle.	International
Inner Thames Marshes Site of Special Scientific Interest (SSSI)	2	An area of wetland and grazing marsh supporting a range of birds, plants and insects.	National
Ingrebourne Marshes SSSI	3	An area of wetland and grazing marsh supporting a range of birds, plants and insects.	National
Oxleas Woodlands SSSI	7	One of the most extensive areas of long-established woodland on the London Clay in Greater London.	National
West Thurrock Lagoon and Marshes SSSI	9	An area of lagoon, marshes and intertidal mudflats known to be of importance to wintering waders and wildfowl.	National
Ruxley Gravel Pits SSSI	11	Relatively undisturbed open water contains a high diversity of habitats and species.	National
Darenth Wood SSSI	11	Ancient semi-natural woodland.	National
Grays Thurrock Chalk Pit SSSI	11	Range of woodland, scrub and calcareous grassland habitats that are important for the assemblage of invertebrate fauna they support.	National
Epping Forest SSSI	12	Ancient wood-pasture, with outstanding assemblage of invertebrates.	National
Hainault Forest SSSI	12	Ancient wood-pasture supporting a diverse flora and fauna, including a diverse breeding bird community.	National
Farningham Wood SSSI	13	Woodland supporting a particularly rich invertebrate fauna.	National
Hangman's Wood &	14	Underground hibernation site for bats.	National

Designated Area	Approximate distance from ROP (km)	Description	Nature Conservation Importance
Deneholes SSSI			
Curtismill Green SSSI	15	Unimproved grassland and scrub.	National
Thorndon Park SSSI	15	Semi-natural broad-leaved woodland and ancient parkland.	National

6.5.2 Eighteen locally designated nature conservation areas have been identified within 2km of ROP. These are set out in **Table 6.4** below, along with their nature conservation importance.

Table 6.4: Locally designated nature conservation areas within 2 km of ROP.

Designated Area	Designation[28]	Nature Conservation Importance
Crossness	LNR	Metropolitan
Lesnes Abbey Wood	LNR	Metropolitan
Rainham Marshes	LNR	Metropolitan
Franks Park	SBINC	Local
Wennington, Aveley and Rainham Marshes	SMINC	Metropolitan
River Thames and tidal tributaries	SMINC	Metropolitan
Dagenham Breach and the lower Beam River in Dagenham	SBINC	Local
Lower River Beam and Ford Works Ditches	SBINC	Local
Goresbrook and the Ship & Shovel Sewer	SBINC	Local
Crossway Park and Tump 52	SLINC	Local
Southmere Park and Woodland Way	SBINC	Local
The Ridgeway	SLINC	Local
Lesnes Abbey Woods and Bostall Woods	SMINC	Metropolitan
Erith Marshes	SMINC	Metropolitan
Thamesview Golf Course	SBINC	Local

[28] LNR – Local Nature Reserve, SMINC – Site of Metropolitan Importance for Nature Conservation, SBINC – Site of Borough Importance for Nature Conservation, SLINC – Site of Local Importance for Nature Conservation.

Belvedere Dykes	SBINC	Local
Church Manorway Nature Area	SBINC	Local
Crossness Sewage Treatment Works Pond	SBINC	Local

6.5.3 One area of ancient woodland included on the Ancient Woodland Inventory, Lesnes Abbey Woods, is present approximately 1.9km south of RRRF. This woodland is also covered by the Lesnes Abbey Wood LNR designation.

6.5.4 Although it is not included on the Ancient Woodland Inventory, it is understood from London Borough of Bexley that Franks Park also contains ancient woodland. Franks Park is covered by Franks Park SBINC designation.

Baseline Evolution

6.5.5 Given that it is planned ROP will become operational in 2021, it is unlikely that the biodiversity baseline will change significantly between that set out in the baseline section above and commencement of operation. Whilst ecological resources are not static, the receptors within the study area are considered unlikely to change significantly within that timeframe.

6.5.6 Changes in rainfall through climate change (such as 40% increase in rainfall intensity[29]) have been predicted, however given the short timeframe this is unlikely to be noticeable prior to operation. During operation, changes to habitats within designated areas in the study area are possible as a result of climate change, however any changes are likely to be minor and would likely take place over a long time period. For these reasons it is not anticipated that the effects of climate change would result in new or different significant effects to those identified in this Chapter.

6.6 Embedded Mitigation

6.6.1 This section describes the measures that are incorporated within the design of ROP to reduce or offset environmental effects. Embedded mitigation aims to design out adverse environmental effects where possible. In terms of impacts on air quality, the following can be considered as embedded mitigation, and have been taken into account within the air quality modelling:

- Stack Height: An elevated release height (90m) achieves better dispersion of air emissions resulting in lower concentrations at sensitive receptor locations.
- Emission Limit Values: Combustion emissions from RRRF are controlled by the requirements of the EPR and early adoption of the BREF BAT-AELs will reduce the maximum permitted emissions of many pollutants.

6.7 Assessment of Likely Effects

6.7.1 As described in **Chapter 5**, emissions from the stack can lead to deposition of compounds with the potential to adversely affect designated areas. Contributions of the following compounds from ROP to designated areas have been calculated using the approach in

[29] Environment Agency, 2016, Flood Risk Assessments: Climate Change Allowances

Environment Agency guidance AQTAG06[30]: nitrogen (N), nitrogen oxides (NOx), sulphur dioxide (SO_2), ammonia (NH_3), hydrogen fluoride (HF), and acid. Detailed modelling has been carried out to predict the Predicted Environmental Concentration ('PECs') and process contributions ('PC') of these compounds from the stack location to the receptors set out in **Section 6.6** above.

6.7.2 The predicted contributions have been compared against the relevant critical loads and levels for the most ecologically sensitive habitats within the designated areas. In line with standard guidance from CIEEM and IAQM, where the annual average critical level or load is already exceeded as a result of the baseline concentrations or deposition rates, a 1% threshold has been used, below which significant effects can be screened out. The 1% threshold is considered in the air quality assessment profession to '*define a reasonable quantum of long-term pollution which is not likely to be discernible from fluctuations in background/measurements*' (Holman et al, 2020[31]).

6.7.3 The air quality modelling set out in **Appendix B.3** demonstrates that, whilst some of the designated areas currently exceed critical loads or critical levels, changes in PCs due to ROP when compared to the existing baseline, are less than 1% of the annual average critical loads or levels for all modelled pollutants, or less than 10% for the short-term average.

6.7.4 For example, the largest modelled increase in nitrogen deposition is 0.13% to the Inner Thames Marshes SSSI / Rainham Marshes LNR, which is an order of magnitude lower than the 1% screening threshold. In many cases, ROP results in slight reductions in the contribution of pollutants to designated areas, when compared to current contributions from RRRF, due to early adoption of emissions regulations.

6.7.5 As set out in standard guidance (Holman et al, 2020) *'the 1% threshold has become widely used throughout the air quality assessment profession to define a reasonable quantum of long term pollution which is not likely to be discernible from fluctuations in background/measurements'* and are therefore considered to be nugatory.

6.7.6 Therefore, predicted effects from ROP through contribution of pollutants to the designated areas considered within this assessment are **Not Significant**.

6.8 Cumulative Effects

6.8.1 In addition to air quality modelling of ROP in the context of the existing baseline, modelling has also been undertaken for the scenario of ROP in addition to Riverside Energy Park ('REP'). REP is a consented energy from waste scheme located immediately to the west of RRRF which is due to be operational by 2024. Modelling of the cumulative contributions from RRRF post ROP and REP to designated areas have been calculated using the approach in Environment Agency guidance AQTAG06 in relation to the following compounds: nitrogen (N), nitrogen oxides (NOx), sulphur dioxide (SO_2), ammonia (NH_3), hydrogen fluoride (HF), and acid. Detailed modelling has been carried out to predict the Predicted Environmental Concentration ('PECs') and process contribution ('PC') of these compounds to the receptors set out in **Section 6.6** above.

6.8.2 All combinations of site and pollutant except those indicated with a 'y' in **Table 6.5** have been scoped out of further assessment. This is because either (i) all modelled pollutant concentrations will increase by less than 1% of the relevant critical threshold at these sites

[30] Environment Agency (2014). AQTAG 06, Technical Guidance on Detailed Modelling Approach for an Appropriate Assessment for Emissions to Air, Ji Ping Shi, Environment Agency Air Quality Monitoring and Assessment Unit, Updated version.

[31] Holman et al, 2020. A guide to the assessment of air quality impacts on designated nature conservation sites – version 1.1. Institute of Air Quality Management, London.

under all development scenarios, or (ii) because critical loads or levels are not exceeded, and therefore ecological effects are considered the be negligible[32].

Table 6.5: Designated areas scoped in for assessment of cumulative effects.

Designated Area	Designation	Scoped in for further assessment			
		Nitrogen	Annual NOx	Acid	Ammonia
Inner Thames Marshes / Rainham Marshes	SSSI / LNR	y	y		y
Oxleas Woodlands SSSI	SSSI				
Epping Forest SSSI	SSSI				
Epping Forest SAC	SAC				
Ingrebourne Marshes SSSI	SSSI	y	y		y
Thorndon Park SSSI	SSSI				
Hainault Forest	SSSI				
Curtismill Green SSSI	SSSI				
West Thurrock Lagoon & Marshes	SSSI				
Grays Thurrock Chalk Pit SSSI	SSSI				
Hangman's Wood & Deneholes SSSI	SSSI				
Darenth Wood SSSI	SSSI				
Farningham Wood SSSI	SSSI				
Ruxley Gravel Pits	SSSI				
Crossness	LNR				
Lesnes Abbey Wood	LNR	y		y	y
Franks Park	SBINC	y		y	
Wennington, Aveley and Rainham Marshes	SMINC	y	y		y
River Thames and tidal tributaries	SMINC				
Dagenham Breach and the lower Beam River in Dagenham	SBINC				
Lower River Beam and Ford Works Ditches	SBINC				

[32] The following pollutants have not been included within Table 7.5 as for all designated areas, the predicted change was below the 1% threshold for annual average, or the 10% threshold for short term average: 24-hour average NOx, annual average SO2, weekly average HF, and 24-hour average HF.

Designated Area	Designation	Scoped in for further assessment			
		Nitrogen	Annual NOx	Acid	Ammonia
Goresbrook and the Ship & Shovel Sewer	SBINC				
Crossway Park and Tump 52	SLINC	y	y		y
Southmere Park and Woodland Way	SBINC				
The Ridgeway	SLINC	y			y
Lesnes Abbey Woods and Bostall Woods	SMINC	y		y	
Erith Marshes	SMINC				
Thamesview Golf Course	SBINC	y			y
Belvedere Dykes	SBINC				
Church Manorway Nature Area	SBINC				
Crossness Sewage Treatment Works Pond	SBINC				

6.8.3 The following sections consider impacts on designated sites that were not scoped out above. The assessment considers cumulative effects of the existing RRRF plus ROP, along with REP.

