Riverside Energy Park

Electrical Connection Progress Report

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CORY
RIVERSIDE ENERGY

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Appendices

1 Executive Summary

1.1.1 This report sets out progress in relation to the Applicant's refinement of the Electrical Connection to a single overall route for Deadline 2 of the Riverside Energy Park Examination.

1.1.2 The process of identifying a single route has been conducted in line with UK Power Network's (UKPN) obligations under the Electricity Act 1989 and in accordance with the relevant National Policy Statements. Consideration of potential risks to delivery of a single route has been informed by a programme of desk study, non-intrusive investigations and subsequent intrusive investigations carried out by UKPN. These investigations have provided UKPN with a high degree of confidence that the preferred route (as set out at the point of Application) can be delivered.

1.1.3 The conclusion of investigatory trial holes in March 2019 has informed the selection of a single overall Electrical Connection route and refinement at key locations as shown in **Appendix A** to this report. These changes bring the following benefits:

- Avoidance of a route traversing Crossness LNR in its entirety;
- A shorter cable route is secured via Norman Road (Route 1A);
- Single carriageway routes are avoided through Crabtree Manorway and Erith Centre, where lane closures would require signalised control of traffic flows in each direction;
- A shorter cable route is secured via Bronze Age Way and Queens Road (Route 1);
- A route that seeks to avoid the northbound entry or exit at Erith Roundabout is preferred and secured, in line with seeking to minimise Transport for London's concerns;
- Public Open Space is removed at the River Cray crossing;
- The extent of works within the Site of Nature Conservation Importance south of Thames Road (between the River Cray and Cray Mill railway bridge) is reduced;
- Works within land to the north and south of the highway at the River Darent and the West Kent Sewer are significantly reduced;
- The works leave the A206 close to Junction 1A of the M25 at Joyce Green Lane (Route 2B) roundabout and would result in limited interaction with the Fastrack bus service; and

- Security of supply for REP and RRRF and consumers generally is achieved through electrical connections to different substations on the wider distribution network.

2 Introduction

2.1 Scope

2.1.1 This report provides an update on work that has been undertaken by UK Power Networks (UKPN) during pre-application and post-application stages in respect of proving and concluding on a single economic, efficient and coordinated route for the Electrical Connection cables from REP to Littlebrook substation.

2.2 Parties to the Electrical Connection

2.2.1 UKPN is the relevant Distribution Network Operator (DNO) for REP, the Littlebrook substation and the surrounding area. The Applicant commenced detailed discussions and investigations with UKPN in 2017, under a contractual agreement, as part of the process to reach a future formal Grid Connection Agreement (GCA). In the GCA, the proposal will be refined to a single connection route and option. As set out in **Paragraph 2.1.5** of the submitted **Electricity Grid Connection Statement (EGCS) (5.3, APP-034)**, the GCA will be signed with the corporate entity London Power Networks plc, which comprises part of UKPN.

2.2.2 The **EGCS (5.3, APP-034)** set out the position at the time of submission of the application, particularly within **Paragraph 3.2.2**, that the Applicant would enter into the GCA once intrusive investigations were complete and the Electrical Connection is refined. This process is now complete and is set out in this progress report. The Applicant is therefore able to confirm that the process of seeking and accepting a formal GCA offer is now underway.

2.2.3 **Paragraph 5.1.2** of the **EGCS (5.3, APP-034)** notes that the detailed design and delivery of the contestable elements may be undertaken by UKPN or an Independent Connection Provider. This position remains unchanged.

2.3 Proposals and Existing Connections

Riverside Energy Park

2.3.1 REP would be constructed on land immediately adjacent to Cory's existing Riverside Resource Recovery Facility (RRRF), within the London Borough of Bexley (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 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 appropriate, 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;

- **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 on site infrastructure included within the REP site.

2.3.2 From the outset the Applicant has proposed, in agreement with UKPN, that the generating station would be connected to the electricity distribution network via a new 132 kilovolt (kV) underground electricity cable connection.

Riverside Resource Recovery Facility

2.3.3 Riverside Resource Recovery Facility (RRRF) has been operating as a residual waste ERF successfully since 2011. RRRF was connected via a new 132kV underground electrical connection, owned and operated by UKPN as DNO, to Barking substation on the north side of the River Thames. This connection passes through the Crossness Local Nature Reserve (LNR) to the west (and associated designations set out in **Section 3.4** of this report), continuing further west before crossing the River Thames in a cable tunnel. It should be noted that this cable tunnel does not have capacity to accommodate any additional cable connections from REP or any other source south of the River Thames.

Electrical Connection Works

2.3.4 As set out in **Paragraph 3.3.78** of **Chapter 3 Project Description** of the **Environmental Statement (ES) (6.1, Rev 1)**, the Electrical Connection would ordinarily comprise a trefoil of 3 single-phase cables placed predominantly in an underground trench (only being above ground within the substation at each end or in a form set out in **Section 5.2** of this report). Small ducts for multi-core cables would also be installed in the same trench. The trench would typically be 450mm wide with 900m ground cover to the ducts, meaning a typical excavation depth of 1.2m for the cables. However localised obstructions may require a deeper open trench or the use of trenchless installation, such as by Horizontal Directional Drilling (HDD) or boring.

2.3.5 Through the process of route refinement and engineering studies, UKPN has identified a need to include above-ground ‘cable trough’ structures or other form of cable support. These are set out below in **Section 5** and are also

considered in the **Environmental Statement Supplementary Report (6.6)**, also submitted at Deadline 2.

2.4 Route Refinement Process

2.4.1 The Applicant and UKPN commenced detailed discussions in 2017 and UKPN proceeded to consider connection options for a range of megawatt electricity output scenarios. Initial discussions identified two potential connection points, namely at the existing Littlebrook and Barking substations. Whilst only a single Electrical Connection is required, potential connections to both substations were included when the Applicant sought an EIA Scoping Opinion from the relevant Secretary of State. Subsequent desk study and non-intrusive investigations identified that the Littlebrook connection was more suitable in respect of being an economic and efficient connection and therefore only a single Electrical Connection Point was included in the submitted application. However, the non-intrusive investigations identified a number of potential route variants to Littlebrook, which presented differing environmental effects and engineering challenges. Notwithstanding this, the Applicant stated in **Chapter 3 Project and Site Description** of the **ES (6.1, Rev 1)** at **Paragraph 3.2.10** that its preferred route was via Route 1, but with variants 1A along Norman Road and 2B through The Bridge development (the submitted routes and their identifiers can be seen in the first sheet at **Appendix A** to this report and were also identified as such in **Figure 1.2** of the **ES (6.2, APP-056)** within the submitted application. Areas subsequently removed through the selection of a final single Electrical Connection route and other minor refinements are shown in blue hatch on all plans within **Appendix A**).

2.4.2 It is this preferred route which UKPN and the Applicant progressed for further analysis and assessment of engineering difficulties, along with ongoing review of environmental effects, through further discussions with relevant stakeholders, local authorities and via a series of targeted intrusive ground investigations.

2.4.3 The intrusive investigations were undertaken during February and March 2019. UKPN confirmed in late March 2019 that the preferred route was deliverable and the Applicant has therefore selected a final route within the Application Boundary on this basis.

3 Regulatory and Policy Framework

3.1 Introduction

3.1.1 UKPN is bringing forward the design of the whole Electrical Connection for REP and have been working closely with the Applicant since 2017. Whilst the REP proposals accord with national policy in respect of Planning Act applications, UKPN is also subject to statutory obligations under the Electricity Act 1989.

3.2 Electricity Act 1989

3.2.1 Section 9 of the Electricity Act 1989 imposes specific duties on Licensees. For Distribution Licence holders such as UKPN (or the appropriate legal entity within UKPN that holds the licence). These are:

"(a) to develop and maintain an efficient, co-ordinated and economical system of electricity distribution;

(b) to facilitate competition in the supply and generation of electricity"

They must also comply with Schedule 9 of the Act which requires that licence holders:

"(a) shall have regard to the desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features of special interest and of protecting sites, buildings and objects of architectural, historic or archaeological interest; and

(b) shall do what he reasonably can to mitigate any effect which the proposals would have on the natural beauty of the countryside or on any such flora, fauna, features, sites, buildings or objects..."

