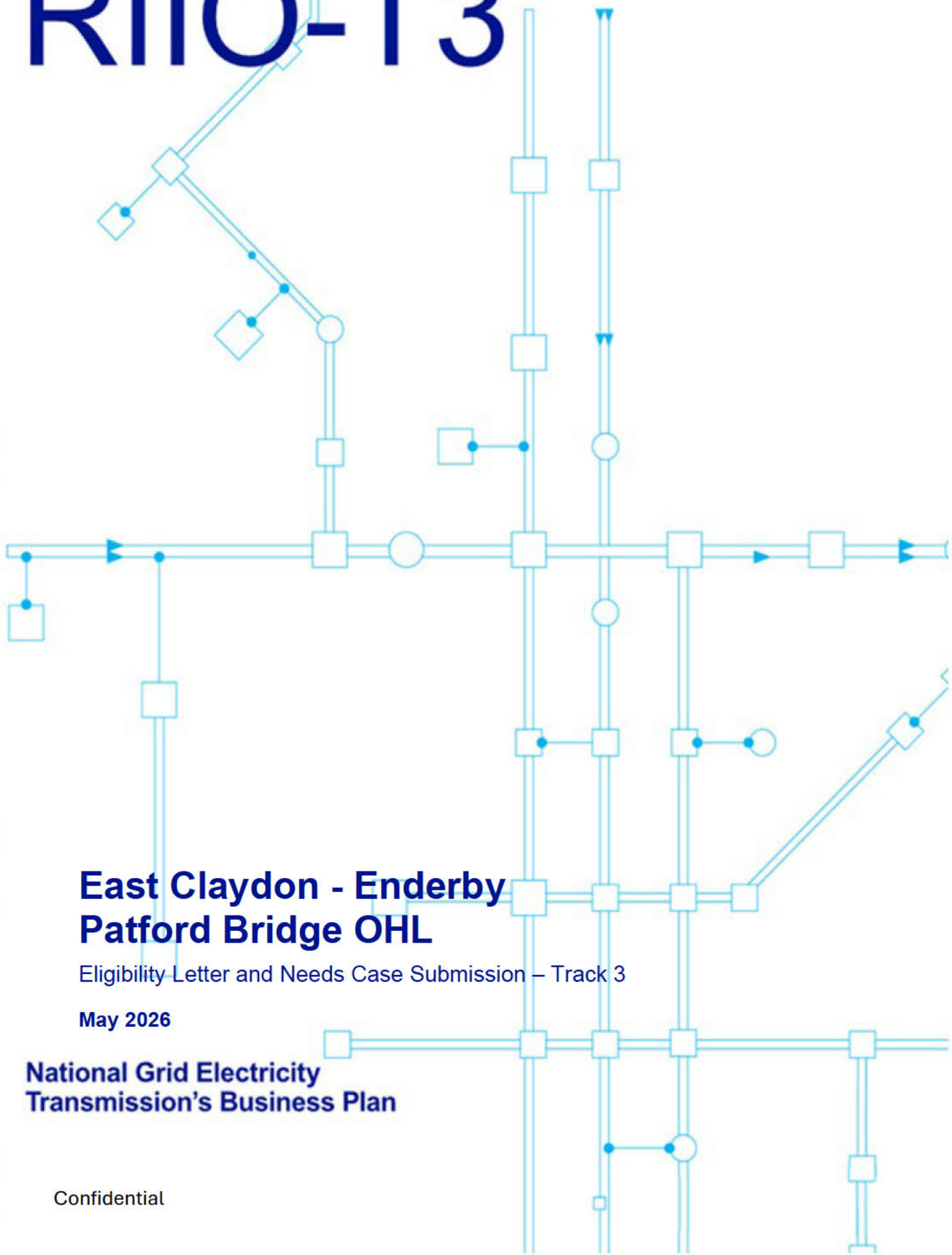


RIIO-T3



East Claydon - Enderby Patford Bridge OHL

Eligibility Letter and Needs Case Submission – Track 3

May 2026

**National Grid Electricity
Transmission's Business Plan**

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Reference and Summary table

Field	Description
Project name	East Claydon – Enderby – Patford Bridge 1 and 2 400 kV OHL Reconductoring (Referred to in this paper as EBRE)
TO's preferred re-opener track	Track 3 Eligibility Letter (EL) and Needs Case (NC)
RRP Reference	[REDACTED]
BPDT / Scheme Reference Number	[REDACTED]
Load Board Reference	<p>Discussed at load board (Feb 2026)</p> <ul style="list-style-type: none"> NGET can submit a portfolio Project Assessment for the five near term OHL schemes that were proposed to be approved in DD with ACCC which has now had type registration removed [REDACTED] <p>Given maturity on costs and new optioneering, we have elected to submit an Eligibility Letter and Needs Case Submission.</p>
Investment driver(s)	<p>NESO</p> <ul style="list-style-type: none"> This project was first identified as a NESO driven project under NOA7. It received a “essential” signal under HND and is designated as Clean Power 2030. As such, this investment supports the delivery of key UK government energy policy objectives and the regulatory framework set through RIIO-T3 and the CP2030 pathway, by enabling a secure, affordable and resilient electricity system capable of accommodating sustained growth in demand and generation. <p>[REDACTED]</p> <p>Customer Connections</p> <ul style="list-style-type: none"> There are no connection customer drivers directly associated with the project.
PASE Compliance	<p>The preferred option is not PASE compliant (as it does not select the highest rated conductor available for the existing tower type).</p> <p>However, the quantitative and qualitative analysis shows it provides the best overall outcome when considering cost, transmission losses, deliverability and reliability risk.</p>
Project outputs	<p>The preferred option will enable the following outputs aligned to the pillars of our ambition for RIIO T3.</p> <p>Deliver the grid of tomorrow; Do the right thing for our consumers, communities, and the environment.</p>

Field	Description
	<ul style="list-style-type: none"> • Increase the [redacted] boundary capability by approximately [redacted] MW and the [redacted] boundary by approximately [redacted] MW, as identified in the NOA7 refresh. • Increase the thermal capacity on the East Claydon - Enderby – Patford Bridge 1&2 circuits from [redacted] to at least a Winter post-fault rating of [redacted] • By replacing and refurbishing aging assets, the project will extend the operational life of the circuits, reduce the likelihood of faults and improve the overall reliability of the transmission network.
Short list of strategic options considered	<p>The shortlisted options for EBRE are:</p> <p>[redacted] Option E-1: Reconductor with [redacted]</p> <p>[redacted] Option E-4: Reconductor with [redacted]</p> <p>[redacted] Option E-5: Reconductor with [redacted]</p> <p>[redacted] Option E-6: Reconductor with [redacted]</p>
Preferred solution and explanatory narrative on the rationale	<p>The preferred solution is option E-1: Reconductor with [redacted]</p> <p>This option meets the required rating by [redacted] and has a lower capex cost and transmission losses when compared with option E-4.</p>
Development Stage	This Investment is at 4.3 Develop and Sanction stage in our BP500 Network
Expected Forecast Cost	Estimated capital cost: [redacted] (23/24 prices, inc. risk & contingency)
Delivery year	<p>The delivery date for EBRE is [redacted]</p> <p>Dates are subject to system access, long-lead equipment procurement and supply chain readiness.</p>
Delivery risks	<ul style="list-style-type: none"> ▪ Design & technical complexities: OHL foundation and steelwork upgrades for new conductor system ▪ Operation & maintenance: Strategic spare availability ▪ Safety, health & security: Protection of 3rd party assets ▪ Planning, land & consent: Access restrictions and ecological consenting and licenses delaying programme ▪ Third party impact & Network Coordination: Impact on third party asset owners and networks ▪ Environmental & Sustainability: Presence of SSSI and the carbon cost of construction ▪ Timing of Programme & Resources: Outage availability and supply chain constraints ▪ Cost: Estimate uncertainty and metal exchange price volatility
Applicable Reporting Tables	BPDT 6.1 Scheme C&V Load Actuals and RRP 24-25 Scheme_C&V_Calc_Load_Actuals.