6.8.4 Some designated areas are covered by multiple designations (e.g. they may be designated as both a SSSI and LNR). In instances where the designations cover the same area, these have been assessed collectively. In addition, where two or more designated areas cover separate areas but contain similar habitat types, e.g. areas designated for aquatic habitats, these have also been assessed collectively.

Inner Thames Marshes SSSI/Rainham Marshes LNR/ Wennington, Aveley and Rainham Marshes SMINC

6.8.5 This collection of designated areas, approximately 1.75km the north east of ROP at their closest distance, principally contain wetland habitats supporting freshwater grazing marshes along with associated habitats including brackish ditches, and reedbed.

6.8.6 The air quality modelling indicates the potential for minor increases of modelled pollutants to these areas above the existing baseline for nitrogen (2.0%), nitrous oxides (1.3%) and ammonia (2.3%).

6.8.7 Inner Thames Marshes currently exceeds critical levels for both NOx and ammonia deposition, although the predicted PCs from the cumulative schemes would not provide the causal factor for this exceedance and would only contribute a small component of the total baseline concentrations ('PECs'). Whilst the NOx and ammonia PCs are above the threshold for potential significance, this reflects the annual mean concentrations (i.e. in the air) whereas the determining factor, which could potentially affect habitats, is the nitrogen deposition. Excessive nitrogen deposition can have negative impacts on plants and habitats by altering

their biochemistry, or through stimulating the growth of competitive plant species which can reduce species diversity within a habitat[33]. The SSSI does not exceed the critical load for nitrogen deposition, even taking account of the predicted cumulative PC, indicating that the cumulative effects of nutrient deposition will not affect the habitats.

6.8.8 The condition assessment for the Inner Thames Marshes SSSI (Condition of SSSI Units for Site Inner Thames Marshes SSSI) concludes that much of the SSSI is in 'favourable condition'. However, some areas of the SSSI or 'units' are in 'unfavourable condition', largely due to abiotic factors, and coastal processes. The condition assessment does not state that the SSSI units in unfavourable condition are adversely affected by eutrophication, or the prevalence of nutrient loving plants (such as some graminaceous species). This suggests that the conservation status of the habitats for which the SSSI is designated is not adversely affected by the levels of nitrogen which it receives at present.

6.8.9 Freshwater systems are typically 'phosphorus limited' (CIEEM, 2021) meaning that phosphorus is generally scarce and will inhibit the growth of plants even in the presence of abundant nitrogen. Therefore, provided phosphorus concentrations remain low, the predicted minor increases in nitrogen, NOx and ammonia at Inner Thames Marshes SSSI/Rainham Marshes LNR/ Wennington, Aveley and Rainham Marshes SMINC as a result of the operation of RRRF post ROP and REP is unlikely to give rise to effects, such as through stimulating the growth of competitive plant species. This is supported by APIS which suggests that 'grazing marshes may be less sensitive to atmospheric deposition [of nitrogen]' than other wetland systems[34].

6.8.10 For these reasons, effects to Inner Thames Marshes SSSI/Rainham Marshes LNR/ Wennington, Aveley and Rainham Marshes SMINC from the modelled increases in nitrogen, NOx and ammonia are assessed as **Not Significant**.

Ingrebourne Marshes SSSI

6.8.11 This area approximately 3km to the north east of ROP contains wetland habitats, supporting freshwater grazing marshes, along with associated habitats including reedbed.

6.8.12 The air quality modelling indicates the potential for minor increases to these areas above the existing baseline for nitrogen (1.8%), nitrous oxides (1.0%) and ammonia (1.5%).

6.8.13 Ingrebourne Marshes currently exceeds critical load for nitrogen, and critical levels for NOx and ammonia, although the predicted PCs from the cumulative schemes would not provide the causal factor for these exceedances and would only contribute a small component of the total baseline concentrations ('PECs'). Whilst the PCs are above the threshold for potential significance, it is the nitrogen deposition which has potential to affect habitats. Excessive nitrogen can have negative impacts on plants and habitats by altering their biochemistry, or through stimulating the growth of competitive plant species which can reduce species diversity within a habitat[34].

6.8.14 The condition assessment for the SSSI (Condition of SSSI Units for Site Ingrebourne Marshes SSSI) concludes that the majority of the SSSI is in 'favourable condition'. However, some areas of the SSSI or 'units' are in 'unfavourable condition', largely due to the presence of invasive species and inappropriate management. The condition assessment does not state that the SSSI units in unfavourable condition are adversely affected by eutrophication, or the prevalence of nutrient loving plants (such as some graminaceous species). This suggests that the conservation status of the habitats for which the SSSI is designated is not adversely affected by the elevated levels of nitrogen which it receives at present.

[33] http://www.apis.ac.uk/node/981 (accessed 16/03/2021)

[34] http://www.apis.ac.uk/overview/ecosystems/overview_wetland.htm

6.8.15 Freshwater systems are typically 'phosphorus limited' (CIEEM, 2021) meaning that phosphorus is generally scarce and will inhibit the growth of plants even in the presence of abundant nitrogen. Therefore, provided phosphorus concentrations remain low, the predicted minor increases in nitrogen, NOx and ammonia at Ingrebourne Marshes SSSI as a result of the cumulative schemes is unlikely to give rise to effects, such as through stimulating the growth of competitive plant species. This is supported by APIS which suggests that 'grazing marshes may be less sensitive to atmospheric deposition [of nitrogen]' than other wetland systems.

6.8.16 For these reasons, effects to Ingrebourne Marshes SSSI from the modelled increases in nitrogen, NOx and ammonia are assessed as **Not Significant**.

Lesnes Abbey Wood LNR / Lesnes Abbey Woods and Bostall Woods SMINC & Franks Park SBINC

6.8.17 These areas of ancient woodland lie approximately 2km to the south of ROP. The air quality modelling indicates the potential for minor increases to Lesnes Abbey Woods / Franks Park above the existing baseline for acid deposition (1.3% / 1.7%), and nitrogen deposition to Franks Parks (1.1%).

6.8.18 Whilst modelling indicates that the current nitrogen and acidity critical loads are exceeded at these designated areas, it should be noted that the largest contributions of nitrogen deposition to woodland in the area are from road transport (25%) and deposition imported (i.e. carried on air currents) from Europe (24%) compared to <1% for 'other sources' including power generation. The largest contributions of acid deposition to woodlands in the area are from deposition imported from Europe (24%) and road transport (20%), compared to 1% for power generation (APIS, 2021)[35].

6.8.19 Given the increases in nitrogen and acid deposition are only marginally over the 1% threshold for screening out significant effects, and the minor contribution which these cumulative schemes make when compared to other sources such as road transport, effects to Lesnes Abbey Wood LNR / Lesnes Abbey Woods and Bostall Woods SMINC & Franks Park SBINC from the cumulative modelled increases in nitrogen and acid deposition are assessed as **Not Significant**.

Crossway Park and Tump 52 SLINC / The Ridgeway SLINC

6.8.20 These designated areas lie approximately 1.5km to the west of ROP. Habitats present include amenity grassland, scattered trees, scrub, secondary woodland, rough grassland and aquatic habitats.

6.8.21 The air quality modelling indicates the potential for increases to Crossway Park and Tump 52 SLINC / The Ridgeway SLINC above the existing baseline for nitrogen deposition (3.8% / 3.3%) and ammonia (1.4% / 1.2%).

6.8.22 The air quality modelling has been precautionary and assessed against critical loads for 'Wood-pasture and parkland' for Crossway Park and Tump 52 SLINC and 'Broadleaved, mixed and yew woodlands' for The Ridgeway SLINC. In reality, the amenity and secondary woodland habitats present within these designated areas will be less sensitive to nitrogen and ammonia than has been assumed in the modelling, and therefore these exceedances are unlikely to result in significant changes to habitats within these designated areas.

6.8.23 Whilst modelling indicates that the current nitrogen critical loads are exceeded at these designated areas, it should be noted that the largest contributions of nitrogen deposition to

[35] Data from Oxleas Woodland SSSI 3km to the southwest of Lesnes Abbey Wood.

woodland in the area are from road transport (25%) and deposition imported from Europe (24%), compared to <1% for 'other sources' including power generation (APIS, 2021)[36].

6.8.24 Given habitats within these designated areas are likely to be less sensitive than assumed in the modelling, and the minor contribution of energy generation to the overall deposition, the modelled increases in nitrogen deposition and ammonia are assessed as **Not Significant**.

Thamesview Golf Course SBINC

6.8.25 This designated area lies approximately 1.5km to the west of ROP. Habitats present include closely mown acid grassland, scrub, secondary woodland, semi-improved neutral grassland, and aquatic habitats.

6.8.26 The air quality modelling indicates the potential for increases above the existing baseline for nitrogen deposition (1.5%).

6.8.27 The air quality modelling has been precautionary and assessed against critical loads for 'acid grassland'. Unimproved acid grassland can be very sensitive to nutrient deposition. As mentioned in the citation for this designed area (provided by GiGL in 2018), the grassland habitats are 'semi-improved' meaning they are likely to have been subject to historical addition of nutrients, likely linked to the amenity use of the area. As a result, the habitats will be less sensitive to additional inputs of nitrogen and ammonia than has been assumed in the modelling, and therefore these exceedances are unlikely to result in significant changes to the habitats within the designated area.

6.8.28 Given increases in nitrogen are only marginally above the 1% threshold, and habitats within this designated area are likely to be less sensitive than assumed in the modelling, increases in nitrogen deposition and ammonia are assessed as **Not Significant**.

6.9 Further Mitigation and Enhancement

6.9.1 As no significant effects have been identified during the assessment of potential effects to biodiversity receptors, no further mitigation is required.

6.10 Residual Effects

6.10.1 Operation of ROP will result in some minor increases and decreases in pollutants to identified biodiversity receptors. The assessment above has concluded that potential effects to all receptors will be **Not Significant (Negligible)**.

6.11 Monitoring

6.11.1 As no significant effects have been identified, no requirement for monitoring of potential effects to biodiversity receptors has been identified.

6.12 Summary

6.12.1 ROP has the potential to result in effects to biodiversity through a change in emission levels from RRRF and resultant deposition of airborne pollutants to nearby designated areas. These potential effects have been assessed within this chapter, informed by the air quality modelling presented in **Chapter 5**. The assessment of effects to biodiversity receptors has followed industry standard approach as set out in the EcIA Guidelines.

[36] Data from Oxleas Woodland SSSI 3km to the southwest of Lesnes Abbey Wood.

6.12.2 In terms of the impact of emissions on designated areas, deposition rates have been calculated and compared against site relevant critical loads/levels for the habitats in question. An impact of less than 1% of the applicable critical level or load is accepted to be a pragmatic threshold for determining no likely significant effects from a source. Where the predicted impact exceeds 1%, further ecological assessment has been undertaken to ascertain the potential significance of the impact and resultant effects.

6.12.3 Potential effects have been assessed to 14 internationally and nationally designated areas within 15km of ROP, and 18 locally designated areas of nature conservation within 2km of ROP.

6.12.4 The air quality modelling demonstrates that changes in deposition to designated areas due to ROP, when compared to the existing baseline, are less than the 1% threshold from screening out significant effects, for all modelled pollutants. Therefore, predicted effects from ROP through contribution of pollutants to the designated areas are **Not Significant**.