3.2.2 Through their route refinement and selection process, UKPN has met with these Licence obligations, in addition to informing the Applicant's Environmental Impact Assessment (EIA), and the subsequent ES and associated documents. The ES clearly provides an appropriate means by which to consider the Schedule 9 obligations, whilst UKPN's own analysis of connection options and routing has responded to the Section 9 matters.

3.3 National Policy Statements

3.3.1 Requirements in relation to electrical connections are set out in National Policy Statements (NPS) EN-1 and EN-5.

3.3.2 EN-1 is relevant to this report in that is supports the fact that:

"The [Secretary of State] should consider that the need for any given proposed new connection or reinforcement has been demonstrated if it represents an

efficient and economical means of connecting a new generating station to the transmission or distribution network…"

3.3.3 Although its focus is above-ground electricity lines, amongst other things, EN-5 reflects UKPN's statutory obligations in paragraph 2.3.5 which states that:

"The [Secretary of State] should also take into account that…Distribution Network Operators (DNOs), are required under section 9 of the Electricity Act 1989 to bring forward efficient and economical proposals in terms of network design, taking into account current and reasonably anticipated future generation demand."

and in paragraph 2.2.2 confirms that:

"In neither the circumstance [of a locationally specific beginning and end to a line or a strategic reinforcement] is it necessarily the case that the connection between the beginning and end points should be via the most direct route (indeed this may be practically impossible), as the applicant will need to take a number of factors, including engineering and environmental aspects, into account."

3.3.4 EN-5 also sets out technology-specific considerations in respect of electrical connections. Whilst these were considered in the submitted **Planning Statement (7.1, APP-102)**, these considerations are revisited in this report in light of the final refined route proposal. The technology-specific considerations in EN-5 relate to:

- Biodiversity and Geological Conservation;
- Landscape and Visual;
- Noise and Vibration; and
- Electric and Magnetic Fields (EMF).

3.3.5 These specific considerations are in addition to, or elaborate, the considerations across all topic areas set out in EN-1.

3.4 Local Planning Policy

3.4.1 Regional and local policy in relation to the proposals was set out in **Section 4.6** of the **Planning Statement (7.1, APP-102)**. In relation to the Electrical Connection, this identifies that Crossness LNR comprises land designated as Metropolitan Open Land (MOL) (Saved UDP Policy ENV15) and an Area of Metropolitan Importance for Nature Conservation (Policies CS17 and CS18) in the Bexley UDP Saved Policies Proposal Map.

3.4.2 In Dartford Borough the Proposals Map identifies that the submitted Application was within a Biodiversity Opportunity Area (Policies CS14 and DP26) and Borough Open Space (Policies CS14 and DP24).

4 Route Refinement

4.1 Decision-making Process

4.1.1 The fundamental steps in the route refinement decision-making process, introduced in **Section 2.4** of this report, as they relate to the design, assessment and application process, comprise:

- Electrical Connection Point identification (Pre-EIA Scoping);
- Electrical Connection Routing to potential Electrical Connection Points (EIA Scoping);
- Selection of a single Electrical Connection Point (before Pre-application consultation);
- Review of risks to Electrical Connection routes and adoption of optional routes where necessary. Identification of the preferred Electrical Connection route (Pre-application consultation and Application submission); and
- Completion of intrusive survey to inform refinement of the preferred route and to prove deliverability (Post submission, at Deadline 2 of the Examination).

4.2 Pre-EIA Scoping and Scoping Stage

Options Included

4.2.1 At the time of seeking a request for an EIA Scoping Opinion, the Indicative Application Boundary included two different Electrical Connection route options to Littlebrook and Barking. The Barking connection was brought forward on the basis that the existing RRRF electrical connection utilised an existing 1.7m diameter tunnel under the River Thames and sought to consider whether this option could be pursued.

Electrical Connection Point

4.2.2 As part of subsequent investigation of the relative engineering, commercial and environmental merits of each connection point, UKPN identified that:

- In the existing Thames tunnel all existing power and telecommunication cables were confirmed as being in use and could not be removed;
- The uprating of the existing RRRF power cables, to accommodate power from REP, was found to be unfeasible due to lack of capacity and potential overheating of the cables. Use of the existing tunnel was therefore discounted;

- Construction of a new tunnel under the Thames was reported by UKPN as having significant cost, engineering/environmental and maintenance implications, given the minimum length of tunnel under the Thames (in excess of 500m) together with additional land on each bank of the river required to secure appropriate launch and reception compounds and appropriate horizontal and vertical alignments;

- The cost of the new tunnel would outweigh the cost of the longer, but relatively straightforward, alternative route to Littlebrook, the majority of which could be run in an open trench in the public or private highway;

- Furthermore, the Littlebrook route options provided alternative routing and engineering solutions that could be brought forward within a suitable timescale, in the event that the preferred engineering solution could not be delivered for engineering or other reasons;

- The Littlebrook solution provided security of supply such that RRRF and REP would not both be disconnected in the event of a failure or outage at Barking substation. Whilst the full export of power from both plants could not be achieved, interconnection between REP and RRRF would allow the full proportion of one, and a proportion of the other, to continue generating and exporting to either Barking or Littlebrook in the event of failure at one substation.

4.3 Pre-application consultation Phase

Options Presented for Non-Statutory and Statutory Consultation

4.3.1 Between EIA Scoping and pre-application consultation the connection route was refined to a Littlebrook only connection, on the basis of the matters set out above.

4.3.2 However, route options were retained through both Crossness LNR and Norman Road due to possible constraints within the highway over the watercourse near the junction with Picardy Manorway. Furthermore, to allow non-intrusive investigation to proceed throughout 2018, together with discussions with highways and streetworks representatives at the LBB and Kent County Council (KCC), secondary options were identified through Erith centre and through The Bridge development. These were included to:

- Secure alternative routes, where available, until non-intrusive and intrusive investigations were completed by UKPN such that a preferred route could be proven as deliverable; and

- Allow consultation responses to be gathered on the different route options, being the predominantly dual carriageway Route 1, compared with the predominantly single carriageway Erith centre Route 2A. These routes are referenced in the opening plan to **Appendix A** of this report. No preference for routes was stated at this stage in the Applicant's consultation and all responses were treated equally.

Other Options Considered

4.3.3 UKPN considered 3 further options prior to the progression of the Applicant's consultation process. These were considered in relation to the above options and were discounted for the following reasons:

- Routing within the River Thames. This was dismissed as being significantly less economic, efficient and coordinated than a land-based option and having the potential to give rise to significant environmental effects. Issues included interaction with marine habitats along the whole route, maintenance of a river-bed cable corridor and additional risks compared with a predominantly highway-based onshore route.

- Routing within existing railway lines. This was dismissed at an early stage due to the narrow corridor available, the potential for significant challenges in relation to installation and maintenance within the live railway network and limited potential cost savings.

- Routing within the River Thames flood defence/embankment. This was dismissed at an early stage, in part following discussion and feedback from the LBB and the Environment Agency. The towpath presented limited width, many constraints and the principle of installing and maintaining live electrical cables within a flood protection embankment were all significant factors against pursuing this option when compared to a predominantly highway-based route.

4.4 Consultation Phase

Main Statutory and Non-Statutory Consultation

4.4.1 Multiple route options for the Electrical Connection route were included in the non-statutory and statutory consultation phase. No strong preference was expressed for either route by consultees since it was perceived that traffic effects on one route might give rise to consequent effects on the other. General concerns were raised in respect of bus routes, driver delay and effects at junction 1a of the A282. However, there was an indication of greater support among the public for Route Options 1A (avoiding Crossness LNR), 2A (through Erith centre) and Route 1 (along Bob Dunn Way).