Field	Description		
Historic funding interaction	<p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p>		
Interactive projects	<p>The EBRE project covers the Overhead Line (OHL) between three substations: East Claydon, Enderby & Patford Bridge.</p> <p>At East Claydon 400 kV substation, there is a significant extension and rebuild planned for connecting customers at the site. There is also further OHL reconductoring planned South of East Claydon supporting demand and generation connecting at East Claydon and Iver.</p> <p>NGET will need to ensure all projects are completed sequentially in line with the NOA, the tCSNP recommendations and customer connection dates to fully unlock the [REDACTED] and [REDACTED] boundary constraints.</p>		
Spend Apportionment	<p>[REDACTED]</p> <p>[REDACTED]</p>	<p>[REDACTED]</p> <p>[REDACTED]</p>	<p>[REDACTED]</p> <p>[REDACTED]</p>

Executive Summary

Project Summary

This investment facilitates an increase to the [REDACTED] boundary capacity by approximately [REDACTED] MW and the [REDACTED] Boundary by approximately [REDACTED] MW additional capacity and will contribute towards decarbonisation and wider net zero objectives, ensuring smooth integration of new generation sources and aligning with local and regional energy needs. It will ensure network reliability and stability by preventing overloads during fault conditions, it will replace Grade [REDACTED] steelwork and will strengthen the reliability and resilience of our transmission infrastructure.

Submission Purpose

This submission updates the Engineering Justification Paper (EJP) for East Claydon – Enderby – Patford Bridge. At Final Determination, this investment was deemed not justified on the basis that the preferred solution relied on the [REDACTED] for which Type Registration was withdrawn.

Since then, we have re-evaluated the investment and removed reliance on non-Type Registered conductors. For robustness, optioneering has been reviewed for this investment, and a clearly defined preferred solution has been identified, consistent with established engineering practice and currently available Type Registered conductors. Consequently, we have updated the qualitative and quantitative analysis accordingly for the short-listed options.

We are seeking Ofgem's confirmation that Track 3 EL and NC is the appropriate route for this project, and approval for our optioneering, preferred solution, and request for Pre-Construction Funding (PCF).

This paper provides an update to the Optioneering and Needs Case originally submitted within the RIIO-T3 Engineering Justification Process (EJP) for **East Claydon - Enderby – Patford Bridge (EBRE)** reconducting. It is submitted as a combined Eligibility Letter and updated Needs Case, in accordance with the RIIO-T3 (T3) Load Re-Opener mechanism under Special Condition 3.18.

Need

The primary driver for this investment is to address the thermal limitations of the existing OHL infrastructure on the Enderby-East Claydon-Patford Bridge circuit, increasing its capacity from [REDACTED] to [REDACTED] to handle higher electrical loads and ensuring the reliability and security of the transmission network.

This need was signalled under EBRE in the NOA7 Refresh 2021/22 and is classified as a Clean Power 2030 (CP2030) project, facilitating an increase to the B8 boundary capacity by approximately [REDACTED] MW and the [REDACTED] Boundary by approximately [REDACTED] MW. EBRE has an optimal date of [REDACTED]. This and contributes towards meeting the power transfer requirements of almost [REDACTED] GW and [REDACTED] GW across the [REDACTED] & [REDACTED] boundaries by [REDACTED] respectively.

Optioneering

We undertook a structured, multi-factor optioneering process to identify all possible options. We first considered a range of strategic options, being do-nothing, hotwiring, reconducting, upgrading, build new and dynamic line rating. From these, we built a long list of 18 options, 11 of which were sub-options of reconducting as we considered all conductors that are compatible with the existing L2 and L6 towers. Seven options met the need but only four were shortlisted as credible and taken forward for detailed analysis. The other two did not meet the need by 2030 and is not a conductor currently available.

Of these, option E-1 is our preferred option because it meets the need, has lower transmission losses than the alternative which supports its higher NPV and is extensively used on the network meaning we have wide-ranging operational and maintenance data, and is only marginally more expensive than option E-6.

Table 1: Long list options

Option	Details	Drivers met	Short List
Option A	Do nothing counterfactual	X	X
Option B	Hotwire the existing circuit	X	X
Option C	Installing Power Control Devices	X	X
Option D	Reconducting and Hotwiring	✓	X
Option E-1		✓	✓ (preferred)
Option E-2		X	X
Option E-3		X	X
Option E-4		✓	✓
Option E-5		✓	✓
Option E-6		✓	✓
Option E-7		X	X
Option E-8		X	X
Option E-9		X	X
Option E-10		X	X
Option E-11		✓	X
Option F	Build a new 400 kV circuit	✓	X
Option G	Dynamic Line Rating	X	X

Cost Estimates

Based on the latest Cost Book (2023/24 prices) the preferred option, Option E-1, has an estimated total cost of [REDACTED] (including risk and contingency). Pre-Construction Funding of [REDACTED] is requested at this stage to progress surveys, stakeholder engagement, project design & engineering development, planning and early enabling works required to mature the project ahead of later re-opener stages.

The costs for all shortlisted options (including risk and contingency) are:

- Option E-1: [REDACTED]
- Option E-4: [REDACTED]
- Option E-5: [REDACTED]
- Option E-6: [REDACTED]

Indicative delivery program

Due to the length of this circuit, the project is currently planned for delivery across the [REDACTED] [REDACTED] outage seasons, which is aligned with outage and supply chain availability and the planned commissioning date for the project of [REDACTED]. Design, surveys and procurement activities will progress in advance. Delivery remains dependent on system access, long-lead equipment procurement and supply chain readiness. Given the risk to deliverability from any changes to output availability, we are planning to develop a delivery strategy to validate outage requirements, minimise outages and mitigate potential issues.

1. Introduction

1.1 Overview - EBRE reconductoring

This paper presents our combined Eligibility Letter and Needs Case review under the Load Re-opener and Price Control Deliverable under Special Condition 3.18 for investment to reconductor the East Claydon – Enderby – Patford Bridge 400 kV circuit.

Through this submission we are seeking approval for:

- The project to assessed under Track 3 EL and NC
- Approval of the investment need, optioneering and our preferred option E-1: reconductoring of East Claydon – Enderby – Patford Bridge with [REDACTED] conductor.
- Pre-Construction Funding (PCF) under Special Condition 3.15 (Pre-Construction Funding Re-opener, Price Control Deliverable).

This is a NOA driven investment, identified as EBRE, to increase to the [REDACTED] boundary capacity by approximately [REDACTED] MW and the [REDACTED] Boundary by approximately [REDACTED] MW, with an optimal delivery date of 2030. This contributes towards meeting the power transfer requirements of almost [REDACTED] GW and [REDACTED] GW across the [REDACTED] & [REDACTED] boundaries by [REDACTED] respectively. Whilst there is no immediate asset health driver, within this investment the 4WP section has quad [REDACTED] conductors which are part of an aging asset with the aim to be removed from the network by [REDACTED]

For this submission we have updated our optioneering and costings for an expanded range of conductors. Subject to Ofgem providing approval, we will then continue development of our Project Assessment for this project.

