Riverside Energy Park

Environmental Statement Technical Appendices

APPENDIX:

K.1

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DOCUMENT REFERENCE:

HEALTH IMPACT ASSESSMENT

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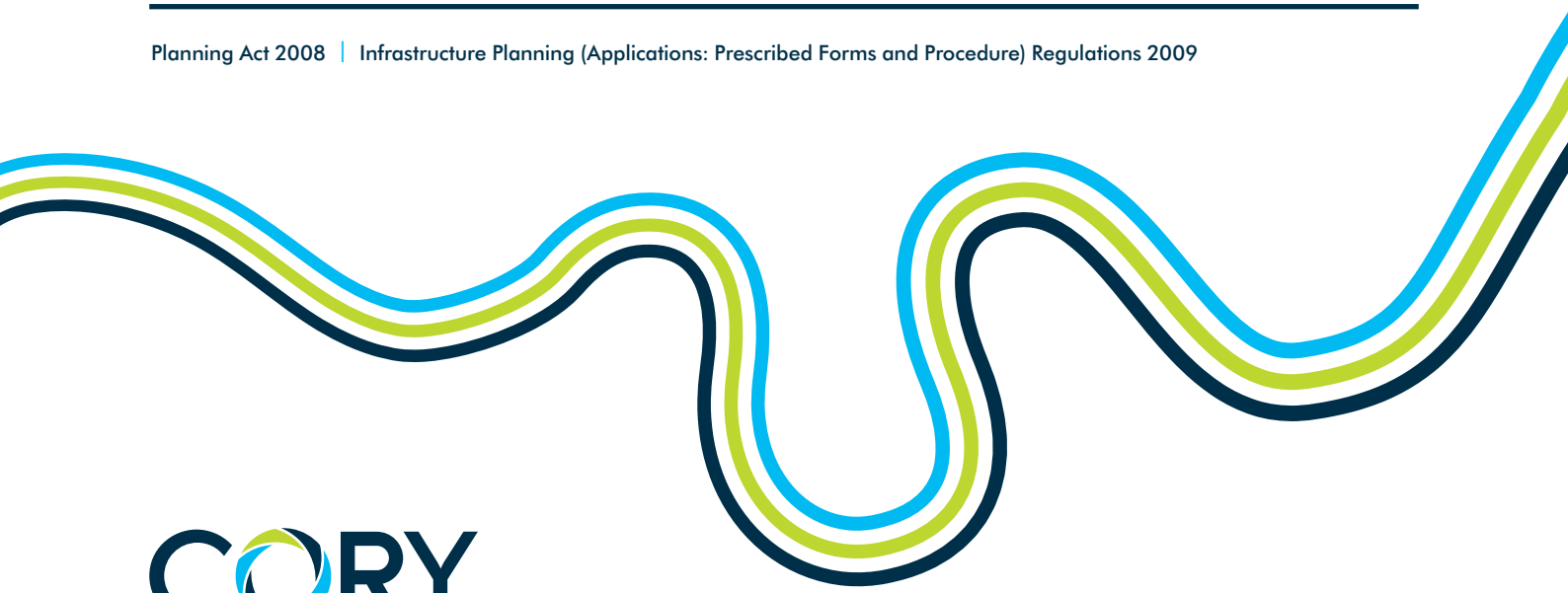

CORY
RIVERSIDE ENERGY

Document Control Sheet

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	Name	Position	Signature	Date
Prepared by:	Shannon Smart, Lucy Whitter & Cicely Postan	Graduate, and Principal Environmental Planners	SS, LW, CP	5/11/2018
Reviewed by:	Stefan Boss	Senior Associate	SB	5/11/2018
Approved by:	Dermot Scanlon	Director Major Infrastructure	DS	5/11/2018
For and on behalf of Peter Brett Associates LLP				

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Executive Summary

Cory Environmental Holdings Limited (trading as Cory Riverside Energy (Cory or the Applicant)) is applying to the Secretary of State under the Planning Act 2008 (PA 2008) for powers to construct, operate and maintain an integrated Energy Park, to be known as Riverside Energy Park (REP or the Proposed Development).

This document presents the findings of the Health Impact Assessment (HIA) for the Proposed Development and constitutes **Appendix K.1** of the Environmental Statement (ES), which documents the Environmental Impact Assessment (EIA) process. It considers the potential positive and negative health and well-being impacts on residential communities and other groups that may be affected during operation and construction/decommissioning of the Proposed Development. The HIA highlights any potential differential distribution effects of health impacts among vulnerable groups within the population and sets out actions / mitigations embedded into the Proposed Development and residual mitigation in the DCO where appropriate (e.g. outline Code of Construction Practice (CoCP) **Document Reference 7.5**).

The geographical scope of the HIA is such that it enables receptor groups which are likely to be significantly affected by the Proposed Development to be included within the assessment. These include residential and community service user groups surrounding the REP site (e.g. in relation to risk to human health as a result of potential ground contamination) and also those in the wider area (e.g. in relation to impact on social infrastructure and local employment opportunities).

The assessment has been undertaken against determinants of health (or health issues) relevant to the Proposed Development. The determinants considered are based on the structure from the London Healthy Urban Development Unit (HUDU) Healthy Urban Planning Checklist, informed by national and local policy guidance and the EIA Scoping Opinion from the Secretary of State. Determinants assessed include:

- Energy Supply;
- Active and Sustainable Travel, Connectivity and Safety;
- Air Quality and Odour;
- Noise;
- Water and Ground Contamination;
- Climate Change and Flood Risk;
- Townscape and Visual Amenity;
- Electromagnetic Fields;

- Social Infrastructure;
- Community Engagement;
- Crime; and
- Training and Employment.

The findings of the HIA have drawn on various technical assessments included within the ES such as air quality, ground conditions, noise and socioeconomics which have considered potential risks to human health. The scope of this HIA has been informed by the EIA Scoping Opinion from the Secretary of State. Consideration has also been given to comments raised during the consultation process and those made on the Preliminary Environmental Information Report (PEIR).

The findings of the HIA have identified that there are unlikely to be significant residual effects on health as a result of the construction / decommissioning and operation (including maintenance) of the Proposed Development. There may be some long term beneficial effects on surrounding communities and vulnerable groups (such as those in social housing) associated with the provision of a secure energy supply. However, this would be dependent on the pricing structure of this energy and the affordability to those on low incomes.

1 Introduction

1.1 Introduction

1.1.1 Cory Environmental Holdings Limited (trading as Cory Riverside Energy (Cory or the Applicant)) is applying to the Secretary of State (SoS) under the Planning Act 2008 (PA 2008) for powers to construct, operate and maintain an integrated Energy Park, to be known as Riverside Energy Park (REP or Proposed Development). The principal elements of REP comprise complementary energy generating development and an associated Electrical Connection. As the generating capacity of REP will be in excess of 50 MWe capacity it is classified as a Nationally Significant Infrastructure Project (NSIP) under section 14 and 15 of the PA 2008 and therefore requires a Development Consent Order (DCO) to authorise its construction and operation.

1.1.2 The two principal elements of the Proposed Development are: the Energy Park which would be located adjacent to an existing Energy Recovery Facility (ERF) operated by Cory (referred to as Riverside Resource Recovery Facility (RRRF)) situated at Norman Road in Belvedere within the London Borough of Bexley (LBB). The underground Electrical Connection would run from the REP site and terminate at the Littlebrook substation in Dartford. Plans showing the location and Assessment Areas for the Proposed Development are provided in **Appendix A**.

1.1.3 This document presents the findings of the Health Impact Assessment (HIA), provided as part of the REP DCO application and has been prepared by Peter Brett Associates LLP (PBA). The HIA forms part of the Environmental Statement (ES) which sets out the findings of the Environmental Impact Assessment (EIA). The EIA identifies the likely significant environmental effects of the Proposed Development.

1.2 The Development Consent Order Process

1.2.1 Cory must submit a DCO application to the Planning Inspectorate (PINS) who will first decide whether to accept the application. If accepted, PINS will examine the application in accordance with the relevant National Policy Statements (NPSs) which outline the need for energy infrastructure and the issues to be considered in applications. The relevant NPSs include: NPS EN-1 (Overarching Energy Policy), NPS EN-3 (Renewable Energy Supply from Waste) and NPS EN-5 (Electricity Networks Infrastructure).

1.2.2 Following the examination, the Examining Authority will make a recommendation to the relevant Secretary of State (SoS) and, should the SoS approve the application, the DCO will be made authorising the construction, commissioning and operation of REP.

1.3 The Applicant and Study Team

1.3.1 Cory is registered in England (Company Number 05360864) and is the Applicant for the Proposed Development. Cory's registered address is 2 Coldbath Square, London, EC1R 5HL, United Kingdom.

1.3.2 Cory is a leading recycling, energy recovery and resource management company, with an extensive river logistics network in London. Cory secured consent for, constructed and now operates the existing RRRF adjacent to the Proposed Development. RRRF is a key element of London's energy and resource management infrastructure.

1.3.3 Cory is now progressing these plans for REP to maximise the use of its existing infrastructure and land holding and to further meet the needs for resource recovery and energy generation in the UK and in London.

1.3.4 Further information on Cory is provided on the dedicated project website at http://www.riversideenergypark.com.

1.4 The Health Impact Assessment Approach

1.4.1 The HIA considers the potential positive and negative health and well-being impacts of the Proposed Development on residential communities, community service users and employees of and visitors to REP. Further details about the receptor groups is provided in Section 4.4 and Section 6.1.

1.4.2 The HIA highlights any potential differential distribution effects of health impacts among vulnerable groups within the population and sets out actions / mitigations embedded into the Proposed Development and residual mitigation in the DCO where appropriate (e.g. outline CoCP).

1.4.3 The Application Site falls within two local planning authorities, LBB and Dartford Borough Council (DBC). The REP site is wholly located within the LBB whilst the Electrical Connection route is partially located within both the LBB and DBC. The local authority areas of Greenwich, Barking and Dagenham, Havering and Thurrock, are the other authorities which immediately surround the Application Site in the wider area, as illustrated in **Appendix B**, which also shows surrounding wards. The Application Boundary and Assessment Areas can be seen at **Appendix A**.

1.4.4 Community service users have been identified as appropriate for the particular impact being considered. For example, hospitals, schools and care homes are considered in relation to air quality; and public footpath and cycle route users are considered in relation to visual impacts. The sensitivity of specific community service users to specific environmental effects is noted in the appropriate chapter of the ES, as outlined in **Table 7.1**.

1.4.5 Baseline health characteristics and how the baseline may evolve in the future have been identified where possible. The evolution of the baseline is relevant to understand the likely health characteristics of receptor groups at the time

significant effects may occur. If consent is granted, construction is anticipated to start in 2021, with REP operational in 2024. It is assumed for the purposes of this assessment that the REP generating equipment would be removed once the plant had ceased operations permanently. Any decommissioning phase is assumed to be of a similar or shorter duration to construction, and therefore environmental effects are considered to be of a similar level to those during the construction phase. It is assumed that the ducting for the Electrical Connection would remain in situ, but that the cables may be removed.

1.4.6 The HIA has drawn on the findings of the various technical assessments presented in the ES such as air quality, ground conditions, noise and socioeconomics which have considered potential risks to human health. The assessments in the ES set out the topic-specific parameters for assessment. The HIA has also drawn on the conclusions of other project information of relevance to health, such as the Consultation Report (**Document Reference 5.1**).

1.4.7 Where information in the ES is relevant to the HIA, this is clearly cross referenced in this document so that readers are signposted to technical assessments and to avoid duplication.

1.4.8 A glossary of defined terms and abbreviations is presented in **Chapter 18** of the ES (**Document Reference 6.1**).

2 The Determinants of Health

2.1 Defining Health and its Determinants

2.1.1 The established definition of health from the World Health Organization (WHO) is that "*Health is a state of complete physical, social and mental wellbeing and not simply the absence of disease or infirmity*."[1]

2.1.2 HIA uses this biomedical and a social definition of health, recognising that although illness and disease (mortality and morbidity) are useful ways of understanding and measuring health, they need to be fitted within a broader understanding of health and wellbeing to be properly useful.

2.1.3 The definition of health reflects the understanding that an individual's inherited traits interact with lifestyle, community, environmental, social and economic factors as well as a much wider range of issues to determine their health outcomes, as shown in **Figure 2.1**.

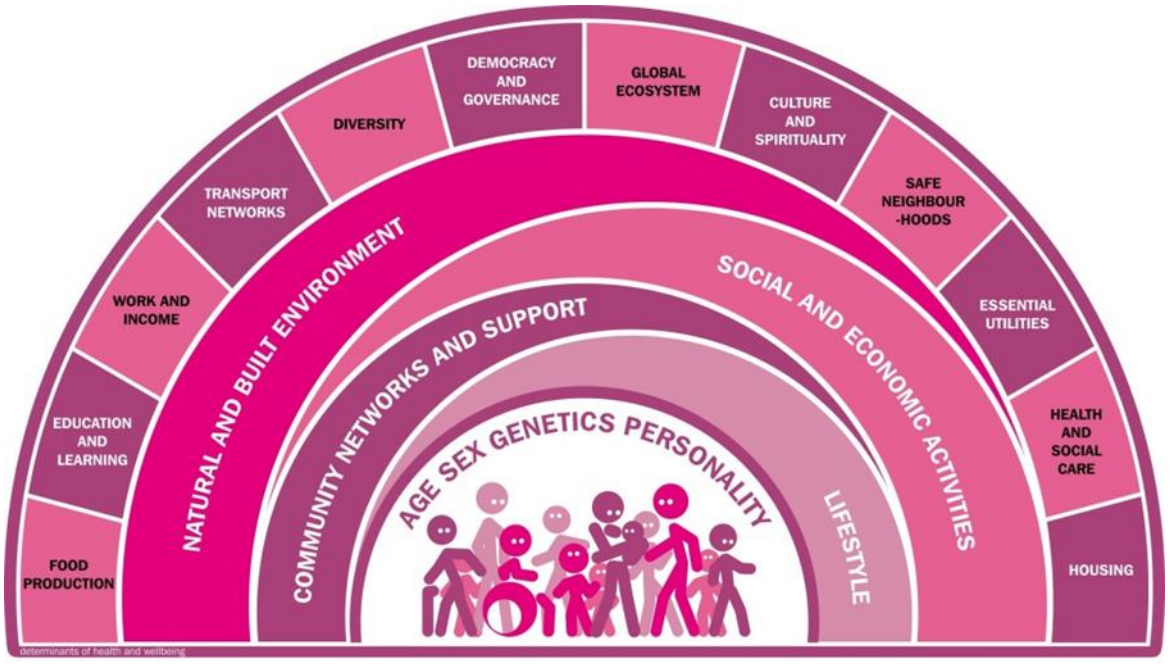


Figure 2.1: The Determinants of Health and Wellbeing (Peter Brett Associates, adapted from Dahlgren and Whitehead, 1991)[2]

2.1.4 Many of these 'determinants' can be influenced by the quality of people's living and working environments.

2.1.5 The Marmot Review[3] reported on a substantial body of evidence on the influence the built environment has on the determinants of health. Whilst it is

[1] World Health Organization; Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19-22 June 1946, and entered into force on 7 April 1948.

[2] Peter Brett Associates; Adapted from Dahlgren G and Whitehead, Policies and strategies to promote social equity in health; Institute of Future Studies; Stockholm; 1991.

acknowledged that the opportunities for healthy place making may not be as great for a development of this type as, for instance, the development of a significant area of new housing, the broader definition of health must still be considered in the HIA and effects on the wider determinants of health assessed.

2.1.6 Therefore, in planning for REP, it is understood that health is not only about avoiding harm through compliance with safety measures, but also through avoiding environmental pollution and contributing to the factors that improve wellbeing. This will include access to jobs and issues of energy security.

2.2 Determinants of Health to be considered in the HIA

2.2.1 The scoping process, as described in Section 4.3, identified that whilst it is acknowledged REP is not an urban development project (which would include residential dwellings), the structure of the Healthy Urban Planning Checklist from London's Healthy Urban Development Unit (HUDU) (refer to Section 5.8) provides a basis for the framework of determinants to be assessed for REP, with certain issues (such as housing design) to be scoped out.

2.2.2 **Table 2.1** indicates the determinants of health (from the HUDU Checklist), of relevance to REP, that have been considered in this HIA, encompassing themes and planning issues and the associated pathways to specific health outcomes.

Table 2.1: Scope of Determinants to be considered in REP HIA

Determinants of Health		
Theme	**Planning issue**	**Pathways to health outcomes**
Healthy Housing	Healthy Living	Excess deaths are recorded in winter due to cold housing conditions associated with fuel poverty, which particularly affects the elderly. The Proposed Development has the potential to have a beneficial effect on energy supply and security in the long term.
Active Travel	Promoting Walking and Cycling	Levels of walking and cycling can affect physical activity, which in turn can affect mental and physical health outcomes including prevalence of cardiovascular disease and obesity. The Proposed Development has the potential to disrupt existing walking and cycling routes (e.g. the Thames Path) during construction but also to promote walking and cycling for new

[3] Strategic Review of Health Inequalities in England post-2010 (the Marmot Review), Task Group 4: The Built Environment and Health Inequalities, Final Report 12 June 2009.

Determinants of Health		
Theme	**Planning issue**	**Pathways to health outcomes**
		employees at the Proposed Development.
	Safety	Transport accidents and safety have direct links to health and injury. The Proposed Development has the potential to affect the volume of traffic on the wider network and therefore transport accidents are considered.
	Connectivity	Connectivity can affect the ability of people to access services and social networks and can encourage walking and cycling – with associated mental health and physical health outcomes. The Proposed Development has potential effects on the connectivity of existing transport routes during construction and also the connectivity of workers to their place of employment and surrounding facilities.
	Minimising Car Use	Links with health are considered with respect to walking and cycling (above) and air quality (below).
Healthy Environment	Air Quality	Poor air quality is linked to a range of health conditions including incidence of chronic lung disease (chronic bronchitis or emphysema), heart conditions and asthma levels among children, as well implications for mental health, primarily dementia. The Proposed Development has the potential to affect air quality through construction activities, transport emissions and waste combustion.
	Odour	Foul odours can cause stress and anxiety and can prevent people using outdoor spaces for physical activity and relaxation. There are potential odour impacts from the receipt and processing of waste.
	Noise	Noise pollution can have a detrimental impact on health resulting in sleep disturbance, cardiovascular and psycho-physiological effects. The Proposed Development has the potential to affect noise levels during both construction and operation, primarily through operation of REP and increase in traffic.
	Contaminated Land and Water	Contamination of land and water bodies poses direct health risks due to toxicity from inhalation and ingestion of pollutants. The

Determinants of Health		
Theme	**Planning issue**	**Pathways to health outcomes**
		Proposed Development has the potential to disturb existing contamination, increase the deposition of metals to soil and contaminate water resources.
	Biodiversity / Open Space	Access to open/ green space and nature can lead to more physical activity and reduce levels of heart disease, strokes and other ill-health problems that are associated with both sedentary and stressful lifestyles. No effects on the biodiversity of publicly accessible natural spaces were anticipated at the scoping stage, therefore consideration of effects on biodiversity was scoped out of the HIA. This approach was adopted within the PEIR and no objections were received. However, effects on assets, such as footpaths (including those through the Crossness Nature Reserve), have been considered within the Active and Sustainable Travel, Connectivity and Safety section and Townscape and Visual amenity.
	Flood Risk	A changing climate poses risks to health including heat related illnesses and respiratory infections. Flood risk may be exacerbated by climate change, which at its extreme poses direct risks to health through drowning and spread of waterborne diseases. There are also links to effects on mental health through damage or loss of property and utilities and transport infrastructure. Flood risk of REP is considered with respect to energy security and safety of workers.
	Visual Amenity	Attractive neighbourhoods contribute to a 'sense of place' and wellbeing. Evidence shows that people are more likely to walk and cycle in attractive spaces. Visually intrusive features can cause stress. The Proposed Development has the potential to affect the visual amenity of the area for residents and pedestrians.
Vibrant Neighbourhoods	Education	Education increases employment opportunities and the capacity to earn, while integrating learning about the importance of a

Determinants of Health		
Theme	**Planning issue**	**Pathways to health outcomes**
		healthy lifestyle including exercise and diet. The Proposed Development has the potential to affect training opportunities. Where educational facilities are considered as receptors to other affects e.g. noise / air quality – these are considered.
	Social cohesion / Access to Social Infrastructure	Social capital is associated with better levels of health, better educational attainment, better chances of employment and lower crime rates. The Proposed Development has the potential to involve the local community to maintain social cohesion.
	Crime Reduction and Community Safety	Mental illness exacerbated through isolation, lack of social contact and fear of crime. The Proposed Development has the potential to affect the fear of crime in particular through the introduction of construction workers at the Application Site.
	Local Employment and Healthy Workplaces	Access to employment can have an effect on both physical and mental health through enhanced social integration, self-esteem, physical activity and income. The Proposed Development has the potential to affect local employment levels both during construction and operation.

2.2.3 It should be noted that compliance with Health and Safety guidance and legislation is not in the remit of this HIA, other than where it is noted that measures are anticipated to be incorporated in the CoCP.