Ongoing Non-Intrusive Investigation

4.4.2 Throughout 2018, UKPN continued non-intrusive and desk-based investigation of the preferred Electrical Connection route, including discussions with the LBB and KCC highway structures and streetworks teams to identify potential risks to route delivery. The Applicant continued, in parallel, discussions with the same authorities (and Dartford Borough Council) in respect of potential environmental assessment effects and outcomes.

4.4.3 UKPN utilised the established process used for streetworks enquiries to identify potential structures and any special engineering difficulties (SED)

along the preferred route. The identification of SEDs and structures (which might present obstructions in respect of available installation depth or other engineering constraint) resulted in the inclusion of a number of additional areas within the Application Boundary. These were included on a precautionary basis to allow alternative deliverable solutions to be secured within the DCO application until the preferred solution was proved or disproved through future intrusive investigations.

Additional Statutory and Non-Statutory Consultation (Supplementary Information to the PEIR)

4.4.4 The additional areas identified by UKPN were included in the application through a further stage of statutory consultation and invitation of comments, on a document referred to as the 'SIP' (Supplementary Information to the Preliminary Environmental Information Report). This consultation took place from 31st July-7th September 2018. No significant preferences were raised in respect of the SIP consultation, except to identify potential disruption to bus routes and driver delay and potential effects on local biodiversity.

Pre-Application Consultation Outcomes

4.4.5 Whilst UKPN and the Applicant acknowledged the presence of general route preferences, the preferred route was selected as Route 1 with Route variants 1A along Norman Road and 2B through The Bridge development.

4.4.6 The preferred route was progressed on the basis that the route through Crossness LNR would be longer and would interact directly with the LNR. Interaction with the Crossness LNR could be largely avoided by a route which sought to follow the public highway on Norman Road. Route 1 along Bronze Age Way was preferred on the basis that emerging engineering risks were identified in UKPN's studies and the effects from road restrictions or closures (including on bus services) were identified as causing greater disruption on route 2A. The option through The Bridge was preferred on the basis of discussions with DBC and KCC. Whilst it was acknowledged that interaction with the Fastrack bus service was an important consideration, there was a general indication that it would be beneficial for the Electrical Connection to be routed away from the A206 as early as possible, particularly on the approach to junction 1a of the A282. The Applicant's own assessment indicated that the effect on Fastrack could be readily mitigated given the low frequency of bus services when compared to traffic movements on the A206.

4.4.7 Notwithstanding the above, the Applicant retained all existing options within the Application until non-intrusive and intrusive investigations were completed by UKPN.

4.5 Application Boundary

4.5.1 At the point of application submission, route options 1, 1A, 2A and 2B were all included, having incorporated the SIP areas. Route 1, with variants 1A and 2B was stated as the Applicant's (and UKPN's) preferred route, subject to

completion of intrusive investigations. The submitted routes and their identifiers are shown in the first sheet of **Appendix A**, including the areas hatched blue.

4.6 Post submission Intrusive Investigations

Description and Purpose

4.6.1 During February and March 2019, UKPN undertook an extensive suite of intrusive investigations by means of open trial trenches, i.e. small trenches excavated from above and subsequently reinstated. A total of 25 trial holes were undertaken at numerous locations along the preferred route (namely along the lengths comprising 1A and 1, together with 2B which was not considered necessary for further investigation). These were intended to prove or disprove the ability of cables to pass over particular structural or SED constraints. Many were conducted in the public highway and traffic lane closures were required, many being greater than the lane closures required to construct the Electrical Connection. All works were undertaken with the agreement and approval of LBB and KCC streetworks teams.

4.6.2 Subject to successful proving of the ability to overcome those constraints, the investigations allowed UKPN (and the Applicant) to secure high confidence of the delivery of the preferred route and the selection of a single overall Electrical Connection, which could be reflected in submissions at Deadline 2 of the Examination. The ability to prove the anticipated engineering solutions also allowed UKPN to be confident that the chosen route remains an economic and efficient (and coordinated) solution in line with their statutory obligations under the Electricity Act 1989 and in line with policy in the relevant NPS. Proving of the route also supports a final consideration, on a reasonable worst case EIA basis, of the chosen route in respect of the effects reported in the ES and separate Schedule 9 obligations under the Electricity Act 1989.

Outcomes

4.6.3 The majority of the trial holes were successful in identifying that no issues would occur in respect of numerous potential constraints, namely:

- Sufficient depth to lay ducts over existing culverts;
- Sufficient space to lay ducts at locations of significant existing utility congestion or over particular utilities;
- Sufficient depth to lay ducts over subways; and
- Sufficient depth to lay ducts in existing bridge decks.

4.6.4 Specific key locations, which resulted in modified routing decisions were as follows. The locations of these key trial holes are shown on the first sheet of **Appendix A**.

Trial Hole 1 (South of Norman Road)

4.6.5 Trial Hole 1 explored the potential to cross the existing watercourse at the southern end of Norman Road. This was identified as a potential constraint at the outset due to limited expected depth and width within the highway bridge. Therefore, the SIP included an area of land either side of the existing structure to enable a potential trenchless solution. Trial Hole 1 proved that the Electrical Connection could not be installed in the highway bridge. Subsequent analysis by UKPN identified a cable trough as the preferred solution in respect of spanning the watercourse. A cable trough is a structure which carries the electrical cables over an obstruction and may be freestanding or attached to an existing crossing. More detail is provided in **Section 5.2** of this report and the potential effects are assessed in the **Environmental Statement Supplementary Report (6.6)** also submitted at Deadline 2.

4.6.6 A formal Approval In Principle process with LBB has been undertaken, since the proposed cable trough would interact with an existing adopted highway structure. LBB's highway structures team has confirmed its support for the cable trough solution at this location. On this basis, and earlier desk-based and non-intrusive investigation of the remainder of Norman Road, UKPN has advised the Applicant that the route through Crossness LNR can be removed (as shown in the plans in **Appendix A** to this report).

4.6.7 Whilst the ES reports that potential environmental effects within the reserve were found to be Not Significant, the Applicant considers that there are benefits in the removal of the route option through the LNR, in light of comments made by various parties at the Relevant Representation stage. The Electrical Connection route now avoids all of Crossness LNR. The decision to refine the route in this manner accords directly with UKPN's obligations under Schedule 9 in respect of preservation and mitigation in respect of various environmental matters.

4.6.8 The route along Norman Road was included in the submitted Application and therefore there is no change in the assessment of environmental effects at these locations with respect to the existing proposals. Regarding the cable trough itself, the Applicant submits at Deadline 2 an **Environmental Statement Supplementary Report (6.6)** that confirms that the cable trough does not give rise any new or different significant environmental effects to those assessed in the ES.

Trial Holes 18 and 19 (Crossing of the River Cray)

4.6.9 Trial Holes 18 and 19 explored the potential to cross the River Cray in the existing highway structure to avoid a potential drilled solution within the Public Open Space to the south west (indicated as parcel 12/02 on the submitted **Land Plans (2.1, APP-007)**).

4.6.10 The trial holes proved that there is sufficient space to install ducts and/or utilise existing ducts within the existing highway crossing. The proposals

within the Public Open Space have therefore been removed, in the area shown in **Sheet 12 (Appendix A)** immediately west of the River Cray.

4.6.11 Furthermore, the ability to remove the land area to the south west has allowed a reduction in area to the east of the River Cray. Whilst some of the Site of Importance for Nature Conservation (SINC) has been retained between the River Cray and the railway line to the east, it has generally been reduced to only the area defined by the existing street lighting. It is understood that this area, immediately beyond the existing highway footway, derives from past proposals to upgrade this length of highway to dual carriageway. Whilst there are no known proposals by LBB, in the short to medium term, to implement this improvement, UKPN considers it prudent to retain the area which might fall within a future alignment of highway or associated footway.

Trial Hole 24 (Existing Bridge over the River Darent)

4.6.12 Trial Hole 24 confirmed UKPN's expectation that there is insufficient depth to pass over the River Darent in the existing highway structure. UKPN's discussions with KCC confirmed that a comparably short (directional) drilled solution is suitable and can be achieved adjacent to the existing highway bridge in preference to an alternative engineering solution.