1.1.1 Eligibility, Project Track Statement & PASE

The project is being submitted under Assessment Track 3 EL and NC as the development is at an advanced stage, with a clearly defined need, and optioneering has identified a clear preferred intervention

While the preferred option is not PASE-compliant (as it does not select the highest-rated conductor available for the existing tower type), the quantitative and qualitative analysis shows it provides the best overall outcome when considering cost, transmission losses, deliverability and reliability risk.

1.1.2 Pre-Construction Funding Request

Under Special Condition 3.15 of the Electricity Transmission licence, this investment qualifies for allowances equal to [REDACTED]

Based on our current forecast we have provided below breakdown of costs amounting [REDACTED] as part of this submission.

Table 2 below summarises the activities covered by the application of these PCF allowances based on our current progress of PCF and EEW spend. This position will be updated as we continue to mature this investment and ultimately reconciled at Project Assessment stage of the re-opener.

We confirm that no PCF activity included in this submission has been funded through baseline allowances, other re-openers, or alternative licence mechanisms.

1.2 Background

1.1.3 Chronology to the investment

EBRE constitutes works to increase the capacity of the existing East Claydon Enderby Patford Bridge single circuit. The network requirement is to increase the winter post fault continuous rating from [REDACTED] to [REDACTED].

A summary of the key milestones relating to the development for EBRE is set out below.

2022: NOA Refresh

- July 2022 the scheme was recommended as HND Essential in the HND/NOA Refresh with an EODD of 2030

2024: Clean Power 2030 (CP30) – Advice to Government

- November 2024: NESO's formal advice to Government on how to achieve a 95% clean power system by 2030. EBRE was identified at project level, as a Clean Power 2030 enabling transmission project, reinforcing the need case established under Beyond 2030.

2024: Beyond 2030 (HND)

- March 2024: Transitional strategic network plan bridging Pathway to 2030 and the future Centralised Strategic Network Plan (CSNP) was released.
- EBRE was reiterated as a reinforcement of the previous recommendation, re-emphasising the need to deliver the 2030 pathway to support boundary capability and system resilience requirements.

2024–2025: Engineering Justification Paper (EJP) submission in T3 plan

- December 2024: EBRE was submitted as part of NGET's RIIO-T3 Business Plan through the Engineering Justification Paper.
- July 2025: Draft Determination and subsequent Ofgem-NGET engagement.

2026: Submission under the Load Re-Opener

- May 2026: Updated submission.

1.1.4 Regional & Network Context

The need for accelerated network investment in Great Britain (GB) due to the growing pipeline of connections is well established. The [REDACTED] & [REDACTED] boundary capacity increase is in line with the forecasted increases in North-to-South power flows, driven by the integration of more renewable energy sources in the North and rising demand in the South, these necessitate an upgrade to this infrastructure.

As noted in our T3 EJP related to this project, the East Claydon substation is a critical node in the UK's electricity transmission network and is undergoing a major rebuild. This project involves the reconstruction of both the 132 kV and 400 kV substations, with the new East Claydon substation designed to handle an increased output. Situated at a crucial intersection of North-South and East-West power flow routes, East Claydon is pivotal for maintaining the stability and reliability of electricity distribution and transmission across the region. Given the ongoing overhead line (OHL) uprating works and the numerous asset health issues at this site, the rebuild is planned within the next decade. During this period, there is an opportunity to coordinate this work with other strategic projects, particularly on the 400 kV routes, to optimise efficiency and ensure the network has the available capacity to connect customers in the region. This includes provisioning additional bays to accommodate future connections, which is important given the growing demand in the area. Additionally, the reconstruction will align with related projects, such as the reconductoring of the Amersham – East Claydon – Iver circuits and the East Claydon - Enderby – Patford Bridge circuits, to enhance the overall network.

In addition to this specific interfacing project, we have identified some wider network considerations as part of this project.

1. Midlands: Situated North-South between Scottish renewables and London demands, and East-West between the E-W interconnector to Ireland and the European interconnectors landing on the East Anglia coast, the Midlands network is a vital central hub, linking the extremities of the GB grid and providing an essential contribution to the stability and balance of the national electricity system. The Midlands features a mixed demand profile, with energy consumption spread across residential, commercial, and industrial sectors, though the region's demand for electricity tends to peak during Winter, driven by heating needs in residential areas.

Several strategic upgrades to increase capacities and improve the power flow through and around the Midlands into Southern England have been planned. These include reconductoring of circuits, additional power-control devices on existing circuits, and a new double-circuit connecting from South Yorkshire into the East Midlands network. Electricity distribution in the region is entirely served by the [REDACTED] (DNO).

2. East Midlands: The East Midlands network covers a large geographic area, including key cities such as Nottingham, Leicester, Derby, and Northampton. This region is diverse, ranging from urban centres to rural areas, which requires a well-balanced and resilient grid. The East Midlands acts as a vital transit route for electricity between the North, Midlands, Lincolnshire and South of England, making this strategic location a key contributor to national electricity flow and system stability. Several strategic reinforcements have been proposed on the NGET network to increase capacity on the North to South routes via the East Midlands

