Riverside Energy Park

Preliminary Environmental Information Report

APPENDIX:

F.4

PLANNING INSPECTORATE REFERENCE NUMBER:

EN010093

WRITTEN SCHEME OF INVESTIGATION

June 2018 | Revision 0

Planning Act 2008 | Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

CORY
RIVERSIDE ENERGY

QUEST
QUATERNARY SCIENTIFIC

University of Reading

RIVERSIDE ENERGY PARK, LONDON BOROUGH OF BEXLEY

Geoarchaeological & Palaeoenvironmental Written Scheme of Investigation

NGR: TQ 495, 806

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1. PLANNING CONTEXT

This document is provided as part of the Riverside Energy Park Development Consent Order (DCO) application. Cory Riverside Energy (Cory) is applying to the Secretary of State (SoS) under the Planning Act 2008 (PA 2008) for powers to construct, commission and operate an integrated Energy Park (the Proposed Development), to be known as Riverside Energy Park (REP), consisting of complementary energy generating development, with an electrical output of up to 96 megawatts (MWe) along with an associated Electrical Connection.

As REP will be in excess of 50 MWe capacity it is classified as a Nationally Significant Infrastructure Project (NSIP) under the section 14 of the Planning Act 2008 (PA 2008), and therefore requires a Development Consent Order (DCO) to authorise its construction and operation.

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. 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).

PINS will make a recommendation to the Secretary of State (SoS) as to whether or not the application should be approved. Should the SoS approve the application then the DCO will be made authorising the construction, commissioning and operation of REP.

REP would be developed on land immediately adjacent to Cory's existing Riverside Resource Recovery Facility (RRRF), within the London Borough of Bexley and would complement the operation of the existing facility. It would comprise an integrated range of technologies including; waste energy recovery, waste anaerobic digestion, solar panels and battery storage. The main elements of REP are described below:

- Energy Recovery Facility (ERF): to provide thermal treatment of Commercial and Industrial (C&I) residual waste (post-recycling) with the potential for treatment of municipal solid waste (MSW);
- Solar Photovoltaic Installation: to be integrated across a wide extent of the roof;
- Battery Storage: to supply additional power to the local distribution network at times of peak electrical demand. This facility would be integrated into the main REP building;
- Anaerobic Digestion Facility: outputs from the anaerobic digestion facility would be used as a fuel in the ERF to generate electricity or alternatively transferred off-site for use in the agricultural sector as fertilizer or as an alternative, where necessary, used as a fuel in the ERF to generate electricity;
- Solar Photovoltaic Installation: to be integrated across a wide extent of the roof;
- Battery Storage: to supply additional power to the local distribution network at times of peak electrical demand. This facility would be integrated into the main REP building;

- Combined Heat and Power Connection ('CHP'): REP would be CHP enabled with necessary infrastructure within the REP site included. The heat connection could service nearby residential developments such as the Thamesmead area;
- The Electrical Connection Route: REP would be connected to the existing National Electrical Transmission System ('NETS') via a new 132 kilovolt (kV) distribution network connection, within the London Borough of Bexley and Dartford Borough Council, and a new substation within the REP site. In consultation with UK Power Networks ('UKPN') Cory are currently considering Electrical Connection route options to connect to the existing National Grid Littlebrook substation located south east of REP. All Electrical Connection options have been included within the Indicative Application Boundary at this stage. A single Electrical Connection route will be confirmed through consultation with UKPN and included in the DCO application;
- 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 as per the existing RRRF. The remainder would be delivered by road. The proportions of the total to be delivered by road and river will be determined through further assessment work and details included in the DCO application; and
- Removal of by-products from REP: Incinerator Bottom Ash (IBA) would be transported by river to the existing IBA Facility at the Port of Tilbury for treatment/recycling, and then 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.

This document provides a Written Scheme of Investigation (WSI) for the staged geoarchaeological investigations at REP. The study site is centred on (NGR) 549542, 180662 (Figure 1). The stages of geoarchaeological investigations include:

- Stage 1: Production of a geoarchaeological deposit model using historic borehole data; monitoring of additional boreholes and production of revised deposit model
- Stage 2: Subject to the conclusions of the Stage 1 works, Stage 2 works may be recommended and may include the identification, assessment and analysis of key Holocene sequences and publication of findings.

This Written Scheme of Investigation covers the Stage 1 works. A separate Written Scheme of Investigation for Stage 2 works will be produced subject to the recommendations resulting from the deposit modelling and following discussions between Orion Heritage, the client and Historic England.