6.12.5 Modelling has also been undertaken for the cumulative scenario of RRRF post ROP in addition to Riverside Energy Park ('REP'). REP is a consented energy from waste scheme located immediately to the west of RRRF which is due to be operational by 2024 The air quality modelling of this cumulative scenario demonstrates that changes in deposition to some designated areas, when compared to the existing baseline, are above the 1% threshold for screening out significant effects. Therefore, further ecological assessment of these potential effects has been undertaken. In all instances this further assessment demonstrates that predicted effects from the cumulative scenario of ROP plus REP through contribution of pollutants to the designated areas is **Not Significant**.

6.13 References

- CIEEM, 2018. Guidelines for Ecological Impact Assessment in the UK and Ireland. Chartered Institute of Ecology and Environmental Management, Winchester.
- CIEEM, 2021. Advice on Ecological Assessment of Air Quality Impacts. Chartered Institute of Ecology and Environmental Management, Winchester.
- Department for Communities and Local Government, 2019. National Planning Policy Framework.
- Department of Energy and Climate Change, 2011. Overarching National Policy Statement for Energy (EN-1).
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- Environment Agency, 2016, Flood Risk Assessments: Climate Change Allowances
- Greater London Authority, 2018, London Environmental Strategy, Greater London Authority.
- Greater London Authority, 2021. The London Plan, The Spatial Development Strategy for Greater London.
- HMSO (Her Majesty's Stationary Office). The Conservation of Habitats and Species Regulations 2017 (as amended) (the Habitat Regulations).
- HMSO, 1981. Wildlife and Countryside Act (as amended by the Countryside and Rights of Way Act 2000).

- HMSO, 2006: Natural Environment and Rural Communities Act.
- Holman et al, 2020. A guide to the assessment of air quality impacts on designated nature conservation sites – version 1.1. Institute of Air Quality Management, London.
- London Borough of Bexley, 2012. Bexley Core Strategy.
- Stantec, 2020. Riverside Optimisation Project Environmental Impact Assessment Scoping Report. Stantec, Reading.
- Stantec, 2021. Riverside Optimisation Project: Habitats Regulations Assessment.

7 Climate Change

7.1.1 This Chapter has been prepared by Fichtner Consulting Engineers Ltd. In accordance with Regulation 17 of the Electricity Works (Environmental Impact Assessment) (England and Wales) Regulations 2017 (as amended) a statement outlining the relevant expertise and qualifications of competent experts appointed to prepare this EIA Report is provided in **Appendix A.4**.

7.2 Policy, Legislation, Guidance and Standards

National Policy and Guidance

National Planning Policy

7.2.1 The National Planning Policy Framework[37] (NPPF, 2019) sets out the government's planning policies for England and how they are expected to be applied. In relation to carbon and greenhouse gas emissions, section 14 of the NPPF states that:

"The planning system should support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change. It should help to: shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure."

7.2.2 Paragraphs 149 – 154 provide policies in relation to the need to plan for climate change. Paragraph 150 states that:

"New development should be planned for in ways that:

a) avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure; and

b) can help to reduce greenhouse gas emissions, such as through its location, orientation and design."

7.2.3 Paragraph 154 states that:

"When determining planning applications for renewable and low carbon development, local planning authorities should:

not require applicants to demonstrate the overall need for renewable or low carbon energy…; and b) approve the application if its impacts are (or can be made) acceptable."

Planning Guidance

7.2.4 The Institute for Environmental Management and Assessment ('IEMA'), the largest professional body for environmental practitioners, has published guidance on the approach to EIA for carbon emissions, titled 'Assessing Greenhouse Gas Emissions and Evaluating their

[37] Ministry of Housing, Communities and Local Government, 2019, "National Planning Policy Framework", HM Government.

Significance'[38] (IEMA, 2017). The guidance sets out areas for consideration at all stages of the assessment to assist EIA practitioners in taking an informed approached to the treatment of greenhouse gas ('GHG') emissions within an EIA.

7.2.5 The guidance mentions the legally binding GHG reduction targets and states that an EIA must give due consideration to how a project will contribute to the achievement of these targets.

7.2.6 The guidance gives detail on how to assess the significance of GHG emissions, in the context of sector, local and national carbon budgets.

7.2.7 IEMA has also produced guidance titled 'Environmental Impact Assessment Guide to Climate Change and Resilience and Adaption'[39] (2020). This provides guidance on how to consider the impacts of climate change within project design.

7.2.8 This Climate Change chapter has been prepared in accordance with the EIA Regulations. It provides the information as required by Schedule 4 of the EIA Regulations and is in line with the requirements of the NPPF. In lieu of any statutory methodologies, this assessment has followed the appropriate methodologies from the IEMA 2020 guidance for GHG emissions and climate change resilience.

Climate Change Act

7.2.9 The UK government set a commitment to reduce GHG emissions in the UK to 50% of 1990 levels by 2025, and to 80% by 2050 through the implementation of the Climate Change Act 2008, the legislative framework for UK climate change policy. More recently, the Climate Change Act 2008 (2050 Target Amendment) Order 2019[40] implemented a new binding target of "net zero by 2050", i.e. that GHG emissions in the UK must be reduced to 100% of 1990 levels by 2050.

National Policy

7.2.10 The principal policies of the NPPF relating to climate have been set out in paragraphs 7.2.1 to 7.2.3.

7.2.11 In response to the Climate Change Act 2008 (2050 Target Amendment) Order 2019, the Government set out how it intends to tackle climate change within 'Leading on Clean Growth the Government Response to the Committee on Climate Change's 2019 Progress Report to Parliament – Reducing UK emissions'[41] (October 2019).

7.2.12 The October 2019 report responds to the specific recommendations made by the Committee on Climate Change ('CCC') across the key sectors in the Clean Growth Strategy: power, buildings (domestic and non-domestic), industry (including carbon capture, utilisation and storage (CCUS) and hydrogen), transport, and natural resources (including agriculture, forestry, land use, waste and F-gases).The Government recognises the need to divert waste from landfill, setting out that "growth in energy from waste and alternative residual waste treatment infrastructure will divert further waste from landfill".

[38] IEMA, ARUP, 2017, Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance, IEMA.

[39] IEMA, 2020, Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation, IEMA.

[40] HM Government, 2019, The Climate Change Act 2008 (2050 Target Amendment) Order 2019, HM Government.

[41] HM Government, 2019, Leading on Clean Growth; The Government response to the Committee on Climate Change's 2019 Progress Report to Parliament – Reducing UK emissions, HM Government.

7.2.13 In October 2020, the Government published the "Government Response to the Committee on Climate Change's 2020 Progress Report to Parliament – Reducing UK emissions"[42]. The Government again recognises the need to divert waste from landfill. In response to the CCC recommendation to *"Legislate (in England via the Environment Bill) for and implement a ban on landfilling of municipal & non-municipal biodegradable wastes from 2025"*, the report states *"The Government is already committed to implementing measures that will remove a large proportion of biodegradable waste from the residual waste stream, such as through implementing separate food waste collections and consistency in the recycling system through the Environment Bill. This will deliver a reduction in volumes of biodegradable waste to landfill or other residual treatments. Remaining waste will increasingly be treated by alternatives to landfill, such as energy from waste plants and waste-to-transport fuels."*

National Policy Statements, Planning Act 2008

7.2.14 The National Policy Statements can be material planning considerations for applications made under the Town and Country Planning Act 1990. EN-1 (Energy) and EN-3 (Renewable Energy Infrastructure) are the relevant National Policy Statements for this application. In relation to carbon and GHG emissions, Section 2.2 of EN-1 sets out the road to meeting GHG emissions targets by 2050 and describes how the UK must reduce its dependence on fossil fuels, pursue its objectives for renewables and ensure that electricity consumed is almost exclusively from "low-carbon" sources. Section 1 of EN-3 identifies that a significant increase in generation from large-scale renewable energy infrastructure is necessary to meet the 15% renewable energy target. Specifically with regard to EfW, section 2.5 states the following:

"The recovery of energy from the combustion of waste, where in accordance with the waste hierarchy, will play an increasingly important role in meeting the UK's energy needs. Where the waste burned is deemed renewable, this can also contribute to meeting the UK's renewable energy targets. Further, the recovery of energy from the combustion of waste forms an important element of waste management strategies in both England and Wales"

Sixth Carbon Budget

7.2.15 Recommendations for the Sixth Carbon Budget were published by Climate Change Committee (CCC) in December 2020 in the Sixth Carbon Budget; the UK's path to Net Zero report[43]. CCC specifies increased carbon reduction targets for the period 2033-2037 and sets out the requirements and actions to reach these targets. The requirements and targets recognise that EfW plants play a part in the long-term plan for waste management for the UK. There are requirements to increase overall recycling rates within the UK and reduce overall residual waste volumes. However, the Sixth Carbon Budget recognises that the maximum recycling rates are uncertain and none of the modelled scenarios have 100% recycling; it is expected for there to always be a level of residual waste which will require disposal. Therefore, targets for, firstly, bans on biodegradable waste in landfill, followed by bans for all waste from landfill, and the phase out of waste exports will mean that there will be a long-term requirement for EfW.

7.2.16 The CCC provided its report to Ministers as an independent expert panel, as required under the Climate Change Act. The Government will consider the report. The report is currently only a recommendation. Ministers must have regard to the CCC's advice when making an order setting a carbon budget. Until an order is made by Government to set the budget, it does not have status as a carbon budget for the purposes of the Climate Change Act.

[42] HM Government, 2020, The Government response to the Committee on Climate Change's 2020 Progress Report to Parliament – Reducing UK emissions, HM Government.

[43] Committee on Climate Change, 2020, the Sixth Carbon Budget; the UK's path to Net Zero, Committee on Climate Change.

Regional Policy

London Environmental Strategy

7.2.17 The London Environmental Strategy[44] ('LES'), published in May 2018, includes an aspiration to "help turn London into a zero carbon city by 2050". To achieve this, the LES sets carbon budgets for London until 2032.

7.2.18 In terms of EfW plants, proposal 7.3.2b states *"Waste authorities must demonstrate how solutions generating energy from waste (EFW) meet the carbon intensity floor (CIF), or put in place demonstrable steps to meet it in the short-term"*. The details of the policy state "*The Mayor will retain, for waste authorities, a target CIF level of 400 grams of CO2 per kWh of electricity produced from LACW until at least 2025*" and "*The CIF will be reviewed in 2025, or earlier where appropriate, once London's heat networks and demand are better understood, with a view to tightening it to around 300 grams per kWh of electricity produced.*"

7.2.19 The Carbon Intensity Floor is explained in Appendix 2 to the LES and is calculated using the London Ready Reckoner spreadsheet. The CIF calculation only considers direct emissions of greenhouse gases from an energy from waste plant, without taking account of landfill displacement.