4.6.13 UKPN employed a specialist drilling contractor who confirmed that the proposals can be delivered at this location. Due to the confidence derived from UKPN's studies, the Application boundary to the south and north has been reduced to lie predominantly within the public highway (see the area north of Bob Dunn Way on **Sheets 13 and 14 (Appendix A)** between the River Darent and Joyce Green Lane. Furthermore, the Applicant has held discussions with Ingrebourne Valley Limited, the landowner to the north of the highway in Dartford Marshes, regarding potential restrictions on the extent of above-ground work within their landholding. Proposed constraints on the works in this area, are captured in amendments to the **Outline Biodiversity and Landscape Mitigation Strategy (7.6, Rev 1, to be updated and submitted at Deadline 3)**, are set out in the Applicant's response to Ingrebourne Valley Limited's Relevant Representation, included in **Chapter 6** of the **Applicant's responses to Relevant Representations** (**8.02.03**) submitted at Deadline 2.

Location 26 (not a trial hole, West Kent Sewer)

4.6.14 UKPN identified, post-submission through further non-intrusive investigation, that there was insufficient space to cross the West Kent Sewer in the existing highway structure. UKPN continue to explore potential engineering solutions at this location west of Joyce Green Lane, comprising either a trenched solution with a watercourse crossing using a cable trough (described in **Section 5.2** of this report) to the north, or via a drilled solution under both the sewer and the existing highway support structure, predominantly within the public highway horizontal extent.

4.6.15 The Applicant and UKPN have agreed to retain the minimum areas required to deliver both alternatives. Whilst UKPN have high confidence in delivering a route via one of the proposed solutions, the final detailed alignment would determine which route is preferred at the point of implementation. Therefore, both these engineering options will be secured within the final DCO boundary.

Overall Routing Option 2A

4.6.16 In light of the outcomes of the route proving process for Route 1 (between Norman Road and south of Erith), no significant residual engineering challenges were identified sufficient to consider use of the alternative route 2A (see route identifier on the first sheet to **Appendix A**). For the reasons set out in this report, Route 1 was considered preferable and comprises an economic and efficient solution, with lesser potential environmental effects. The proving of Route 1 affords high confidence in its delivery. Accordingly, route 2A has been removed from the Application Boundary. In doing so this removes the potential for adverse effects on single carriageway routes through Erith Centre and potential closures at some locations, in some cases specifically for buses or larger vehicles due to the limited working width available.

4.6.17 Furthermore, although not comprising part of the preferred route 1, UKPN's drilling contractor identified that insufficient or very restricted space would be available to successfully achieve a drilling alignment under the live railway immediately south of Slade Green Station. In addition, UKPN attributed significant commercial and engineering risk to installing route 2A in respect of Crabtree Manorway, which comprises a continuously reinforced concrete slab construction.

4.6.18 UKPN and the Applicant did not identify any notable effects, either through the EIA or UKPN's proving process, which indicate that the central section of Route 1 would conflict with UKPN's licence obligations.

Overall Routing Option 2B

4.6.19 No trial holes were required in respect of the route through The Bridge development (Route 2B) since no potential structures or engineering difficulties were identified post-submission (see route identifier on the first sheet to **Appendix A**). In light of this, and the potential for only limited interaction with the Fastrack service, the Applicant has removed this part of Route Option 1 from the Application Boundary (Bob Dunn Way, where Route 1 presented an alternative to Route 2B).

4.6.20 No Significant Effects were identified for either route and UKPN's decision respects the preference stated by DBC and KCC to consider an alignment off the A206 when possible, whilst delivering an economic and efficient solution.

5 Confirmed Changes to the Application

5.1 Revised DCO Application Boundary

5.1.1 In light of the changes set out in **Section 4** of this report, a revised Application Boundary has been submitted at Deadline 2 of the Examination. This boundary confirms a single overall Electrical Connection route from REP to the existing Littlebrook substation, as shown in **Appendix A: Electrical Connection Refined Application Boundary** of this report.

5.1.2 Confirmation of the electrical connection route is reflected in updated documents also submitted at Deadline 2, namely the **Land Plans (2.1, Rev 1), Works Plans (2.2, Rev 1), Access and Public Rights of Way Plans (2.3, Rev 1), draft Development Consent Order (3.1, Rev 1), Statement of Reasons (4.1, Rev 1) and Book of Reference (4.3, Rev 1)**.

5.2 Above-ground Crossing Structures

5.2.1 Through the process of route refinement set out in **Section 4**, it was determined that at two locations it would be necessary to cross, or preserve the ability to cross, existing watercourses with an above-ground structure. These lengths of above-ground installation are short in comparison to the cable route and are located at the following watercourses:

- Southern end of Norman Road, at the junction with Picardy Manorway; and
- In land to the north of the A206 Bob Dunn Way crossing over the West Kent Sewer (west of Joyce Green Lane).

5.2.2 These locations are indicated in **Figures 1** and **2** below.

Figure 1: Norman Road above-ground crossing location

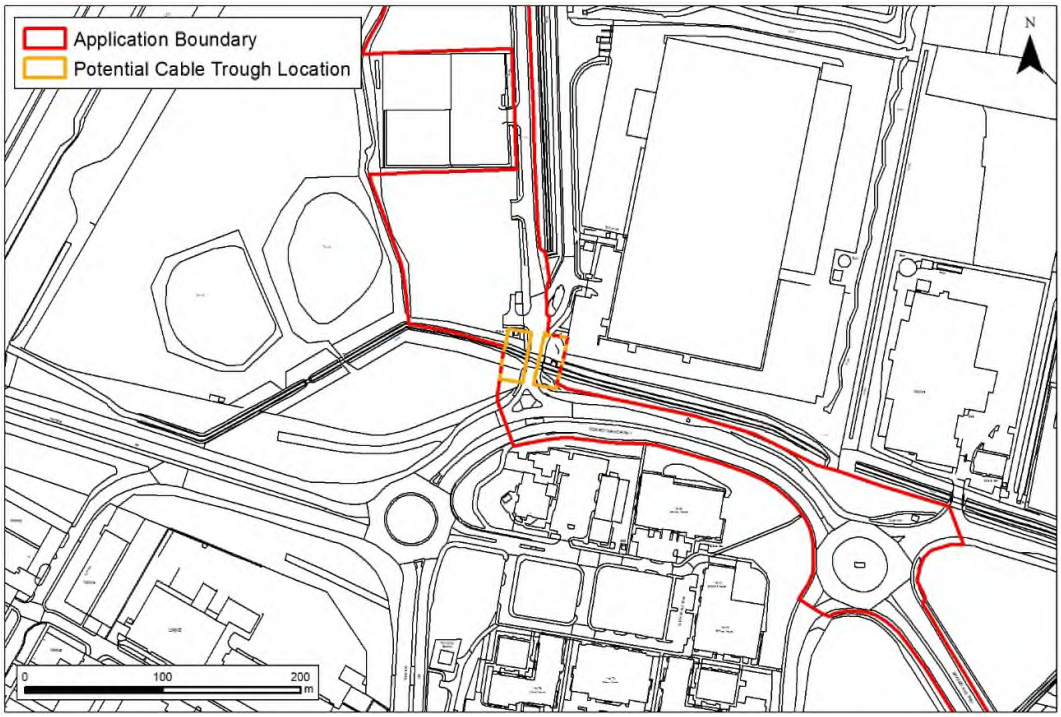
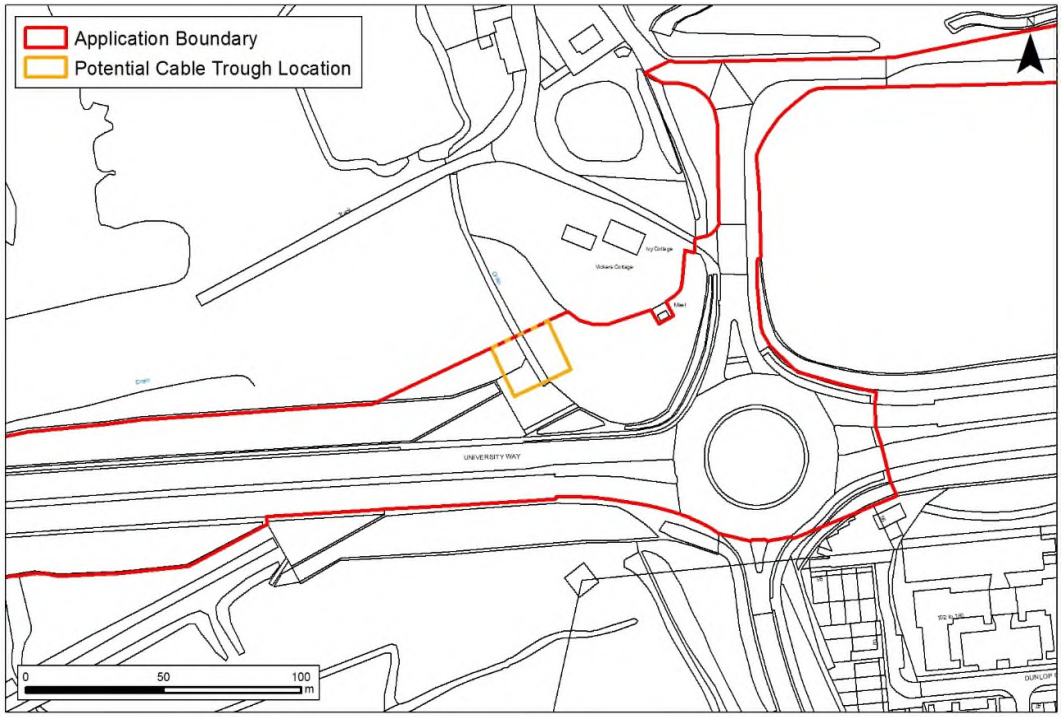