3 The Application Site and Proposed Development

3.1 The Application Site and Surrounding Area

3.1.1 The Application Site consists of several areas as described below. The Application Boundary and Assessment Areas are included at **Appendix A**:

- the REP site, located to the north of Belvedere off Norman Road;
- the Main Temporary Construction Compounds located to the south of the REP site and west of Norman Road;
- the Electrical Connection, running underground between the REP site and the Electrical Connection Point at Littlebrook substation connecting into an existing National Grid building in Dartford; and
- Cable Route Temporary Construction Compounds required to support the construction of the selected Electrical Connection route. These will be small discrete compounds, required for a period of time whilst works are undertaken along particular lengths of the Electrical Connection route.

3.1.2 The Application Site is located within the administrative areas of the LBB and DBC. The site extents are shown in **Figure 1.1**, Site Location Plan, **Figure 1.2**, Application Boundary and Assessment Areas and **Figure 1.3**, Indicative Site Layout of the ES.

REP Site & Main Temporary Construction Compounds

3.1.3 The REP site is located in Belvedere, in the LBB, in an area bounded to the north by the River Thames and the adjacent Thames Path long distance trail. It is bounded to the east by a boundary fence onto a public footpath linking Norman Road with the Thames Path, and to the west by a boundary fence onto the adjacent undeveloped Crossness Nature Reserve, between the REP site and Thames Water's Crossness Sewage Treatment Works (STW) site, approximately 200 m away. Within this area a public footpath links the Crossness Local Nature Reserve (LNR) with the Thames Path. A number of ditches and small watercourses surround the REP site.

3.1.4 The REP site includes the existing jetty extending out into the River Thames but excludes the existing Riverside Resource Recovery Facility (RRRF) main building itself. The majority of the REP site is used for private vehicle circulation areas, the jetty access ramp, staff and visitor parking, open container storage, contractor maintenance, an electrical substation and associated landscape/habitat areas.

3.1.5 The REP site 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 Manorway.

3.1.6 To the immediate north of the REP site is the River Thames. Further north, on the opposite bank of the river is an area characterised by manufacturing, including the Ford Motor Company works, and associated car and lorry parking. To the east of the REP site 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 warehouse, distribution and similar commercial developments.

3.1.7 West of the REP site is Crossness STW, which is approximately 1 km in width from east to west and approximately 200 m from the REP site boundary. 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. Further to the west of the STW is the Thamesview Golf Centre, beyond which is the Thamesmead residential area.

3.1.8 To the south and west of the REP site and Norman Road is Crossness Nature Reserve, 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. To the east of the Crossness LNR, adjacent to Norman Road is a site owned by the Applicant, with planning permission for a Data Centre (Local Planning Authority reference: 15/02926/OUTM). Power for the Data Centre is expected to be provided via a connection along Norman Road from the RRRF and REP site. South of the Data Centre site is the area identified as the Main Temporary Construction Compounds.

3.1.9 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 of The Morgan 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. South of Eastern Way are areas of undeveloped marshland, containing a number of ponds and watercourses, interspersed with commercial storage and distribution and education development, and bounded to the south and southwest by Yarnton Way, a dual carriageway.

3.1.10 The proposed Main Temporary Construction Compounds would be located in an area of previously developed land (a former National Grid substation site) adjacent to the west side of Norman Road, immediately north of its junction with A2016 Picardy Manor Way. The northern extent of this area most recently received planning permission for the erection of three industrial units for mixed-use within Class B1 (business), Class B2 (general industrial) and B8 (storage/distribution), with associated ancillary works (Local Planning Authority reference: 13/00918/FULM). Part of the southern portion comprises an existing window joinery business.

3.1.11 The communities in close proximity to the REP site include those within the wards of Belvedere, Thamesmead East and Erith. These areas are relatively deprived communities in comparisons to other wards located further south within Bexley, with Thamesmead East having particularly high unemployment rates and incidents of poor health (see Section 6 for further details).

Electrical Connection

3.1.12 The proposed Electrical Connection route runs southwards from the REP site towards the existing Littlebrook substation, in Dartford. A number of alternative route options were identified through studies undertaken by UK Power Networks (UKPN), the local distribution network operator, and are shown in **Figure 1.2** of the ES. Only one overall route would be required to connect from the REP site to the Electrical Connection Point. It is anticipated that an ongoing programme of exploratory engineering investigation will conclude during the pre-examination and examination process that will allow the application to be refined to include a single route.

3.1.13 The Electrical Connection routes are predominantly located on highway (highway, verges and railway/watercourse crossings on highway structures) and are predominantly through urban areas. Some route lengths run outside the highway and include the Crossness LNR, adjacent areas of the River Cray and Dartford Creek valleys and through The Bridge development. In developed areas the site surroundings for the Electrical Connection are generally residential, but with significant industrial and commercial areas.

3.1.14 The Electrical Connection route would cross the River Darent, a tributary which feeds into the River Thames. The Dartford Marshes Local Wildlife Site (LWS) is a large area of marshland and wetland habitat along the River Darent and on the Darent floodplain. The Electrical Connection route would cross the River Darent in existing highway or using trenchless installation techniques.

3.1.15 The Electrical Connection route would pass through a number of communities within Bexley and Dartford. As noted above, the exact route of the connections is yet to confirmed, however it would potentially pass through the wards of Belvedere, Erith, Colyers, North End, Crayford, Town, Joyce Green and Littlebrook. In general these areas are relatively deprived and have higher unemployment rates in comparison to other wards within their respective Local Authority areas (see Section 6 for further details).

3.2 Project Description

3.2.1 The Proposed Development comprises REP and the associated Electrical Connection. These are described in turn, together with the anticipated REP operations, below. Chapter 3 of the ES provides further details of the Proposed Development upon which this assessment has been based.

REP

3.2.2 REP would be constructed on land immediately adjacent to Cory's existing RRRF, within the LBB and would complement the operation of the existing facility. It would comprise an integrated range of technologies including: waste energy recovery, anaerobic digestion, solar panels and battery storage. The main elements of REP would be as follows:

- Energy Recovery Facility (ERF): to provide thermal treatment of Commercial and Industrial (C&I) residual (non-recyclable) waste with the potential for treatment of (non-recyclable) Municipal Solid Waste (MSW);
- Anaerobic Digestion facility: to process food and green waste. Outputs from the Anaerobic Digestion facility would be transferred off-site for use in the agricultural sector as fertiliser or as an alternative, where necessary, used as a fuel in the ERF to generate electricity;
- Solar Photovoltaic Installation: to generate electricity. Installed across a wide extent of the roof of the Main REP Building;
- Battery Storage: to store and supply additional power to the local distribution network at times of peak electrical demand. This facility would be integrated into the Main REP building; and
- On Site Combined Heat and Power ('CHP') Infrastructure: to provide an opportunity for local district heating for nearby residential developments and businesses. REP would be CHP Enabled with necessary infrastructure included within the REP site.

Electrical Connection

3.2.3 REP would be connected to the electricity distribution network via a new 132 kilovolt (kV) underground electricity cable connection. The route options for the Electrical Connection are shown in the Works Plans (**Document Reference 2.2**).

3.2.4 In consultation with UK Power Networks ('UKPN'), Cory has considered different Electrical Connection route options to connect to the existing National Grid Littlebrook substation located south east of REP.

REP operations

3.2.5 Delivery of waste to REP: the majority of waste will be delivered to REP by barge from Waste Transfer Stations (WTS) along the River Thames, utilising the existing jetty which is located immediately to the north of RRRF and the REP site. The remainder would be delivered by road. Whilst the Applicant is a river-based operator, the application includes flexibility to allow deliveries by road where commercially and environmentally appropriate to do so, e.g. for local waste deliveries or for food/green waste to the Anaerobic Digestion facility.

Removal of by-products from REP

3.2.6 Incinerator Bottom Ash (IBA) would be transported by river to the existing IBA Facility at the Port of Tilbury for treatment/recycling, and then for onward use as secondary aggregate in the construction sector. Air Pollution Control Residues (APCR) would be taken off-site by road in sealed containers to be treated/recycled for use as a construction material.

3.3 Construction / Decommissioning

3.3.1 If consent is granted, it is anticipated that construction would start in 2021, with REP operational in 2024. It is assumed for the purposes of this assessment that the REP generating equipment would be removed once the plant had ceased operations permanently. Any decommissioning phase is assumed to be, at worst, of a similar or shorter duration to construction, and therefore environmental effects are considered to be of a similar level to those during the construction phase. It is assumed that the ducting for the Electrical Connection would remain in situ, but that the cables may be removed.

4 Health Impact Assessment Methodology

4.1 Introduction

4.1.1 The principal steps of the HIA process are shown in **Figure 4.1**.

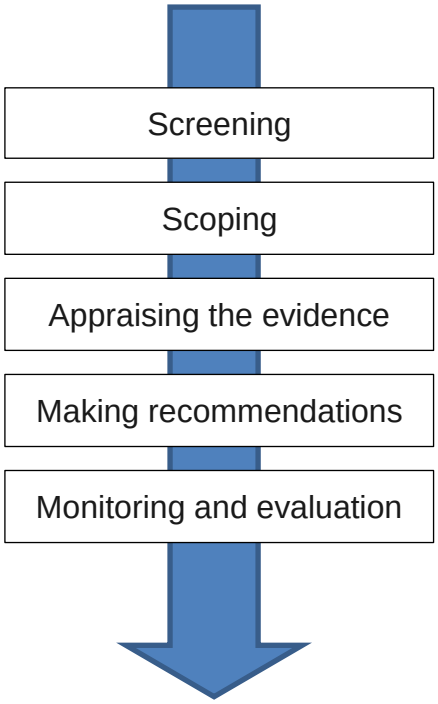


Figure 4.1: The HIA Stages (based on those outlined in the HUDU checklist)

4.1.2 Given that this HIA forms part of the ES, the HIA is also cognisant of the stages, structure and methodology used in the EIA and has been developed on that basis.

4.1.3 'Appraising the evidence' in HIA encompasses the main baseline and impact assessment undertaken as described in Sections 4.4 to 4.6. 'Making recommendations' is where mitigation measures to prevent, reduce and where possible offset any significant adverse effects, is proposed, as described in Section 4.9**.**

4.1.4 A description of the methodology for the HIA is provided below to encompass the stages that have been developed for the practice of HIA and to be consistent with the EIA.

4.2 Screening

4.2.1 The first step in the HIA process is known as Screening, where the need for HIA is established.

4.2.2 Human health must be given consideration as part of the EIA process under the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended) (the Infrastructure EIA Regulations 2017). Additionally, the adopted and emerging London Plans require development proposals to take account of the potential impact of proposals on health and health inequalities. Local policy related to protecting / enhancing health is set out in Section 5.5. This HIA presents the findings of the HIA as part of the ES.

4.3 Scoping

4.3.1 Scoping for the HIA was undertaken alongside the EIA scoping process in the form of an HIA scoping memo appended to the Scoping Report which was submitted to PINS on the 27th November 2017. The scoping memo outlined the proposed methodology and the scope for the HIA and the key aspects of REP, specifically:

- Purpose;
- Geographical area to be considered;
- The process of assessment;
- Sources of information to be used to establish baseline conditions;
- Health issues to be considered; and
- Potential receptors and vulnerable groups to be assessed.

4.3.2 The scoping memo stated that using the information gathered from the baseline and from consultation, the HIA would establish a set of 'health and wellbeing objectives' (or issues), tailored to the local context and the Proposed Development.

4.3.3 The structure of the issues to be considered has been developed from the Healthy Urban Planning Checklist from HUDU. The potential for the Proposed Development to affect the issues is noted in **Table 2.1** which forms the proposed scope of health issues for the Proposed Development.

4.3.4 The Scoping Opinion received from PINS on the 5th January 2018 included a number of responses from stakeholders such as Public Health England (PHE) and confirmed the need to address the issues identified in **Table 2.1** and the impact of the Proposed Development on vulnerable groups.

4.3.5 In addition to those issues, the Scoping Opinion also outlined the need to consider the impact of Electric and Magnetic Fields (EMFs) and climate change on health.

4.3.6 Due to the nature of REP, it was agreed through the Scoping Opinion that the following issues are not likely to result in significant effects to health and wellbeing and therefore have been scoped out of the HIA:

- Housing design and accessible housing;
- Housing mix and affordability;
- Play space/local food growing;
- Healthcare service;
- Access to local food shops; and
- Public buildings and spaces.

4.3.7 The full scoping opinion can be found in **Appendix A.1** of the ES.

4.3.8 In addition to this, effects on the biodiversity of publicly accessible natural spaces were scoped out of the preliminary HIA as no significant effects were identified in the PEIR. As no objections were raised during consultation and no significant effects on designated ecological areas have been identified in the ES, this approach has also been adopted for this HIA. Effects on assets, such as footpaths (including those through the Crossness Nature Reserve), have been considered within the Active and Sustainable Travel, Connectivity and Safety section and Townscape and Visual Amenity Baseline Assessment and Community Profile.

4.4 Baseline Assessment and Community Profile

4.4.1 The baseline assessment and community profile provide details of current health and wellbeing issues in the study area population.

Study Population

4.4.2 The Application Site falls within two local planning authorities, LBB and DBC. The REP site is wholly located within LBB whilst the Electrical Connection route is in both LBB and DBC.

4.4.3 The geographical scope of this HIA is such that it enables receptor groups which are likely to be significantly affected by REP to be included within the assessment. The scope of the HIA is therefore in part dependent upon study areas identified by other disciplines (such as air quality, transport and socio-economics) and the receptor groups within these study areas which are considered to be sensitive within the EIA and whose health may potentially be adversely affected or benefitted by REP.

4.4.4 Receptor groups considered within the HIA include the following:

- Residents and community service users within the area surrounding the REP site (the site of permanent works in the area north of Norman Road)

and Main Temporary Construction Compounds (located immediately west of Norman Road south of the REP site);

- Residents and community service users within the area surrounding the Electrical Connection route and associated Cable Route Temporary Construction Compounds including those within the wards of Belvedere, Erith, Colyers, North End, Crayford, Town, Joyce Green and Littlebrook;

- Residents in the wider area in the local authority areas of Bexley, Dartford, Greenwich, Barking and Dagenham, Havering and Thurrock have also been considered where it has been identified that there is the potential for significant effects, e.g. in relation to employment or air quality. In addition, for employment effects, a 60 minute drive time area is considered which extends into Sevenoaks, Tonbridge and Malling and Tunbridge Wells (Appendix Cii). This is considered to reflect the outer limit that individuals would typically commute on a daily basis; and

- Receptor groups that access the REP site, Electrical Connection or Temporary Construction Compounds, such as employees and visitors.

4.4.5 Future receptors have been considered as outlined in the relevant assessments of the ES. The air quality assessment includes consideration of opportunity areas identified for new housing development.

4.4.6 Community service users have been identified as appropriate for the particular impacts being considered. For example, hospitals, schools and care homes are considered in relation to air quality and public footpath and cycle route users are considered in relation to visual impacts. The sensitivity of specific community service users to specific environmental effects is noted in the appropriate chapter of the ES. Links to the ES are noted in **Table 7.1**.

Evolution of the Baseline

4.4.7 The baseline health characteristics and how the baseline may evolve in the future has been identified for these groups where possible. Health trends and changes in the prevalence of diseases have been identified by reviewing health strategies and Joint Strategic Needs Assessments (JSNA) for populations within the study area. The evolution of the baseline is relevant to understand the likely health characteristics of receptor groups at the time significant effects may occur.

Vulnerable Groups

4.4.8 Some groups are potentially more vulnerable to negative impacts from development and disproportionally experience the effects of development. Therefore, in addition to looking at the overall effects on health and wellbeing, the HIA identifies the impacts on specific vulnerable groups in the local communities surrounding REP. These are identified in Section 6.1.

Baseline Information Sources

4.4.9 The assessment that has been undertaken is qualitative except where data are readily available to enable quantification or where quantification of health impacts is undertaken in other assessments e.g. technical studies for the EIA.

4.4.10 The range of information sources that were considered include:

- London Borough of Bexley JSNA, 2016;
- A Health and Wellbeing Strategy for Bexley (London Borough of Bexley and Bexley Clinical Commissioning Group (CCG)), 2012;
- Public Health England Bexley Health Profile, 2017;
- Labour market statistics including Census 2011 data;
- Bexley Core Strategy adopted February 2012; and
- Public Health England Local Health Information (including Dartford), various dates.

4.4.11 The sources outlined above are those which were primarily used to inform the baseline conditions of the assessment. The HIA has also drawn upon baseline information presented within the ES, the sources of which are presented within the relevant topic chapters.

4.5 Assessment

4.5.1 The approach to the HIA involves a desk-top investigation of health impacts.

4.5.2 The HIA utilises the HUDU planning checklist as the starting point for the structure and used information gathered from the baseline and consultation exercises undertaken as part of the wider EIA and DCO preparation process to develop a list of health and wellbeing issues against which to assess the Proposed Development. The health issues proposed for assessment of REP are outlined in Section 7.1. By assessing the Proposed Development under these headings, it is possible to identify the positive or negative effect of development on the health and wellbeing of the identified receptors, and provide a basis for setting actions for further mitigation and enhancement.

4.5.3 Sections 8 to 20 cover the assessment of each of the health and wellbeing issues to identify likely significant effects.

4.5.4 The study area and receptors to be considered within the HIA are outlined in Section 4.4 above.

4.5.5 In terms of temporal limits, the HIA considers the evolution of the baseline within reasonable foreseeable limits.

Significance

4.5.6 This HIA uses the findings of the assessments presented in the ES to establish likely significant effects on health. The overarching methodology for assigning significance of effects in the EIA is described in **Chapter 4** of the ES. The approach to assessing and assigning significance to an environmental effect relies upon factors such as legislative requirements, guidelines, standards and codes of practice, consideration of the Infrastructure EIA Regulations 2017, the advice and views of statutory consultees and other interested parties and expert judgement. Specific significance criteria have been prepared as appropriate for each specialist topic, based on generic criteria. 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. See **Chapters 6 to 14** of the ES for detailed methodology relevant to each assessment.

4.5.7 Given the multitude of factors (determinants) that contribute to an individual's health outcomes, it is difficult to draw a quantified conclusion regarding the contribution of a particular development to an increase or decrease in the number of additional cases of a particular physical or mental health outcome. It is therefore also difficult to assign levels of significance (negligible, minor, moderate, major, substantial) to a particular effect. As noted at the scoping stage, the HIA categorises effects into 'significant' or 'not significant' and beneficial (positive) or adverse (negative). A significant effect is reported where, based on professional judgement, the Proposed Development is likely to contribute to a material change in health outcomes associated with the health issue being assessed and, in determining this, the following questions have been considered, which are in line with those described in **Chapter 4** of the ES:

- Have significant effects been identified in the ES which are linked to human health (i.e. are environmental or health standards threatened)?
- Are vulnerable groups affected?
- Is the effect reversible or irreversible?
- Does the effect occur over the short (less than one year), medium (one to five years) or long (over five years) term?
- Is the effect permanent or temporary?
- Does it increase or decrease with time?
- Is the effect at an individual or population level?
- Are mitigating measures available and is it reasonable to require these?

4.6 Cumulative Effects

4.6.1 This HIA focusses on the effects of REP and where necessary the cumulative and combined effects with 'other development'. The ES identifies 'other development' within the vicinity of REP where there is potential for cumulative effects to occur during the construction, operation and decommissioning of REP.

4.6.2 The potential for cumulative effects is assessed and presented in the ES. Where relevant, the assessment of effects in the HIA identifies cumulative effects. For example, an assessment of the potential traffic impacts of REP, gives consideration to the effects of traffic in relation to air quality and noise and the wider cumulative effects of traffic on the highways. Also, for air quality effects, consideration is given in technical assessments to relevant existing point source emissions including nearby power generation facilities and 'other development' which would introduce new receptors into the study area (as described in Section 4.4 regarding the study population).

Construction/Decommissioning

4.6.3 Construction and decommissioning of REP could occur simultaneously with 'other development' located in the vicinity of the Application Site. The 'other developments' with the most potential for concurrent construction effects are identified in **Chapter 4 (Appendix A.4)** of the ES. Construction phase mitigation measures will be employed during the construction of REP, as such significant adverse cumulative construction effects are not anticipated. Further assessments are presented within **Chapters 6 to 14** of the ES.

4.6.4 It is assumed for the purposes of this assessment that the REP generating equipment would be removed once the plant has ceased operations permanently. Any decommissioning phase is assumed to be of a similar or shorter duration to construction and therefore environmental effects are considered to be of a similar level to those during the construction phase. It is assumed that the ducting for the Electrical Connection would remain in situ, but that the cables may be removed.

Operation

4.6.5 The operation of REP could occur concurrently with 'other development' located in the vicinity of the Application Site. The 'other developments' with the most potential for concurrent operational effects are identified in **Chapter 4 (Appendix A.4)** of the ES. Significant adverse cumulative operational effects are not anticipated. Further detailed assessments are presented within **Chapters 6 to 14** of the ES.

4.7 Consultation and Engagement

Non-statutory consultation and Non-statutory engagement

4.7.1 The Applicant has undertaken non-statutory engagement and non-statutory consultation. This included providing information about the Proposed Development at open days at RRRF for members of the public and holding four public exhibitions at venues close to the Application Site. This enabled the Applicant to explain the rationale and key objectives of the Proposed Development and provided consultees with the opportunity to submit feedback early in the process. Exhibition venues were selected which met the requirements of the Disability Discrimination Act 1995.