Figure 1: Location of EBRE on NGET's network

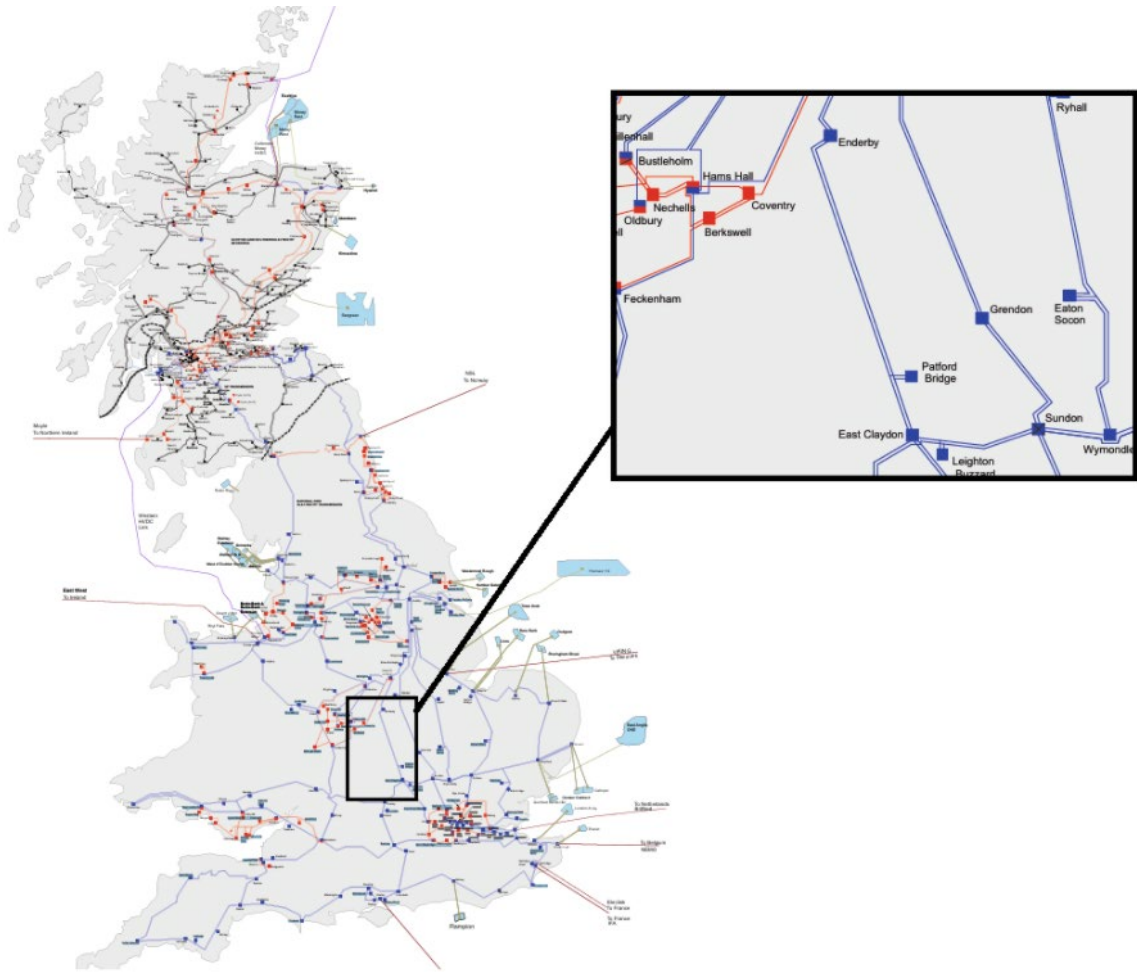
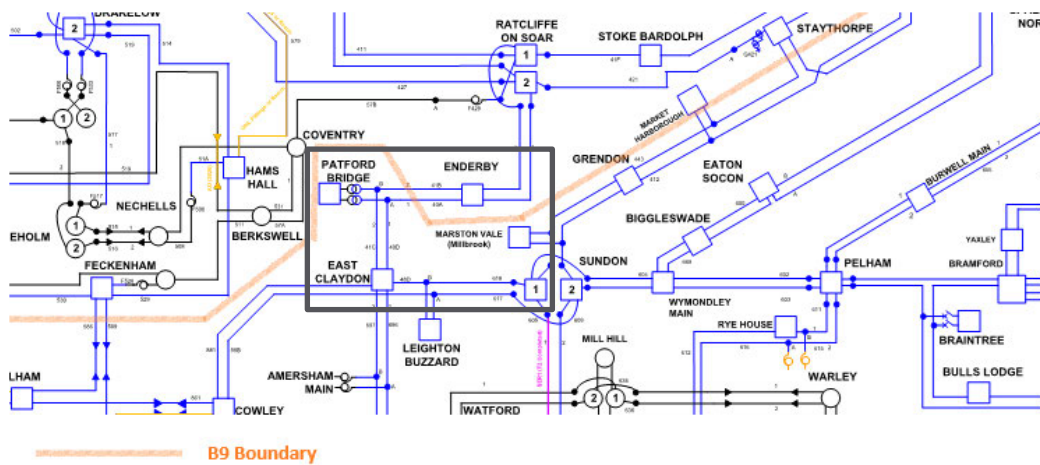


Figure 2: Network configuration around East Claydon Enderby Patford Bridge



1.1.5 Interactive Projects

Although, there are no interactions or dependencies between EBRE and other projects, it is important to recognise there are several OHL project interactions at the interface with East Claydon, Enderby & Patford Bridge 400 kV substations. As such, coordination and portfolio management is required across all interfacing projects to ensure efficient system access and supply management.

- Reconductoring of East Claydon – Amersham - Iver Circuit [REDACTED]
- East Claydon 400 kV Substation rebuild, due later than the EBRE Circuit reconductoring

On the ZL route there is a temporary diversion of the OHL at Verney Junction to allow works to commence on the railways. This programme of works is due for delivery much later than the EBRE project and will not affect the EBRE Programme.

1.1.6 Site Background

The EBRE route runs between East Claydon to Enderby 400 kV substations with a two-phase connection into Patford Bridge 400 kV substation. Although the project aims to increase the capacity of this circuit, no major works will be completed on the substations as part of this submission.

Figure 3: Satellite view of the OHL route and East Claydon, Enderby and Patford Bridge 400 kV substations



The route currently consists of;

- ZL – double circuit, [REDACTED], L2 towers, 80.71km (route)
- 4WP – double circuit, [REDACTED], L6 towers, 5.03km (route)

The ZL section was initially constructed in 1959. The route has undergone major refurbishments in the past, with the most recent refurbishment taking place in 1985. The 4WP section was initially constructed in 1965. Refurbishment of this section involved replacement of fittings in 2010 however the conductor is the original.

We hold wayleave agreements for this route and undertake an occupier role for these circuits and towers. Access for the route is granted under permitted development and is sanctioned under our current agreements.

The following information has been gathered by our internal lands team where we have had recent interactions with stakeholders and 3rd parties on these circuits:



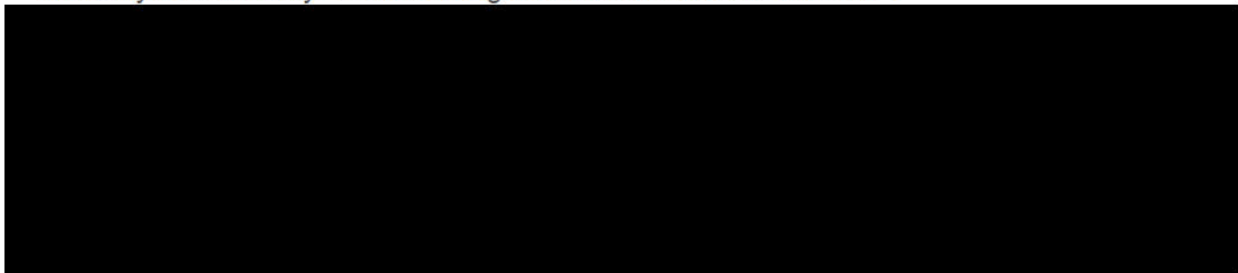
- There are no environmental considerations highlighted upon this route due to the nature of the land (predominantly intensive agricultural land).
- There may be significant/widespread farming incentives that could cause access constraints through environmental enhancement-based schemes on individual land ownership upon the route which may need to be considered at the time of delivery.



There are 57 Category 1 crossings along the route, including crossing railways 6 times, and dual carriageways/motorways 10 times. Additionally, there are 72 Category 3 and 4 crossings, mainly consisting of farm tracks and DNO lines. *Note: for more information on crossings, please see appendix B which includes some photos of the major crossings.*


1.1.7 Historic Funding

East Claydon - Enderby – Patford Bridge constitutes routes ZL and 4WP.



No additional funding has been provided for this project to date. All preliminary work completed at risk.