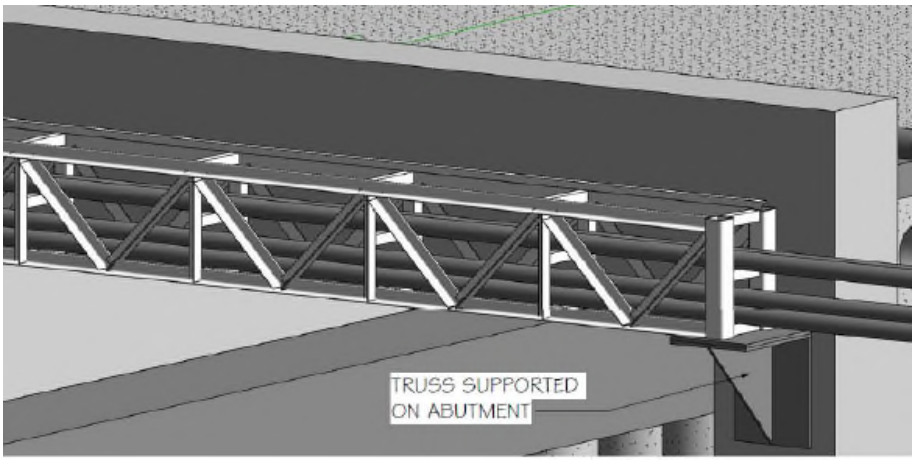
Figure 2: Land west of Joyce Green Lane above-ground crossing location



Description of Works

5.2.3 The above-ground structures (the 'cable trough') would comprise a metal lattice or tubular structure, supported at either end on a foundation or support brackets, which would carry the cables over the watercourse. The lattice structure would likely be covered in panels. An example of the indicative internal structure at Norman Road is provided in **Plate 1** below. External cladding with metal or plastic panels would give the appearance of a solid structure. Appropriate fencing and/or other security measures may be installed to prevent unauthorised access, subject to detailed design risk assessment by UKPN.

Plate 1: Indicative cable trough crossing (internal structure shown which would likely be clad in panels)



5.2.4 The elevation of the structure will be minimised to a level sufficient to clear the watercourse, provide safe access and to meet with river/flood flow requirements where necessary.

Norman Road crossing

5.2.5 The structure at Norman Road is presented in **Plate 1** in terms of its indicative scale, which is required to carry 3 power cables and 2 multicore cables associated with the Electrical Connection. The structure will either be supported off the existing structure, as indicated on **Plate 1**, or on its own independent foundations. The structure would allow a clear span of the existing watercourse and would be set at a height similar to that of the existing bridge, but sufficient not to impede or affect existing flows.

5.2.6 The crossing may be located on either the west or east side of the existing highway bridge and is considered by UKPN to present an economic and efficient solution in light of intrusive works proving that there is insufficient space within the existing bridge structure and ducting.

Watercourse crossing adjacent to Joyce Green Lane

5.2.7 The structure at this location would be of a similar scale, design and span to the Norman Road crossing. However, in the absence of an existing adjacent structure, the cable trough would require its own independent foundations, which would be located outside of the existing watercourse banks. This would allow the structure to span the watercourse above ground level. The elevation of the structure would be minimised subject to allowing safe construction and maintenance and meeting requirements in respect of watercourse flow.

5.2.8 Subject to detailed design, the crossing could occur at any location within the zone show on **Figure 2**. This crossing has been considered in the **Environmental Statement Supplementary Report (6.6)** that confirms that the cable trough does not give rise any new or different significant environmental effects to those assessed in the ES.

5.3 Benefits arising from the final route selection

5.3.1 The Applicant, working with UKPN, has identified a single Electrical Connection route, which is reflected in updated submissions at Deadline 2. Particular benefits arising from this refined route include:

- Avoidance of Crossness LNR in its entirety. The cable route will not therefore be constructed in open trench along or alongside existing footpaths or watercourses within the reserve. The reduction in the area affected provides parallel benefits in respect of local policy as only a small remaining area of the Metropolitan Open Land and SINC are affected (in the event that a western cable trough is installed);
- A shorter cable route is secured via Norman Road (Route 1A);
- Single carriageway routes are avoided through Crabtree Manorway and Erith Centre, where lane closures would require signalised control or traffic flows in each direction. In some cases, lane closure in more constrained areas would result in a potential complete closure to all traffic or larger vehicles. No such closures are anticipated on the refined route;
- A shorter cable route is secured via Bronze Age Way and Queens Road (Route 1);
- A route that seeks to avoid the northbound entry or exit at Erith Roundabout is preferred and secured, in line with seeking to minimise Transport for London's concerns;
- Potential landtake from Public Open Space is removed at the River Cray crossing;
- The extent of works within the SINC south of Thames Road (between the River Cray and Cray Mill railway bridge) is reduced;

- Works within land to the north and south of the highway at the River Darent are significantly reduced and constraints discussed with Ingrebourne Valley Limited will be captured in an update to the **Outline Biodiversity and Landscape Mitigation Strategy (7.6, Rev 1)**, to be submitted at Deadline 3. This brings the parallel benefits in respect of local policy of reducing the areas affected. These are the Biodiversity Opportunity Area, Local Wildlife Site and Borough Open Space in Dartford (amongst others);

- Works within land to the north and south of the highway at the West Kent Sewer Crossing are significantly reduced and are the subject of ongoing discussion to further mitigate temporary effects to the north in Ingrebourne ownership; and

- The works leave the A206 close to Junction 1a of the A282 at Joyce Green Lane (Route 2B) roundabout and would result in limited interaction with the Fastrack bus service.

5.3.2 In respect of the specific effects arising from the final selected route (set out in the ES and the **Environmental Statement Supplementary Report (6.6)**), these do not differ from those considered originally. In line with the specific considerations set out in NPS EN-5, the submitted documents including those for Deadline 2, continue to give adequate consideration to biodiversity and geological conservation, landscape and visual and noise and vibration. Furthermore, none of the refined proposals affect the ability to conform with EMF public exposure levels as noted in ICNIRP 1998 guidance and the 1999 EU Recommendation.