Statutory consultation

4.7.2 In accordance with requirements of the Planning Act 2008 (as amended) (PA 2008) and the Infrastructure Planning (Applications: Prescribed Forms and Procedures) Regulations 2009 (APFP Regulations), the PEIR was published as part of the Statutory Consultation process undertaken for the REP DCO. Consultees were invited to provide feedback and comments on the Proposed Development and the information set out in the PEIR during the consultation period which ran from 18th June 2018 to 30th July 2018 (inclusive). An additional minor refinement consultation period was undertaken from the 31st July to the 7th September 2018 to enable consultees to respond to minor refinements that had been made to the site application boundary during the initial consultation period. Further information is provided in the Consultation Report (**Document Reference 5.1**).

4.7.3 No specific comments were made on the preliminary findings of the HIA by consultees during these consultations periods, however a number of comments were made which related to health and wellbeing.

4.7.4 In particular, the GLA expressed concerns regarding the potential impact that the Proposed Development may have on air quality and how this might affect existing and future residents, including future residents of nearby development Opportunity Areas such as Riverside, London and Thamesmead & Abbey Wood. PHE also noted that there are public health benefits from reducing public exposure to non-threshold pollutants below air quality standards and that mitigation measures should be implemented that reduce public exposures to pollutant levels as low as reasonably practicable. These responses have been addressed within the air quality assessment presented in **Chapter 7** of the ES, which has been used to inform this HIA.

4.7.5 Forestry Commission England, in their response, highlighted the benefits that green infrastructure and links to the existing countryside can have on health and wellbeing in their response. They noted that providing such links help encourage people to access the countryside by the local community for quiet enjoyment which can have benefits on mental as well as physical health.

4.7.6 Whilst no effects on the biodiversity of publicly accessible natural spaces are anticipated (e.g. Crossness Nature Reserve), effects on assets, such as footpaths (including those through the Crossness Nature Reserve), have been considered within the Active and Sustainable Travel, Connectivity and Safety section and the Townscape and Visual Amenity assessment.

4.7.7 Public Consultation events were also undertaken to allow local residents and businesses to comment on the Proposed Development. Seven consultation events took place at venues close to the Application Site in July 2018. These were:

- Belvedere Community Centre: 6th, 7th and 10th of July 2018;
- Slade Green and Howbury Community Centre: 6th and 10th July 2018;
- The Leigh University Technical College: 7th July 2018; and
- The Dartford Bridge Learning & Community Campus: 12th July 2018.

4.7.8 A summary of the responses provided by the local community at the events are presented in the Consultation Report (**Document Reference 5.1**). As with the PEIR, no direct comments were made relating to the HIA. Responses from the events did, however, note that there were a number of concerns about the impact of the Proposed Development on air quality. Comments were also made noting concern about noisy activities such as piling and the impacts on traffic. The results of the air quality and noise assessments are presented in Chapter 7 and 8 of the ES, respectively, which described how sensitive receptors (such as nearby residents) may be affected by the Proposed Development. This HIA has considered the results of these assessments when identifying potential effects on health and wellbeing.

4.7.9 The Consultation Report (**Document Reference 5.1**) describes how issues raised during the consultation process have been addressed and where further information can be found within the application documents.

4.8 Assumption and Uncertainties

4.8.1 Every reasonable effort has been made to obtain the most up to date baseline information and where available, the most up to date data have been used. However, characteristics of an area change, for instance, the census data are now over seven years old. The implications of this are that this baseline information may have undergone some change. However, it is likely that the broad characteristics have remained the same.

4.8.2 Whilst it is not possible to accurately characterise the health of the receptor groups at a defined point in time in the future, the evolution of the baseline has been considered with respect to information within the Bexley and Kent JSNAs, relevant assessments for the EIA and committed schemes have been identified.

4.8.3 This assessment has been undertaken based on consideration of the effects of the Proposed Development on the relevant determinants of health. Whilst it is difficult to demonstrate causality between the Proposed Development and health outcomes (e.g. cases of particular diseases) effort has been made to link the determinants to health outcomes where appropriate.

4.8.4 Additionally, as noted, given the multitude of factors (determinants) which contribute to an individual's health outcomes, it is difficult to draw a quantified conclusion in relation to the contribution of a particular development to an increase or decrease in the number of additional cases of a particular physical or mental health outcome. It is therefore also difficult to assign levels of significance (negligible, minor, moderate, major, substantial) to a particular effect. Therefore the HIA categorises effects simply into 'significant' or 'not significant' and beneficial (positive) or adverse (negative).

4.8.5 The analysis of environmental issues is based on the findings of the assessments presented in the ES which are subject to uncertainties and assumptions as described in the relevant 'topic' assessment chapters in the ES.

4.9 Mitigation and Enhancement Measures

4.9.1 Consideration has been given to the potential mitigation measures which could be used to ensure that likely adverse significant environmental effects of the Proposed Development are reduced. In the hierarchy of mitigation, likely significant adverse effects should, in the first instance, be avoided altogether; where this is not possible such effects should then be minimised, where practicable reduced and, finally, off-set.

4.9.2 Significant adverse effects are best avoided by incorporating appropriate measures into the design. As such, the iterative nature of the EIA and HIA process has assisted in informing the development of the design of the Proposed Development that is the subject of the REP DCO application.

4.9.3 Two broad types of potential mitigation measures have been applied in the EIA and HIA and are reported in the ES, namely:

- embedded mitigation - designed to be an inherent part of the scheme for which consent is sought (e.g. limiting the height of a stack). Embedded mitigation evolves through the iterative design process and early consideration of the likely significant effects; and

- further mitigation - which requires further activity to be achieved, is identified through carrying out assessments and does not form part of the scheme design in its own right.

4.9.4 Opportunities to provide enhancements, or to further beneficial effects will be progressed where suitable as outlined within **Chapters 6 – 14** of the ES where relevant.

4.9.5 REP has been developed in such a way that the reduction and, where possible, elimination of significant adverse effects is integral to the overall design philosophy.

4.10 Monitoring and Evaluation

4.10.1 No significant residual likely significant effects have been identified in the findings of the HIA.

5 Health and Wellbeing Policy Context

5.1 Introduction

5.1.1 This Chapter presents a review of the health priorities for REP as set out in published policy and strategies at local and national levels. This has been used to establish health issues of relevance to REP.

5.2 National Planning Policy and Strategies

Overarching National Policy Statement for Energy (NPS EN-1) (DECC, July 2011)

5.2.1 The National Policy Statement (NPS) sets out national policy for energy infrastructure. NPS sets the overarching policy, supported by an NPS for the relevant type of technology, which in this case is Renewable Energy Infrastructure (NPS EN-3) and Electricity Networks Infrastructure (EN-5) as shown below. NPS EN-1 provides the primary basis for decisions on these projects under the Planning Act 2008 made by the Infrastructure Planning Commission (superseded by the Planning Inspectorate) on applications for relevant energy developments.

5.2.2 The Appraisal of Sustainability, which forms part of NPS EN-1, identifies that:

"*The energy NPSs are likely to contribute positively towards improving the vitality and competitiveness of the UK energy market by providing greater clarity for developers which should improve the UK's security of supply and, less directly, have positive effects for health and well-being in the medium to longer term through helping to secure affordable supplies of energy and minimising fuel poverty; positive medium and long term effects are also likely for equalities."* (1.7.2)

5.2.3 NPS EN-1 specifically identifies 'health' as an issue to be considered by DCO applications. It states that:

"*Energy production has the potential to impact on the health and well-being ("health") of the population. Access to energy is clearly beneficial to society and to our health as a whole. However, the production, distribution and use of energy may have negative impacts on some people's health."* (4.13.1)

5.2.4 NPS EN-1 identifies that where a proposed project may have effect on human beings these should be assessed as part of the ES. Any adverse health effects should be identified and measures to avoid, reduce or compensate for these should be included. Cumulative effects on health should be considered.

5.2.5 The potential sources of health effects are given in NPS EN-1 (4.13.3). These are the direct effects of:

- Increased traffic,

- Pollution - including air, water, dust, odour, and noise;
- Hazardous waste and substances;
- Radiation; and
- Increases in pests.

5.2.6 New energy infrastructure may also have indirect effects, such as on open space or traffic, but this will depend on the siting of a development, proximity to local populations and current land use.

5.2.7 It is also noted that "*generally, those aspects of energy infrastructure which are most likely to have a significantly detrimental impact on health are subject to separate regulation (for example for air pollution) which will constitute effective mitigation of them…*" (4.13.5). This assumes that other energy infrastructure regimes which have been consented will operate effectively and not have significant adverse impacts to health.

5.2.8 NPS EN-1 contains specific details on the importance of addressing some issues that may have human health effects. These include air, noise, and water.

5.2.9 Air quality emissions: "*Infrastructure development can have adverse effects on air quality. The construction, operation and decommissioning phases can involve emissions to air which could lead to adverse impacts on health…*" (5.2.1). These need to be addressed in an air quality assessment and the SoS must take these into account in decision making.

5.2.10 Noise and Vibration: NPS EN-1 states that "*excessive noise can have wide ranging impacts on the quality of human life, health (for example owing to annoyance or sleep disturbance) and use and enjoyment of areas of value such as quiet places and areas with high landscape quality. The Government's policy on noise is set out in the Noise Policy Statement for England (DEFRA, 2010). It promotes good health and good quality of life through effective noise management. Similar considerations apply to vibration, which can also cause damage to buildings. In this section, in line with current legislation, references to "noise" below apply equally to assessment of impacts of vibration*." (5.11.1). The SoS should not grant development consent unless he or she is satisfied that they:

- avoid significant adverse impacts on health and quality of life from noise;
- mitigate and minimise other adverse impacts on health and quality of life from noise; and
- where possible, contribute to improvements to health and quality of life through the effective management and control of noise (5.11.9).

5.2.11 Waste Management: Government policy on waste aims to contribute to protecting human health by producing less waste and using it as a resource

where possible. Waste can be managed sustainably through the implementation of the 'Waste Hierarchy' and disposal of waste being considered only when other waste management options are not feasible. Where an Environmental Permit (EP) is required the applicant will need to demonstrate to the Environment Agency (EA) that processes are in place to meet the relevant EP requirements before the permit is granted. Arrangements for how waste will be managed should be set out in a Site Waste Management Plan (SWMP). The Secretary of State should be satisfied that waste will be managed properly both on and off site, waste can be dealt with appropriately by the waste infrastructure and that an effort has been made to reduce the volume of waste produced (5.14).

5.2.12 Water quality and resources: NPS EN-1 notes that infrastructure development can have adverse effects on the water environment, including groundwater and inland surface water. This can be at construction, operation and decommissioning phases. It can lead to discharges to water and cause adverse ecological effects resulting from physical modifications to the water environment. There may also be an increased risk of spills and leaks of pollutants to the water environment. These effects could lead to adverse impacts on health and should be addressed in the ES. The Secretary of State will generally need to give impacts on the water environment more weight where a project would have an adverse effect on the achievement of the environmental objectives established under the Water Framework Directive (5.15).

National Policy Statement for Renewable Energy Infrastructure (EN-3) (DECC, July 2011)

5.2.13 Biomass and waste combustion: NPS EN-3 notes that waste combustion can have an impact air quality and can have a significant impact on carbon dioxide (CO_2) emissions. In addition to the air quality and emission legislation outlined in NPS EN-1, the Waste Incineration Directive (WIncD) (Directive 2000/76/EC, European Commission, 2010) was relevant to waste combustion plants although it has now been superseded by the Industrial Emissions Directive (EC Directive 2010/75/EU) (IED). An assessment of air emissions resulting from the proposed project should outline how it will comply with the relevant regulations. Where a proposed waste combustion generating station meets the requirements of WIncD, now contained in the IED, and will not exceed the local air quality standards, the SoS should not regard the proposed waste generating station as having adverse impacts on health (2.5).

National Policy Statement for Electricity Networks Infrastructure (NPS EN-5) (DECC, July 2011)

5.2.14 Electric and Magnetic Fields: Electric and Magnetic Fields (EMFs) arise from the generation, transmission, distribution and use of electricity and are therefore present near electric cables. Where an electric cable is passed underground as opposed to overhead the electric field will be eliminated but a magnetic field will still be produced. EMFs can affect human health in various ways including through impacting the central nervous system and normal

functioning. Government policy indicates that exposure of the public to EMFs should comply with the International Commission on Non-Ionizing Radiation Protection (ICNIRP) 1998 guidelines. Where it can be demonstrated that the proposal will comply with the current public exposure guidelines and the policy on phasing, no further mitigation should be necessary (2.10).

5.2.15 Discussion on the following National, Regional and Local policy specific to this HIA is located in **Appendix A.3** of the ES.

- National Planning Policy Framework (2018);
- National Planning Policy for Waste (2014); and
- Planning Practice Guidance (2014).

5.3 Regional Planning Policy and Strategies

- London Plan (March 2016);
- Planning for Equality and Diversity in London, Supplementary Planning Guidance (October 2007);
- The Control of Dust and Emissions During Construction and Demolition, SPG (July 2014);
- Greater London Authority - Green Infrastructure and Open Environments: The All London Green Grid, SPG (March 2012);
- London's Wasted Resource: The Mayors Municipal Waste Management Strategy (2011);
- Managing Risks and Increasing Resilience: The Mayor's Climate Change Adaptation Strategy (2011);
- London Environment Strategy (2018); and
- London Health Inequalities Strategy (2018).

5.4 Emerging Regional Planning Policy and Strategies

- Draft New London Plan showing Minor Suggested Changes (2018).

5.5 Local Planning Policy and Strategies

- Bexley Core Strategy (February 2012);
- London Borough of Bexley Unitary Development Plan Saved Policies (as amended 2012);
- Bexley Growth Strategy (December 2017);
- Dartford Core Strategy (September 2011);

- Dartford Development Policies Plan and Policies Map (July 2017);
- Kent Minerals and Waste Local Plan 2013-30 (2016); and
- Kent Local Transport Plan 4: Delivering Growth without Gridlock 2016-2031.

5.6 Emerging Local Planning Policy and Strategies

- Draft Bexley Local Plan;
- Draft Dartford Borough Council Local Plan.

5.7 Health Strategies

The Marmot Review

5.7.1 Fair Society, Healthy Lives: A Strategic Review of Health Inequalities in England Post-2010 (The Marmot Review)[3] was published on 11 February 2010. This was the culmination of a year long independent review into health inequalities in England. Six policy objectives were developed:

- Give every child the best start in life;
- Enable all children, young people and adults to maximise their capabilities and have control over their lives;
- Create fair employment and good work for all;
- Ensure healthy standard of living for all;
- Create and develop healthy and sustainable places and communities; and
- Strengthen the role and impact of ill health prevention.

5.7.2 The review highlighted the role that planning and design play in creating healthy communities and how the built environment can impact determinants of health. The relevance of this to REP is outlined in Section 2.1.4.

Healthy Lives, Healthy People: Our Strategy for Public Health in England (November 2010)

5.7.3 This document sets out the Government's long-term vision for the future of public health in England. The aim is to create a 'wellness' service (Public Health England) and to strengthen both national and local leadership. It adopts the Marmot Review's life course framework for tackling the social determinants, and aims to support healthy communities.

London Borough of Bexley Joint Strategic Needs Assessment (2016)

5.7.4 The JSNA is the means by which CCGs and local authorities describe the future health, care and wellbeing needs of local populations to identify the strategic direction of service delivery to meet those needs. The JSNAs are produced by health and wellbeing boards, and are unique to each local area.

5.7.5 The JSNA Summary Report 2016 provides a brief overview and update on the entire breadth of the JSNA work in Bexley to date, along with a description of the latest key population and health statistics for the county. The 2016 study focuses on the demographic makeup and burden of disease in Bexley. Based on this work, the report includes a summary on local health and wellbeing, emerging challenges and projected future needs.

5.7.6 The JSNA highlights that, overall, Bexley is a relatively healthy borough and most diseases are showing a reduction in prevalence and/or mortality. The key disease priorities for Bexley are:

- Cardiovascular disease;
- Cancer;
- Diabetes; and
- Obesity.

5.7.7 In relation to health inequalities in Bexley, it was found that differences in life expectancy between the most and least deprived areas persist, particularly for females, and that action should be taken to address health inequalities across the borough.

A Health and Wellbeing Strategy for Bexley (2012)

5.7.8 The strategy sets out how the Bexley Health and Wellbeing Board will work with local people and partners to improve health and wellbeing across the borough. It is the first Health and Wellbeing strategy produced for the residents of Bexley and is based on the borough's 2011 JSNA, the Public Health Outcomes Framework and consultation with residents. The strategy presents the following health priorities for Bexley:

- Tackling childhood and adult obesity;
- Diabetes;
- Supporting people with addictions – including smoking, alcohol and drugs; and
- Dementia.

5.7.9 The strategy also presents key changes to how health and social care is to be delivered in Bexley such as joining up health care with social care to keep more people out of hospital and investing in prevention services.

Kent Joint Strategic Needs Assessment 2016 Overview Report

5.7.10 The 2016 overview report lists Kent's emerging health priorities as:

- Cancer;
- Demographics;
- Diabetes;
- Growth;
- Health Inequalities;
- Healthy Weight;
- Mental Health; and
- Stroke.

5.8 Guidance, Checklists and Recommendations

Healthy Urban Planning Checklist (2017)

5.8.1 London HUDU works with local, London wide and national organisations on behalf of the NHS and "*staffed by professional town planners, the work of the unit is focused around:*

- *partnerships for health – facilitating engagement between health and planning authorities at all levels;*
- *influencing the planning and health agendas – integrating health into national, regional and local planning policy;*
- *promoting healthy urban development – monitoring development and providing advice, guidance and support on the health impacts and opportunities to promote healthy communities and provide and fund appropriate health infrastructure.*"

5.8.2 The HUDU Healthy Urban Planning Checklist aims to bring together key policy requirements and standards, which influence health and wellbeing to assist the decision-making process. The checklist incorporates general London-wide policies and is consistent with the most recent London Plan (2016). It highlights that a 'healthy' development can be achieved when requirements and standards referred to within the checklist are met.

5.8.3 The checklist categorises health related planning issues into four main themes:

- Healthy housing;
- Active travel;
- Healthy environment; and
- Vibrant neighbourhoods.

Rapid Health Impact Assessment Tool (2017)

5.8.4 This tool has been used to help identify determinants of health which are likely to be affected by a development proposal. It outlines a range of planning issues which may influence health and wellbeing under eleven broad determinants including climate change and accessibility and active travel. By identifying where potential adverse health impact may occur, appropriate mitigation measures can be recommended to lessen the impact to an acceptable level.

6 Baseline Assessment and Community Profile

6.1 Introduction

6.1.1 This Chapter summarises the community profile and health characteristics of the study population identified in Section 4.4**.** It has focused on key matters that could be influenced by REP in relation to the relevant health issues identified for the HIA and the identification of vulnerable groups.

6.1.2 The sources used to develop the baseline assessment and community profile and the identified study area / receptor groups are outlined in Section 4.4**.**

6.1.3 For each of the baseline topics, the wards surrounding REP and the wider study area (as noted in Section 4.4) are discussed. In relation to employment and economy – data is also presented for Lower Super Output Areas (to identify vulnerable groups in relation to deprivation) and the 60-minute drive time area, given that effects may be significant at this geographical scale for this particular topic. Where baseline data are available at a different geographical level e.g. transport and crime – this is noted in these topic areas.

6.1.4 The wards immediately surrounding the REP site (as outlined in **Appendix B**) have similar population sizes, based on Public Health England 2016[4] information, they are approximately:

- Belvedere: 13,123 people;
- Thamesmead East: 13,212 people; and
- Erith: 12,751 people.

6.1.5 The wider borough of Bexley has a population of approximately 242,142[4]. The neighbouring borough of Dartford, through which part of the Electrical Connection route would run and the Electrical Connection Point would be located, has a population of approximately 103,892[4], less than half that of Bexley's, despite being of a similar area.

Vulnerable Groups

6.1.6 The most vulnerable groups for this HIA have been determined based on groups which have been identified in the health strategies for Bexley (Section 5.7) and in local policy (Section 5.3). The groups which have been identified to be potentially disproportionately affected are:

- Children and young people;
- The elderly;

[4] Public Health England (2016) *Local Health*. [Online] Available at: www.localhealth.org.uk [Accessed 1st October 2018]

- Those with existing respiratory related health conditions such as asthma; and
- Those who are unemployed or on low incomes.

6.1.7 Further to this, consideration has been given to groups in more deprived areas and those with higher rates of unemployment as populations within these areas are more likely to already experience poorer health and therefore be more sensitive to the impacts of development. As shown in **Appendix C** and described below in Section 6.4**,** these areas include:

- Belvedere;
- Thamesmead East;
- Erith;
- North End;
- Littlebrook; and
- Joyce Green.

6.1.8 As REP is not introducing new communities, only vulnerable groups from existing communities have been identified.

6.2 Local Authority Health Profiles

6.2.1 This section gives a current overview of the general health, inequalities and priorities for each of the six local authority areas in the wider study area identified in **Appendix B.** The 60 minute drive time **(Appendix Cii)** baseline is considered specifically in relation to employment and economy.