1.1.8 Early Asset Write Offs (EAWO)

The estimate of spend using our statutory Fixed Asset Register and estimate of remaining Regulated Asset Value (RAV) on existing assets for ZL and 4WP as of 2026 is 

2. Drivers & Needs Case

2.1 Drivers

The investment in the East Claydon - Enderby – Patford Bridge circuit is driven by load-related needs with additional asset health benefits:

Table 3: EBRE Drivers

Type	Description	Date
Network Operability (tCSNP)	East Claydon - Enderby – Patford Bridge (EBRE) <ul style="list-style-type: none"> OHL reconductoring 	█

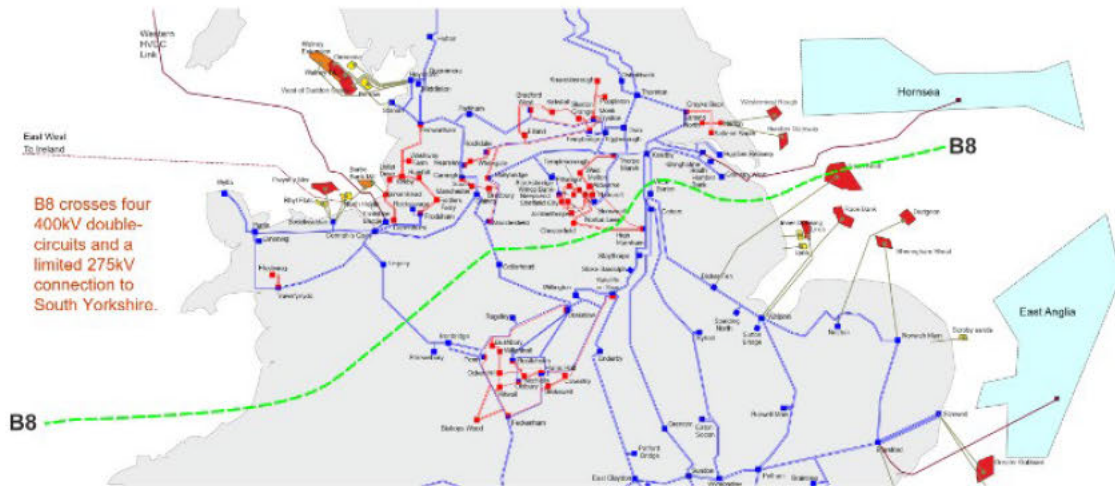
2.2 NESO requirements

Primary driver: Network Options Assessment

The primary driver for this investment is the need to increase capacity across the █ boundary by approximately █ MW and the █ boundary by █ MW, as signalled by the NOA7 Refresh, with an Optimal Delivery date █. This is to contribute towards meeting the power transfer requirements of █ GW and █ GW across the █ and █ boundaries respectively by █. The thermal requirements of this driver will mean an increase of MVA on the East Claydon - Enderby – Patford Bridge circuits from █ to at least █.

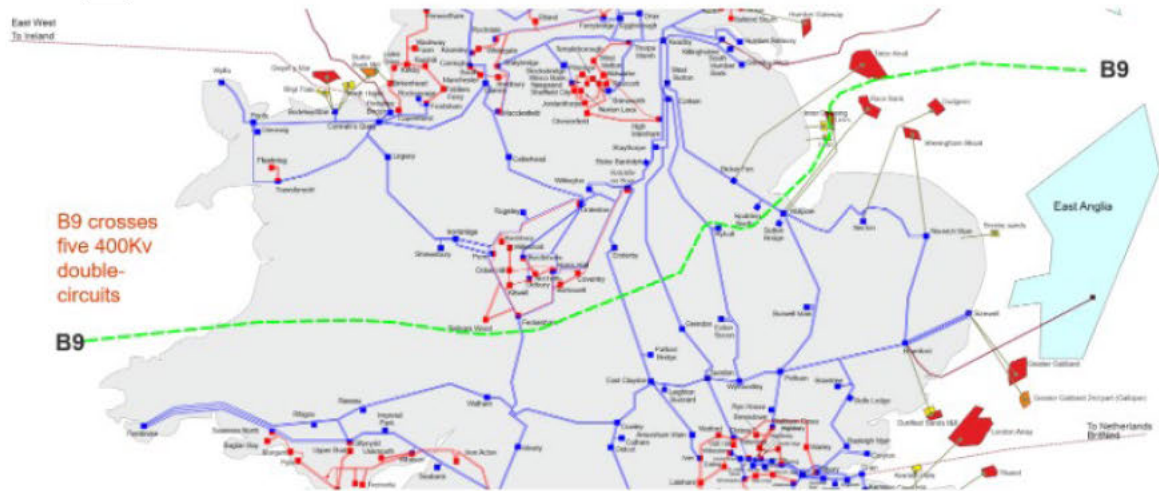
The █ boundary is one of the wider boundaries that intersects the centre of Great Britain, separating the Northern generation zones including Scotland, Northern England and North Wales from the Midlands and Southern demand centres.

Figure 4: █ Boundary Map



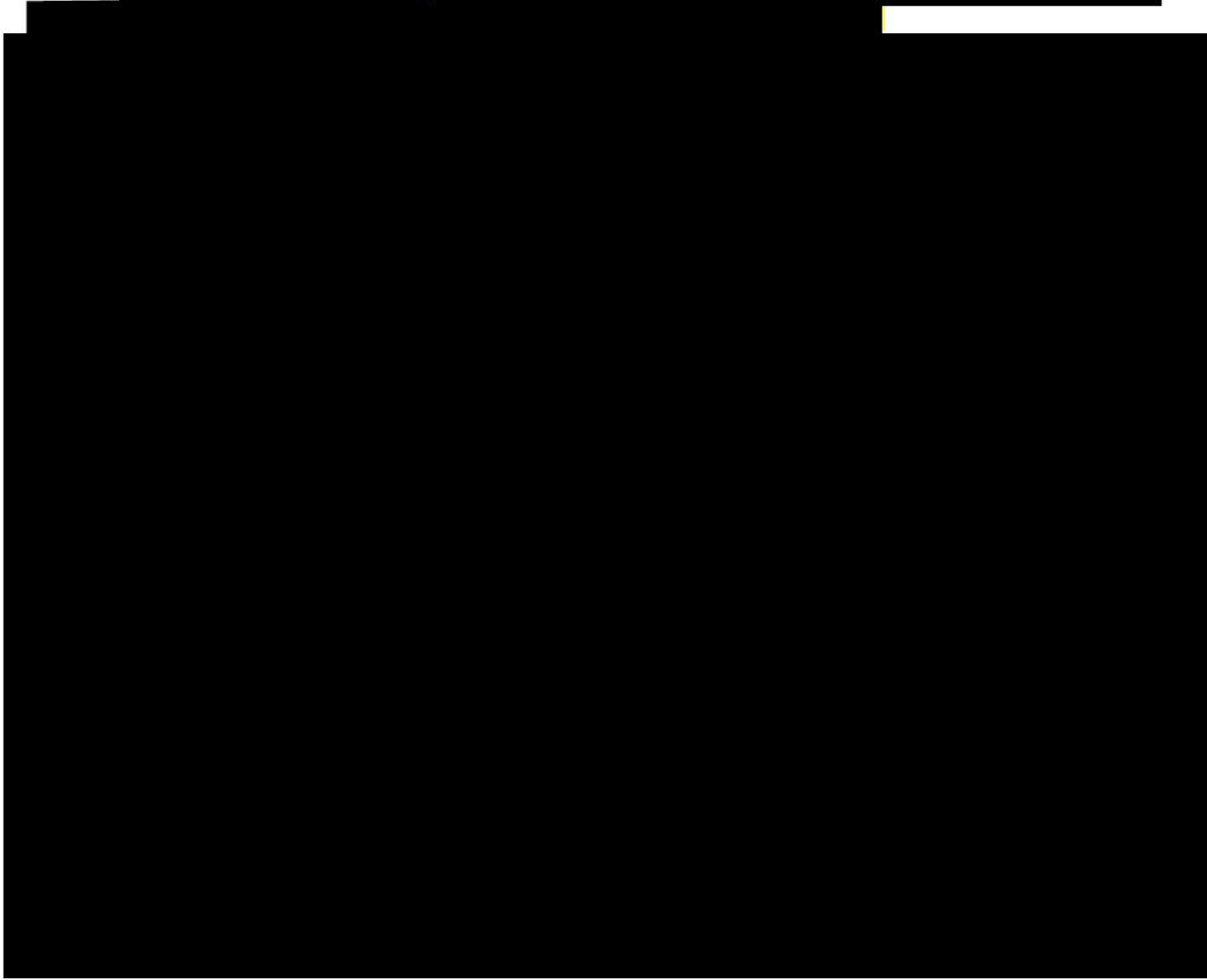
The Boundary █ separates the Northern generation zones and the Southern demand centres.