London Plan

7.2.20 The London Plan was published in March 2021[45]. It includes an aspiration, expressed in policy SI 2, that "*major development should be net zero carbon.*"

7.2.21 In terms of EfW plants, Policy SI 8 E 3 states *"all facilities generating energy from waste will need to meet, or demonstrate that steps are in place to meet, a minimum performance of 400g of CO2 equivalent per kilowatt hour of electricity produced"*. Paragraph 9.8.14 states *"To support the shift towards a low-carbon circular economy, all facilities generating energy from waste should meet, or demonstrate that they can meet in future, a measure of minimum greenhouse gas performance known as the carbon intensity floor (CIF). The CIF is set at 400g of CO2 equivalent generated per kilowatt hour (kwh) of electricity generated. The GLA's free online ready reckoner tool can assist boroughs and applicants in measuring and determining performance against the CIF. Achieving the CIF effectively rules out traditional mass burn incineration techniques generating electricity only. Instead, it supports techniques where both heat and power generated are used, and technologies are able to achieve high efficiencies, such as when linked with gas engines and hydrogen fuel cells. More information on how the CIF has been developed and how to meet it can be found in the London Environment Strategy".*

Local Policy

7.2.22 Policy CS08 of the Bexley Core Strategy[46] covers "*Adapting to and mitigating the effects of climate change, including flood risk management*". This policy states that "*All development should contribute to the delivery of sustainable development by planning for, adapting to, and mitigating the impacts of climate change, by reducing the carbon emissions related to the construction and operation of all development*." There is no construction involved in ROP. The carbon emissions associated with the operation of RRRF after the implementation of ROP are calculated in this chapter.

[44] Greater London Authority, 2018, London Environmental Strategy, Greater London Authority.

[45] Greater London Authority, 2021, London Plan, Greater London Authority

[46] London Borough of Bexley, February 2012, Bexley Core Strategy.

7.3 Consultation

7.3.1 A number of statutory bodies have responded to the Scoping Report (as outlined in **Section 4.3**). Of these, only the Greater London Authority ('GLA') made any comments on climate change.

7.3.2 The GLA states *"It is vital that the decision on whether the proposals are acceptable take into account the impact on local air quality and the Government's legislative net zero carbon target*" and "*It is essential that the EIA includes a full assessment of the impact on local air quality as well as the additional carbon emissions resulting from the proposal in light of national and London's own carbon budgets, and how the additional heat will be captured to enable a heat network allowing the facility to produce energy more efficiently and reduce carbon emissions."*

7.3.3 The change in carbon emissions as a result of ROP is considered in this chapter and compared with the national and London carbon budgets, as requested. ROP does not increase the heat export capacity of RRRF and so this has not been considered further. However, Cory has partnered with Vattenfall, with the aim of developing one of the largest district heating networks in the UK. The district heating network proposals were recently granted funding through the BEIS Heat Networks Investment Scheme and will connect RRRF with residential, commercial, retail and industry properties in the London Borough of Bexley and the Royal Borough of Greenwich. Over the long term, the scheme has the potential to deliver low to zero carbon heat supply to a network of up to 30km and with a heat scale equivalent of 75,000 homes.

7.4 Methodology

Study Area

7.4.1 As GHG emissions have a global impact, and do not have local impacts, the study area is effectively global.

Baseline Data Collection

7.4.2 Baseline data on UK and local carbon emissions and the UK Carbon Budget were collected from published government documents. Full references are given with the data in sections 7.5 and 7.7.

Assessment

7.4.3 Although the quantification of GHG emissions for an EIA may vary in methodology and approach between projects, it is expected that in almost all cases, a calculated (not measured) approach is taken because these are completed in advance of a project commencing development. The assessment has been undertaken in line with IEMA (2017) guidance, which recommends the following structure to calculate GHG emissions:

GHG emission/removal = GHG emission factor x Activity data

7.4.4 The detailed methodology for calculating GHG emissions from the RRRF, including equations, is presented within Technical **Appendix D.1**, and is in line with the methodology presented in both the IEMA (2017) guidance and the UK Government guidance document 'Energy recovery for residual waste – A carbon based modelling approach'[47].

[47] DERFA, 2014, Energy recovery for residual waste; A carbon based modelling approach, DERFA.

7.4.5 With regard to GHG emissions, the IEMA (2017) guidance defines the baseline as a reference point against which the impact of a new development can be compared against (sometimes referred to 'business as usual', where assumptions are made on current and future greenhouse gas emissions). The baseline can be in the form of:

“a) GHG emissions within the agreed physical and temporal boundary of a project but without the proposed project; or

b) GHG emissions arising from an alternative project design and assumptions".

7.4.6 The ROP is a modification to an existing project, but the GHG emissions for both the existing plant and the optimised plant will vary in the future. Therefore, while the operational parameters of the existing and optimised plant have been derived from operational data, the actual emissions from waste recovery and displacing other activities have been calculated. Furthermore, as the impact of GHG emissions from the development will be worldwide, a physical boundary to their impact cannot be defined. Therefore, option (b) has been chosen to establish the baseline, but with some aspects of option (a).

7.4.7 For this assessment, the principal 'alternative project design and assumptions' will be sending the additional waste processed to landfill, as this is currently the most likely alternative destination for the waste, and generating electricity via gas-fired power stations, as this is the current 'marginal' technology. This is supported by the DEFRA guide 'Energy from Waste - A guide to the debate'[48] which states that "a gas fired power station (Combined Cycle Gas Turbine - CCGT) is a reasonable comparator as this is the most likely technology if you wanted to build a new power station today". However, a number of sensitivity scenarios have been considered.

7.4.8 The carbon emissions have been calculated for RRRF as it currently operates and as it would operate in the future, using consistent assumptions around waste composition, operating hours and auxiliary fuel consumption. This takes account of:

a. carbon dioxide released from the combustion of fossil-fuel derived carbon in RRRF;

b. releases of other greenhouse gases from the combustion of waste;

c. combustion of gas oil in auxiliary burners;

d. carbon dioxide emissions; and

e. emissions offset from the export of electricity from RRRF.

7.4.9 The change in emissions following ROP has been compared with the carbon emissions from sending the additional waste to a typical modern UK landfill site, taking account of:

a. the release of methane in the fraction of landfill gas which is not captured; and

b. emissions offset from the generation of electricity from landfill gas.

7.4.10 The Carbon Assessment also takes account of the carbon emissions from transportation associated with the additional waste. These are further detailed within the corresponding sections of the Carbon Assessment (Technical **Appendix D.1**).

7.4.11 The IEMA 2017 guidance states that all GHG emissions are potentially significant, but that *“it is down to the practitioner’s professional judgement on how best to contextualise a project’s GHG impact. Generating a project’s carbon contribution, will enable the impact of your project,*

[48] DERFA, 2014, Energy from waste; a guide to the debate (revised edition), DERFA.

to be contextualised against sectoral, local or national carbon budgets." Therefore, the resulting net emissions from ROP have been assessed for their significance in the context of current London and sector emissions and UK and London carbon budgets. As the carbon budgets are for future years, the carbon assessment has considered potential changes in emissions and offsets in the future.

7.4.12 In addition, the GLA's Ready Reckoner spreadsheet[49] has been used to calculate the CIF for RRRF as it currently operates and after the implementation of ROP.

Limitations

7.4.13 When considering the GHG emissions from ROP, the following assumptions have been made:

a. As a conservative assumption it has been assumed that there will be 6 start-ups a year at RRRF where the auxiliary burners will be in operation. It is likely that this would be lower, reducing the overall GHG emissions.

b. Recent bidding of EfW plants into the capacity market means they are competing primarily with combined cycle gas turbines ('CCGT'), gas engines and diesel engines. CCGT has been used as the comparator for displaced electricity and may possibly be conservative compared to the other options providing balancing services.

c. The future of the UK electricity grid mix is uncertain. Therefore, the current 'marginal' comparator has been used to assess grid displacement, and a sensitivity included to account for changes in the UK electricity grid mix.

d. There is considerable uncertainty in literature surrounding the amount of biogenic carbon that is sequestered in landfill. A sequestration rate of 50% for biogenic carbon in landfill has been applied to the baseline scenario.

e. There is uncertainty over the landfill gas capture rate. This has been accounted for by including a sensitivity analysis using a low and high capture rate.

f. The transportation distances of the waste in not fixed; therefore, when considering the carbon burden of the transportation of waste reasonable assumptions have been applied.

g. The generation assumptions are based on operating at the design net calorific value ('NCV') of 9.6 MJ/kg. The future composition of waste is uncertain and so the sensitivity of the calculation to different waste compositions has been assessed.

7.5 Baseline Conditions

Current Baseline

7.5.1 The baseline carbon emissions from the UK and London are published by the UK Government on an annual basis[50]. This data is provided for individual sectors and local authorities. The latest data available is from 2018. Waste is not contained in the database as an individual sector. However, emissions from EfW facilities are contained within the "Industrial and Commercial Other Fuels" sector. The following table sets out the baseline emissions of CO_2 which include the operation of RRRF.

[49] Eumonia Research and Consulting, 2018, GLA EPS Ready Reckoner, [[=https://www.london.gov.uk/what-we-do/environment/waste-and-recycling/waste-policy] [Accessed 05/02/2021]

[50] HM Government, 2020, UK local authority and regional carbon dioxide emission national statistics: 2005-2018, < https://www.gov.uk/government/statistics/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics-2005-to-2018> [accessed 27/11/2020].

Table 7.1. Baseline Carbon Dioxide Emissions Summary.

Item	Units	Value
London - Total 2018	$ktCO_2e$	28,852
UK - Industrial and Commercial Other Fuels 2018	$ktCO_2e$	16,900
London - Industrial and Commercial Other Fuels 2018	$ktCO_2e$	494.2

7.5.2 As stated within section 3.2 of the Carbon Assessment (Technical **Appendix D.1**), the baseline for the alternative treatment route available for residual waste is landfill. The need for the increase in capacity which the RRRF would provide is detailed and assessed within the Planning Statement.

7.5.3 For waste which is disposed of in landfill, the biogenic carbon degrades and produces landfill gas ('LFG'). LFG is comprised of methane and carbon dioxide, so has a significant carbon burden. Some of the methane in the LFG can be recovered and combusted in a gas engine to produce electricity, therefore creating some offset. There is also carbon release associated with the transport of waste to landfill. Section 3.2 of the Carbon Assessment (Technical **Appendix D.1**) presents the assumptions and calculations for the emissions associated with landfill which form the baseline. This is based on the same quantity of waste going to landfill rather than being processed in RRRF following the implementation of ROP. The results are summarised in **Table 7.2**.