Bexley

6.2.2 The 2017 public health profile for Bexley states that:

- The health of people in Bexley is generally better than the England average. About 19% (8,900) of children live in low income families. Life expectancy for both men and women is higher than the England average;
- Life expectancy is 6.4 years lower for men and 5.1 years lower for women in the most deprived areas of Bexley than in the least deprived areas; and
- Priorities in Bexley include addressing obesity - adult and children diabetes, dementia, addiction - smoking, substance misuse, and children and young people's emotional wellbeing.

Dartford

6.2.3 The 2017 public health profile for Dartford states that:

- The health of people in Dartford is varied compared with the England average. About 16% (3,300) of children live in low income families. Life expectancy for both men and women is lower than the England average;
- Life expectancy is 9.4 years lower for men and 4.5 years lower for women in the most deprived areas of Dartford than in the least deprived areas; and
- Priorities in Dartford include reducing obesity levels in Reception and Year 6 children, reducing falls, improving life expectancy and adult healthy weight and reducing the amount of adult inactivity.

Greenwich

6.2.4 The 2017 public health profile for Greenwich states that:

- The health of people in Greenwich is varied compared with the England average. About 26% (14,100) of children live in low income families. Life expectancy for women is lower than the England average;
- Life expectancy is 5.5 years lower for men and 4.7 years lower for women in the most deprived areas of Greenwich than in the least deprived areas; and,
- Priorities in Greenwich include developing a systematic prevention infrastructure across the borough, embedding a 'make every contact count' approach across council, health and third sector organisations, improving mental well-being and addressing the continuing rise in child and adult obesity.

Barking and Dagenham

6.2.5 The 2017 public health profile for Barking and Dagenham states that:

- The health of people in Barking and Dagenham is varied compared with the England average. Barking and Dagenham is one of the 20% most deprived districts/unitary authorities in England and about 29% (15,300) of children live in low income families. Life expectancy for both men and women is lower than the England average;
- Life expectancy is 2.9 years lower for men in the most deprived areas of Barking and Dagenham than in the least deprived areas; and
- Priorities in Barking and Dagenham include reducing childhood obesity, healthy growth and reducing inequalities in smoking prevalence.

Havering

6.2.6 The 2017 public health profile for Havering states that:

- The health of people in Havering is generally better than the England average. About 19% (8,800) of children live in low income families. Life expectancy for both men and women is higher than the England average;
- Life expectancy is 6.7 years lower for men and 4.3 years lower for women in the most deprived areas of Havering than in the least deprived areas; and
- Priorities in Havering include improving nutrition and increasing physical activity to promote healthy weight management, identifying vulnerable children and families and intervening earlier, and reducing avoidable admissions to hospital or long term care home.

Thurrock

6.2.7 The 2017 public health profile for Thurrock states that:

- The health of people in Thurrock is varied compared with the England average. About 21% (7,600) of children live in low income families;
- Life expectancy for both men and women is similar to the England average; and
- Priorities in Thurrock are reducing excess weight, improving the health of those with long term conditions, reducing smoking prevalence in adults, and improving the capacity and quality of Primary and Community Care in order to reduce variation in healthcare outcomes.

6.3 Health Overview

Wards Surrounding REP

6.3.1 The wards of Belvedere, Thamesmead East and Erith are immediately adjacent to the REP site. Belvedere and Erith also border the Electrical Connection route as do the wards of Colyers, North End, Crayford, Town, Joyce Green and Littlebrook. The Electrical Connection Point is located at the Littlebrook substation in Littlebrook ward.

6.3.2 Overall these wards have a similar proportion of people of working age (16-64 years old) as the England average which is 63.3%. Each ward has a higher proportion of people aged under 16 than the England average, which ranges from 2.3% higher in Crayford to 8.5% and 8.6% higher in Joyce Green and Thamesmead East, respectively[4].

6.3.3 In relation to the proportion of people being aged 65 - 84, all nine wards have a lower percentage than the England average which is 15.4%. Thamesmead East has the lowest percentage of its population in this age bracket at 7.1%

(Joyce Green also has a similarly low figure of 7.6%) and Colyers has the highest at 14%. Of the population aged 85 and over Crayford has the highest percentage at 2% and Town has the lowest at 0.8%, again all lower than the England average of 2.4%[4].

6.3.4 All of the wards (apart from Colyers) do not have a significantly higher proportion of people considering their general health as 'very bad' or 'bad' compared to the England average of 5.5%. In Colyers, 6% of people consider their general health to be 'bad' or 'very bad' which is significantly worse than the England average. In Thamesmead East and Town this figure is significantly better than the England average with only 4.7% and 3.2% of people considering their health in these terms[5].

6.3.5 The majority of these wards also report a significantly lower proportion of people living with limiting long term illness or disability than the England average which is 17.6%. Town experiences the lowest percentage (5.7% fewer) whereas North End, Joyce Green and Littlebrook do not significantly differ from the England average although Littlebrook does have a slightly higher incidence of 0.1%[5].

6.3.6 Dartford has a significantly lower than average life expectancy for males and females when compared to the England average whereas Bexley has a significantly higher life expectancy for both. The life expectancy for females in Belvedere is significantly better than the England average of 83.1 by 3.6 years. Male life expectancy was significantly lower in Town, North End and Joyce Green, where life expectancy was up to 5.3 years lower than the England average[6].

6.3.7 Bexley and Dartford both have a higher proportion of obese adults than the England average, however, none of the wards were considered to differ significantly from this average. Of the three wards, North End has the highest proportion of obese adults at 30.3%, 6.2% more than the England average[7].

6.3.8 Emergency hospital admissions are significantly worse than the England average in Erith, Littlebrook, Joyce Green, Crayford, North End and Colyers. Of these wards, Joyce Green have the highest Standardised Admission Ratio (SAR) at 139.2, which is also higher than the Dartford and Bexley averages (105.8 and 89.6, respectively). Only North End and Crayford have significantly higher hospital admissions for chronic obstructive pulmonary disease at 242.8 and 126.5, respectively, which are both far higher than the Bexley average of 83[6].

[5] Public Health England (2011) *Local Health*. [Online] Available at: www.localhealth.org.uk [Accessed 1st October 2018]

[6] Public Health England (2017) Local Health. [Online] Available at: www.localhealth.org.uk [Accessed 1st October 2018]

[7] Public Health England (2010) Local Health. [Online] Available at: www.localhealth.org.uk [Accessed 1st October 2018]

6.3.9 Of the wards surrounding REP Joyce Green, Town and North End have significantly worse Standardised Mortality Ratios (SMR) for all causes of death of people aged under 75 when compared to the England average. Joyce Green has the highest Standardised Mortality Ration (SMR) at 167.2[6].

Wider Study Area

6.3.10 The wider study area constitutes the local authority areas of Bexley, Greenwich, Barking and Dagenham, Havering, Dartford and Thurrock. These areas have been included within the assessment to reflect receptors which may potentially be adversely impacted by issues which are more far reaching that the immediate area surrounding REP from air quality, socio-economics and transport.

6.3.11 These six areas all have proportions of people aged 16 to 24 similar to the England average. The biggest deviation from the average is in Dartford where there are 1.3% fewer people that fall within this age bracket. With regard to the proportion of people aged 25-64, the biggest deviation from the England average is in Greenwich where there is a higher proportion of people in this group (up to 4.3% more)[4].

6.3.12 All six of these areas have a higher percentage of under 16 year olds than the England average (19%). Of these areas Barking and Dagenham have the highest proportion at 27.2%, followed by Thurrock at 22.3%, the other areas differ from the England average by less than 3%[4].

6.3.13 The majority of these areas have a similar, although slightly lower proportion of people aged 65 to 84 compared to the England average (15.4%), apart from Havering which has a slightly higher proportion. Barking and Dagenham and Greenwich have the lowest percentage of people residing in this category of 8.2% and 9%, respectively. A similar pattern is seen in relation to the proportion of people aged 85 and over, with Barking and Dagenham and Greenwich having the lowest proportion of people in this age group[4].

6.3.14 Barking and Dagenham is the only area where the proportion of people reporting their general health as ‘bad or ‘very bad’ is higher than the England average (0.6% more). All six of these areas have a lower proportion of people living with limiting long term illness ability compared to the England average (17.6%) which varies from 15.1% in Greenwich and Dartford, to 17.3% in Havering[5].

6.3.15 Life expectancy for males is only higher than the England average in Havering and Dartford. The highest deviation from the England average is in Barking and Dagenham where life expectancy is 77.5 years, 1.9 years less than the England average. In Bexley and Havering female life expectancy is higher than the England average. The lowest female life expectancy is 81.8 in Barking and Dagenham, 1.3 years fewer than the England average[6].

6.3.16 Greenwich is the only area where the percentage of the obese adult population is lower than the England average. All other areas have a greater

percentage of obese adults, the highest of which is Barking and Dagenham at 28.7%[7].

6.3.17 The SMR for premature mortality of people aged 75 and under for all causes is significantly higher than the England average in Greenwich, Dartford and Barking and Dagenham. Barking and Dagenham has the highest Standardised Admission Ratio (SAR) at 122.9 whereas Havering and Bexley had significantly better SMR that the England average[6].

6.3.18 Barking and Dagenham also has a significantly worse SAR than the England average for all emergency hospital admissions as did Dartford. Greenwich, Thurrock and Barking and Dagenham had significantly higher hospital admissions for chronic obstructive pulmonary disease, again Barking and Dagenham has the highest SAR at 189.2[6].

6.4 Employment and Economy

6.4.1 There is a strong link between unemployment and deterioration in physical and mental health as well as wellbeing. Unemployment is shown to increase rates of sickness, disability and mental health problems, such as depression and anxiety, and to decrease life expectancy. Studies have also shown a link between unemployment and increased risk of suicide[8].

6.4.2 In addition to this, young people who are classed as NEET (Not in Education, Employment or Training) have an increased risk of subsequent unemployment, having a criminal record and experiencing depression.

Wards Surrounding REP

6.4.3 Of the wards surrounding REP, only Town has an unemployment rate lower than the England and Wales average at 6.7%. Thamesmead East has the highest unemployment rate of all the wards at 15%, this is also the highest figure for Bexley and Dartford. North End, Erith, Joyce Green and Littlebrook also have unemployment rates above 10%[9].

6.4.4 All nine wards have lower percentages of people employed in high level occupations (manager, senior officials, professionals and associate professionals and technical) than the England and Wales average. Of these wards, Thamesmead East and Littlebrook have the highest percentage of people employed in low level ‘elementary occupations’ whereas Crayford had the lowest at 10.15%, this was the only ward to have lower proportion employed in this occupation than the England and Wales average[9].

6.4.5 Erith, Thamesmead East and North End all had a higher than average percentage of people who were economically inactive. Of these, the highest

[8] NHS (2015) *Unemployment and job insecurity linked to increased risk of suicide*. [Online] Available at: https://www.nhs.uk/

[9] Nomis (2011) Ward Labour Market Profiles. [Online] Available at: https://www.nomisweb.co.uk/

proportion occurs in North End at 7%, 4% higher than the average for England and Wales. Of this percentage, the highest proportion were students and the lowest proportion were retired[9].

Wider Study Area and 60 minute Drive Time Area

6.4.6 Average unemployment rates for local authority areas within a 60 minute drive time of REP are presented in **Appendix Cv**. This map shows that most areas surrounding REP have higher unemployment rates than the Great Britain average which is 4.3%[10]. Local authority areas to the west of REP have the highest rates of employment, including Barking and Dagenham, Greenwich and Newham. Further north and south of REP towards the periphery of the 60 minute drive time study area, unemployment rates decrease. The lowest unemployment rates occur to the south which include the local authority areas of Sevenoaks, Tonbridge and Malling and Tunbridge Wells.

6.4.7 Greenwich is the only local authority area within the wider study area which has a higher percentage of people (by 14%) working in high level roles such as managers, professional occupations, associate professionals than the Great Britain average (45.8%). The most common form of employment in Greenwich, Havering, Bexley and Dartford is 'professional occupation' where as in Thurrock this is lower level 'administrative & secretarial' employment. Barking and Dagenham is characterised by lower level 'elementary occupation' employment, which accounted for 14.3% of employment.

6.4.8 In relation to the economically inactive, these areas are generally characterised by high proportions of students and people looking after family/home. Barking and Dagenham, Thurrock and Greenwich have a higher proportion of economically inactive people that the Great Britain average. Of the population of Barking and Dagenham 25.2% are economically inactive, 3.6% above average, of this the highest proportion are classified as 'looking after family/home'[11].

Lower Super Output Area

6.4.9 Lower super output areas (LSOAs) are the smallest geographical area which aggregated census data is available for. LSOAs have similar population sizes, the minimum population is 1000 and the mean is 1500. Using data at the LSOA level enables pockets of deprivation to be identified that might otherwise be overlooked if data is only considered at ward level.

6.4.10 Income rank, index of multiple deprivation and jobseeker/universal credit claimant count information for the borough of Bexley and lower super output areas are presented in **Appendices Ciii, Civ and Ci** respectively. These maps have been used to identify pockets of deprivation in the area

[10] Nomis (2018) Labour Market Profile (April 2017-March 2018). [Online] Available at: https://www.nomisweb.co.uk/

[11] No data on economic inactivity was available for Dartford for the period April 2017-March 2018.

surrounding REP. People that reside in more deprived areas typically have poorer health and therefore and more vulnerable to potential health impacts related to development.

6.4.11 LSOAs in Bexley which border the River Thames (including those which are immediately adjacent to the REP site) are comparatively more deprived and have a higher number of people claiming benefits than those which are situated further south. In particular, LSOA reference 002F and 002C which are located in Thamesmead East, 004B, 004C and 004D in Erith and 008B, 008D and 008F which are located in North End. Havering also has areas with high rates of deprivation, again these are mainly located along the River Thames and also on the border with Barking and Dagenham in the wards of South Hornchurch and Rainham and Wennington. Lower levels of deprivation occur further north east of the river.

6.5 Education and Learning

6.5.1 Access to good education and education attainment and qualifications has implications for health. This is not only in terms of accessing employment and higher skilled professions, and hence increased income, but also in terms of understanding health issues and aiding peoples' ability to make healthy lifestyle choices.

Wards Surrounding REP

6.5.2 Of the nine wards, eight have a higher proportion of the population with no qualifications than the England and Wales average (14.3%). Town was the only ward which had a lower proportion at 13.5%. North End has the highest proportion of the population with no qualifications at 21.8%, the rest of the wards all had proportions below 20%.

6.5.3 Thamesmead East has the highest proportion of the population with level 4 qualifications and above at 29.9%, the only ward which has a higher level than the England and Wales average (29.7%). Erith and Town also have higher proportions than their local authority area averages. Littlebrook has the lowest proportion of the population attaining this level of qualifications at 19.8%.

Wider Study Area

6.5.4 Bexley and Dartford are the only two local areas that have lower proportions of people achieving no qualifications than the Great Britain average (8%). Barking and Dagenham had the highest proportion at 14.8%, although there is a higher proportion of people achieving 'other qualifications' than the other areas.

6.5.5 Greenwich has the highest proportion of people achieving level 4 qualifications and above, 7.7% more than the Great Britain average of 38.2%. It should be noted that this is still lower than the London average, which is 51.9%. All other local authority areas were below average for Great Britain, the lowest of

which was Thurrock with a proportion of 27.8% of the population achieving level 4 qualifications or above.

6.6 Transport and Connectivity

6.6.1 Transport has a vital role in contributing to health and wellbeing of communities, with multiple and complex relationships between transport, access and health.

6.6.2 A good transport system not only enables access to work, education, and social networks which advance people's opportunities, but also has an important role in encouraging and providing sustainable transport modes (walking, cycling and public transport) which improve the health and wellbeing of the community through increasing physical activity across all social and age groups.

Transport Provision

6.6.3 Census data show that walking and cycling are not common methods of transport that people in the surrounding communities use to travel to work with proportions being below the average for England and Wales.

6.6.4 The REP site is linked to the A2016 by Norman Road which has a footpath that is lit and runs along the eastern side of the road. The A2016 has a foot and cycle path adjacent to the road until it meets the roundabouts to the east (A2016, B253 and Anderson Way) and west (A2016 and Yarnton Way). There is a dedicated cycle path along Anderson Way and Yarnton Way, although this is not continuous. The area surrounding the REP site is mostly flat and there is potential for future REP employees to cycle to work although this would likely require them to cycle on main roads for part of the journey.

6.6.5 There is potential for employees to walk from nearby communities, although the surrounding area is relatively industrial and may make pedestrians feel uncomfortable or unsafe if they were required to walk through these areas later at night. The Thames Path is a national trail, part of which runs along the southern bank of the River Thames linking the REP site to south east London and the wards of Thamesmead East, Belvedere and Erith to the south west.

6.6.6 The proportion of people who travel by bus in the area surrounding REP is similar to average for England and Wales in most areas. Transport for London's online WebCAT toolkit rates the Public Transport Accessibility of REP as 0, this equates to 'very poor' provision. Despite this rating, it should be noted that there are bus stops situated along the A2106, less than 100 m from Norman Road. During the week, services 180 and 401 run from these stops, approximately every 7-15 minutes and 15-20 minutes, respectively, for most of the day. These services provide public transport links that link the REP site to areas to the south and west including Thamesmead, Bexleyheath, Erith and to the wider Greenwich and Dartford areas.

6.6.7 Rail is a popular method of transport that people use to travel to work with the proportion of people travelling by train in the area surrounding REP being above the England and Wales average. The nearest railway station is situated approximately 1.3 km to the south of the REP site in Belvedere which provides connections to Dartford, Crayford and to Cannon Street in central London, the journey time for the latter is approximately 40 minutes.

6.7 Crime and Safety

6.7.1 The impact of crime and safety can have both a direct effect on health for example through incidences of physical violence but also through indirect effects such as impacts on perceived safety.

6.7.2 Where people perceive areas to be unsafe this may increase incidences of anxiety and also discourage people from undertaking physical activity outdoors in the surrounding area. Where people feel safer they may be more inclined to travel by foot or bike instead of car or public transport, although in areas where crime is higher people may also feel unsafe using public transport during quieter times of the day such as late evening.

6.7.3 The London Borough of Bexley is within the jurisdiction of the Metropolitan Police. Between January 2016 and 2018 the crime rate in Bexley (defined as the number of crimes per 1,000 head of population) was 1.3. Over this period the area saw an increase in the number of crimes reported, however this figure is lower than the crime rate for London which is 2.10. Of the wards surrounding the REP site, Belvedere and Erith had higher crime rates than the borough average, the highest of which is Erith at 2.14. Crime rates in these areas have increased over this period whereas Thamesmead East has seen a drop in crime rate and has a slightly lower rate of 1.24.

6.7.4 'Theft and handling' was the crime with the highest incidences in Belvedere and Erith whereas in Thamesmead East this was 'violence against the person', although it should be noted that these two were the crimes with the highest incidences in both wards[12].

6.7.5 The borough of Dartford falls within the jurisdiction of Kent Police. The Police UK website[13] indicates that in the year ending September 2017, the crime rate in Dartford & Gravesham (defined as total number of crimes over a twelve month period per thousand residents) is 102.84, a figure which is higher than the average crime rate across similar areas (such as Havering (71.96) and Thurrock (83.63)) and also higher than average for Kent which was 84.73.

6.7.6 When compared with the corresponding quarter in 2016, crime rates had increased in Dartford, Gravesham and Kent. In the wards surrounding the Application site in Dartford, the most common crime in Littlebrook, Town and Joyce Green were classed as 'violent and sexual offences'. The second most

[12]Metropolitan Police Service (2018) Crime Data Dashboard. [Online] Available at: https://www.met.police.uk/

[13] Police UK (2018) Crime Map. [Online] Available at: https://www.police.uk/kent/

common were ‘anti-social behaviour’, ‘criminal damage and arson’ and ‘shoplifting’.

6.8 Summary and Key Issues

6.8.1 The wards surrounding the Proposed Development and the Local Authority areas considered within the wider study area are generally characterised by higher than average proportions of young people aged under 16 and lower proportions of elderly people aged 65 and over.

6.8.2 None of the wards or local authority areas experience significantly higher than average proportions of people living with long term illness and disability although some areas have higher incidences of the population reporting bad general health e.g. Barking and Dagenham and Colyers (the latter on the route of the Electrical Connection).

6.8.3 Life expectancy is broadly similar to the England average in most areas. Male life expectancy is much lower in some wards including Joyce Green (on the route of the Electrical Connection).

6.8.4 Emergency hospital admissions are significantly higher than average in the wards surrounding REP, of these North End and Crayford (on the route of the Electrical Connection) had the highest incidents of emergency admissions due to respiratory conditions.

6.8.5 Most surrounding wards have a high proportion of people who are unemployed, the highest being Thamesmead East (the REP site is within this Ward). This ward also had a high proportion of the people that were employed working in lower level occupations. Of the economically inactive in the study area, high proportions are students.

6.8.6 The majority of areas within the study area had above average rates of people achieving no qualification, which was highest in North End. Thamesmead East, although recording poorly in other social and economic factors, had the highest proportion of people attaining level four qualifications or higher. However, this was still lower than the London average.