5.4 Routing matters still to be resolved

5.4.1 No routing matters remain to be resolved during the Examination. However, at two locations, namely the Cray Mill railway bridge and at the West Kent Sewer crossing, the Applicant continues to explore different possible engineering solutions with landowners. All solutions are considered suitable in each case, although the final balance between relevant statutory, economic, environmental, social and engineering will be determined at the detailed design stage prior to implementation.

6 Conclusion

6.1 Benefits of the final selected route

6.1.1 A number of benefits arise from refinement of the Electrical Connection route, including but not limited to:

- Avoidance of a route traversing Crossness LNR in its entirety;
- A shorter cable route is secured via Norman Road (Route 1A);
- Single carriageway routes are avoided through Crabtree Manorway and Erith Centre, where lane closures would require signalised control of traffic flows in each direction;
- A shorter cable route is secured via Bronze Age Way and Queens Road (Route 1);
- A route that seeks to avoid the northbound entry or exit at Erith Roundabout is preferred and secured, in line with seeking to minimise Transport for London's concerns;
- Public Open Space is removed at the River Cray crossing;
- The extent of works within the SINC south of Thames Road (between the River Cray and Cray Mill railway bridge) is reduced;
- Works within land to the north and south of the highway at the River Darent and the West Kent Sewer are significantly reduced and are the subject of ongoing discussion to further mitigate temporary environmental effects;
- The works leave the A206 close to Junction 1A of the M25 at Joyce Green Lane (Route 2B) roundabout and would result in limited interaction with the Fastrack bus service; and
- Security of supply for REP and RRRF and consumers generally is achieved through electrical connections to different substations on the wider distribution network.

6.1.2 The final selected route is shown (the 'Rev 1' boundary) in **Appendix A**. Areas removed subsequent to the submitted Application are shown in blue hatch and no longer form part of the DCO Application. These changes are also reflected in updated **Land Plans (2.1, Rev 1), Works Plans (2.2, Rev 1), Access and Public Rights of Way Plans (2.3, Rev 1), draft Development Consent Order (3.1, Rev 1), Statement of Reasons (4.1, Rev 1)** and **Book of Reference (4.3, Rev 1)** submitted at Deadline 2.

6.2 Statutory Obligations and Policy

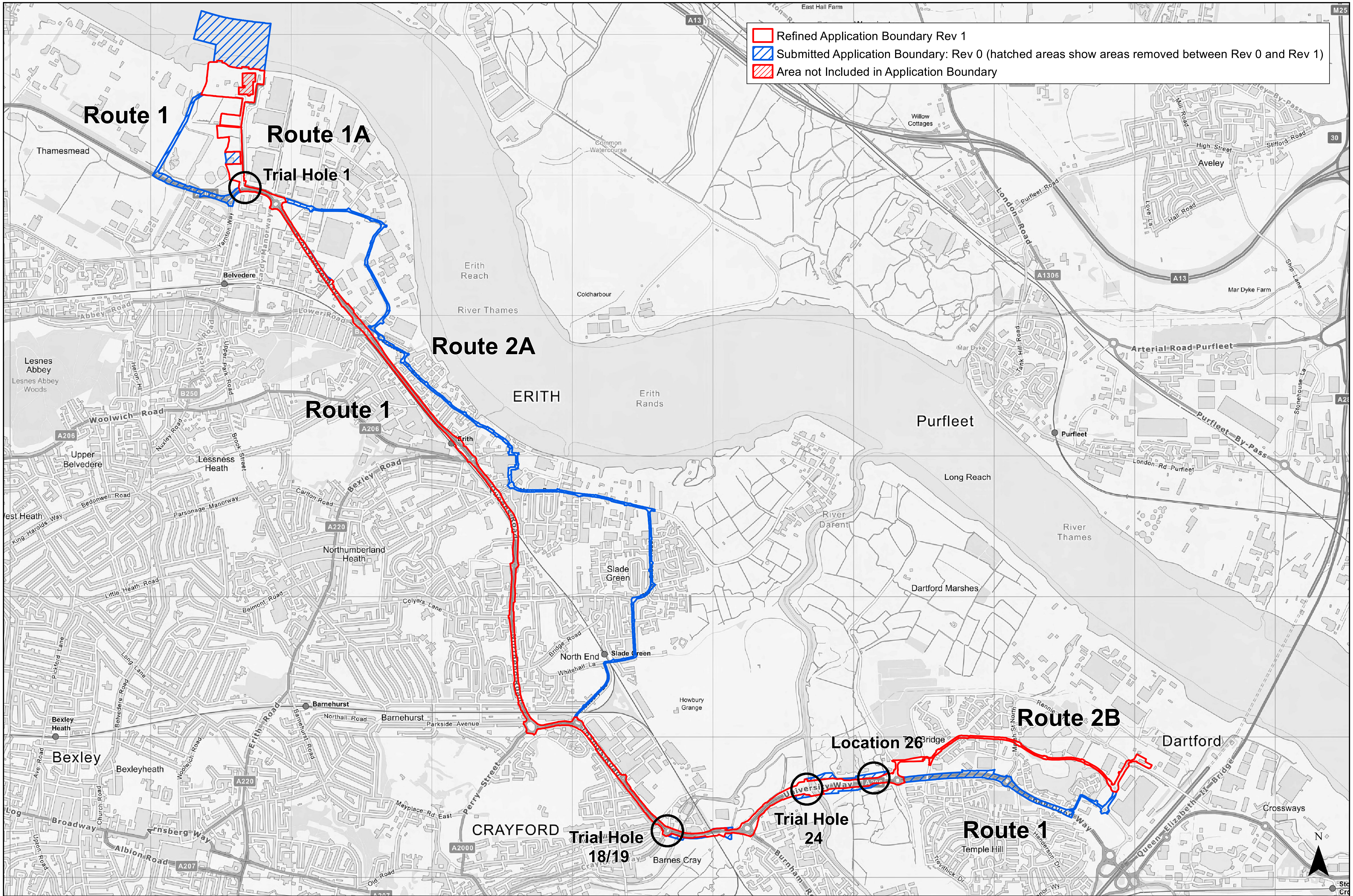
6.2.1 UKPN is required, under their licence obligations, to deliver an economic, efficient and coordinated electrical system. The non-intrusive and intrusive investigations undertaken by UKPN have proved that the original preferred route (Route 1A, 1, 2B) remains deliverable and that no significant changes are required to the anticipated engineering solutions. None of the refinements proposed substantially alter the original findings by UKPN that the route meets with their licence obligations.

6.2.2 Furthermore, refinements to the route have not altered any of the assessment findings reported in the ES and, as set out above, have brought potential benefits in respect of reduced interactions with different environmental receptors. In this respect UKPN continue to have regard to, and satisfy, their duties under Schedule 9 of the Electricity Act 1989.

6.2.3 The obligations above are carried into the relevant NPS and align with the EIA process which seeks to identify significant effects. No significant effects have been identified in relation to the refined Electrical Connection which therefore continues to be compliant with relevant national policy.

6.2.4 Taking economic, environmental and social considerations in balance, the refined route represents the best route option and is an economic and efficient solution in line with NPS EN-1 and EN-5.