Figure 5: Boundary Map

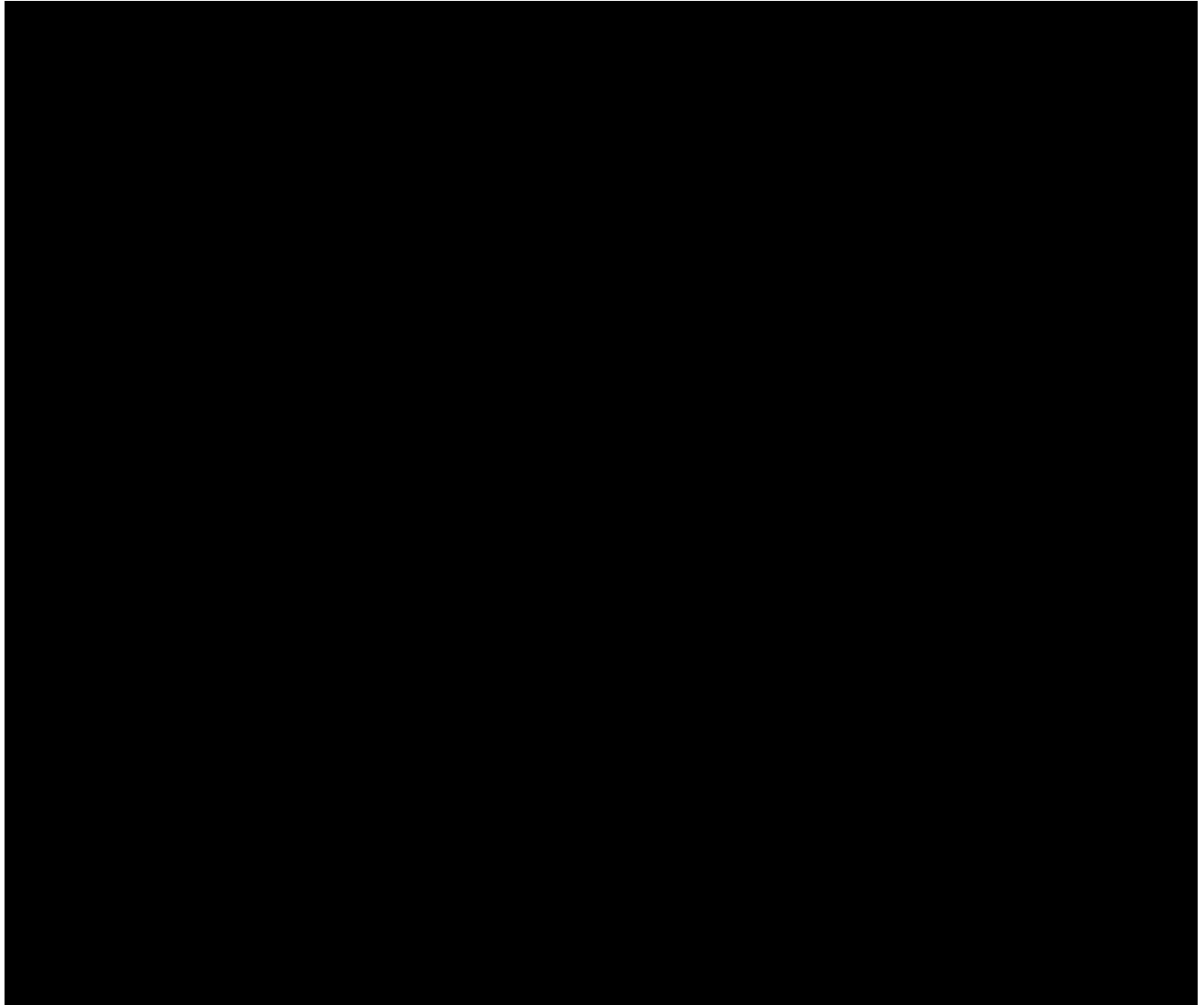


2.3 Asset Health

The primary focus of the EBRE investment is to increase network capacity. However, there will be asset health benefits delivered through the delivery of our preferred option associated with the existing conductors and steelwork



The current condition of the conductor, fittings and steelwork on the East Claydon-Enderby-Patford Bridge circuit (ZL, 4WP routes) are as per below:



The reconductoring project has therefore been scoped to address these emerging asset health needs alongside the capacity reinforcement, by replacing the conductors, fittings, and any necessary corroded steelwork, thereby ensuring continued reliability and long-term resilience of the circuit.

3. Optioneering

We follow a structured appraisal process to select the most economic and efficient solution, in the interest of consumers. We progress from longlist definition to shortlist identification through assessing each longlist option against the ability to achieve the following key outputs and benefits:

- Must achieve post-fault winter rating of [REDACTED] as a minimum requirement to meet the boundary uplift triggered in the NOA7 report
- Must be able to be delivered by [REDACTED] to satisfy [REDACTED]
- Address steelwork related condition on the East Claydon – Enderby - Patford Bridge circuit
- Consider opportunity to provide further capacity to address potential future needs

3.1 Strategic Options

In line with our standard optioneering process, we considered the following broad strategic options:

Table 5: Breakdown of Strategic Options

Option Number	Option Name	Option Description
A	Do nothing	The network is kept in its current state, and no circuit upgrades are made
B	Hotwiring	Meet the increased rating by operating the circuit at a higher temperature
C	Install power flow control devices	Meet the increased rating by installing power flow control devices enabling active control and redistribution of power flows on the network circuit.
D	Reconducting and Hotwiring	Meet the increased rating by Hotwiring where possible and reconductoring where necessary.
E	Reconductoring	Meet the increased rating by increasing the capacity of the existing circuit by replacing the conductors and associated works
F	New circuit	Meet the increased rating by building a new circuit
G	Dynamic line rating	Meet the increased rating by using real-time monitoring and dynamic calculation of line capacity (based on actual weather and conductor conditions such as wind cooling, ambient temperature, solar heating, temperature/sag) to increase the permitted rating when conditions allow.

In total, 14 options were developed in our long list, with 11 options relating to reconducting to assess the feasibility of all standard conductors and bundle configurations that are compatible with the existing L2 and L6 tower type along the East Claydon - Enderby - Patford Bridge circuit (listed below). Other conductors (including Lynx, Upas and Leipzig) and alternative bundle configurations have been excluded, as they are not approved for use on L2/L6 towers.

Method:

To identify the most suitable options we considered the following additional factors to the primary driver.

- We examined current and future load requirements utilising the NGET [REDACTED] model. The predicted total demand forecast is circa [REDACTED] GW at Enderby and [REDACTED] MW at East Claydon which means the demand on the [REDACTED] and [REDACTED] boundary requirement will remain high. The options consider this to ensure we do not sterilise the circuit potential future need.
- It is important to note that no sensitivity was performed in terms of timing, as timescales are limited by system access constraints due to the significant volume of works in the region.