6.8.7 Walking and cycling links to the REP site are available but may not be appealing as they mainly link through industrial areas and busy roads due to the nature of the location of the REP site and the surrounding land uses. Public transport links are available within walking distance of the REP site.

6.8.8 Crime rates in the area are lower than the London average, although these are increasing in some wards surrounding the REP site apart from in Thamesmead East where incidents of crime appear to be falling when compared to the Metropolitan Police Service 2017 figures.

6.8.9 Based on the baseline assessment of the areas surrounding REP, Barking and Dagenham has been identified as being vulnerable to the potential impacts of REP as have a number of wards in Bexley and Havering.

6.8.10 Barking and Dagenham scores worse than the England average for a number of general health and economic factors, reporting poorer health and having higher emergency hospital admissions, high levels of deprivation and unemployment and high proportions of people being employed in lower level occupations. In the neighbouring borough of Havering there were also several areas with higher levels of deprivation, mainly in South Hornchurch and Rainham and Wennington.

6.8.11 Of the wards surrounding the Application Site, Thamesmead East, Littlebrook and Joyce Green often fall below average and are the worst of the wards affected on a range of baseline health factors in relation to general health, employment and education. Further to this, particular pockets of deprivation have been identified in the wards of Thamesmead, Erith, North End, South Hornchurch and Rainham and Wennington.

6.9 Baseline Evolution

6.9.1 Whilst it is not possible to accurately characterise the health of the receptor groups at a defined point in time in the future, the following considerations are relevant when assessing the evolution of the baseline:

- Projected trends in health outcomes;
- Success of the strategic programmes for health improvement; and
- Projected changes in demographics including new communities being built.

6.9.2 The Bexley JSNA, notes the current trends with regard to health outcomes. It is concluded that there were no major changes to the leading causes of morbidity and mortality in Bexley since the previous assessment (2014). However, the following trends in **Table 6.1** were noted.

Table 6.1: Key disease priorities for Bexley in 2016 JSNA and trends

Disease	Trend
Cardiovascular Disease (CVD)	Prevalence appears to be going down
Cancer	Appears to be increasing
Diabetes	There appears to be a levelling off of Type 2 Diabetes
Obesity	Adult rates remain similar to the nation average and higher than the London average
	Childhood rates (4-5 year olds) has increased which is in contrast to England and London averages which have seen a slight decrease Prevalence rates in 10-11 year olds in Bexley appear to be levelling off whilst there has been slight increase across London and England

6.9.3 Additionally, the resident population of Bexley is projected to increase to 246,600 by 2021 and increase further to 252,500 by 2026. The projected increase in population is not distributed evenly across the borough, with some wards expecting to increase more than others. Christchurch and Erith wards are expected to see the largest increases in population and Colyers is projected to see a population decrease.

6.9.4 Although overall there is expected to be a decrease in the population aged 0-4 years old in Bexley, there are two wards which are projected to see an increase (Christchurch and Erith). The over 75 year old population in Bexley has increased since 2001 and is predicted to reach 25,100 by 2031.

6.9.5 The health needs and recommendations for Dartford are considered within the JSNA for Kent (2016). This document outlines the emerging priorities for Kent based on current and predicted future health trends, these are presented in **Table 6.2**.

Table 6.2: Health Priorities for Kent

Priority	Rationale
Cancer	The prevalence of cancer has increased.
Demographics	Projected growth in population for Kent to 2020 highlights the growth particularly in the two age bands of 65–84 (9.6%) and over 85 (13%).
Diabetes	Recorded diabetes prevalence has risen from 4.5% in 2006/07 to 6.2% in 2014/15.
Growth	Infrastructure needed to support economic and housing growth.
Health Inequalities	Lack of capacity of primary healthcare required to support population growth to 2031.
Healthy Weight	The percentage of adults classified as overweight or obese has risen. Dartford was found to have once of the highest prevalence's of adult obesity.
Mental Health	Estimated that approximately 85,000 people in Kent have a common mental illness.

Priority	Rationale
Stroke	The recorded prevalence of stroke in Kent and Medway has increased from 1.56% in 2006/07 to 1.71% in 2013/14.

6.9.6 The Growth and Infrastructure Framework[14] for Kent predicts an increase in the population from 1,524,719[4] in 2015 to 2,127,000 by 2031. This document also noted that the majority (72%) of population increase between 2007 and 2016 was due to net inward migration.

6.9.7 Within the 60 minute drive time area **(Appendix Cii),** the population projection figures indicate that the population is expected to increase by 10% between 2017 and 2027 which is higher than the national average (7%).

[14] Kent County Council (2018) Growth and Infrastructure Framework: [Online] Available at: http://www.kent.gov.uk/

7 Assessment Framework

7.1 The Health and Wellbeing Issues

7.1.1 The determinants of health, of relevance to REP, that have been considered in this HIA (based on the HUDU Checklist) as presented in **Table 2.1** are reproduced in the first columns of **Table 7.1**. This table also identifies where each of the issues are assessed in this report and provides the links with the polices and strategies related to health noted in Section 5 of this HIA. It is not intended that this is a full policy review in relation to each of the issues but an indication of where the issues are highlighted in polices and strategies.

7.1.2 Sections 8 to 20 set out the assessment of the development against each of these themes.

Table 7.1: Structure of Assessment

Theme from HUDU Checklist	Scoping Issue (Refer to Table 2.1)	HIA Assessment Heading	Links to policy etc. (Refer to Section 5)	Links to ES / other assessments
Healthy Housing	Healthy Living	Section 8 Energy Supply	National Policy Statement for Energy 2011	Project and its Benefits Report (**Document Reference 7.2**)
Active travel	Promoting Walking and Cycling	Section 9 Active and Sustainable Travel, Connectivity and Safety	NPPF (2018) London Plan (2016 and 2018 emerging) GLA Green Infrastructure and Open Environments (2012) Bexley Core Strategy (2012) Dartford Core Strategy 2011 and Development Plan Polices 2012	Chapter 6 Transport
	Safety			
	Connectivity			
	Minimising Car Use			
Healthy environment	Air Quality	Section 10 Air Quality and odour	National Policy Statement for Energy (2011) National Policy Statement for Renewable Energy Infrastructure (2011) NPPF (2018) London Plan (2016 and 2018 emerging) Control of Dust and Emissions SPG (2014) London's Wasted Resource (2011) London Environment Strategy (2018)	Chapter 7 Air Quality
	Odour			

Theme from HUDU Checklist	Scoping Issue (Refer to Table 2.1)	HIA Assessment Heading	Links to policy etc. (Refer to Section 5)	Links to ES / other assessments
			Bexley Core Strategy (2012) Dartford Development Plan Polices (2012) Kent Minerals and Waste Local Plan (2016)	
	Noise	Section 11 Noise and Vibration	National Policy Statement for Energy 2011 NPPF (2018) London Plan (2016 and 2018 emerging) London Environment Strategy (2018) Bexley Core Strategy (2012) Dartford Development Plan Polices (2012) Kent Minerals and Waste Local Plan (2016)	Chapter 8 Noise and Vibration
	Contaminated Land and Water	Section 12 Water and Ground Contamination	National Policy Statement for Energy (2011) NPPF (2018) London Plan (2016 and 2018 emerging) Bexley Core Strategy (2012) Dartford Development Plan Polices (2012)	Chapter 13 Ground Conditions
	Biodiversity / Open Space	Section 14 Townscape and Visual amenity	NPPF (2018) GLA Green Infrastructure and Open Environments (2012) London Environment Strategy (2018) Bexley Core Strategy (2012)	Chapter 9 Townscape and Visual

Theme from HUDU Checklist	Scoping Issue (Refer to Table 2.1)	HIA Assessment Heading	Links to policy etc. (Refer to Section 5)	Links to ES / other assessments
			Dartford Development Plan Polices (2012)	
	Flood Risk	Section 13 Climate Change and Flood Risk	National Policy Statement for Renewable Energy Infrastructure (2011) NPPF (2018) Managing Risk and Increasing Resilience (2011) London Environment Strategy (2018)	Chapter 12 Hydrology, Flood Risk Assessment (**Document Reference 5.2**)
	Visual Amenity	Section 14 Townscape and Visual amenity	NPPF (2018) Bexley Core Strategy (2012) Dartford Development Plan Polices (2012) Kent Minerals and Waste Local Plan (2016)	Chapter 9 Townscape and Visual
	N/A	Section 15 Electro Magnetic Fields	National Policy Statement for Electricity Networks Infrastructure (NPS EN-5)(2011)	N/A
Vibrant neighbourhoods	Education	Section 16 Social Infrastructure	Bexley Growth Strategy (December 2017)	Chapter 14 Socio-economics
	Access to Social Infrastructure			
	Social cohesion	Section 17 Community	National Policy for Waste (2014)	Consultation Report

Theme from HUDU Checklist	Scoping Issue (Refer to Table 2.1)	HIA Assessment Heading	Links to policy etc. (Refer to Section 5)	Links to ES / other assessments
		Engagement	London Plan (2016 and 2018 emerging)	(**Document Reference 5.1**)
	Crime Reduction and Community Safety	Section 18 Crime	Bexley UDP Saved Polices (amended 2012) Dartford Development Plan Polices (2012)	N/A
	Local Employment and Healthy Workplaces	Section 19 Training and Employment	Planning for Equality and Diversity in London SPD (2007)	Chapter 14 Socio-economics

8 Energy Supply

8.1 Introduction

8.1.1 Excess deaths are recorded in winter due to cold housing conditions associated with fuel poverty, which particularly affects the elderly and those on low incomes. REP has the potential to have a beneficial effect on energy supply, fuel poverty and security in the long term.

8.1.2 With reference to the receptor groups considered in this HIA, this health issue is relevant to residential receptors and community service users in the area surrounding REP and the wider area and is applicable to the operation of the Proposed Development (REP as a whole, rather than either REP or the Electrical Connection specifically).

8.2 REP

Operational Effects

8.2.1 'The Project and its Benefits Report' (**Document Reference 7.2**) has been developed for the Proposed Development drawing out the potential societal benefits, concluding that REP will make a significant contribution to delivering the UK's urgent and substantial need for new energy infrastructure. Even with the substantial changes seen in the power sector over the past 10 years, and consequent dramatic decrease in greenhouse gas emissions associated with our former reliance on coal, there remains an urgent and significant demand for renewable/low carbon electricity supply. This is driven both by the forecast increase in use of electricity and the risk of being able to provide for that demand.

8.2.2 London is part of a national energy system and currently sources approximately 95 per cent of its energy from outside Greater London (paragraph 9.3.2 of Draft London Plan). REP would be largely self-sufficient in its own power demands and also contribute to London's energy needs.

8.2.3 REP is CHP Enabled, and is proactively seeking to connect to a district heating network, serving, for example, social housing within the Peabody Estate in Thamesmead. Thamesmead is identified as an area of high income deprivation and residential receptors are therefore considered to be a vulnerable group.

8.2.4 Alongside the drive for new energy generation, is the desire for it to be renewable or low carbon, in order to meet climate change targets. Taking waste out of landfill (the greatest source of carbon emissions for the waste sector) REP will efficiently recover renewable/low carbon energy. Through these actions, REP makes two important contributions to meeting climate change targets, and delivering the Mayor's aspiration for London to be a zero carbon city.

8.2.5 With reference to the questions in Section 4.5 of this HIA, given that that vulnerable groups could be affected, on a long term, permanent basis and the effect is at a population level, there is potential for beneficial effect on health associated with the security of energy supply. However, this will be dependent upon the pricing structure of this energy and affordability to those on low incomes. As information is not yet known about how accessible this energy supply would be to nearby vulnerable groups, it is considered that there is potential for beneficial effects. However, no likely significant effects are identified at this stage.

Further Mitigation and Enhancement

8.2.6 Opportunities for connecting to the district heating network, in particularly to supply community facilities and social housing to benefit those on low incomes should continue to be explored.

Residual Effects and Monitoring

8.2.7 It is anticipated that there is the potential for long term beneficial effects on health outcomes associated with security of energy supply, however this is not considered to be significant.

9 Active and Sustainable Travel, Connectivity and Safety

9.1 Introduction

9.1.1 Levels of walking and cycling can affect physical activity, which in turn can affect mental and physical health outcomes including prevalence of cardiovascular disease and obesity. The Proposed Development has the potential to promote walking and cycling for new employees and the potential to disrupt existing walking and cycling routes during construction.

9.1.2 Connectivity can affect the ability of people to access services and social networks and can encourage walking and cycling – with associated mental health and physical health outcomes. The Proposed Development has potential effects on the connectivity of existing transport routes during construction and also the connectivity of workers to their place of employment and surrounding facilities.

9.1.3 Transport accidents and safety have direct links to health and injury. REP has the potential to affect the volume of traffic on the wider network, along with the proportion of Heavy Goods Vehicles (HGVs), and therefore transport accidents have been considered.

9.1.4 With reference to the receptor groups considered in this HIA, this health issue is relevant to workers and visitors both during construction and operation of the REP site and construction of the Electrical Connection. It is also relevant to residential and community service users (specifically users of PRoWs) in the areas surrounding REP and wider area during construction and operation of REP.

9.1.5 Transport Sensitive Receptors are identified in **Table 6.29** of the ES and include the relevant links (footpaths) and junctions. All of these are within Bexley and Dartford.

9.1.6 Related to the health issues noted above, the Transport chapter of the ES has considered the assessment on the following elements:

- Severance;
- Pedestrian delay and amenity;
- Pedestrian fear and intimidation;
- Accidents and road safety; and
- Driver delay.

9.2 REP

Construction/Decommissioning Effects

9.2.1 Based on construction traffic associated with the REP site, the findings of the assessment presented in **Chapter 6** of the ES identify that effects on fear and intimidation, accidents and road safety, severance and pedestrian delay and amenity are considered to be 'negligible' or 'minor' and not significant.

9.2.2 Increases in driver delay at the majority of the junctions studied are considered to have a 'negligible' effect which are not significant. The exceptions to this are the A206/A2016/Bexley Road roundabout where effects are identified as being 'Moderate' adverse due to predicted delays of between 1 and 3 minutes.

9.2.3 Effects on driver delay during decommissioning are likely to be less due to having a shorter duration and therefore effects during this phase are likely to be 'minor' adverse and not significant. All other effects are likely to be similar, if not less, during the decommissioning phase.

9.2.4 Based on the result of this assessment, there is potential for there to be negative health effects associated with stress due to increased delays at these junctions. As these delays are minor, restricted to one junction and temporary, effects on health are not considered to be significant.

9.2.5 As noted in the 'further mitigation' section below, a Construction Traffic Management Plan will be implemented which will include travel information for workers. This will help encourage the use of non-car modes of travel which are more sustainable and can be more active. However, based upon the findings of the assessment no significant effects are anticipated on health.

Operation

9.2.6 Based on operational traffic associated with the REP site, the findings of the assessment identify that effects on severance, pedestrian delay and amenity, driver delay and accidents and road safety are considered to 'negligible' and not significant.

9.2.7 The impact of additional vessel movements associated with the operation of REP was also considered within the Transport Assessment presented in Chapter 6 of the ES. This assessment identified that there would be a 'negligible' impact upon navigational safety on the River Thames.

9.2.8 Effects on fear and intimidation were identified as being 'negligible' at the majority of links apart from Norman Road (south) where it is anticipated that the fear and intimidation level would increase from a 'negligible' effect to a 'minor' and adverse (not significant) effect due to increases in vehicle movements along this link.

9.2.9 As noted in the further mitigation section below, whilst no significant effects have been anticipated, an operational Travel Plan will be implemented which will be beneficial in terms of encouraging sustainable and active travel choices. However, based upon the findings of this assessment, no significant effects on health are anticipated.

Further Mitigation and Enhancement

9.2.10 Whilst no significant effects have been anticipated, a draft Construction Traffic Management Plan (CTMP) has been appended to the Transport Assessment to be submitted with the DCO application. A final CTMP would be produced to manage and control the delivery of materials and the routeing of these vehicles to the Application Site. This would include movements by both road and river, with a focus on maximising the use of the river without causing adverse effects to the existing RRRF operation.

9.2.11 Workforce travel planning has also been included with the CTMP. The Travel Plan will help encourage the use of non-car modes of travel including public transport, walking and cycling. It would also encourage car/van share for those requiring to travel by private vehicle. This, coupled with minimal parking provided for construction staff, would help to reduce any impacts of construction workers travelling to the site.

9.2.12 A draft operational Worker Travel Plan has been produced for workers at REP which would be finalised prior to the commencement of the operation of REP. This would encourage more sustainable travel by operational REP site staff. Within the Travel Plan there would be measures to encourage the use of sustainable travel, while car and cycle parking provision to London Plan standards would help to discourage the use of private cars and encourage cycling.

Residual Effects and Monitoring

9.2.13 Based on the findings of the assessment no significant residual effects on health are anticipated and therefore no monitoring is required.

9.3 Electrical Connection

Construction/Decommissioning Effects

9.3.1 The Electrical Connection would be constructed by way of sections of temporary works. The impact of those works would be transient and depend on many variables, such as: the method of construction; the programme and sequence of works; the length of time within a location; and the location of the active works. Final details of the above are not known, however, the contractor will employ appropriate worksite controls and agree the programme of works with the Local Authorities through the CTMP, to be secured through the DCO, to limit the impact of the works.

9.3.2 Some Public Rights of Way may be temporarily affected during construction of the electrical connection. However, any temporary closures would be supported by diversions to be agreed with the local authority. If the route crosses the Crossness Nature Reserve, it is expected that a footpath (FP2) could be closed for a number of weeks (subject to detailed programme). However, a diversion route could be promoted using Norman Road and another existing footpath (FP4).

9.3.3 The assessment presented in the Transport chapter of the ES has identified that effects on pedestrian delay and amenity, fear and intimidation and accidents and road safety are 'negligible' and not significant.

9.3.4 Severance effects are generally considered to be 'negligible' however there is potential for disruption to a number of bus services such as the 229, 469 and school services 602 and 669 due to temporary works on these routes. The details of these impacts are not known currently and would be detailed and mitigated as part of the CTMP, secured through the DCO.

9.3.5 It is anticipated that there may be a 'minor' and adverse (not significant) effect on driver delay due to the temporary traffic management put in place where works are being undertaken on the Electrical Connection. The programme of works would be managed as part of the CTMP in coordination with the Local Highways Authority.

9.3.6 It is anticipated that the ducting for the Electrical Connection would be left in situ at the end of its operational life and therefore effects associated with decommissioning are considered to be 'negligible' and not significant.

9.3.7 Based upon the findings of this assessment, no significant effects on health are anticipated.

Further Mitigation and Enhancement

9.3.8 Construction Phase mitigation for REP site is anticipated to also be applicable to the Electrical Connection. As noted above, details of any road closures and alternative routes for vehicles and bus services would be provided as part of the final CTMP.

Residual Effects and Monitoring

9.3.9 Based on the findings of the assessment no significant residual effects on health are anticipated and therefore no monitoring is required.

10 Air Quality and Odour

10.1 Introduction

10.1.1 Poor air quality has the potential to contribute to a range of health conditions including incidence of chronic lung disease (chronic bronchitis or emphysema), heart conditions and asthma levels among children, as well as implications for mental health, primarily dementia. There is also a human health risk from potential inhalation or ingestion of persistent pollutants that may occur in flue stack emissions from the Proposed Development. Odours can cause stress and anxiety and can prevent people using outdoor spaces for physical activity and relaxation.

10.1.2 For the REP site, the receptor groups considered are residents and community service users (as identified in the air quality assessment) in the areas surrounding the site both at construction and operational stages. There may also be the potential for impacts on the residents in the wider local authority areas due to the dispersal of flue emissions.

10.1.3 Detail of how the likely effects on air quality have been assessed is presented in the Air Quality assessment in **Chapter 7** of the ES. In particular, ES Section 7.5 gives details of:

- the parameters used for assessment;
- inclusion of emissions from other main point sources in the area, including the RRRF, Belvedere and Crossness Sewage Sludge Incinerator;
- the selection of receptors in a wide study area, with human health receptor locations chosen where the impacts of emissions were likely to be greatest; and
- the methodology for assessment.

10.1.4 This section also considers the potential impact of the Electrical Connection during the construction stages on residential and community service user receptors surrounding the route. No operational effects are considered for the Electrical Connection as it is unlikely to lead to significant air quality or odour effects.

10.2 REP

Construction/Decommissioning Effects

10.2.1 There is the potential for significant adverse air quality effects during construction and decommissioning of the Proposed Development arising from dust deposition and associated elevation of PM_{10} concentrations. Dust effects have the potential to have direct adverse effects from inhalation of fine particulate matter on physical health as well as wellbeing impacts related to dust annoyance. These effects would be experienced by residential receptors

and community service users (as identified in the air quality assessment) in the area surrounding the REP site for the duration of construction, although may be elevated during bare earth stages.

10.2.2 The main cause of unmitigated dust would be from vehicles using unpaved haul roads and off-site from the suspension of dust from the mud deposited on local roads by traffic. The unmitigated dust impacts would be affected by weather and distance to nearest receptor. PM_{10} emissions and emissions of NO_x can occur from road traffic, plant and equipment use on the REP site and construction compound. However, for dust impacts the REP site is identified as a low sensitivity area due to distance to residential receptors (see Section 7.9 of **Chapter 7**), and the site is low risk.