The Proposed Development includes the construction of a 0.9m deep and 0.45m wide electrical connection trench to Littlebrook substation. There are currently four electrical cable options (Figure 1). This report is concerned primarily with the REP site only; a Temporary Laydown Area on Norman

Road, the Electrical Connection route options and Electrical Connection Point at Littlebrook substation, Dartford have been scoped out due to the depth of groundworks in these areas.

The Proposed Development constitutes a project falling within the definition of a Nationally Significant Infrastructure Project (NSIP) under the Planning Act 2008 by virtue of building, commissioning and operating an onshore generating station with an energy generating capacity of greater than 50 MWe. Consent for the Proposed Development therefore requires a Development Consent Order (DCO) and the process of EIA is governed by the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the 'Infrastructure EIA Regulations').

An Environmental Impact Assessment (EIA) Scoping Report has been prepared by Peter Brett Associates LLP (PBA) on behalf of Cory in relation to the Proposed Development (PBA 2017) and a Heritage Desk Based Assessment (Orion Heritage 2018). This document has been produced following consultation with Historic England / GLAAS.

2. OVERARCHING GOAL OF RESEARCH IN THE LOWER THAMES VALLEY

The REP site (NGR: *centred on* NGR TQ 496 807) (Figures 1 & 2) provides an opportunity to test the hypotheses generated by previous studies in this part of the Lower Thames Valley, such as on the Former Borax Works site (Batchelor *et al.*, 2008a) and adjacent Alchemy Park (Batchelor & Young, 2016; Batchelor *et al.*, 2016), former NuFarm (Young *et al.*, 2012a), Imperial Gateway (Batchelor *et al.*, 2008b), Crossness Sewage Works (Green *et al.*, 2011) and Pirelli Works (Young *et al.*, 2012b) sites. Through such investigation, we can enhance the geoarchaeological model for this part of the Lower Thames Valley during the Middle to Late Holocene, permitting comparison and integration with neighbouring records. This will enable a detailed reconstruction of spatial and temporal variations in the environment, and make a significant contribution to achieving the overarching goal of the research programme.

The long-term goal of our research programme in the Lower Thames Valley is to compile a high-resolution spatial-temporal model of the changing environment of the wetland and dryland during the Middle and Late Holocene (last 7000 years). This integrated model, we propose, should be generated by the compilation of environmental archaeological records from intercalated alluvial and peat sequences (wetland), and archaeological stratigraphy (wetland and dryland). Individual recording sites should be analysed at high resolution to provide a detailed three-dimensional spatial reconstruction of changing environmental conditions, which, coupled with the archaeological records, will permit micro-scale (local) and meso-scale (regional) modelling of the interactions (e.g. economic and dietary activities) between human groups and their environment. In particular, we need to continue to source information on floodplain development, channel migration and abandonment, marine incursion, terrestrialisation (peat and soil formation), vegetation structure and composition (both wetland and dryland), animal husbandry, cultivation, and the exploitation of wild plants and animals.

The REP site offers the potential to provide detailed records of spatial and temporal changes in the environment due to the known presence of alluvial and peat sequences. The stratigraphic boundaries between alluvium and peat indicate highly significant successions from aquatic to semi aquatic, and then semi terrestrial to fully terrestrial ecosystems. These successions result in changes in the composition and diversity, and potential availability to humans, of plant and animal resources. However, our records from the Lower Thames Valley (Batchelor, 2009; Branch *et al.*, 2012; Green *et al.*, 2014) indicate significant changes in environmental conditions, in particular vegetation structure and composition, *during* the main period of Middle Holocene peat formation. These changes occurred due to: (1) natural succession and human impact, and (2) episodic fluvial inundation of the peat surface prior to the main period of marine incursion (alluviation). Recording these changes enables us to address questions relating to human adaptability and survivability against a background of changing environmental conditions, and human modification of the natural environment.

3. SITE CONTEXT

A desk-based geoarchaeological deposit modelling report has been prepared in tandem with this report (Batchelor, 2018), which provides a detailed context for the site. In summary, over 130 logs were inspected and evaluated, together with records from nearby archaeological/geoarchaeological investigations. The depth, thickness and nature of each major sedimentary unit was extracted and entered into geological modelling software, from which a series of topographic surface and thickness maps were produced. The results of the deposit modelling indicate that the sediments recorded at the REP site are similar to those recorded elsewhere in the Lower Thames Valley, with Late Devensian Shepperton Gravel overlain by a tripartite sequence of Holocene Lower Alluvium, Peat and Upper Alluvium, buried beneath modern Made Ground. However, due to an absence of borehole records, our knowledge and understanding of the sedimentary sequence is limited across the south-western part of the REP site.