Table 7.2. Baseline Carbon Dioxide Emissions Summary

Item	Units	Value
Releases to atmosphere from landfill gas	tCO2e p.a.	45,955
Indirect transport emissions from landfill	tCO2e p.a.	588
Offset through grid displacement from the export of electricity from landfill gas engines	tCO2e p.a.	-7,066
Total	**tCO2e p.a.**	**39,477**

7.5.4 The additional electricity exported from RRRF to the electricity distribution network would displace electricity otherwise produced. Therefore, the Carbon Assessment (Technical **Appendix D.1**) has included this offset within its calculations. As justified in section 3.1.3 of the Carbon Assessment (Technical **Appendix D.1**) the most likely source of electricity which RRRF is and will be displacing is that from CCGTs. This is because in the UK CCGTs operate under the concept of the marginal generating unit and they are the most likely form of electricity generation to be used to balance demand. Other electricity sources such as wind and solar, are intermittent, with varying electricity supplies dependent on the weather conditions and time of year. As RRRF will be displacing regular energy generation, CCGTs are considered the most appropriate comparative technology. In the recent decision letter on the Development Consent Order for the adjacent Riverside Energy Park ('REP') (ref. EN010093, dated 9 April 2020), the Secretary of State said in paragraph 4.12 that "CCGT is the appropriate counterfactual against which the Development should be assessed."[51] This supports the approach taken in this carbon assessment.

Baseline Evolution

7.5.5 The emissions from the implementation of ROP have also been compared to the UK carbon budgets for the periods 2023-2027 and 2028-2032 and for the London Carbon Budgets for the same periods (taken from the London Environmental Strategy). It is also noted that the fifth

[51] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010093/EN010093-001388-Final%20Decision%20Letter%20-%20Riverside%20Energy%20Park%20PA08%20Application.pdf

carbon budget only reaches 2032. Future continuation in the reduction of these budgets is expected in order to reach net zero by 2050. A summary of the future baseline figures for the currently published UK carbon budgets is provided in **Table 7.3**.

Table 7.3 UK Carbon Budget.

Item	Units	Value
UK carbon budget 2023 - 2027	MtCO2e	1,950
UK carbon budget 2028 - 2032	MtCO2e	1,725
London carbon budget 2023-2027	MtCO2e	22.4
London carbon budget 2028-2032	MtCO2e	18.0

7.6 Embedded Mitigation

7.6.1 The purpose of ROP is to enable RRRF to divert additional waste from landfill and to generate electricity more efficiently. The net efficiency of RRRF increases from 27.07% to 27.69%, which means that more power will be displaced per tonne of waste.

7.7 Assessment of Likely Effects

Base Case Results

7.7.1 The GHG emissions associated with the implementation of ROP have been calculated in the Carbon Assessment (Technical **Appendix D.1**). In summary, the results are as follows.

Table 7.4 Base Case Carbon results.

Item	Units	Value
Releases from LFG	t CO2e	45,955
Transport of waste and outputs to landfill	t CO2e	588
Offset of grid electricity from LFG engines	t CO2e	-7,066
Total landfill emissions	**t CO2e**	**39,477**
Transport of waste to and outputs from RRRF	t CO2e	619
Offset of grid electricity with RRRF generation	t CO2e	-33,148
Emissions from RRRF	t CO2e	42,861
Total RRRF Emissions	**t CO2e**	**10,331**
Net Benefit of additional waste processed at RRRF	**t CO2e**	**29,146**

7.7.2 Another way to express the benefit of ROP is to consider the additional power generated by RRRF following the implementation of ROP as compared to the landfill counterfactual and calculate the effective net carbon emissions per MWh of additional electricity exported. This is referred to as the effective carbon intensity and is calculated to be -0.043 tCO2e/MWh. These calculations are displayed in further detail within the Carbon Assessment (Technical **Appendix D.1**). Hence, it can be seen that the overall effect of the increased waste throughput at RRRF would be to generate an additional 70,302 MWh of power with an effective carbon intensity below zero.

Sensitivities

7.7.3 The two key assumptions in the Carbon Assessment are the grid displacement factor for electricity and the LFG capture rate. The sensitivity of the net carbon emissions to different combinations of these assumptions has been assessed.

a. There is some debate over the type of power which would be displaced. As explained in Technical **Appendix D.1** and paragraph 7.5.4 above, the Applicant considers that the most likely source of electricity which RRRF is and will be displacing is that from CCGTs. However, an alternative view is that long-run marginal generation-based emissions factor should be used. This is intended to reflect the change in emissions that would result from a small but sustained change in electricity consumption. While the Applicant does not accept this position, the effect of varying this value is presented below by using the long-run marginal figures for 2021 and 2025 and the effect of using lower figures has been considered, which would only be relevant if RRRF were to displace other renewable sources of electricity.

b. The Golders Associates report[52] for the Department for Environment, Food and Rural Affairs ('DEFRA') states that the collection efficiency for large, modern landfill sites was estimated to be 68% and the collection efficiency for the UK as a whole was estimated to be 52%. There have been suggestions in other guidance that a conservative figure of 75% should be used.[53]

7.7.4 The results of the sensitivity are shown in **Table 7.5** below, in terms of tCO_2e per annum.

Table 7.5 LFG and Grid Electricity Sensitivity results.

Grid Displacement Factor (t CO_2e/MWh)	**LFG Capture Rate**			
	75%	68%	60%	52%
0.371	18,832	**29,146**	40,933	52,720
0.258	11,110	21,202	32,736	44,269
0.205	7,488	17,476	28,891	40,306

7.7.5 The results in the table are all positive. This means that the implementation of ROP is predicted to lead to a net reduction in climate change emissions of between 7,488 and 52,720 t CO_2e per annum, depending on the sensitivity assumptions used. The base case benefit, which is shown in **Table 7.4** and shown bold in **Table 7.5**, is 29,146 t CO_2e per annum. Hence, it can be seen that there is a benefit for all LFG capture rate and grid displacement factor combinations.

7.7.6 The actual waste to be processed in RRRF may change over time. Therefore, the effect of three different waste compositions has been considered:

a. REP Design waste – This is the waste composition which was used as the design case for REP. It is based on current RRRF waste but with 36% of plastic bottles removed and has a NCV of 9 MJ/kg.

b. Reduced food – this is based on current RRRF waste but with 50% of the putrescible waste removed to take account of a significant increase in separate collection of food and garden waste. The NCV in this scenario is 10.79 MJ/kg.

[52] Golder Associates, 2014, Review of Landfill Methane Emissions Modelling, Golder Associates

[53] For example, this is the base assumption in DEFRA, 2014, Energy recovery for residual waste – A carbon based modelling approach

c. Future waste – this is also based on RRRF waste but with 50% plastics, 50% food and 20% metals removed to model a significant increase in source segregation. The NCV in this scenario is 9.56 MJ/kg.

7.7.7 The results are shown in **Table 7.6** below, with further details in Technical **Appendix D.1**.

Table 7.6 Base Case Carbon results.

Item	**Units**	**Value**	**Value**	**Value**	**Value**
Waste Type		RRRF Design	REP Design	Reduced Food	Future Waste
Releases from LFG	t CO2e	45,955	29,865	40,622	49,119
Transport of waste and outputs to landfill	t CO2e	588	366	523	569
Offset of grid electricity from LFG engines	t CO2e	-7,066	-4,592	-6,246	-7,552
Total landfill emissions	**t CO2e**	**39,477**	**25,639**	**34,899**	**42,136**
Transport of waste to and outputs from RRRF	t CO2e	619	444	550	604
Offset of grid electricity with RRRF generation	t CO2e	-33,148	-21,185	-33,148	-32,119
Emissions from RRRF	t CO2e	42,861	22,396	46,775	36,325
Total RRRF Emissions	**t CO2e**	**10,331**	**1,655**	**14,177**	**4,810**
Net Benefit of additional waste processed at RRRF.	**t CO2e**	**29,146**	**23,985**	**20,722**	**37,326**

7.7.8 It can be seen that there is a net benefit of processing additional waste in all cases.

7.7.9 The lifetime impact of ROP is based on a remaining operational lifetime of RRRF of 20 years. The carbon benefits will therefore be cumulative over time. However, during the lifetime of RRRF a number of key assumptions will vary.

7.7.10 The cumulative impact of ROP is assessed in section 4.4 of the Carbon Assessment (Technical **Appendix D.1**) and takes into account the following variations in assumptions:

a. The grid displacement factor is varied from 0.258 kg CO2e/kWh in 2021 to 0.03734 kg CO2e/kWh by 2040. This is more conservative than the base case, for illustrative purposes.

b. Waste composition is varied by 2% decrease of plastics and 3% decrease in food waste each year.

c. Landfill gas recovery rates increase by 0.2% per year.

7.7.11 The cumulative benefit of ROP over 20 years operation compared to landfill is estimated to be approximately 188,000 tCO2e. ROP is estimated to continue to have an annual net benefit over landfill throughout its operational lifetime, with the exception of the final operational year (2040). These results are displayed visually within the Carbon Assessment (Technical **Appendix D.1**).

Carbon Intensity Floor

7.7.12 The GLA Ready Reckoner has been used to calculate the CIF value for three cases:

a. The current operational plant;

b. The optimised plant after ROP; and

c. A nominal EfW plant which processes the additional waste and generates the additional electricity as a result of the optimisation.

7.7.13 The key inputs and results of the calculation are shown in **Table 7.7**. The waste composition used for all of the cases is the design waste with a calculated NCV of 9.6 MJ/kg, although the calorific value of the waste types used in the Ready Reckoner is not shown.

Table 7.7 Carbon intensity floor calculations.

Item	Units	Current	Future	Difference
Inputs				
Waste processed	tpa	745,605	850,000	104,395
Gross electrical efficiency	%	29.78%	30.32%	34.18%
Outputs				
Electricity Generated	MWh	722,973	839,144	116,171
Carbon Emissions	tCO2	328,458	374,447	45,989
CIF		454	446	396

7.7.14 It can be seen that the optimisation project improves the CIF from 454 to 446. It can also be seen that the additional waste is effectively treated in an EfW plant with a CIF of 396. All of these figures would be improved with the export of heat. This has not been considered as ROP does not, in itself, lead to any changes in heat export.

Significance

7.7.15 To determine the significance of the annual carbon emissions, the base case emissions from **Table 7.4** have been compared with the baseline emissions in **Table 7.8**.

Table 7.8 GHG significance compared to baseline emissions.

Item	Baseline (kt CO_2e)	ROP emissions as % baseline	Landfill emissions as % baseline	Benefit as % baseline
London - Total 2018	28,852	0.04%	0.14%	0.10%
UK - Industrial and Commercial Other Fuels 2018	16,900	0.06%	0.23%	0.17%
London - Industrial and Commercial Other Fuels 2018	494.2	2.09%	7.99%	5.90%

7.7.16 The contribution of emissions from ROP is below 1% of total London emissions and the UK Industrial and Commercial Other Fuels Sector. Therefore, the implementation of ROP is not considered to represent a significant contribution. The contribution of emissions from ROP is 2% of London Industrial and Commercial Other Fuels Sector emissions.

7.7.17 These emissions are positive, and so will be contributing to the carbon emissions of the region and UK. However, IEMA guidance 2017[54] recognises that it is important to consider the 'net' effects of the emissions, when compared against the likely alternative:

"When evaluating significance, all new GHG emissions contribute to a significant negative environmental effect; however; some projects will replace existing development that have higher GHG profiles. The significance of a project's emissions should therefore be based on its net impact, which may be positive or negative."