10.2.3 The outline CoCP which is submitted as part of the REP DCO application is anticipated to employ the dust mitigation measures that are outlined in the dust risk assessment.

10.2.4 With implementation of a CoCP, effects are not anticipated to be significant with respect to criteria in the air quality assessment and no significant effects on health are anticipated based upon the findings of this assessment.

10.2.5 Section 7.8 of **Chapter 7** notes that the magnitude of impact of additional traffic movements is considered to be negligible. There are therefore no predicted significant effects related to the additional traffic at the construction/decommissioning stage.

10.2.6 No vulnerable group is likely to be inequitably affected (affected to a greater or lesser degree that another) by air quality impacts at construction/decommissioning stages.

Operational Effects

10.2.7 During the operational stages, the most likely source of impact relates to air quality of emissions from the ERF and the Anaerobic Digestion combustion engine. There is the potential for effects on residential and community service user receptors (as identified in the air quality assessment) in the area surrounding the REP site and the residential and community service user receptors in the wider area. Emissions from the flare from anaerobic digestion combustion are identified as being not likely to be significant, (ES Section 7.9).

10.2.8 The Air Quality modelling assessment identifies that there are no significant impacts related to NO_2, PM_{10} and $PM_{2.5}$, identified from stack emissions.

10.2.9 Many potential effects are mitigated through embedded mitigation which is inherent as part of the operational effects of the Proposed Development. The mitigation is:

- the chosen site location, where the closest sensitive human receptors is over 750 m to the south of the site;

- flue stack heights to achieve better dispersion of air emissions (stack heights have been optimised following completion of a stack sensitivity analysis); and

- emission limit values for the Design and Operation of equipment in the operational site, controlled through relevant legislative requirements (see Section 7.8 of **Chapter 7**).

10.2.10 There is the potential for stack emissions to have effects on human health from long-term exposure to certain pollutants. Exposure pathways can be direct (e.g. inhalation) or indirect (e.g. through the food chain). However, no significant adverse effects have been identified in the air quality assessment for the modelled human health pollutants including Arsenic, Benzene, Benzo(a)pyrene, Cadmium, Chromium VI, Lead, Manganese and Nickel.

10.2.11 A draft Waste Incineration Directive Best Available Techniques (BAT) Reference document (BREF) has been published (European Parliament, 2017). This document sets out current BAT for reducing pollution from waste incineration plants and includes a number of Best Available Techniques - Air Emission Limits (BAT – AELs). Once finalised, the BAT-AELs would need to be incorporated into the Environmental Permit for the Proposed Development to be issued by the Environment Agency (EA).

10.2.12 No significant odour effects are identified due to the embedded mitigation that is part of the design of the facilities. Both the ERF and the Anaerobic Digestion buildings will operate under negative pressure, therefore limiting any potential egress of odours into the wider environment. Waste will be delivered in closed ISO standard containers, in bulk container vehicles or enclosed refuse collections vehicles which will help prevent the spread of odour during waste transportation. Anaerobic Digestion will occur in sealed vessels and any excess biogas flared off or converted to Compressed Natural Gas in a closed process, so avoiding the escape of gases.

10.2.13 The potential impact of emissions from additional road and river traffic associated with REP has been assessed as not significant in air quality terms. No significant effects on health are anticipated based on the findings of this assessment.

Further Mitigation and Enhancement

10.2.14 Based upon the findings of the assessment, no significant effects have been identified and therefore no further mitigation is required.

Residual Effects and Monitoring

10.2.15 Following implementation of the dust mitigation measures and the CoCP no significant residual effects relating to dust and on-site construction activities are anticipated. No significant effects on health are anticipated based on the findings of this assessment.

10.2.16 The Proposed Development would give rise to a negligible effect to most human receptors. A minor impact may occur to two receptors which is related to arsenic emission. The two receptors are both located within a business park where the long term objective is not relevant and short term objectives are met. There may also be a minor effect on seven receptors which is related to nickel. These effects are not considered to be at a level that would have a significant effect on human health.

10.3 Electrical Connection

Construction/Decommissioning Effects

10.3.1 Residential areas, through which the Electrical Connection is routed, are identified as 'high sensitivity' to dust effects. As identified dust effects can have direct physical impacts, particularly related to respiratory disease and also wellbeing effects from annoyance. However, effects will only be short-term on any specific receptor as construction of the Electrical Connection progresses along the entire route in stages, ceasing entirely when construction is completed.

10.3.2 There are no predicted significant effects related to the additional traffic at the construction/decommissioning of the Electrical Connection. Section 7.9 identifies that impacts due to construction traffic will be negligible.

10.3.3 The outline CoCP which is submitted as part of the REP DCO application is anticipated to employ the dust mitigation measures that are outlined in the dust risk assessment. A detailed CoCP would also be used to mitigate potential air quality impact at the construction site and compounds.

10.3.4 With implementation of the CoCP, air quality effects are not anticipated to be significant and therefore no significant effects on health are anticipated based upon the findings of this assessment.

Further Mitigation and Enhancement

10.3.5 Based upon the findings of the air quality assessment, no significant effects have been identified and therefore no further mitigation is required.

Residual Effects and Monitoring

10.3.6 Based upon the findings of the assessment, following implementation of the dust mitigation measures and an outline CoCP, no significant residual effects are likely from dust and on-site construction activities.

10.3.7 Based upon the findings of the air quality assessment, no significant adverse effects on health are anticipated.

11 Noise

11.1 Introduction

11.1.1 Excessive noise is linked to a number of physical health conditions including high blood pressure, heart attacks and strokes. It can also interfere with an individual's day to day life through disturbance to work, school or sleep and result in irritation and annoyance which can impact social behaviour and mental wellbeing.

11.1.2 This has been identified as a health issue of relevance to REP as activities associated with the construction, operation and decommissioning of REP have the potential to introduce new noise sources which may affect:

- Existing residents and community service users (as identified in **Chapter 8** of the ES) within the area surrounding the REP site and Main Temporary Construction Compounds during construction and operation;
- Existing residents and community service users (as identified in **Chapter 8** of the ES) within the area surrounding the Electrical Connection route and associated Cable Route Temporary Construction Compounds during construction; and
- As noted in **Chapter 8** of the ES, noise effects associated with the operation of the Electrical Connection have been scoped out of the assessment as agreed with the Secretary of State during the scoping process as there is limited potential for significant effects to occur. Therefore, it is unlikely that there will be any health implications associated with the operational phase and this has not been considered further within this assessment.

11.2 REP

Construction/Decommissioning Effects

11.2.1 At present, details of the construction methods and plant to be used during construction are not known but is anticipated to include the use of loud equipment such as piling, dump trucks and tracked excavators. Decommissioning effects are likely to be of a similar nature to those which occur during construction.

11.2.2 An outline CoCP (**Document Reference 7.5**) has been submitted as part of the REP DCO which will include measure to reduce noise and vibration associated with construction. This will include operational hours of 7am to 7pm Mondays to Fridays, 7am to 1pm on Saturdays and no works on Sundays/Public Holidays. During these hours, potentially high noise generating activities will be undertaken. However, in addition to these activities, there are also more fundamental activities (including slip forming) which would be undertaken outside of core construction hours.

11.2.3 Screening of plant will also be undertaken to reduce noise and plant will be directed away from sensitive receptors where possible.

11.2.4 The nearest residential receptor is located over 500 m from the REP site, at which it was identified that noise levels associated with the construction would be below the Lowest Observed Adverse Effect Level (LOAEL) which is considered to be *"the level above which adverse effects on health and quality of life can be detected"*[15].

11.2.5 The Main Temporary Construction Compounds is approximately 150 m away from the nearest sensitive receptor. This area is likely to be used as a laydown and car parking area and as such will not require noisy equipment.

11.2.6 Construction traffic flows were reviewed as part of the assessment presented in ES **Chapter 8.** The assessment identified that increases in road traffic associated with construction were unlikely to result in a noise increase of more than 1 decibel (dB) and therefore effects are considered to be negligible and not significant.

11.2.7 Therefore, whilst construction may result in some short term increase in noise levels, effects are not considered to be significant at noise sensitive receptors and therefore no significant effects on health are anticipated based upon the findings of the assessment.

Operational Effects

11.2.8 It is anticipated that REP will be operational 24 hours a day and therefore has the potential to affect the sleep of nearby residential receptors, as well as cause disturbance to individuals who undertake activities in close proximity to REP.

11.2.9 The findings of the noise and vibration assessment (see **ES Chapter 8**) identified that noise emission levels from REP operations are below the background noise levels during the daytime and night-time and equate to a No Observed Effect Level (NOEL) which is considered to be *"the level below which no effect can be detected"*[14] and the effects are considered to be negligible and not significant.

11.2.10 The assessment has also considered the impacts of vehicle and vessel movements during the operation of REP. The assessment has identified that there is unlikely to be increases in noise levels of more than 3db. Vessel movements were also noted as unlikely to increase by more than 27% at the points considered within the assessment. It is therefore considered that changes in noise levels associated with increases in vehicle and vessel movements are negligible and not likely to be significant.

[15] Department for Environment Food & Rural Affairs (2010) The Noise Policy Statement for England.

11.2.11 Whilst there may be small increases in noise levels associated with the operation of REP and related vehicle and vessel movements, it is not considered that these effects will be significant from a noise perspective. Therefore, based upon the findings of the assessment, these effects are not considered to have a significant effect on health.

Further Mitigation and Enhancement

11.2.12 Based upon the findings of the assessment, no significant effects have been identified and therefore no further mitigation is required.

Residual Effects and Monitoring

11.2.13 Based upon the findings of the assessment, residual effects are not likely to be significant and therefore no monitoring is required.

11.3 Electrical Connection

Construction/Decommissioning Effects

11.3.1 At present, details on the exact construction methods and plant to be used during construction are not known. At the end of its operational life, it is currently anticipated that the Electrical Connection cables would be left in situ, such that there would be limited decommissioning works and therefore no effects on nearby noise sensitive receptors.

11.3.2 The findings of the noise and vibration assessment (**ES Chapter 8**) has identified that where receptors are located over 20 m of construction activities they are likely to be below the Significant Observable Adverse Effect Levels (SOAEL) which is "*the level above which significant adverse effects on health and quality of life occur*"[15]

11.3.3 It also identified that where sensitive receptors are located over 30 m construction activities that are likely to experience noise levels below the Lowest Observable Effect Level (LOEL). Therefore, receptors located at these distances from construction activities are unlikely to experience significant adverse health effects associated with noise although there may be some negative impacts due to disturbance.

11.3.4 Receptors located within 20 m of construction activities may be adversely impacted by noise although this will be short term in nature as the construction of the Electrical Connection will be phased and carried out in sections. It is anticipated that excavation for each 200 m section of cable route is likely to take approximately 5-7 working days.

11.3.5 As noted in Section 11.2, a number of measures are included in the outline CoCP to reduce the potential impact of noise to surrounding receptors which will include limiting working hours and the use of temporary sound reducing screens/enclosures around plant and activities (where possible). With these mitigation measures in place it is anticipated that effects will be negligible it is

not anticipated that there will be any significant adverse effects as a result of noise and vibration as outlined in **Chapter 8**.

11.3.6 Whilst there will be an increase to noise levels, during construction of the electrical connection particularly for receptors within 20 m. The effects will be temporary, phased and largely mitigated through the CoCP. The CoCP includes measures to make the public aware of construction activities that are taking place. This will help enable residents to make alternative arrangements (where possible) to reduce potential effects associated with disruption from construction noise. Therefore, based upon the findings of the assessment, these effects are not considered to have a significant effect on health, however there may be some disruption and temporary stress to nearby residents where they are less able to adapt their daily schedules (e.g. the elderly or parents with young children).

Further Mitigation and Enhancement

11.3.7 No significant effects have been identified and therefore no further mitigation is required.

Residual Effects and Monitoring

11.3.8 Residual effects are not likely to be significant and therefore no monitoring is required.

12 Water and Ground Contamination

12.1 Introduction

12.1.1 Serious health implications can occur where people are exposed to contaminated land and water. A development may give rise to the exposure of humans to contamination in various ways such as through ground disturbance, particularly where brownfield land is being developed and there may be historical contamination, and the introduction of new potential sources (e.g. leaks and spills from plant) which may result in the activation and spread of contamination. Risks to health may occur where there is pathway between sources of contamination and human receptors.

12.1.2 As REP will require construction activities which will include excavation and disturbance to ground and will introduce potential new source of contamination, there is potential for the health of receptors that access REP (during construction and operation), Electrical Connection or Temporary Construction Compounds (during construction), and existing residents and community service users within the areas surrounding the REP site (during construction and operation) to be adversely impacted by contamination.

12.1.3 Health related effects are largely related to the construction and decommissioning phases where activities are being undertaken which have the potential to disturb ground and expose human receptors to potentially harmful substance where they are present.

12.2 REP

Construction/Decommissioning Effects

12.2.1 The health of the workers undertaking construction and decommissioning has the potential to be adversely affected by known and potential unknown sources of contamination present in made ground on site (e.g. asbestos is found at the REP site as well as the Main Temporary Construction Compound) and by introduced potential sources of contamination (e.g. petroleum from machinery). Workers health may be impacted either through direct or indirect contact with these contamination sources. Pathways may also be created to nearby residential receptors.

12.2.2 The assessment presented in **Chapter 13** of the ES reports the Phase 1 and Phase 2 ground conditions assessment undertaken, including ground investigations. Embedded mitigation measures relevant to water and ground contamination include:

- Measures within the outline CoCP with regard to control of dust and dust and vapour;

- Construction of REP and its foundations may result in the removal of ground that may be contaminated, hence resulting in removal of the contamination source;

- The outline CoCP includes protocols for working in confined spaces, in accordance with Health and Safety Executive Approved Code of Practice 'Safe work in confined spaces';

- Off-site disposal of ground would be undertaken in accordance with the Waste Duty of Care Code of Practice (March 2016), and the excavation and re-use of materials would be undertaken in accordance with a Materials Management Plan (MMP); and

- The method of construction may include embedded mitigation such as appropriate piling techniques to minimise the risk of mixing of aquifer bodies through the creation of new pathways. This may include the provision of a Foundation Works Risk Assessment (FWRA).

12.2.3 With implementation of these measures, no significant effects are reported in the ground conditions assessment on offsite human health receptors. However, due to the presence of asbestos in Made Ground on site and for potential hazardous ground gases in any buildings or confined spaces, there is potential, prior to mitigation (which would be secured through a DCO Requirement), for effects on construction workers and future site users to be major to substantial. This is considered to be a significant effect.

12.2.4 Based upon the findings of this assessment, in the absence of additional mitigation measures to protect the health of construction workers and future site users, there may be potential for significant effects on health to occur[16]. No significant health effects to off-site receptors are anticipated.

Operational Effects

12.2.5 As noted in **Chapter 13** of the ES, the operation of REP itself is not anticipated to give rise to significant effects to the human health on the basis that it operates in accordance with the Applicant's existing and new Environmental Management Systems (EMS). Measures within the EMS include spill response procedures and requirements for the correct handling of any hazardous substances. Therefore, it is not anticipated that there will be significant adverse effects to the environment.

12.2.6 The assessment undertaken in **Chapter 13** identifies that there may be potential risk to future site users/ maintenance workers as a result of exposure to asbestos within any Made Ground that remains in place in any soft landscaped areas in the completed development. This may result in a major effect for future users and a moderate effect for maintained workers. Future

[16] This assessment related to the construction period of the Proposed Development only and is not an assessment of the risks to current RRRF staff prior to construction commencing.

site users may also be exposed to potential hazardous ground gas concentrations in any buildings or confined spaces which may result in a moderate effect. These effects are considered to be significant without the implementation of mitigation.

12.2.7 It is therefore considered that significant effects on health may occur to human health receptors present on the REP site as a result of the operation of REP in the absence of further mitigation. All other health effects related to water and ground contamination are considered to be not significant based on the findings of this assessment.

Further Mitigation and Enhancement

12.2.8 The Outline Remediation Strategy presented in **Appendix I.2** provides preliminary recommendations for specific personal protection measures for construction workers and for the protection of human health (end users) in relation to asbestos in the Made Ground. Once additional investigation, sampling and assessment has been undertaken, the final specific personal protection measures required will be included in the Remediation Strategy that forms part of the final CoCP. Any structures or confined spaces proposed will incorporate appropriate ground gas protection measures in accordance with appropriate investigation, monitoring and assessment (if required).

Residual Effects and Monitoring

12.2.9 With the proposed embedded and further mitigation in place, **Chapter 13** notes that a Negligible/No effect is anticipated to human health receptors. With the implementation of the proposed embedded mitigation and further mitigation, there are therefore no residual effects on health anticipated.

12.3 Electrical Connection

12.3.1 With implementation of mitigation measures, no significant effects are reported in the ground conditions assessment on human health receptors and no significant effects on health are anticipated based upon the findings of this assessment.

13 Climate Change and Flood Risk

13.1 Introduction

13.1.1 A changing climate poses risks to health including heat related illnesses and respiratory infections. Flood risk may be exacerbated by climate change, which at its extreme poses direct risks to health through drowning and spread of waterborne diseases. There are also links to effects on mental health through damage or loss of property and utilities and transport infrastructure.

13.1.2 This health issue is relevant to workers and site visitors, surrounding area and wider area residential receptors during the construction and operation of the REP site.

13.1.3 A Flood Risk Assessment (FRA) (**Document Reference 5.2**) and ES Chapter 12 - Hydrology, Flood Risk and Water Resources assess the potential impacts that the construction and operation of the Proposed Development may have on flooding. These assessments have included allowances for the predicted impacts of climate change.

13.2 REP

Construction/ Decommissioning

13.2.1 A Qualitative Greenhouse Gas (GHG) Emissions Assessment was undertaken and is provided in **Chapter 15**. This assessment noted that sources of GHGs during the construction/decommissioning of REP would largely relate to transportation of building materials, use of construction equipment, commissioning activities and the use of temporary construction welfare and office facilities. This assessment requires the outline CoCP to include measures such as responsibly sourcing local material, limiting vegetation clearance and replacing lost vegetation to reduce GHG emissions. It is anticipated that emissions from energy demand during this phase will be minor in comparison to national, local and sector emissions.

13.2.2 The assessment presented in **Chapter 12** of the ES has identified that there is likely to be ‘no significant’ effects to the flood risk of existing development, infrastructure, third party assets or land in the vicinity and downstream of REP with the provision of the identified embedded mitigation measures (such as those outlined in the CoCP). The outline CoCP includes implementing management systems to adequately manage works within the floodplain.

13.2.3 It is therefore considered that there is unlikely to be any significant effect on health due to climate change and flood risk as a result of construction/ decommissioning of the REP.

Operational Effects

13.2.4 A carbon emission assessment has been completed for the existing RRRF, which was reviewed and ratified by the Carbon Trust on 1st March 2017. The study showed that the energy from waste plant provides a carbon saving of 212 kg CO_2 per tonne of waste when compared to disposal to landfill.

13.2.5 From a national, sector and local GHG emissions perspective the study shows a positive impact in reducing GHG emissions, when compared to a landfill alternative. Guidance from the Institute of Environmental Management and Assessment (IEMA) has been followed and it has been concluded that the Proposed Development is not likely to have a significant effect on climate change. A qualitative assessment of GHG emissions has been undertaken.

13.2.6 During operation, REP is expected to contribute positively to the direct national, local and energy sector emissions inventory through the use of recovered energy from waste.

13.2.7 The FRA identifies that finished floor levels of the infrastructure within the REP site will be set above the appropriate flood level (including allowances for climate change and breach of flood defences) and that flood sensitive equipment further raised compared to floor levels. A surface water management strategy has been prepared that will limit surface water outflows from the REP site to the greenfield rate to negate potential for increased flood risk to areas further downstream.

13.2.8 In the event that the area in the vicinity of the REP site is inundated following a breach of the tidal flood defences, such that safe exit is not possible, safe refuge may be provided for operational staff/visitors within the administration block and other areas of the building which are above the appropriate breach level (see **Document Reference 5.2** for further details).

13.2.9 The assessment presented in **Chapter 12** identifies that there is likely to be 'no significant' effects to the flood risk of existing development, infrastructure, third party assets or land in the vicinity and downstream of REP should embedded mitigation measures (such proposed finished floor levels and the surface water management strategy) be implemented.

13.2.10 With implementation of these measures, no significant effects are reported in relation to flood risk that may impact human health receptors and based upon the findings of this assessment no significant effects on health are anticipated.

Further Mitigation and Enhancement

13.2.11 Based upon the findings of the assessment, no significant effects have been identified and therefore no further mitigation is required. However, as identified in the FRA, a flood incident management plan should be prepared prior to the facility becoming operational to identify operational 'trigger' levels and the roles and responsibilities of REP operational staff/managers in the event of a flood.

Residual Effects and Monitoring

13.2.12 Based upon the findings of the assessment, residual effects are not likely to be significant and therefore no monitoring is required.

14 Townscape and Visual Amenity

14.1 Introduction

14.1.1 Changes to townscape and visual amenity have the potential to affect health through reduction in the amenity of views from outdoor recreational areas such as public open spaces, foot and cycle paths. Impacts on views and the feel of accessible open outdoor spaces can make people less likely to utilise these outdoor resources which provide an opportunity for exercise and access to nature, both of which are important in supporting physical and mental health and wellbeing.