We short listed 4 options - E-1, E-4, E-5 and E-6 for a more detailed analysis to determine which conductor system would be the most suitable to address all drivers and additional considerations. Throughout the RIIO-T3 period we will continue to verify the most efficient conductor type as material prices and technology change.

3.2 Siting

There was no siting study conducted as there is no proposed change to the existing route.

3.3 Longlist of options considered

Table 7: Longlist table

Options	Technical Description	Relevant Diagrams or Layout References	Consenting Risks & Environmental Impact	Reason for Rejecting or Taking Forward the Option ¹
A: Do Nothing Rejected	The network is kept as is, circuits are not updated	N/A	N/A	Engineering: Would not deliver the required 3100MVA rating Compliance: Would not comply with SQSS
B: Hotwiring the East Claydon - Enderby – Patford Bridge Circuit Rejected	Hotwiring is when a circuits rating is increased by operating the circuit at a higher temperature	N/A	N/A	Engineering: Rejected because the hotwire intervention does not provide sufficient MVA increase for the Rubus conductor (ZL route) to meet the NOA driver. Hotwiring the East Claydon - Enderby – Patford Bridge Rubus circuit would only achieve a circuit MVA rating of 2210MVA Winter post-fault at 90°C which would be insufficient. Hotwiring the Zebra circuits (4WP route) would meet the need; please see details in Options D.
C: Install Power Control Devices (Smart Valves or Quad boosters) Rejected	installing power flow control devices enabling active control and redistribution of power flows on the network circuit.	N/A	N/A	Engineering: Rejected due to being insufficient to resolve the thermal limitations due to the increasing North-to-South power flows. Additionally, the introduction of impedance exacerbates voltage stability issues, particularly under certain fault conditions. The use of a power control device would cause overloads on adjacent circuits and exacerbate voltage issues.
D: Reconductoring of ZL route with Hotwiring of 4WP route. Rejected	Not PASE Compliant.		Minor consenting requirements, only if additional ground works are needed to achieve clearance.	Engineering: Hotwiring the Zebra circuits (4WP route) would meet the need. But as explored in option B the ZL route would not be suitable for hotwiring due to not meeting the required rating of 3100MVA. This option has been rejected due to the system access and additional cost for limited benefit. Hotwiring the 4WP route would only be a temporary solution which would require a second programme of work with more system access within five years of reconductoring the ZL route [REDACTED]

¹ All conductor ratings stated in this column are in reference to winter post-fault ratings (MVA)

Options	Technical Description	Relevant Diagrams or Layout References	Consenting Risks & Environmental Impact	Reason for Rejecting or Taking Forward the Option ¹
E-1: Reconductor the ZL circuit with [REDACTED] Taken Forward	Not PASE Compliant. (see Table 6 for new winter rating)	<p>The layout of the route is the same for all options (see Figure 3).</p> <p>The layout of the route is the same for all options.</p>	Minor consenting requirements, only if additional ground works are needed to achieve clearance.	Engineering: This option effectively addresses the thermal limitations and meets the forecasted demand with a 3100MVA rating. With Future proofing on the 4WP route installing the highest rating conductor along the L6 Tower type in Araucaria.
E-2: Reconductor wi [REDACTED] Rejected	Not PASE Compliant. (see Table 6 for new winter rating)	[REDACTED]	<p>Minor consenting requirements, only if additional ground works are needed to achieve clearance.</p> <p>Some additional surveys required due to the land take at EPZ locations being different to other conductor types. Further FEED studies would also be needed due to the additional tension and ice loading this conductor is subject to.</p>	Compliance: As of February 2025, type registration of [REDACTED] conductor has been withdrawn, therefore this is no longer a compliant solution.
E-3: Reconductor with [REDACTED] Rejected	Not PASE Compliant. (see Table 6 for new winter rating)		Minor consenting requirements, only if additional ground works are needed to achieve clearance.	Compliance: As of February 2025, type registration for the [REDACTED] [REDACTED] has been withdrawn, therefore this is no longer a compliant solution.
E-4: Reconductor with [REDACTED] Taken Forward	PASE Compliant. (see Table 6 for new winter rating)		Minor consenting requirements, only if additional ground works are needed to achieve clearance.	<p>Engineering: This option effectively addresses the thermal limitations and meets the forecasted demand with a 3180MVA rating. Provides some futureproofing.</p> <p>Operability: Only 47km of [REDACTED] is deployed on the network so there is limited strategic spares, operational and maintenance data – leading to more reliability risk.</p> <p>Future Proofing: Although [REDACTED] is type registered at 210°C and would deliver a 3320MVA rating, existing [REDACTED] on the network is predominantly operated at 190°C and therefore there is insufficient performance evidence to support adoption at 210°C.</p>

Options	Technical Description	Relevant Diagrams or Layout References	Consenting Risks & Environmental Impact	Reason for Rejecting or Taking Forward the Option ¹
E-5: Reconductor with [REDACTED] Taken Forward	Not PASE Compliant. (see Table 6 for new winter rating)		Minor consenting requirements, only if additional ground works are needed to achieve clearance.	Engineering: This option effectively addresses the thermal limitations and meets the forecasted demand with a 3160MVA rating as a minimum across the circuit with the limiting factor being the [REDACTED] conductors.
E-6: Reconductor With [REDACTED] Taken Forward	Not PASE Compliant. (see Table 6 for new winter rating)		Minor consenting requirements, only if additional ground works are needed to achieve clearance.	Engineering: This option effectively addresses the thermal limitations and meets the forecasted demand with a 3100MVA rating as a minimum across the circuit with the limiting factor being the [REDACTED] conductors.
E-7: Reconductor with [REDACTED] Rejected	Not PASE Compliant. (see Table 6 for new winter rating)		Minor consenting requirements, only if additional ground works are needed to achieve clearance.	Engineering: Rejected due to being insufficient to resolve the thermal limitations due to the increasing North-to-South power flows.
E-8: Reconductor with [REDACTED] Rejected	Not PASE Compliant. (see Table 6 for new winter rating)		Minor consenting requirements, only if additional ground works are needed to achieve clearance.	Engineering: Rejected due to being insufficient to resolve the thermal limitations due to the increasing North-to-South power flows.
E-9: Reconductor with [REDACTED] Rejected	Not PASE Compliant. (see Table 6 for new winter rating)		Minor consenting requirements, only if additional ground works are needed to achieve clearance.	Compliance: Type registration of [REDACTED] conductor has been withdrawn; therefore, this is no longer a compliant solution.
E-10: Reconductor with [REDACTED] Rejected	Not PASE Compliant. (see Table 6 for new winter rating).		Minor consenting requirements, only if additional ground works are needed to achieve clearance.	Engineering: Rejected due to being insufficient to resolve the thermal limitations due to the increasing North-to-South power flows.
E-11: Reconductor with [REDACTED] Rejected²	Not PASE Compliant. (see Table 6 for new winter rating)		Minor consenting requirements, only if additional ground works are needed to achieve clearance.	Compliance: [REDACTED] conductor is currently not type registered so is not a compliant solution.