It was therefore recommended that a programme of targeted geoarchaeological monitoring is carried out on forthcoming geotechnical site investigations to enable the production of a complete deposit model for the area of investigation (Figure 2).

On the basis of the likely depth of the sediments and findings from nearby sites, the archaeological potential of the REP site is considered low; although, this cannot be confirmed until a deposit model is produced. However, even in the absence of archaeological remains, the sediments have the potential to contain further information on the past landscape, through the assessment/analysis of palaeoenvironmental remains (e.g. pollen, plant macrofossils and insects) and radiocarbon dating.

4. AIMS & OBJECTIVES

Seven significant research aims relevant to the geoarchaeological investigations at the REP site are outlined here:

1. To clarify the nature of the sub-surface stratigraphy across the REP site;
2. To provide a complete deposit model for the REP site
3. To ascertain evidence for any significantly high (or low points in the Shepperton Gravel surface.
4. To clarify the nature, depth, extent and date of any alluvium and peat deposits
5. To investigate whether the sequences contain any artefact or ecofact evidence for prehistoric or historic human activity
6. To investigate whether the sequences contain any evidence for natural and/or anthropogenic changes to the landscape (wetland and dryland)
7. To integrate the new geoarchaeological record with other recent work in the local area for publication in an academic journal

In order to address the first two of these aims, the following objectives are proposed during the pre-planning stage:

1. To monitor selected geotechnical boreholes being put down across the site by Terra Consulting. The ideal boreholes for monitoring would be BH1, BH2, BH4 & BH8 as these represent a good spatial distribution across this area of the site; however, there is room for flexibility depending upon the program of works and BH3, BH5 and BH10 would be suitable alternative locations.
2. To use the stratigraphic data from the new locations, and existing records to produce a n updated deposit model of the major depositional units across the site.

5. METHODOLOGY - FIELD INVESTIGATIONS, DEPOSIT MODELLING & REPORTING

In order to address the first two aims and objectives of the project, the following methods will be employed:

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Twelve new geotechnical boreholes are due to be put down across the site by Terra Consulting. A selection of these will be monitored by a qualified geoarchaeologist. The ideal boreholes for monitoring would be BH1, BH2, BH4 & BH8 as these represent a good spatial distribution across this area of the site; however, there is room for flexibility depending upon the program of works and BH3, BH5 and BH10 would be suitable alternative locations.

Detailed laboratory-based description of the geoarchaeological or geotechnical borehole sequences using the Tröels-Smith (1955) procedure for the description of sediments, noting composition, colour boundary types (sharp or diffuse) and degree of humification. The results will be used to contribute to the existing deposit model for the site (Batchelor, 2018) and our understanding of the site formation processes and depositional environment.

Integration of the new geoarchaeological borehole records and any relevant existing geotechnical records to produce a site-wide model of the stratigraphic architecture. This deposit model will be

created using Rockworks deposit modelling software and Adobe Illustrator and will assist in the reconstruction of site formation and transformation processes, such as alluvial sedimentation and peat formation.

Following the results of the deposit modelling, a report will be produced including the following sections:

- Introduction
  (inclusive of site location and borehole location figures)
- Methods
- Results and interpretation of the geoarchaeological fieldwork and deposit modelling
  (inclusive of borehole description tables and figures, topographic surface and thickness models and cross sections)
- Discussion
  (inclusive of appropriate tables and figures)
- Conclusions and recommendations for assessment
- References

6. MITIGATION - FIELD INVESTIGATIONS, LABORATORY-BASED ASSESSMENT & REPORTING

A separate Written Scheme of Investigation for Stage 2 works will be produced subject to the recommendations of the deposit modelling and following discussions between the client, Orion Heritage and Historic England. The following provides an indication of mitigation objectives:

1. To retrieve geoarchaeological borehole sequences from select locations across the site for laboratory-based investigation (number/location to be decided on the basis of objective 2)
2. To carry out an environmental archaeological assessment of selected borehole core samples incorporating: (1) range finder radiocarbon dating to determine the approximate chronology of any periods of peat formation recorded within the borehole samples; (2) assessment of their archaeobotanical content, and (3) recommendations for further environmental archaeological investigations (if necessary).
3. To carry out environmental archaeological analysis (if necessary) incorporating the recommendations made during the assessment.
4. To publish the results of the site investigations in an academic journal, either as a standalone site, or integrating the results of other nearby investigations.