14.1.2 REP has the potential to create a temporary change to views during construction and permanent changes to views during operation which could affect views and the use of outdoor recreational areas of public open realm, Public Rights of Way and cycle paths.

14.1.3 There is therefore the potential for residents and community service users (as identified in the Townscape and Visual Assessment within the ES) within the areas surrounding the REP site and Main Temporary Construction Compounds to be affected during construction and operation. Existing residents and community service users within the areas surrounding the Electrical Connection route and associated Cable Route Temporary Construction Compounds may also be affected during the construction phase, although it is not anticipated that there will be significant effects on the amenity of the surrounding townscape during the operation phase as the Electrical Connection comprises a underground trefoil of cables such that it will only be visible at the Electrical Connection point (see ES **Chapter 9** Townscape and Visual Impact Assessment for further details).

14.2 REP

Construction/Decommissioning Effects

14.2.1 Construction and decommissioning activities are likely to include site clearance, earthworks, traffic movement, the movement of large scale construction equipment (such as cranes) and will include the construction of the structures such as buildings, storage facilities, carparks, fencing, and hardstanding. However, as construction will take place over a c. 43-month period, different equipment will be required at during different phases such that, for example large cranes would not be required for the full construction period and therefore impacts on visual amenity may vary.

14.2.2 During construction, it is likely that hoardings would be erected around the area of construction works, to provide a visual barrier to the ground level construction activities and also as a safety measure, to prevent access to the general public.

14.2.3 The Townscape and Visual Assessment (TVIA) (**Chapter 9**) has identified the potential for significant effects to the townscape character and a number of visual receptors at various viewpoints within the surrounding area. These effects are largely associated with presence of large scale cranes.

14.2.4 It is anticipated that views from outdoor recreational areas such as the Crossness Nature Reserve, Thames Path, National Cycle Route 1 as well as other Public Rights of Way and accessible open spaces immediately surrounding REP may change during the construction period, such that it may reduce the visual amenity and recreational quality of these areas. Due to REP being located in a built up industrial area, construction activities are not unusual for the location and therefore users are less likely to be deterred from using these recreational spaces.

14.2.5 It is therefore anticipated that there may be short term adverse effects on visual amenity however given the character of the surrounding area and short term nature of construction, these impacts are unlikely to result in any significant effects to health based upon the findings of this assessment.

Operational Effects

14.2.6 The tallest elements of REP are the Main REP Building, maximum height 65 m Above Ordnance Datum (AOD), and the stack (maximum height 113 m AOD) which will be visible from both nearby and distant views (see **ES Chapter 9** for the assessment of views).

14.2.7 The TVIA has identified the potential for significant impacts to the townscape character due to large scale industrial development on what is currently open land and a change in the character of views in the area. It was identified that there may be a significant effect on visual receptors at various viewpoints where the Proposed Development is visible, these effects are beneficial from some views (PRoW at South Mere, west of Erith Marshes) and adverse from others (e.g. PRoW in Crossness Nature Reserve).

14.2.8 As noted above, REP will be located in an industrial area within the context of other large industrial buildings. It is likely that the upper sections of the stack and Main REP Building will be visible in the sky line however the lower sections will be mostly screened by existing build development in the area. Although there may be a noticeable visual change to receptors it is unlikely that this will be such that it will deter people from using nearby outdoor recreational spaces and they would experience similar views on large industrial buildings in the direction of the REP development site.

14.2.9 It is therefore anticipated that although REP may have a significant effect on visual amenity, it is unlikely that this will be such that it will result in a significant effect on health.

Further Mitigation and Enhancement

14.2.10 No significant effects to health have been identified and therefore no further mitigation is required.

Residual Effects and Monitoring

14.2.11 Residual effects are not likely to be significant and therefore no monitoring is required.

14.3 Electrical Connection

Construction/Decommissioning Effects

14.3.1 Temporary construction works may involve features such as construction plant, construction vehicles, traffic management infrastructure and temporary site compounds. It is anticipated that this will result in temporary changes to views where construction activities are being undertaken.

14.3.2 Embedded mitigation included in the outline CoCP sets out measures to reduce visual impacts including general good housekeeping and best practice measure to keep construction areas tidy and screening works where appropriate. The findings of the townscape and visual impact assessment (**Chapter 9**) have not identified any significant effects in relation to the construction and decommissioning of the Electrical Connection.

14.3.3 It is not anticipated that this will lead to significant effects on health.

Further Mitigation and Enhancement

14.3.4 Based upon the findings of this assessment no significant effects have been identified and therefore no further mitigation is required.

Residual Effects and Monitoring

14.3.5 Based upon the findings of this assessment residual effects are not likely to be significant and therefore no monitoring is required.

15 Electromagnetic Fields

15.1 Introduction

15.1.1 An electromagnetic field (EMF) can arise from the generation, transmission, distribution and use of electricity and occur near electric cables. It has the potential to interfere with day to day bodily functions and has been linked to incidence of leukaemia in children, although evidence for this is debated and it is considered that if there is a risk, this is very small[17]. Where cables are routed underground there will be no effects from electric fields as they are surrounded by a metal sheath which screens the electric field, but a magnetic field will still be produced.

15.1.2 EMFs are therefore only relevant to the operation of the Electrical Connection as electricity will be transmitted through this element only during the operation of REP. The REP site and construction of the Electrical Connection have therefore not been considered within this assessment. Existing residents within the area surrounding the Electrical Connection route are those most likely to be impacted by exposure to potentially harmful EMFs as electric and magnetic fields decrease rapidly with distance from the source.

15.2 Electrical Connection

Operational Effects

15.2.1 The National Policy Statement for Electricity Networks Infrastructure (NPS EN-5) outlines that exposure of the public to EMFs should comply with the International Commission on Non-Ionizing Radiation Protection (ICNIRP) 1998 guidelines. The guidelines are conservative guidelines based on scientific evidence which set acceptable exposure levels for the general public to electric and magnetic fields. The basic restriction at 50 Hz (as per EU recommendation[18]) for public exposure to magnetic fields is 360 microtesla (μT).

15.2.2 The 132 kV Electrical Connection cable will be buried approximately 1.1 m underground which will reduce the strength of the magnetic field which receptors are exposed to. Full details of the design of the Electrical Connection are not currently available, however it will be designed in such a way that it does not create EMFs that are above the acceptable public exposure levels as noted in ICNIRP 1998 guidance and 1999 EU Recommendation. It is therefore considered that there are unlikely to be significant health effects as a result of exposure to EMFs during the operation of the Electrical Connection.

[17] World Health Organisation; Electromagnetic fields (EMF) [accessed 1st October 2018] available at: http://www.who.int/peh-emf/en/

[18] European Union (1999) Council recommendation on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz).

Further Mitigation and Enhancement

15.2.3 Based upon the findings of this assessment it is not anticipated that there will be significant effects to health as the Electrical Connection will be designed to enable EMFs to be within public exposure guideline levels and therefore no further mitigation is required.

Residual Effects and Monitoring

15.2.4 Based upon the findings of this assessment, it is not anticipated that there will be significant effects to health as the Electrical Connection will be designed to enable EMFs to be within public exposure guideline levels and therefore no further monitoring is required.

16 Social Infrastructure

16.1 Introduction

16.1.1 Social infrastructure, including schools, healthcare facilities, community centres and footpaths, contributes to social capital and cohesion. In turn, strong social capital is associated with better levels of health, better educational attainment, better chances of employment and lower crime rates. Elderly people are particularly vulnerable to issues surrounding social isolation.

16.1.2 The effects of the Proposed Development on the capacity of social infrastructure are considered. The effects of noise and air quality on sensitive receptors e.g. schools are considered in Sections 10 and 11 respectively. The effects on disruption to footpaths and highways is considered within Section 9.

16.1.3 This health issue is relevant to the community service users (as identified in the socio-economic assessment of the ES) within the areas surrounding the REP site during construction and operation and the areas surrounding the Electrical Connection during construction.

16.2 REP

Construction/Decommissioning Effects

16.2.1 The socio-economics assessment presented in the ES considers whether the capacity of social infrastructure will be affected by the Proposed Development, including schools, GP surgeries and hospitals. The assessment concludes that it is unlikely construction workers would permanently re-locate to the area as a result of the construction of the Proposed Development. It also concludes that there is capacity within existing community infrastructure in the local area to accommodate more people should it be required. The assessment identifies that there may be a 'negligible adverse' (not significant) effect as a result of increased demand for school places and increased pressure on other community infrastructure.

16.2.2 Based upon the findings of this assessment, the effect on health due to disruption to social infrastructure due to the construction of the REP site are not significant.

Operational Effects

16.2.3 The socio-economics assessment identifies that transport links in the area would allow workers to travel from within the study area to the REP site without the need to relocate. The community infrastructure baseline shows that there is availability within local facilities should workers choose to relocate as a result of their job. However, this requirement is likely to be minimal. The assessment therefore identifies that there may be a 'negligible adverse' (not significant) effect on social infrastructure.

16.2.4 Based upon the findings of this assessment, the effect on health due to disruption to social infrastructure due to the operation of the REP site are not significant.

Further Mitigation and Enhancement

16.2.5 The Applicant will explore the possibility of making a number of bookings with specific local accommodation providers who have capacity to accommodate workers.

Residual Effects and Monitoring

16.2.6 The effects on health due to the disruption to social infrastructure are not significant and therefore no monitoring is required.

16.3 Electrical Connection

Construction/Decommissioning Effects

16.3.1 The findings with regard to this health issue for the construction of the REP site are also applicable to the construction of the Electrical Connection.

17 Community Engagement

17.1 Introduction

17.1.1 Feeling excluded from decision-making can result in poor mental health including depression, anxiety and isolation.

17.1.2 This health issue is relevant to residential receptor groups in the area surrounding the REP site during construction and operation. Construction and operation have been considered together in the sections below, as community consultation relates to both the construction and operational stages. The health issue is also relevant to the construction of the Electrical Connection.

17.2 REP

Construction/Decommissioning and Operational Effects

17.2.1 Potential effects on communities during construction and operation which are addressed elsewhere in this HIA (e.g. noise and visual amenity) may give rise to significant effects on health outcomes for local communities if they are unable to voice any concerns.

17.2.2 The outline CoCP includes a requirement for engagement with local residents and stakeholders to keep them informed of the proposed working schedule.

17.2.3 A Consultation Report (**Document Reference 5.1**) has been developed which describes the statutory consultation being undertaken with communities. Seven consultation events were held in July 2018, in areas near to the Application Site including in Belvedere and Dartford (see Section 4.7 for further details).

17.2.4 In addition, non statutory consultation has been undertaken including providing information about the Proposed Development at open days for members of the public at RRRF; holding four public exhibitions at local venues in proximity to the Application Site. This has enabled the Applicant to explain the rationale and key objectives of the Proposed Development and provide consultees with the opportunity to submit feedback early in the process. Exhibition venues were selected to give local people the greatest possible opportunity to attend, and met the requirements of the Disability Discrimination Act 1995.

Further Mitigation and Enhancement

17.2.5 The outline CoCP outlines how communities will be kept informed and enabled to voice and address concerns, should they arise during the construction phase.

17.2.6 Community consultation will include reaching out to vulnerable communities and service users e.g. schools that may not otherwise be mobilised to express their opinions.

Residual Effects and Monitoring

17.2.7 Based upon the findings of this assessment the effect on health due to community engagement are not anticipated to be significant, if appropriate mitigation is implemented.

17.3 Electrical Connection

Construction/Decommissioning Effects

17.3.1 The findings with regard to this health issue for the construction of the REP site are also applicable to the construction of the Electrical Connection.

18 Crime

18.1 Introduction

18.1.1 Mental illness can be exacerbated through isolation and lack of social contact through fear of crime. The Proposed Development has the potential to affect the fear of crime, particularly through the introduction of construction workers in the area. Elderly people are particularly vulnerable to issues surrounding the fear of crime.

18.1.2 This health issue is relevant to the residential receptor groups in the area surrounding the REP site during construction and operation and the electrical connection during construction.

18.2 REP

Construction/Decommissioning Effects

18.2.1 There is a need to ensure that the construction areas are appropriately secured and workers are appropriately trained with regard to respecting neighbours when exiting and entering a construction site and accessing any community facilities. The outline CoCP requires engagement with local neighbours and residents through agreed Community Liaison channels, so that local communities can voice any concerns.

18.2.2 Construction of REP has the potential to affect crime and the fear of crime through introduction of site workers, compound and working areas, However, based upon the findings of the assessment, with the mitigation noted, the effect on health due to crime associated with the construction of the REP site are not anticipated to be significant.

Operational Effects

18.2.3 There is a need to ensure that the operational site is appropriately secured with an appropriate level of surveillance and lighting. Detailed design principles, expected to be similar to that existing at RRRF, will be considered at the post consent stage and will include security measures.

18.2.4 The presence of REP has the potential to affect crime and the fear of crime through the introduction of employees, visitors to the operation and the presence of the infrastructure itself. However, based upon the findings of this assessment with the mitigation noted, effect on health due to crime associated with the operation of the REP site are not anticipated to be significant.

Further Mitigation and Enhancement

18.2.5 This is identified in the sections above.

Residual Effects and Monitoring

18.2.6 Based upon the findings of this assessment, no residual effects on health are anticipated and therefore no monitoring is required.

18.3 Electrical Connection

Construction/Decommissioning Effects

18.3.1 The findings with regard to this health issue for the REP site are also applicable to the construction of the Electrical Connection.

19 Training and Employment

19.1 Introduction

19.1.1 Employment and education play important roles in supporting both physical and mental health and wellbeing. As noted in Section 6.4, unemployment has a strong link with mental health issues such as depression and anxiety and can lead to a reduction in life expectancy.

19.1.2 The demand for a workforce required for construction, operation and decommissioning of the Proposed Development has the potential to influence opportunities for training and employment of existing residents in the 60-minute drive time area (considered to be the outer limit that an individual would commute on a daily basis).

19.2 REP

Construction/Decommissioning Effects

19.2.1 The number of staff required and additional jobs supported during construction and decommissioning is likely to be similar. However, it should be noted that current decommissioning procedures may differ to those used in the future as technological advancements and changes are made to the decommissioning process.

19.2.2 It is anticipated that construction activities for REP and Main Temporary Construction Compounds would support approximately 837 temporary construction job years over a c. 43-month period (see **Chapter 14** of the ES, **Socio-Economics** for further details). This would result in a 'slight/moderate beneficial' short term effect on employment.

19.2.3 Due to the temporary nature of construction work and the requirement for a range of specialised skilled workers during different phases of the Proposed Development, staff are often not local and move to the area on a temporary basis. Experience of the RRRF shows that workers who are not from the local area would typically stay in local hotels/B&Bs during the working week.

19.2.4 Over the construction period of RRRF (July 2008 – October 2011), 6,000 nights of hotel bookings were made for management and engineering contractors and approximately 230,000 nights of local accommodation (hotels, B&Bs or other lodgings) were required for temporary construction workers. The socio-economics assessment indicates that REP would give rise to similar requirements, which would have an 'slight/moderate beneficial' short term effect in terms of increased bookings with accommodation providers in the local area.

19.2.5 There is therefore potential for this phase to have beneficial effects to employment rates, within the wider 60 minute drive time. However, the extent to which this affects the overall reduction in unemployment rates of residents

in areas currently experiencing higher than average levels of unemployment (including the vulnerable groups identified in Section 6.1) is likely to be limited and the effects will be short term. Therefore, there is likely to be support for opportunities for training and employment of REP in the short term but this is not likely to have a significant effect on health.

Operational Effects

19.2.6 The operational phase of REP would provide an estimated 75 full time equivalent (FTE) direct jobs. Although a number of these jobs would be filled by staff who relocate from other roles within the area and are already in employment (particularly more senior roles), it is likely the provision of permanent jobs will provide opportunities for employment that will be taken up by those who are currently out of work. It is anticipated that with these roles additional training will likely be required.

19.2.7 The net effect as calculated in **Chapter 14**, would be 88 net additional regional FTE jobs within the 60 minute drive time area. There is anticipated to be a 'slight beneficial' long term employment effect within the 30 minute drive time area and a 'slight/moderate beneficial' short term employment effect within the 60 minute drive time area.

19.2.8 Whilst there will be no significant effects in terms of labour market distortions or pressure as there is a readily available labour force in this area, the effect is considered to be beneficial in terms of the number of jobs created.

19.2.9 There is likely to be opportunities for training and employment due to REP in the long term. This will have a beneficial effect on health throughout the 60 minute drive time area, however this is not considered to be a significant effect in terms of health outcomes.

Further Mitigation and Enhancement

19.2.10 In the past, for the RRRF development, the Applicant had a strong preference to recruit in the borough and a similar approach will be followed for the Proposed Development as set out within the outline CoCP (**Document Reference 7.5**).

Residual Effects and Monitoring

19.2.11 There is likely to be a beneficial residual effect related to training and opportunities for employment within a 60 minute drive time, particularly for permanent roles during operation. This would have a beneficial effect on health, dispersed throughout the 60 minute drive time area, however this is not considered to be a significant effect in terms of health outcomes and therefore no monitoring is required.

19.3 Electrical Connection

Construction/Decommissioning Effects

19.3.1 It is anticipated that the construction of the Electrical Connection would support 13 temporary jobs. As noted in above Section 19.2, due to the nature of construction work, staff are not likely to relocate to the area on a temporary basis for employment. The construction of the Electrical Connection route is therefore likely to have similar effects as for the construction of the REP development site, although to a lesser extent. The socio-economic assessment has identified that there will be a 'slight beneficial' temporary effect on the local labour market across the 60 minute drive time area.

19.3.2 There are therefore likely to be opportunities for training and employment during the construction/ decommissioning of the Electrical Connection however these are likely to be short term and this is not likely to have a significant effect on health.

Operational Effects

19.3.3 There is likely to be limited opportunity for the operation of the Electrical Connection to affect local training and employment as opportunities associated with this will largely be related to maintenance. It is estimated that maintenance would be undertaken by existing UKPN staff and contractors as part of existing duties.

19.3.4 The effects on health are therefore not anticipated to be significant.

Further Mitigation and Enhancement

19.3.5 In the past, for the RRRF development, the Applicant had a strong preference to recruit in the borough and a similar approach will be followed for the Proposed Development.

Residual Effects and Monitoring

19.3.6 Based upon the findings of this assessment, no significant effects on health are anticipated and therefore no monitoring is required.

20 Cumulative and Interactive Effects

20.1 Cumulative and Interactive Effects from the Proposed Development

20.1.1 It is noted that noise, air quality, townscape and visual and transport assessments undertaken for the ES focus on the specific sensitive receptors as defined through those assessments.

20.1.2 Users of footpaths and public open space are not considered as sensitive receptors in noise and air quality assessments. However, the cumulative effects of noise, dust, changes to visual amenity and footpath disruption during construction may deter people from using the outdoors for physical activity.

20.1.3 Given that these effects will be temporary, phased and mitigated through measures within the final CoCP, no significant adverse effects on health are anticipated based upon the findings of this assessment.

20.1.4 No cumulative effects on health from the Proposed Development during the operation of REP have been identified.

20.2 Cumulative Effects of other development

20.2.1 As noted in Section 4.6, the ES identifies other developments within the vicinity of REP where there is potential for cumulative effects to occur during the construction, operation and decommissioning of REP.

20.2.2 The potential for cumulative effects is assessed in the ES. No cumulative effects in relation to health have been identified in the ES or HIA.

21 Conclusion

21.1.1 The HIA considers the positive and negative health and well-being impacts of the Proposed Development on receptor groups which are likely to be significantly affected by the Proposed Development. These include residential and community service user groups surrounding the REP site and also those in the wider area.