7.7.18 Therefore, as ROP will displace waste from landfill and will have a net positive impact, the significance of the difference is considered as being a significant (>1%) positive impact for London's Industrial and Commercial Other Fuels Sector.

7.7.19 The contribution of emissions from the implementation of ROP has been compared to UK and London carbon budgets to assess the significance of the net carbon benefit.

Table 7.9 GHG significance compared to carbon budgets.

Parameter	Unit	2023-2027	2028-2032
UK Carbon Budget	$ktCO_2e/a$	1,950,000	1,725,000
London Carbon Budget	$ktCO_2e/a$	22,400	18,000
ROP Emissions ($ktCO_2e/a$)	$ktCO_2e/a$	25.2	32.3
Landfill Emissions ($ktCO_2e/a$)	$ktCO_2e/a$	41.4	41.4
Net Benefit of ROP ($ktCO_2e/a$)	$ktCO_2e/a$	16.2	9.1
ROP emissions as % of UK Carbon Budget		0.0013%	0.0019%
ROP emissions as % of London Carbon Budget		0.1124%	0.1796%
Net emissions as % of UK Carbon Budget		0.0008%	0.0005%
Net emissions as % of London Carbon Budget		0.0725%	0.0505%

7.7.20 The emissions from ROP are less than 0.2% of UK and London Carbon Budget. Therefore, ROP is not considered to represent a significant contribution. Although there is a net benefit of ROP, the benefit is well below 1% and therefore not considered to be of a significant contribution to reducing carbon emissions nationally or in London.

7.8 Cumulative Effects

7.8.1 The cumulative impacts of RRRF (after the implementation of ROP) and REP have been considered.

7.8.2 According to the carbon assessment submitted as part of the DCO application for REP[55], the carbon emissions from REP, allowing for displacement of electricity, would be 45 to 99 ktCO2e/annum in the base case (depending on waste composition), offsetting 206 to 260 ktCO2e/annum from landfill. The net emissions from REP were reported to be a reduction in carbon emissions of between 108 and 210 ktCO2e/annum.

[54] IEMA, ARUP, 2017, Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance, IEMA

[55] Cory Riverside Energy, 2019, Riverside Energy Park Carbon Assessment (Doc ref 8.02.08)

7.8.3 For consistency with the figures presented in **Table 7.9**, the net emissions of REP have been recalculated for 2023-2027 and 2028-2032 using the same grid displacement factors over time, as described in paragraph 8.7.10. The average net benefit of REP is 75.5 ktCO2e/annum in 2023-2027, and 42.6 ktCO2e/annum in 2028-2032. Therefore, when combined with the net benefit of REP, the overall benefit would be 91.7 ktCO2e/annum in 2023-2027 and 51.7 ktCO2e/annum in 2028-2032. Therefore, the cumulative net benefit is 0.34% of the 2023-2027 London Carbon Budget and 0.29% of the 2028-3032 London Carbon Budget and so is not considered to be of a significant contribution to reducing carbon emissions nationally or in London.

7.9 Further Mitigation and Enhancement

7.9.1 No likely significant adverse effects have been identified and therefore no further mitigation or enhancement is proposed.

7.10 Residual Effects

7.10.1 ROP will have a net carbon benefit when compared to the baseline due to the displacement of waste from landfill and the displacement of other forms of electricity. In addition, when comparing a range of sensitivities to account for varying grid displacement factors and waste compositions there remains a net benefit associated with the proposals. This net benefit is considered to be significant when compared to the Industrial and Commercial Other Fuels sector within London from 2018, but is not significant when compared with total London emissions or the London and UK carbon budgets.

7.10.2 Therefore, the carbon benefits are considered to be of minor beneficial significance.

7.11 Monitoring

7.11.1 No likely significant adverse effects have been identified and therefore no monitoring is proposed.

7.12 Summary

7.12.1 The change in carbon emissions as result of the implementation of ROP has been assessed. The effect of ROP will be that RRRF can process additional waste and generate additional electricity. This means that less waste will be sent to landfill and less power will be generated by other forms of electricity. There will also be changes in waste transport. The assessment takes account of all of these changes.

7.12.2 The operation of RRRF after ROP leads to the following sources of greenhouse gases:

a. Burning waste leads to the release of carbon dioxide from the carbon in the waste, as well as small amounts of other trace greenhouse gases;

b. Gas oil is burnt in auxiliary burners for start-up and shut down of RRRF;

c. Carbon dioxide is released from the transport of waste and residues; and

d. Emissions are avoided by exporting electricity.

7.12.3 The change in emissions from RRRF following ROP have been compared with the carbon emissions from sending waste to a typical modern UK landfill site, taking account of releases of methane in the fraction of landfill gases which are not captured and the generation of electricity from the fraction of landfill gases which is captured.

7.12.4 The assessment shows that ROP would lead to the release of 10,331 tCO2e per year but would avoid the release of 39,477 tCO2e per year from landfill. Hence, the net benefit of ROP would be a reduction in greenhouse gas emissions of 29,146 tCO2e per year. The sensitivity of this result to changes in waste composition, landfill operation and the type of electricity displaced has been assessed and ROP continues to have a benefit under all scenarios.

7.12.5 The net benefit of ROP has been compared with current UK and London carbon emissions and the carbon budgets set by the UK government and the GLA. While there is a benefit, this benefit is less than 1% of the carbon budgets and so the benefit is considered to be of minor significance.

7.13 References

- Ministry of Housing, Communities and Local Government, 2019, “National Planning Policy Framework”, HM Government.
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- Golder Associates for DEFRA, 2014, Review of Landfill Methane Emissions Modelling, Golder Associates

8 Accidents and Disasters

8.1 Introduction

8.1.1 This Chapter has been prepared by Stantec. In accordance with Regulation 17 of the Electricity Works (Environmental Impact Assessment) (England and Wales) Regulations 2017 (as amended) a statement outlining the relevant expertise and qualifications of competent experts appointed to prepare this EIA Report is provided in **Appendix A.4**.

8.1.2 This Chapter presents a summary of the potential effects deriving from the vulnerability of the ROP to relevant major accidents and disasters. This Chapter has been included in the EIA Report to respond to comments received as part of the EIA Scoping exercise (see **Section 8.3** below).

8.1.3 ROP has the potential to be affected (and therefore has the potential to impact the environment) by the risk of major accidents or disasters. 'Accidents' are considered to be an occurrence resulting from uncontrolled developments in the course of construction and operation of a development (e.g. major emission, fire or explosion). 'Disasters' are considered to be naturally occurring extreme weather events or ground related hazard events (e.g. subsidence, landslide, earthquake).

8.2 Policy, Legislation, Guidance and Standards

The Electricity Works (Environmental Impact Assessment) (England and Wales) Regulations 2017

8.2.1 As part of the amendments to the EIA Regulations made in 2017, there is now a requirement for EIAs to consider accidents and disasters.

8.2.2 Schedule 4 Part 8(1) of the EIA Regulations state that an EIA Report should include:

"A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and disasters that are relevant to the development."

8.2.3 Part 8(3) also states that:

"*Where appropriate, the description must include measures envisaged to prevent or mitigate the significant adverse effects of accidents and disasters referred to in sub-paragraph (1) on the environment and details of the preparedness for and proposed response to such emergencies."*

Major Accidents and Disasters in EIA: A Primer[56]

8.2.4 The purpose of this primer is to increase awareness of the major accidents and disasters topic and its application within all stages of EIA. The primer offers an assessment methodology based on known current practice within the UK to date, and provides definitions of key terminology. The primer includes key steps to enable practitioners to undertake an assessment and identify any potential significant effects that require further mitigation.

[56] IEMA and Arup (2020) Major Accidents and Disasters in EIA: A Primer. Available online at: https://www.iema.net/resources/blog/2020/09/23/iema-major-accidents-and-disasters-in-eia-primer

8.3 Consultation

8.3.1 As outlined in **Chapter 4.3**, a request for an EIA Scoping Opinion was submitted to BEIS on 18th December 2020. A formal EIA Scoping Opinion was received for BEIS on 18th February 2021. The Scoping Opinion noted that Accidents and Disasters should be scoped into the EIA and this chapter has been prepared to respond to this requirement.

8.3.2 LBB also noted in their response to the request for an EIA Scoping Opinion that accidents and disasters should be scoped into the EIA due to risks of *"pushing equipment well beyond their original design criteria". T*he assessment presented in **Section 8.7** below outlines the changes that have been undertaken to the RRRF in greater detail which have resulted in an increase in efficiency and capacity of the equipment.

8.3.3 HSE did not comment on the proposed scope of the EIA Report but provided information to the Applicant, noting that they have identified one major accident hazard site within the proposed application boundary of RRRF. The major accident hazard site is H0260 operated by Nufarm UK Ltd, Crabtree Manorway. The assessment presented in **Section 8.7** gives consideration to impacts of the identified major accident hazard site.

8.4 Methodology

8.4.1 The Major Accidents and Disasters in EIA: A Primer[56] guidance document has been used to inform the assessment of accidents and disasters. When undertaking the assessment, a proportionate approach has been undertaken given that the RRRF is an existing operating EfW facility with existing health, safety and management procedures in place to manage potential accidents and disasters and given that no major accidents and disasters have occurred at the RRRF to date.

8.4.2 The Major Accidents and Disasters in EIA: A Primer guidance document supports a proportionate, signposting approach to assessment and states that:

'A key aim of the EIA Directive update was to ensure efforts are not duplicated, reinforcing the need for proportionality.'

It further states:

'In order to avoid duplications, it should be possible to use any relevant information available and obtained through risk assessments carried out pursuant to Union legislation, such as Directive 2012/18/EU of the European Parliament and the Council (13) and Council Directive 2009/71/Euratom (14), or through relevant assessments carried out pursuant to national legislation provided that the requirements of this Directive are met.' (Paragraph 15 of Directive 2014/52/EU).

The UK already has a structured framework of risk management legislation in place. This guidance therefore suggests a 'sign-posting' approach to assessment, making efficient use of existing and available risk assessments rather than duplicating any risk quantification and management already undertaken on developments as part of the assessment approach."

8.4.3 The methodology for the assessment has involved undertaking a review of potential major accidents and disasters which are relevant to ROP and to describe where and how they are addressed within the EIA and/ or wider legislative, permitting and health and safety procedures required.

8.4.4 The assessment has focused on low likelihood but potentially high consequence events as per the Major Accidents and Disasters in EIA: A Primer guidance. This is because high likelihood and high consequence events should already be managed and designed out through approach procedures as these are unacceptable for any development, and because low impact events are low risk and unlikely to result in significant effects.

8.4.5 When considering where there is potential for a significant effect for accidents and disasters to the environment, a source, pathway, receptor approach has been undertaken, namely that for such events to pose a risk to the environment, there must be a source (the event), a pathway (a process by which a receptor could be affected by the event), and a receptor.