Appendix A Electrical Connection Refined Application Boundary



Refined Application Boundary Rev 1
Submitted Application Boundary: Rev 0 (hatched areas show areas removed between Rev 0 and Rev 1)
Area not Included in Application Boundary
Route 1
Route 1A
Trial Hole 1
Route 2A
Route 1
Route 2B
Location 26
Trial Hole 24
Trial Hole 18/19
Route 1
Thamesmead
Belvedere
Lesnes Abbey
ERITH
Erith Reach
River Thames
Erith Rands
Purfleet
Long Reach
River Darent
River Thames
Dartford Marshes
Slade Green
North End
Northumberland Heath
Upper Belvedere
Lessness Heath
Barnehurst
Bexley Heath
Bexley
Bexleyheath
CRAYFORD
Barnes Cray
Howbury Grange
Dartford
Crossways
Temple Hill
Aveley
Coldharbour
Mar Dyke Farm
East Hall Farm
N

RIVERSIDE ENERGY PARK

0 0.5 1 km

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Based on Babcock/EDF plan - RRRL Cable Route Landowners - 2-01-2010 - Drawing NO. Cable Route Plan

pba peterbrett

Client: CORY RIVERSIDE ENERGY

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Checked: RG

Electrical Connection Refined Application Boundary

Appendix A | Rev 0

Document Path: Z:\Projects\42166\02_mxd\WorkPlans\42166_01_IndicativeRedlineBoundary_Rev1c_Workplansoverview.mxd

Refined Application Boundary Rev 1

Submitted Application Boundary: Rev 0 (hatched areas show areas removed between Rev 0 and Rev 1)

River Thames

Halfway Reach

N

RIVERSIDE ENERGY PARK

0 100 200 m

pba peterbrett

Client: CORY RIVERSIDE ENERGY

1:3,000 @ A3

16/05/19

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Checked: RG

Electrical Connection Refined Application Boundary Sheet 1

Appendix A | Rev 0

Document Path: Z:\Projects\42166\02_mxd\WorkPlans\42166_01_IndicativeRedlineBoundary_Rev1c_WorksPlans_.mxd

RIVERSIDE ENERGY PARK

0 100 200 m

Based on Babcok/EDF plan - RRRL Cable Route Landowners - 2-01-2010 - Drawing NO. Cable Route Plan

pba peterbrett

Client
CORY RIVERSIDE ENERGY

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Drawn: HG
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Electrical Connection Refined Application Boundary
Sheet 2

Appendix A Rev 0

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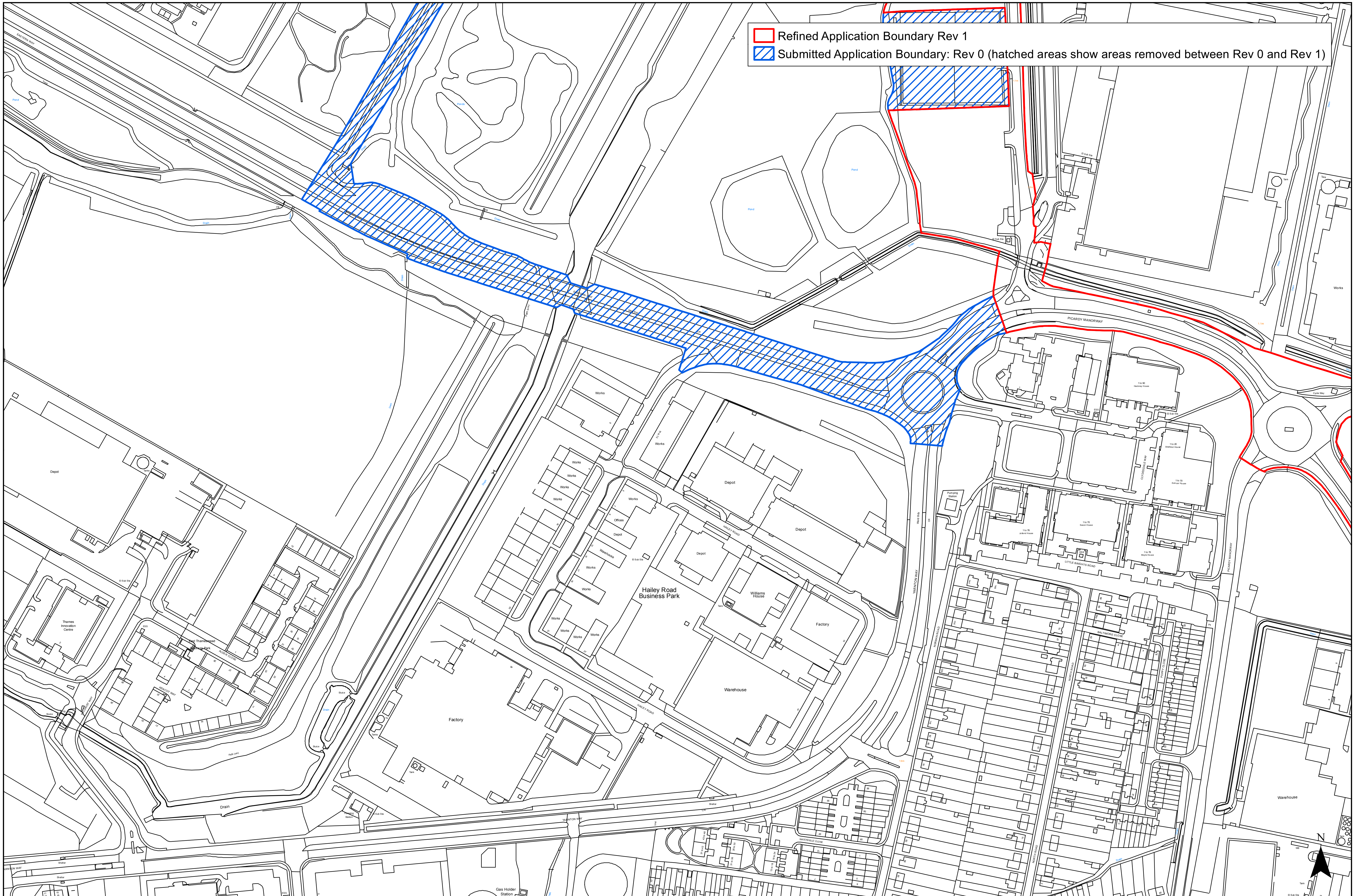

RIVERSIDE ENERGY PARK

0 100 200 m

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Based on Babcok/EDF plan - RRRL Cable Route Landowners - 2-01-2010 - Drawing NO. Cable Route Plan
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pba peterbrett

Client

CORY RIVERSIDE ENERGY

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Electrical Connection Refined Application Boundary
Sheet 3

Appendix A | Rev 0

Document Path: Z:\Projects\42166\02_mxd\WorkPlans\42166_01_IndicativeRedlineBoundary_Rev1c_WorksPlans_.mxd

Refined Application Boundary Rev 1

Submitted Application Boundary: Rev 0 (hatched areas show areas removed between Rev 0 and Rev 1)

RIVERSIDE ENERGY PARK

0 100 200 m

pba peterbrett

Client: CORY RIVERSIDE ENERGY

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Electrical Connection Refined Application Boundary Sheet 4

Appendix A | Rev 0

Document Path: Z:\Projects\42166\02_mxd\WorkPlans\42166_01_IndicativeRedlineBoundary_Rev1c_WorksPlans_.mxd

Refined Application Boundary Rev 1

Submitted Application Boundary: Rev 0 (hatched areas show areas removed between Rev 0 and Rev 1)

Erith Marshes

Frank's Park

N

RIVERSIDE ENERGY PARK

0 100 200 m

pba peterbrett

Client: CORY RIVERSIDE ENERGY

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Electrical Connection Refined Application Boundary Sheet 5

Appendix A | Rev 0

Document Path: Z:\Projects\42166\02_mxd\WorkPlans\42166_01_IndicativeRedlineBoundary_Rev1c_WorksPlans_.mxd

Refined Application Boundary Rev 1

Submitted Application Boundary: Rev 0 (hatched areas show areas removed between Rev 0 and Rev 1)

RIVERSIDE ENERGY PARK

0 100 200 m

pba peterbrett

Client: CORY RIVERSIDE ENERGY

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Electrical Connection Refined Application Boundary Sheet 6