Figure 1: The Riverside Energy Park site and associated zones of construction. The geoarchaeological study focuses on the permanent works in the area adjacent / around Riverside Resource Recovery Facility (RRRF) north of Norman Road, rather than the entire application boundary.

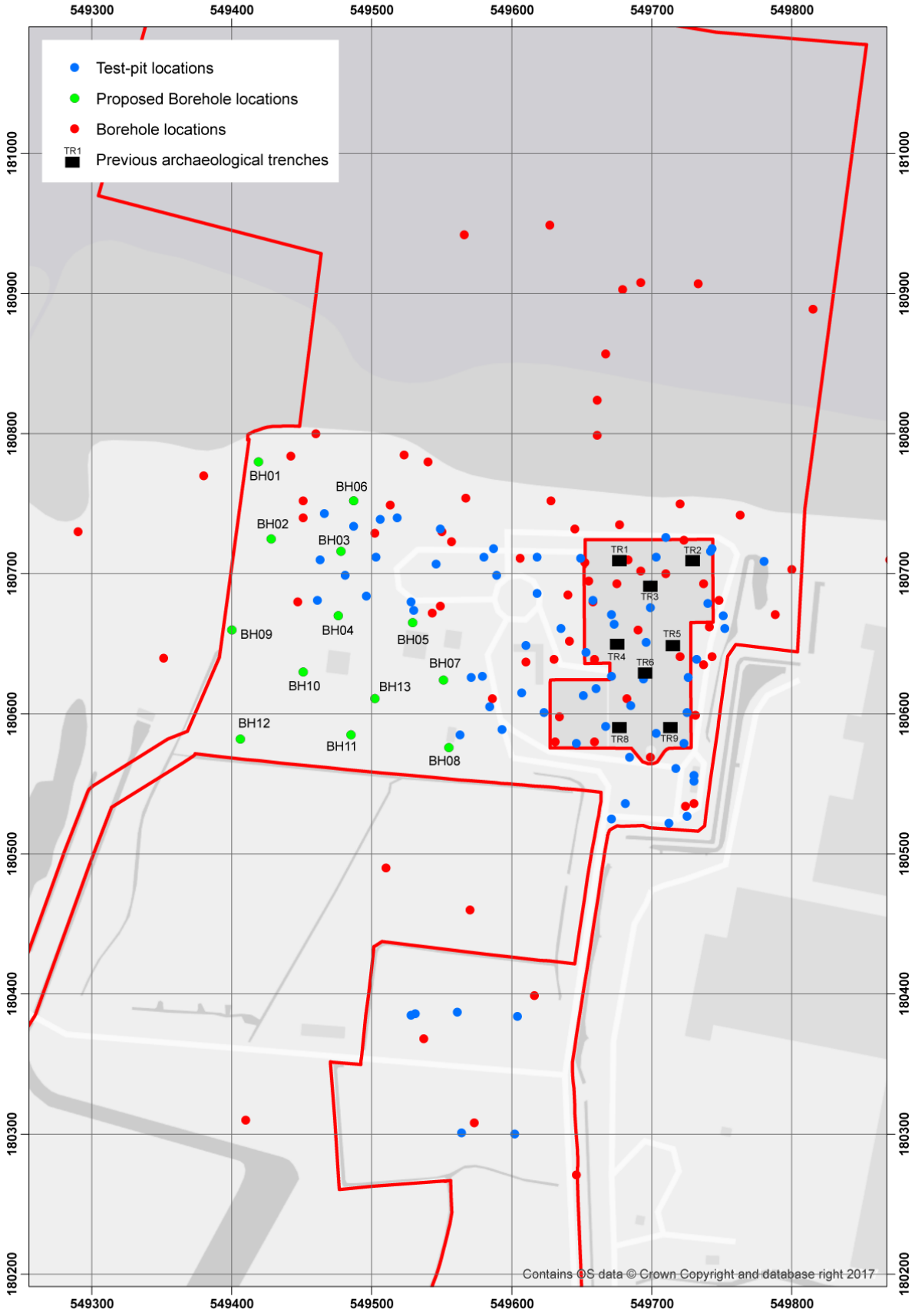

Figure 2: Proposed Geotechnical borehole locations

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