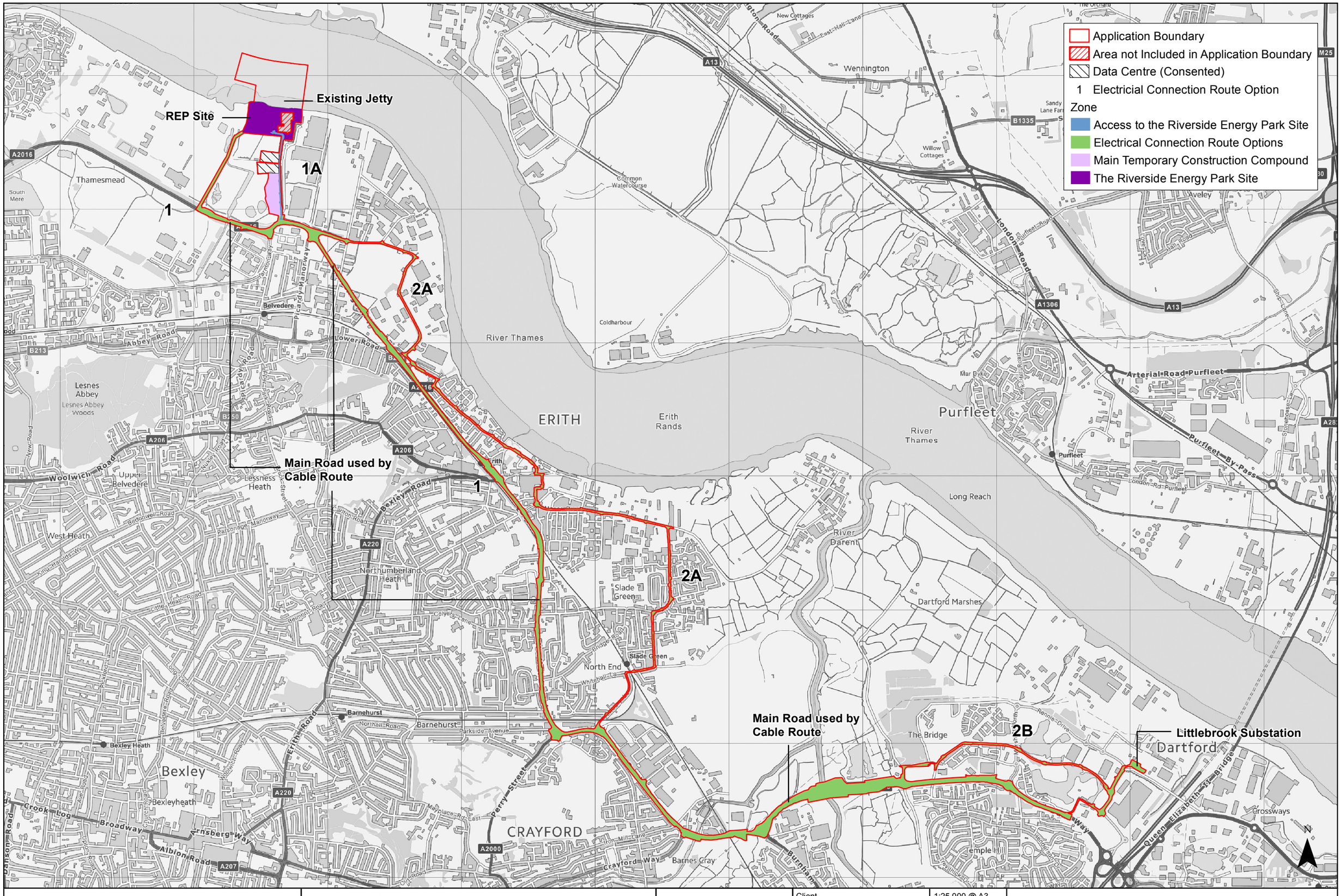
21.1.2 Effects have been assessed in relation to the following determinants of health, applicable to the Proposed Development:

- Energy Supply;
- Active and Sustainable Travel, Connectivity and Safety;
- Air Quality and Odour;
- Noise;
- Water and Ground Contamination;
- Climate change and flood risk;
- Townscape and Visual Amenity;
- Electromagnetic Fields;
- Social Infrastructure;
- Community Engagement;
- Crime; and
- Training and Employment.

21.1.3 The findings of the HIA have identified that there is unlikely to be significant residual effects on health arising as a result of the construction and operation of the Proposed Development, once mitigation is implemented.

21.1.4 There may be some long term beneficial effect on surrounding communities and vulnerable groups (such as those in social housing) associated with the provision of a secure energy supply, however this would be dependent on the pricing structure of this energy and the affordability to those on low incomes.

Appendix A Application Boundary and Assessment Areas



RIVERSIDE ENERGY PARK

Client: CORY RIVERSIDE ENERGY

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Application Boundary and Assessment Areas

Figure 1.2 | Rev 0

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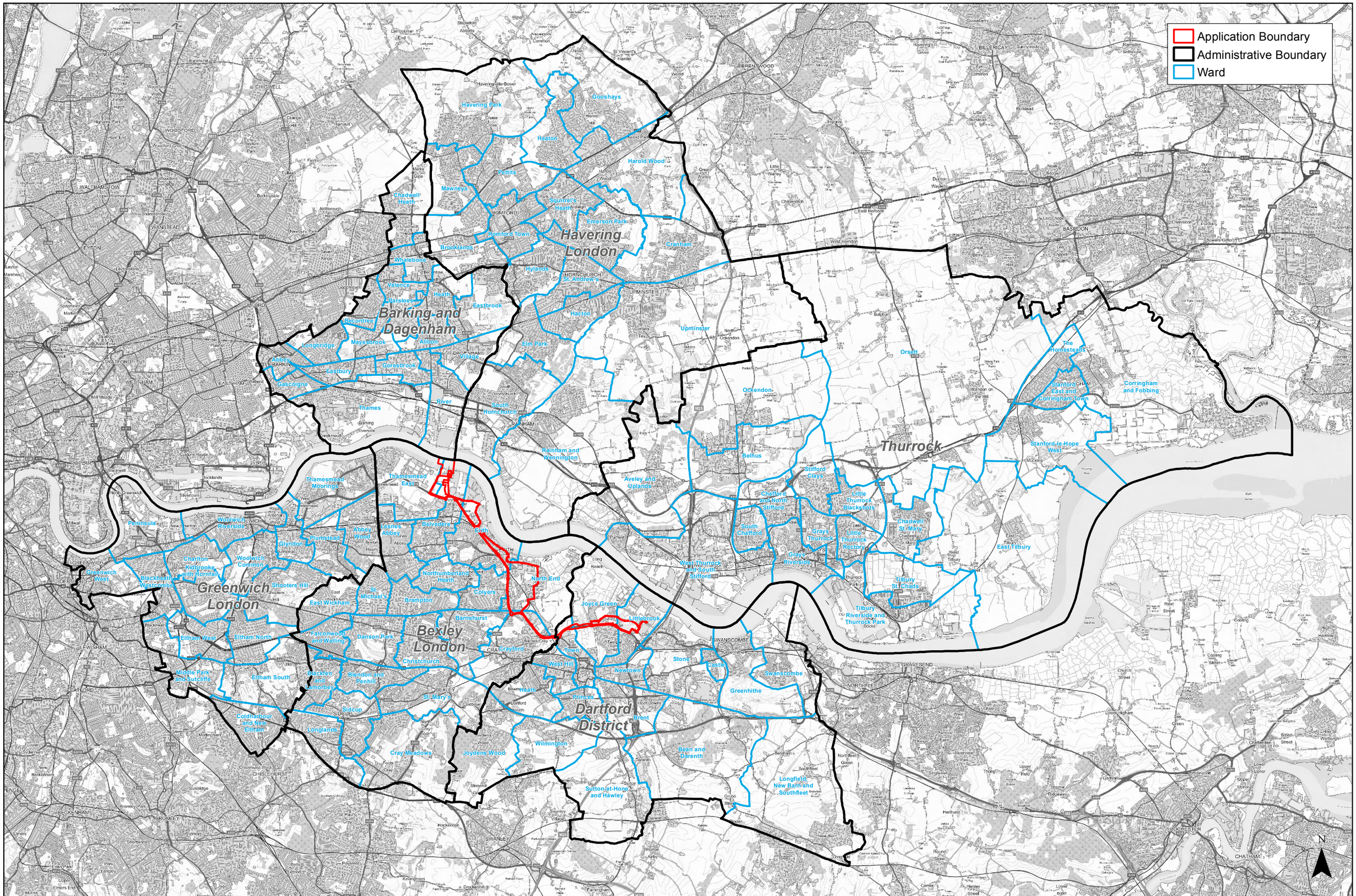
Appendix B Ward and Local Authority Boundaries



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Wards and Local Authority Boundaries

Appendix B | Rev 0

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Appendix C Baseline Employment and Economy Maps

Ci Claimant Count

Application Boundary
Borough Boundary
Ward

Jobseekers/Universal Credit Claimant Count (%)

- 0 - 0.5%
- 0.6 - 1.1%
- 1.2 - 1.7%
- 1.8 - 2.5%
- 2.6 - 5.6%

Barking & Dagenham
Havering
Thurrock
Greenwich
Bexley
Dartford

0 1 2 Kilometers

RIVERSIDE ENERGY PARK

Client: CORY RIVERSIDE ENERGY

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Employment: Claimant Count (Yearly Total 2017, % of LSOA Population)

Appendix Ci | Rev 0

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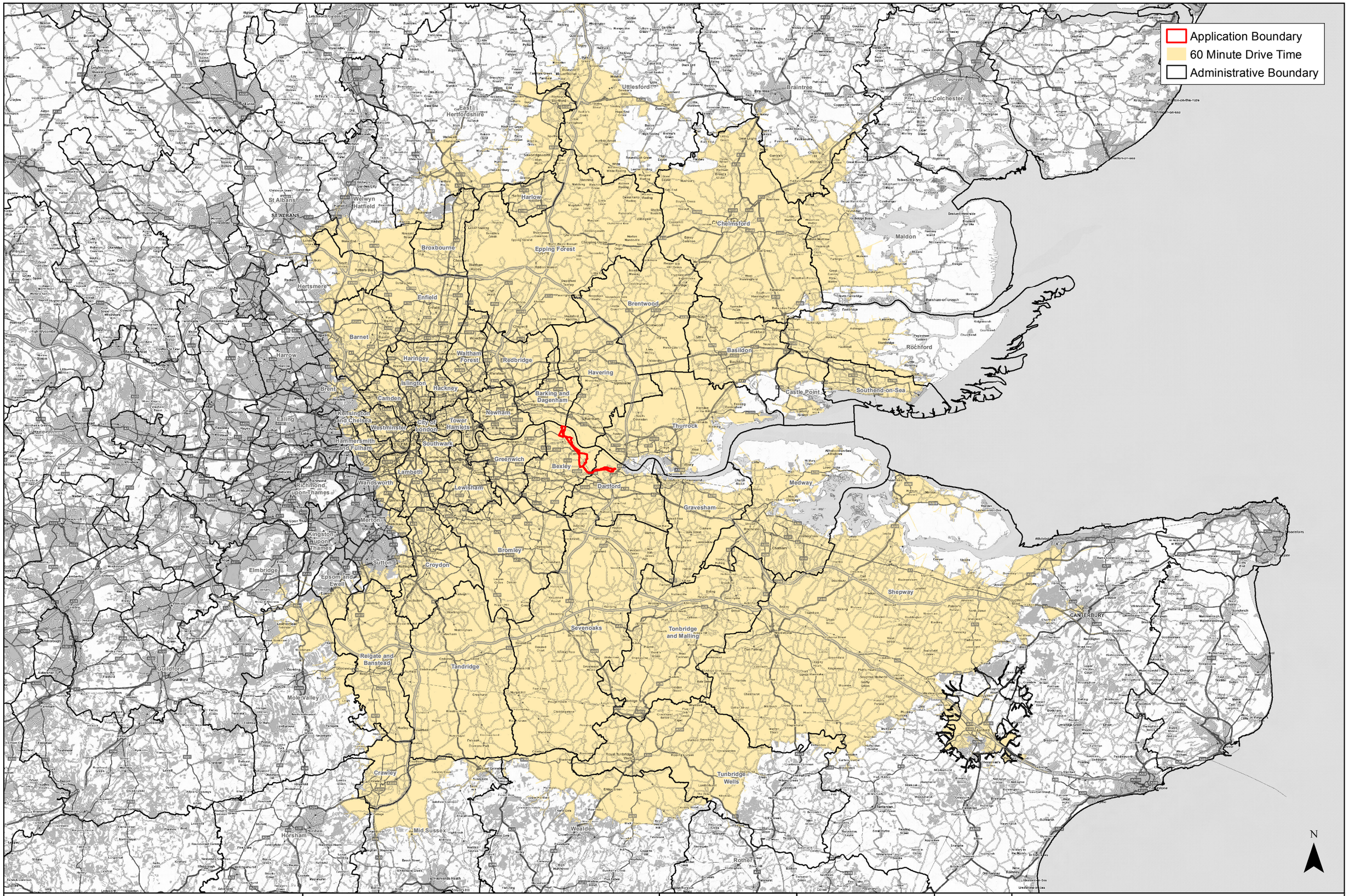
Cii 60 Minute Drive Time



RIVERSIDE ENERGY PARK

0 10 20 Kilometers

pba peterbrett

Client: CORY RIVERSIDE ENERGY

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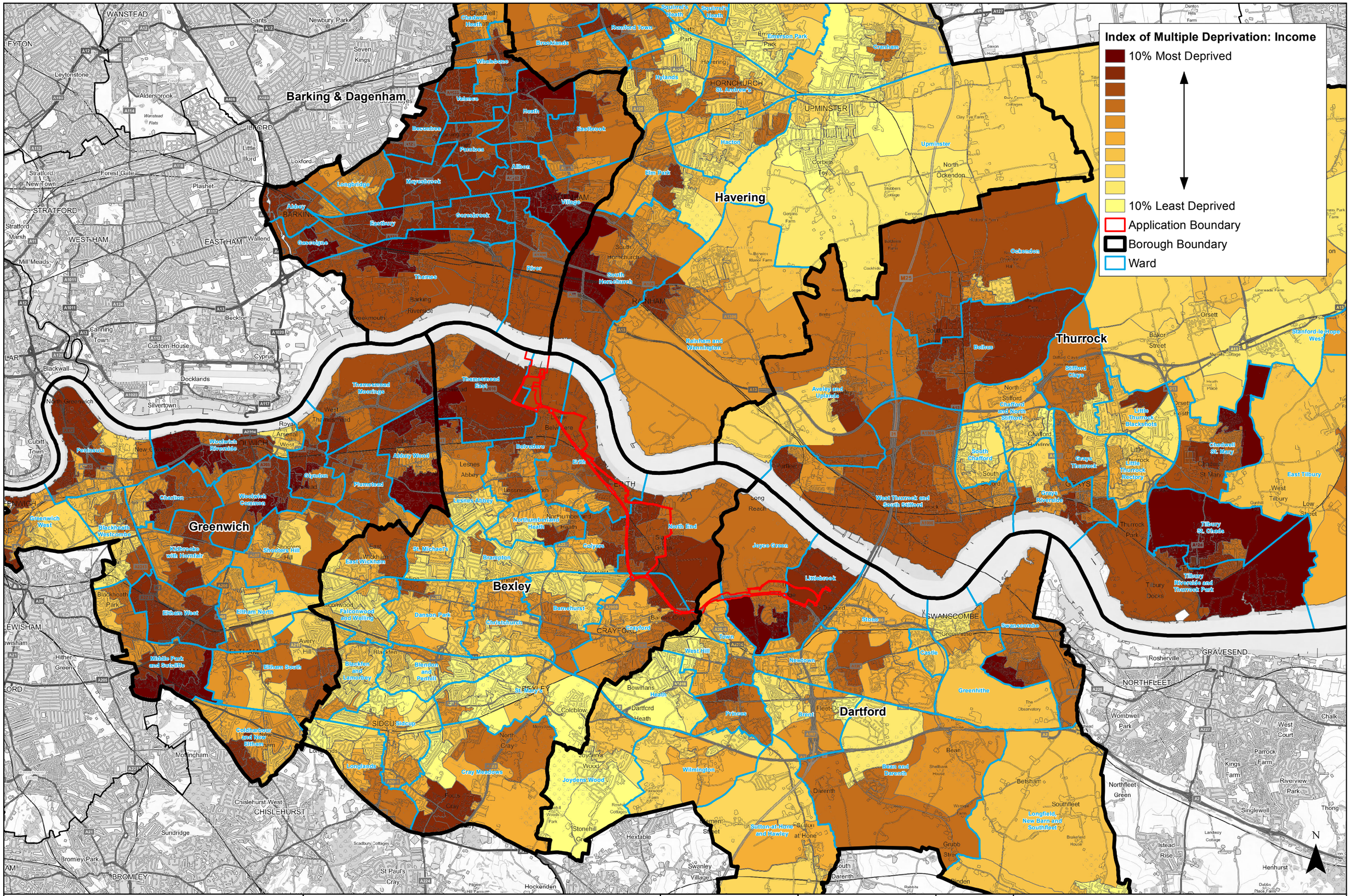
60 Minute Drive Time

Appendix Cii | Rev 0

Document Path: Z:\Projects\42166\02_mxd\HIA\42166_drivetime.mxd

Ciii Index of Multiple Deprivation - Income



RIVERSIDE ENERGY PARK

0 1 2 Kilometers

pba peterbrett

Client: CORY RIVERSIDE ENERGY

1:75,000 @ A3

02/10/18

Drawn: CM

Checked: JM

Index of Multiple Deprivation - Income Decile

Appendix Ciii | Rev 0

Document Path: Z:\Projects\42166\02_mxd\HIA\42166_imdIncome.mxd

Civ Index of Multiple Deprivation

Index of Multiple Deprivation IMD Rank (where 1 is most deprived)

- 1277
- 32568
- Application Boundary
- Borough Boundary
- Ward
- Lower Super Output Area

Barking & Dagenham

Havering

Bexley

RIVERSIDE ENERGY PARK

0 1 2 Kilometers

pba peterbrett

Client: CORY RIVERSIDE ENERGY

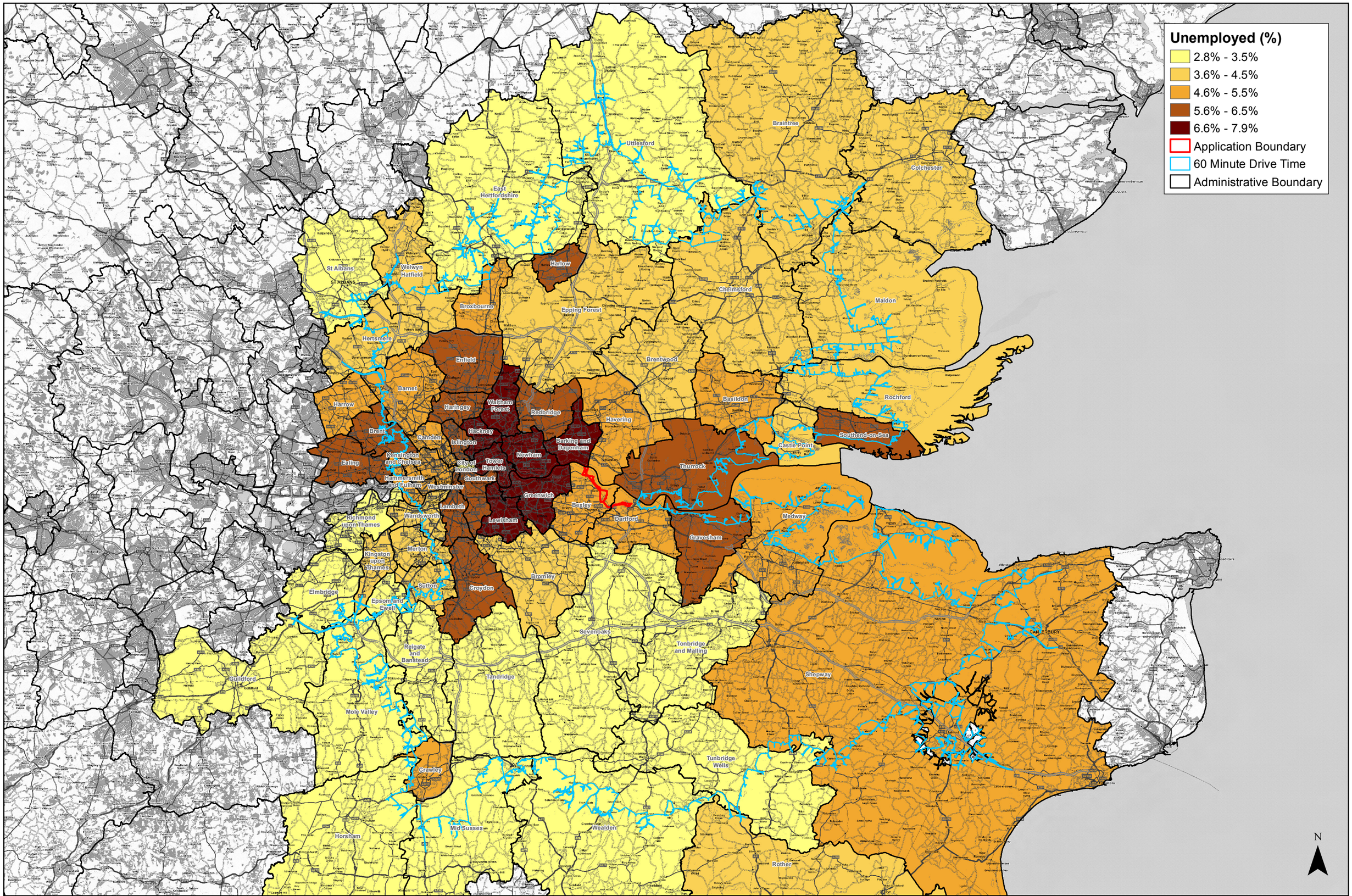
1:75,000 @ A3	
02/10/18	
Drawn: CM	
Checked: JM	

Index of Multiple Deprivation

Figure | Rev 0

Document Path: Z:\Projects\42166\02_mxd\HIA\42166_imd.mxd

Cv Unemployment (%)



RIVERSIDE ENERGY PARK

pba peterbrett

Client: CORY RIVERSIDE ENERGY

1:481,481 @ A3	
02/10/18	
Drawn: CM	
Checked: JM	

Unemployed (%)

Appendix Cv | Rev 0

Document Path: Z:\Projects\42166\02_mxd\HIA\42166_unemployed60min.mxd