8.4.6 The following factors will be given consideration when determining whether an effect is likely to be significant:

- the geographic extent of the effects. Effects beyond the development boundaries are more likely to be considered significant;
- the duration of the effects. Effects which are permanent (i.e. irreversible) or long-lasting are more likely to be considered significant;
- the severity of the effects in terms of number, degree of harm to those affected and the response effort required. Effects which trigger the mobilisation of substantial civil emergency response effort are more likely to be considered significant;
- the sensitivity of the identified receptors; and
- the effort required to restore the affected environment. Effects requiring substantial clean-up or restoration efforts are more likely to be considered significant.

Limitations

8.4.7 This assessment has given consideration to low likelihood and high consequence events; however this is not an exhaustive list of events, but aims to address key issues raised by stakeholders during consultation.

8.5 Baseline Conditions

Current Baseline

8.5.1 As outlined in **Chapter 2**, the Proposed Changes will be undertaken to the existing RRRF in Belvedere, London. The RRRF is an existing EfW plant that has been operating since 2011 and has a range of systems in place to manage health, safety and environmental impacts, including a detailed operational environmental management plan ('OEMP') which forms part of the Environmental Permit for RRRF. The RRRF is also certified to ISO 140001 which is the standard for implementing an environmental management system.

8.5.2 The Application Site is located in a predominantly industrial area on the southern bank of the River Thames. Surrounding industrial uses including storage and distribution centres to the east and Crossness Sewage Treatment Works to the west. Hayley Road Business Park is also located to the south beyond Eastern Way A2016. Residential properties are located to the south of the Application Site, beyond the Eastern Way A2016 and an area of commercial development located at Belvedere Park on Clydesdale Way.

8.5.3 As outlined in the HSE Scoping Opinion response, there is one major accident hazard site within the proposed application boundary of RRRF. The major accident hazard site is H0260 operated by Nufarm UK Ltd, Crabtree Manorway.

8.5.4 It is understood that Nufarm UK Ltd are an agrochemical company who have since suspended operations at their plant in Belvedere and now have a new UK base in Bradford[57]. It is also

[57] https://nufarm.com/uk/contact/

understood that the former Nurfarm site is the subject of a planning application for a new policing facility[58].

Baseline Evolution

8.5.5 In the absence of the Proposed Changes, the RRRF would continue operating in line with its existing consent and management procedures. Given that it is anticipated that the ROP would be operational by 2021, it is not anticipated that there would be material changes to the future baseline conditions.

8.6 Embedded Mitigation

8.6.1 As noted above, the RRRF has a range of existing health, safety and environmental management procedures and permits which help manage potential for accidents and disasters. These procedures will be reviewed and updated to account for the Proposed Changes.

8.6.2 For example, the RRRF has an existing Environmental Permit issued by the Environment Agency which will be the subject of a variation application to account for the changes proposed for the ROP. It is anticipated that the majority of emergency response plans, OEMP and contingency measures would be dealt with through the Environmental Permit and amended and updated as necessary to reflect ROP. In addition, it is considered that the Health and Safety effects arising from accidents and disasters would be dealt with through relevant industry controls (e.g. those contained within the Health and Safety at Work Act 1974) which currently apply to RRRF.

8.7 Assessment of Likely Effects

8.7.1 A summary of risks is presented in **Table 8.1** below and includes a list of potential major accidents and disasters which are relevant to the ROP and describes where and how they are addressed within the EIA and and/ or wider legislative, permitting and health and safety procedures required.

8.7.2 As outlined in **Table 8.1** below, given the limited changes to the existing consented RRRF associated with ROP it is not anticipated that there will be an increase in likely effects associated with accidents and disasters.

[58] https://www.london.gov.uk/what-we-do/planning/planning-applications-and-decisions/planning-application-search/former-nufarm-uk-ltd-0

Table 8.1: Summary of Accidents and Disasters

Major accident/ disaster (incidents)	Further description of risk	Assessment
Severe weather – storms and floods	Potential risk of flooding (tidal, fluvial and surface water). High winds placing excess loading on buildings.	The RRRF is an existing consented EfW facility. The original Environmental Statement (ES) prepared for the RRRF in 2002 included a Water Resources chapter which included consideration of flood prevention measures. ROP will not result in any physical changes to the development or result in changes to the risk of flooding or impacts from storms. As such, no likely significant effects are anticipated.
Tidal waves / storm surges	Potential risk of flooding (tidal, fluvial and surface water).	The RRRF is an existing consented EfW facility. The original ES prepared for the RRRF in 2002 included a Water Resources chapter which included consideration of flood prevention measures. ROP will not result in any physical changes to the development or result in changes to the risk of flooding. As such, no likely significant effects are anticipated.
Poor air quality events	Rise in levels of pollution in the vicinity of the Proposed Development which could lead to human health issues.	The original ES prepared for the RRRF in 2002 included an Air Quality chapter which included consideration of air pollution. An updated Air Quality assessment has been undertaken for ROP which is presented in **Chapter 6** of this EIA Report. The Air Quality assessment has identified that no significant air quality effects are anticipated as a result of ROP.
Transport incidents – road, rail, air, maritime	Risk of major incidents/ accidents on transport network.	The RRRF is an existing consented EfW facility. The original ES prepared for the RRRF in 2002 included a Traffic and Highways chapter and associated Transport Assessment which assessed impacts on the highways network and on vulnerable road users such as pedestrians and cyclists. It is not proposed that any of the existing conditions attached to the 2017 Permission and restricting vehicle movements would be amended as part of ROP. This is because the transport of any additional inputs

Major accident/ disaster (incidents)	Further description of risk	Assessment
		and outputs to and from RRRF can be accommodated within existing limits imposed on road transport movements. As such it is not anticipated that ROP would result in an increased risk for major accidents or disasters associated with transport incidences.
Terrorist incidents	REP could be targeted by terrorist organisations resulting in explosion / fire risk.	The RRRF has existing security procedures, and control measures of fire and explosion risk in place. Procedures have been reviewed as part of the variation to the Environmental Permit for ROP. Therefore, no likely significant effects are anticipated.
Gas explosion of local gas network/infrastructure surrounding RRRF	Gas infrastructure in vicinity of RRRF could fail leading to explosion, and in turn environmental consequences from fire / chemical leak / emissions.	The RRRF is an existing consented EfW facility. ROP will not result in any physical changes to the development that would increase the proximity of the EfW facility to gas infrastructure or the associated risk from gas explosions. Therefore, no likely significant effects are anticipated.
Fires / explosions	Fire / explosion from plant malfunction or unexploded ordnance on site.	The RRRF has existing security procedures, and control measures of fire and explosion risk in place. Procedures have been reviewed as part of the variation to the Environmental Permit for ROP and confirmed that they are still sufficient to accommodate the changes from ROP. Therefore, no likely significant effects are anticipated.
Contamination	Existing contamination posing threat to construction workers. Spillages of contamination posing threat to operational workers / sensitive sites / species	The RRRF is an existing consented EfW facility. The original ES prepared for the RRRF in 2002 included a Geo-Environmental chapter which included consideration of contamination. ROP will not result in any physical changes to the development or result in changes to contamination, as such no likely significant effects are anticipated.
Impact from major accident hazard sites in proximity to ROP	Potential for ROP to be impacted by other major accidents in the surrounding area	As outlined in **Section 8.5** above, the HSE Scoping Opinion response, it was identified that there is one major accident hazard site within the proposed application boundary of RRRF. The major accident hazard site is H0260 operated by Nufarm UK Ltd, Crabtree Manorway.

Major accident/ disaster (incidents)	Further description of risk	Assessment
		It is understood that Nufarm UK Ltd are an agrochemical company who have since suspended operations at their plant in Belvedere and that the former Nurfarm site is the subject of a planning application for a new policing facility. As such it is not anticipated that there are likely to be any significant effects.
Major outage caused by the catastrophic equipment failure	Potential for the increased throughput as a result of ROP to overwhelm the equipment at the RRRF and result in a major power outage.	An enhanced Combustion Control System (CCS) has been implemented within the overall existing combustion control system at RRRF. The CCS interacts with the existing operational control system, using an improved logic formula and allowing existing systems to operate more efficiently. No physical changes are proposed to the plant/ equipment. The main changes associated with the CCS upgrade are as follows: • Improved Feed Rate Control • Automated adjustment of the nominal calorific value (NCV) of the waste; • Improved logic software for burn-out control; • Improved logic for detection of waste layer thickness; • Automated adjustment of the O_2 setpoint; and • Automated adjustment of the primary air distribution. The operation of the RRRF will not change as a result of the implementation of the upgraded CCS system; however, the improved combustion controls, modifications to the steam circuit, and adjustments to the generator and turbine software will result in the RRRF being able to process higher waste throughput than currently consented and export up to 80.5 MWe from the additional waste processed. In addition to this section 36 amendment planning application, Riverside Resource Recovery Limited will be applying for a variation to its operating permit (referred to as an Environmental Permit (EP)) to allow

Major accident/ disaster (incidents)	Further description of risk	Assessment
		for the proposed increase in capacity. Riverside Resource Recovery Limited is twin-tracking the application for the variation to the EP with the section 36 amendment planning application. The application to vary the EP will include updates to all of the relevant environmental assessment and management plans, including accident management plans, associated with the propose increased in processing capacity. Given the proposed upgrades to the system, it is not anticipated that this will result in likely significant effects.

8.8 Cumulative Effects

8.8.1 As outlined in **Section 9.7** above, no significant effects are anticipated in relation accidents and disasters as a result of ROP. The EIA for the nearby REP has also identified that it is not considered that there is the likelihood for significant adverse environmental effects here and that standard industry controls, measures within the outline Code of Construction Practice and Environmental Permit will be implemented to mitigate potential adverse effects. As such it is not anticipated that there will be likely cumulative significant effects.

8.9 Further Mitigation and Enhancement

8.9.1 No significant effects have been identified and therefore no further mitigation is proposed.

8.10 Residual Effects

8.10.1 As outlined in **Section 8.7** above, no significant adverse effects are anticipated in relation to accidents and disasters.

8.11 Monitoring

8.11.1 No significant effects have been identified and therefore no monitoring is proposed. Monitoring will be undertaken as required by the Environmental Permit.

8.12 Summary

8.12.1 This Accidents and Disasters assessment presents a summary of the potential effects deriving from the vulnerability of the ROP to relevant major accidents and disasters. This Chapter has been included in the EIA Report to respond to comments received as part of the EIA Scoping exercise.

8.12.2 ROP has the potential to be affected (and therefore has the potential to impact the environment) by the risk of major accidents or disasters. ‘Accidents’ are considered to be an occurrence resulting from uncontrolled developments in the course of construction and operation of a development (e.g. major emission, fire or explosion). ‘Disasters’ are considered to be naturally occurring extreme weather events or ground related hazard events (e.g. subsidence, landslide, earthquake).

8.12.3 The assessment has been informed by IEMAs Major Accidents and Disasters in EIA: A Primer guidance document which includes key steps to enable practitioners to undertake an assessment and identify any potential significant effects that require further mitigation.

8.12.4 In response to comments received by stakeholders during the EIA scoping process, this assessment has included consideration of a major outage caused by catastrophic equipment failure. The assessment has also included consideration of other potential events including severe weather, transport incidents, poor air quality events, terrorist incidents, fires and explosions and contamination.