Appendix A | Rev 0

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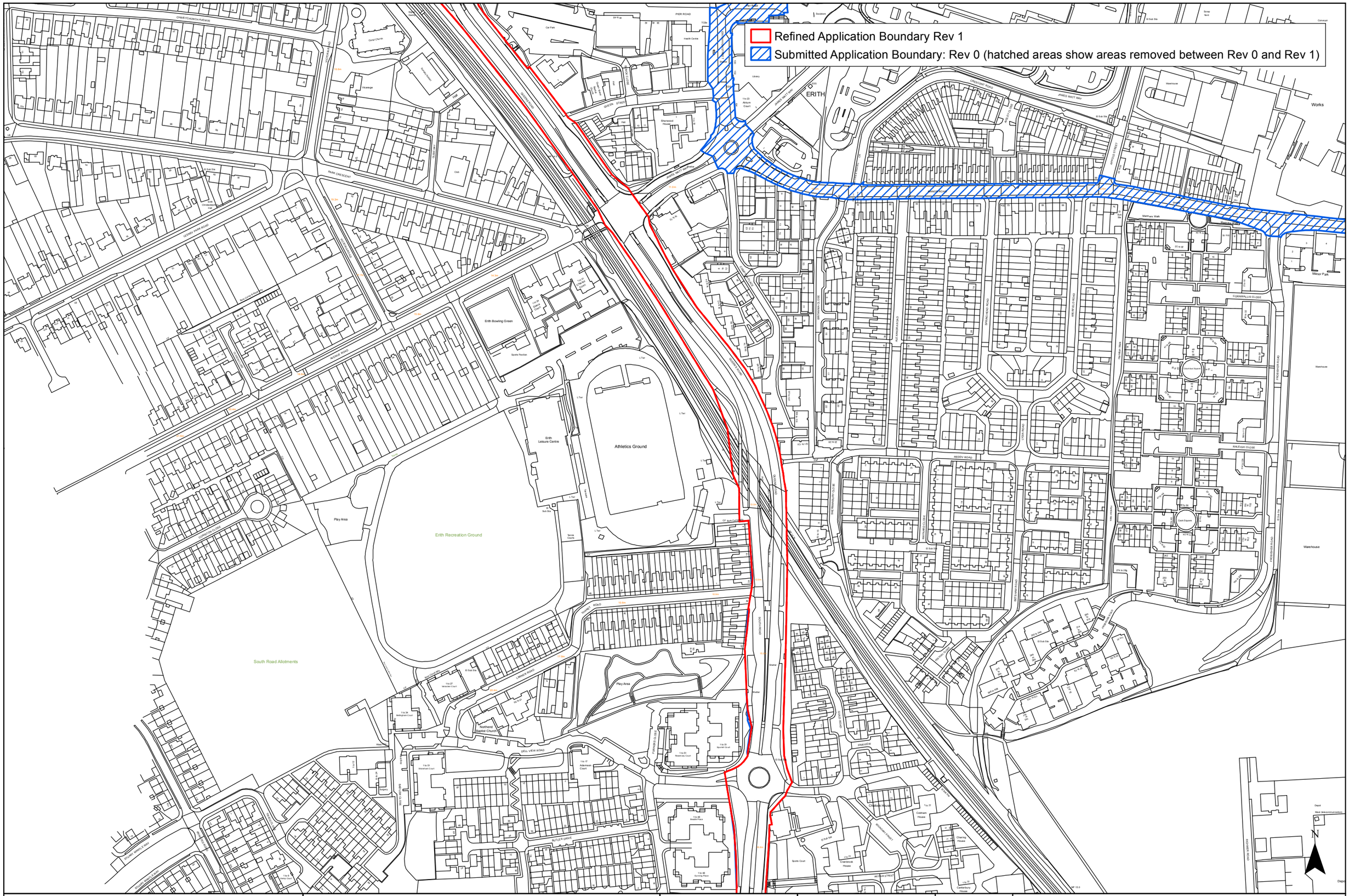

RIVERSIDE ENERGY PARK

0 100 200 m

pba peterbrett

Client: CORY RIVERSIDE ENERGY

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Electrical Connection Refined Application Boundary Sheet 7

Appendix A | Rev 0

Document Path: Z:\Projects\42166\02_mxd\WorkPlans\42166_01_IndicativeRedlineBoundary_Rev1c_WorksPlans_.mxd

Submitted Application Boundary: Rev 0 (hatched areas show areas removed between Rev 0 and Rev 1)

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RIVERSIDE ENERGY PARK

0 100 200 m

pba peterbrett

Client: CORY RIVERSIDE ENERGY

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Electrical Connection Refined Application Boundary Sheet 8

Appendix A | Rev 0

Document Path: Z:\Projects\42166\02_mxd\WorkPlans\42166_01_IndicativeRedlineBoundary_Rev1c_WorksPlans_.mxd

Refined Application Boundary Rev 1

Submitted Application Boundary: Rev 0 (hatched areas show areas removed between Rev 0 and Rev 1)

RIVERSIDE ENERGY PARK

0 100 200 m

Client

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Electrical Connection Refined Application Boundary Sheet 9

Appendix A | Rev 0

Document Path: Z:\Projects\42166\02_mxd\WorkPlans\42166_01_IndicativeRedlineBoundary_Rev1c_WorksPlans_.mxd

Submitted Application Boundary: Rev 0 (hatched areas show areas removed between Rev 0 and Rev 1)

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RIVERSIDE ENERGY PARK

0 100 200 m

pba peterbrett

Client: CORY RIVERSIDE ENERGY

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Electrical Connection Refined Application Boundary Sheet 10

Appendix A | Rev 0

Document Path: Z:\Projects\42166\02_mxd\WorkPlans\42166_01_IndicativeRedlineBoundary_Rev1c_WorksPlans_.mxd

Refined Application Boundary Rev 1

Submitted Application Boundary: Rev 0 (hatched areas show areas removed between Rev 0 and Rev 1)

RIVERSIDE ENERGY PARK

0 100 200 m

pba peterbrett

Client: CORY RIVERSIDE ENERGY

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Electrical Connection Refined Application Boundary Sheet 11

Appendix A | Rev 0

Document Path: Z:\Projects\42166\02_mxd\WorkPlans\42166_01_IndicativeRedlineBoundary_Rev1c_WorksPlans_.mxd

Refined Application Boundary Rev 1

Submitted Application Boundary: Rev 0 (hatched areas show areas removed between Rev 0 and Rev 1)

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RIVERSIDE ENERGY PARK

0 100 200 m

pba peterbrett

Client: CORY RIVERSIDE ENERGY

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Electrical Connection Refined Application Boundary Sheet 12

Appendix A | Rev 0

Document Path: Z:\Projects\42166\02_mxd\WorkPlans\42166_01_IndicativeRedlineBoundary_Rev1c_WorksPlans_.mxd

Refined Application Boundary Rev 1

Submitted Application Boundary: Rev 0 (hatched areas show areas removed between Rev 0 and Rev 1)

RIVERSIDE ENERGY PARK

0 100 200 m

pba peterbrett

Client: CORY RIVERSIDE ENERGY

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Electrical Connection Refined Application Boundary Sheet 13

Appendix A | Rev 0

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Refined Application Boundary Rev 1

Submitted Application Boundary: Rev 0 (hatched areas show areas removed between Rev 0 and Rev 1)

RIVERSIDE ENERGY PARK

0 100 200 m

pba peterbrett

Client: CORY RIVERSIDE ENERGY

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Electrical Connection Refined Application Boundary Sheet 14

Appendix A | Rev 0

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Refined Application Boundary Rev 1

Submitted Application Boundary: Rev 0 (hatched areas show areas removed between Rev 0 and Rev 1)

RIVERSIDE ENERGY PARK

0 100 200 m

pba peterbrett

Client: CORY RIVERSIDE ENERGY

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Electrical Connection Refined Application Boundary Sheet 15

Appendix A | Rev 0

Document Path: Z:\Projects\42166\02_mxd\WorkPlans\42166_01_IndicativeRedlineBoundary_Rev1c_WorksPlans_.mxd

Refined Application Boundary Rev 1

Submitted Application Boundary: Rev 0 (hatched areas show areas removed between Rev 0 and Rev 1)

El Sub Sta

El Sub Sta

Tank

Tank

Tank

Crossways

Crossways

Edison's Park

Multi-storey Car Park

CROSSWAYS BOULEVARD

CROSSWAYS BOULEVARD

Pumping Station

Electricity Sub Station

N

RIVERSIDE ENERGY PARK

0 100 200 m

pba peterbrett

Client: CORY RIVERSIDE ENERGY

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Electrical Connection Refined Application Boundary Sheet 16

Appendix A | Rev 0

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