8.12.5 The RRRF has a range of existing health, safety and environmental management procedures and permits which help manage and mitigate the potential for accidents and disasters, and these will be reviewed and updated to account for the Proposed Changes.

8.12.6 The RRRF has an existing Environmental Permit issued by the Environment Agency which is being updated for ROP. It is anticipated that the majority of emergency response plans and contingency measures will be dealt with through the Environmental Permit. In addition, it is considered that the health and safety effects arising from accidents and disasters will be dealt with through relevant industry controls.

8.12.7 It is considered that, given the limited changes proposed by ROP and that the existing measures and protocol in place as part of the RRRF (including the Environmental Permit) are being updated to account for the Proposed Changes, it is not anticipated that ROP would result in a likely significant effect in relation to accidents and disasters.

8.13 References

- Institute of Environmental Management and Assessment and Arup (2002) Major Accidents and Disasters in EIA: A Primer. Available online at: https://www.iema.net/resources/blog/2020/09/23/iema-major-accidents-and-disasters-in-eia-primer

9 Impact Interactions

9.1 Introduction

9.1.1 Environmental effects can result from incremental changes caused by the interactions between effects resulting from a project.

9.1.2 The direct and indirect effects of ROP have been assessed within the relevant topic chapters of the EIA Report prepared by suitable technical specialists. Environmental effects are assessed by reference to the topic under consideration. This approach can lead to the interaction of effects being reported in separate chapters but the collective effect on the same environmental resource(s) not being considered.

9.1.3 In response, this chapter, prepared by Stantec, summarises the principal findings of each topic chapter of the EIA Report to enable assessment of the potential for impact interactions. This chapter also provides a summary of the environmental effects identified throughout the EIA Report and allows a judgement to be made of the overall effect of the ROP during operation.

9.2 Methodology

9.2.1 The assessment methodology involves the identification of impact interactions associated with the operational phases of ROP upon one or more environmental receptors. This is undertaken using a qualitative appraisal process using professional judgement. A summary of residual effects and mitigation measures is provided in **Section 9.3** below which has been used to help identify where there is likely for potential significant adverse impact interactions to occur.

9.3 Operational Effects

9.3.1 Key receptors where there could be impact interactions are ecological receptors. **Chapter 6: Biodiversity** has inherently considered potential effects on air quality on ecological receptors and therefore no further impact interactions are considered in relation to this. As outlined in **Chapter 5: Air Quality** and **Chapter 6: Biodiversity**, effects to air quality and biodiversity were identified as being not significant. As such no further mitigation measures were identified as being required.

9.3.2 **Chapter 7: Climate Change** has identified that there will be a minor beneficial effect and as such it is not anticipated that this would result in any significant impact interactions on the identified sensitive receptors. No significant effects have been identified in relation to Accidents and Disasters as outlined in **Chapter 8**.

9.3.3 Based on the above, no new significant adverse impact interactions are anticipated during the operation of ROP.

10 Schedule of Mitigation and Monitoring

10.1 Introduction

10.1.1 This chapter provides a consolidated schedule of mitigation and enhancement measures proposed to avoid significant adverse effects and enhance beneficial effects from the ROP.

10.1.2 Schedule 4 Part 7(1) of the EIA Regulations notes that the EIA Report should include "*A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example, the preparation of a post-development analysis).*"

10.1.3 The chapter is provided to assist BEIS with its obligation under the EIA Regulations to secure within any planning permission, as appropriate, mitigation measures and monitoring arrangements relating to significant adverse effects of the ROP identified in the EIA Report.

10.2 Proposed Mitigation and Monitoring

10.2.1 **Table 10.1** details all further mitigation and enhancement measures committed to by the Applicant for the operational phases of ROP.

10.2.2 A summary of the nature of each measure and suggested compliance mechanism is provided, together with a cross-reference to the relevant technical assessment section of this EIA Report where further details of the required measure(s) are set out.

10.2.3 Embedded mitigation measures which are inherent in ROP and have been considered in the initial assessment of effects are identified in each technical chapter and are therefore not identified in this chapter. **Table 10.1** outlines 'further' mitigation measures which are required in addition to embedded mitigation measures to further reduce potential significant adverse effects.

10.2.4 As required by the EIA Regulations, this chapter sets out any further mitigation and monitoring operation of ROP (**Table 10.1**), as identified in the relevant topic chapters.

Table 10.1: Summary of Proposed Mitigation and Monitoring During Operation

Further Mitigation	Proposed Monitoring	Compliance Mechanism(s)
Chapter 6: Air Quality		
No mitigation will be necessary as no significant residual adverse effects have been identified.	No monitoring will be necessary as no significant residual adverse effects have been identified. However, it should be noted that there are already existing air quality emission monitoring processes in place at the RRRF which are required as part of the Environmental Permit for the RRRF. The Applicant also has an agreement LBB in relation to wider ambient air quality monitoring	N/A
Chapter 7: Biodiversity		
No mitigation will be necessary as no significant residual adverse effects have been identified.	No monitoring will be necessary as no significant residual adverse effects have been identified.	N/A

Further Mitigation	Proposed Monitoring	Compliance Mechanism(s)
Chapter 8: Climate Change		
No mitigation will be necessary as no significant residual adverse effects have been identified.	No monitoring will be necessary as no significant residual adverse effects have been identified.	N/A
Chapter 9: Accidents and Disasters		
No mitigation will be necessary as no significant residual adverse effects have been identified.	No monitoring will be necessary as no significant residual adverse effects have been identified.	N/A

11 Glossary

Abbreviation/Acronym	Definition
AERA	Air Emissions Risk Assessment
APCR	Air Pollution Control Residue
APIS	Air Pollution Information System
AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
AQR	Air Quality (England) (Amendment) Regulations
AURN	Automatic Urban and Rural Network
BaP	Benzo-a-pyrene
BAT	Best Available Techniques
BAT-AEL	Anticipated Emission Level associated with application of Beast Available Techniques
BECCS	Bioenergy with carbon capture and storage
BEIS	Department for Business, Energy and Industrial Strategy
Biodegradable waste	Any waste that is capable of undergoing anaerobic or aerobic decomposition, such as organic kitchen and green garden waste, and paper and paperboard.
Biogenic carbon	Carbon which has been sequestered from the atmosphere during biomass (e.g plant) growth and may be released back to the atmosphere later due to combustion or decomposition. Considered 'short-cycle' as any released carbon has only been absorbed within the lifetime of the plant.
BREF	Best Available Techniques reference document
Carbon dioxide equivalent (CO_2e)	The universal unit of measurement used to indicate the global warming potential (GWP) of greenhouse gases. It is used to evaluate the impacts of releasing (or avoiding the release of) different greenhouse gases.
Carbon Intensity Floor (CIF)	The CO2e emissions performance level set for electricity generated from London's municipal waste to achieve. The carbon intensity floor has been set at the level whereby any electricity generated from London's municipal waste is to be no more polluting in carbon terms than the electricity source it replaces. The carbon intensity floor sits within the Emissions Performance Standard that has been set for London's activities associated with the collection, treatment and final disposal of London's municipal waste to achieve.

Abbreviation/Acronym	Definition
CAZ	Clean Air Zone
CCC	Committee on Climate Change
CCGT	Combined cycle gas turbine
CCS	Combustion Control System
Climate change	A large scale, long-term shift in the planet's weather patterns or average temperatures. Characterised by higher temperatures, sea level rise, changing rainfall, and more frequent and severe extreme weather.
CO_2	Carbon dioxide
DCO	Development Consent Order
DEFRA	Department for Environment, Food and Rural Affairs
Diffusion Tube	A passive sampler used for collecting NO2 in the air
EA	Environment Agency
EC	European Commission
EcIA	Ecological Impact Assessment
EEA	European Environment Agency
EfW	Energy from Waste
EHO	Environmental Health Officer
EIA	Environmental Impact Assessment
EIPPCB	European Integrated Pollution Prevention and Control Bureau
ELV	Emission Limit Values
EPR	Environmental Permitting Regulations 2010
EPUK	Environmental Protection UK
ERF	Energy Recovery Facility
EU	European Union
GHG	Greenhouse Gas
GLA	Greater London Authority
Greenhouse gas	Any gas that induces the greenhouse effect, trapping heat within the atmosphere that would normally be lost to space, resulting in an increase in average atmospheric temperatures, contributing to climate

Abbreviation/Acronym	Definition
	change. Examples include carbon dioxide, methane and nitrous oxides.
Ha	Hectares
HDV	Heavy duty vehicles
IAQM	Institute of Air Quality Management
IBA	Incinerator bottom ash
IED	Industrial Emission Directive
IEMA	Institute of Environmental Management and Assessment
IES	Institution of Environmental Sciences
JNCC	Joint Nature Conservation Committee
LA	Local Authority
LACW	Local authority collected waste
LAQM	Local Air Quality Management
LBB	London Borough of Bexley
LBBD	London Borough of Barking and Dagenham
LDV	Light duty vehicles
LES	London Environmental Strategy
LFG	Landfill gas
LNR	Local Nature Reserve
LPA	Local Planning Authority
LWS	Local Wildlife Site
MW	Megawatt
NAQO	National Air Quality Objective as set out in the UK Air Quality Strategy
NCV	Net calorific value
NE	Natural England
NGR	National Grid Reference
NNR	National Nature Reserves

Abbreviation/Acronym	Definition
NO_2	Nitrogen dioxide
NOx	Oxides of nitrogen generally considered to be nitric oxide and NO_2. Its main source is from combustion of fossil fuels, including petrol and diesel used in road vehicles
NPPF	National Planning Policy Framework
NPPW	National Planning Policy for Waste
NSIP	Nationally Significant Infrastructure Project
PAC	Powdered Activated Carbon
PAH	Poly aromatic hydrocarbons
PC	Process Contribution
PCB	Polychlorinated biphenyls
PEC	Predicted Environmental Contribution
PM	Particulate Matter
PM_{10} / $PM_{2.5}$	Small airborne particles less than 10/2.5 µm in diameter
PPG	Planning Practice Guidance
RBG	Royal Borough of Greenwich
Receptor	A location where the effects of pollution may occur
REP	Riverside Energy Park
ROP	Riverside Optimisation Project
RRRF	Riverside Resource Recovery Facility
SAC	Special Areas of Conservation
SBINC	Site of Borough Importance for Nature Conservation
SINC	Sites of Importance for Nature Conservation
SLINC	Site of Local Importance for Nature Conservation
SMINC	Site of Metropolitan Importance for Nature Conservation
SPA	Special Protected Area
SPD	Supplementary Planning Document

Abbreviation/Acronym	Definition
SSSI	Sites of Special Scientific Interest
STW	Sewage Treatment Works
Tpa	Tonnes per annum
UAQS	UK Air Quality Strategy
UNECE	United Nations Economic Commission for Europe
Waste	Any substance or object which the holder discards, intends to discard or is required to discard.
WHO	World Health Organisation
WRWA	Western Riverside Waste Authority
Zero Carbon	Activity that causes no net release of carbon dioxide and other greenhouse gas emissions into the atmosphere.