2

At the time of writing, the new [REDACTED] Wider market engagement is ongoing, however no additional manufacturers are currently in the formal type-registration process. The current supply route has experienced constraints associated with wider global and geopolitical factors, introducing

Options	Technical Description	Relevant Diagrams or Layout References	Consenting Risks & Environmental Impact	Reason for Rejecting or Taking Forward the Option ¹
				<p>Deliverability: Type registration activities are being progressed [REDACTED]</p> <p>[REDACTED]</p> <p>Operation: Experience from the early deployment of newly introduced conductor technologies on the network indicates that such conductors can present operational and delivery challenges, particularly in relation to installation productivity, constructability, and the establishment of repeatable installation practices. In the absence of sufficient operational deployment, established productivity benchmarks, and mature supply chain resilience, there is currently insufficient evidence to support the inclusion of the Holmes conductor within the optioneering beyond the initial options list.</p>
<p>F: New 400 kV overhead line</p> <p>Rejected</p>	Installation of new route from end to end including all new towers, fittings and conductors.	N/A	DCO required to deliver a new OHL which would lead to a 10-year planning and build time. Highest risk	<p>Programme: Would not meet the required boundary capacity by 2030.</p> <p>Deliverability: Would not be delivered within the project time frame</p> <p>Consents: Would require a DCO which is high risk and lengthy</p> <p>Cost: Cost would be significantly higher than the alternative options.</p> <p>Environment: Significant environmental impact with a new build route compared to other credible options</p>
<p>G: Dynamic Line Rating</p> <p>Rejected</p>	Installation of Sensors on the OHL to monitor and calculate real time Ratings.	N/A	N/A	<p>Engineering: Would achieve a rating similar to hotwiring, which is insufficient on the ZL route. Additionally, it would only achieve a short-term rating that can only be used in live operational planning scenarios, not permanently as a continuous rating.</p>

uncertainty around manufacturing capacity, delivery timelines, and supply resilience. These factors, combined with limited operational deployment to date, contribute to the overall delivery and commercial risk associated with adoption at this stage

3.3.1 Influence of stakeholders on shortlisting

Even though the project pertains to an existing OHL route, the proposed works will impact local communities, and NGET has the responsibility to manage these relationships. NGET will seek to mitigate potential disruptions (e.g., minor road closures, railway crossings, designated land assents, access to third party land, etc.) by engaging early with local stakeholders and parish councils, carrying out letter drops and communicating the disruptions to impacted residents and local businesses.

NGET proposes to engage with third parties such as landowners and local DNOs once we have completed FEED, and once we have certainty on access routes and expected road closures to complete the work scope.

Where possible, a NGET Land Officer will begin scheme development at least two years before project delivery. This provides sufficient time for a land rights audit which will highlight apparatus that is not appropriately secured. The Land Officer then has 24 months to pursue the Statutory process to secure NGET's land rights should voluntary negotiations prove unsuccessful.

A land agent, instructed by NGET's Land Officer, will write to all parties affected by a project at the earliest opportunity and when all pertinent project information becomes available to warrant a meaningful conversation. NGET's land agent will discuss all works and access requirements with affected grantors and agree suitable accesses and accommodation works if necessary. Projects will need to give sufficient time for the identification and relocation of land-based business activities such as golf courses or shoots to mitigate grantor losses. Depending on the scale and perceived impact of the works, various virtual and on-site meetings may be conducted. Stakeholder engagement will continue until an Access Pack has been created clearly detailing all accesses and associated requirements to be distributed amongst the delivery team. NGET will remain a point of contact throughout the project and will reengage with all stakeholders to ensure the project has been delivered to their satisfaction and can be closed out.

Ideally, the initial 24-month window for scheme development will create an opportunity to de-risk projects by ensuring NGET's land rights are sufficient. If this is not possible, our land agents will be instructed to negotiate new rights with landowners. The risk associated with unsecured apparatus will be flagged and monitored until a new agreement has completed. Early engagement and open, honest communication are paramount to mitigate risk and ensure the continuation of mutually beneficial relationships with NGET's stakeholder population.

3.4 Shortlisted Options

The shortlisted options for this investment are below. The MVA quoted is the winter post fault.

- **Option E-1:** the reconductoring of both circuits through a full asset refurbishment of both fittings and the new conductors [REDACTED]
- **Option E-4:** the reconductoring of both circuits through a full asset refurbishment of both fittings and the new conductors with [REDACTED]
- **Option E-5:** the reconductoring of both circuits through a full asset refurbishment of both fittings and the new conductors [REDACTED]
- **Option E-6:** the reconductoring of both circuits through a full asset refurbishment of both fittings and the new conductors with [REDACTED]

For all options, and using the existing towers, a full refurbishment of fittings and the new conductor will be carried out, with the need to also strengthen the infrastructure's foundation and steel. To

further enhance the system's capabilities, the current earth wire will also be substituted with an optical ground wire (OPGW).

The reconductoring will extend the OHL circuit's life by 40 years, as the new conductor system would be replaced, responding to the asset health-related issues previously illustrated and avoiding further interventions in the long-run.

As part of this investment, we have looked at the substation equipment and other limiting factors and determined that no further work would be required to achieve the [REDACTED] winter post fault rating for both shortlisted options. For this investment, we have not costed or studied any further substation equipment as this would be additional unnecessary spend at this stage that is not required to achieve the need.

The System Design Table included in Appendix B demonstrates how the system design of the above shortlisted options has been considered in meeting the investment drivers of the project.

3.4.1 PASE

The preferred strategic option is not PASE-compliant (as it does not select the highest-rated conductor available for the existing tower type), the quantitative and qualitative analysis shows it provides the best overall outcome when considering cost, transmission losses and network operability.

3.5 Detailed qualitative analysis of shortlisted options

Qualitative analysis was carried out to understand the strengths and weaknesses of the four shortlisted options. The different features of the options were assessed and assigned a ranking from "detractor" to "benefit".

Based on the qualitative assessment presented in table 8, E-1 is our preferred option because it is widely used conductors on the network and consequently, we have experience in its operation and maintenance, making it less risky than alternative options. The conductors in E-1 are also more widely available in our supply chain and have lower TOTEX, ensuring value for end consumers.

Table 8: Qualitative Analysis of Shortlist

Option	Optioneering Categories				
	Engineering	Environmental	Deliverability	Economic/Consumer Value	Consenting /Stakeholder
Option E-1 – Reconductor with [REDACTED]	[REDACTED] meets the required ratings for the L2 ZL route but is not the highest rated conductor. [REDACTED] gives futureproof capability on the 4WP route for any further uprating requirements if future demand was to increase.	[REDACTED] Conductor has less MVH Losses per year against the alternative options suitable for L2 towers per KM. [REDACTED] has less MVH losses per KM than the alternative options for L6 towers.	Both [REDACTED] are used extensively across the network giving confidence in operation and maintenance of the system.	As per the quantitative analysis below, Option E-1 is the second lowest TOTEX Value.	Throughout the route all options would require the same consenting and stakeholder engagement. Set up sites and pulling zones for installation of [REDACTED] conductors require less lay down areas during installation than alternative ACCC conductors. Due to the bend radius requirements of the carbon core during installation.
	Neutral	Benefit	Benefit	Detractor	Benefit
Option E-4 – Reconductor with [REDACTED]	Use of highest rated conductor on both tower types using existing infrastructure, thereby maximising capacity on the network.	[REDACTED] Conductor has higher MVH Losses per year against the alternative options suitable for L2 towers per KM. [REDACTED] has less MVH losses per KM than the alternative options for L6 towers.	First and only installation of [REDACTED] on NGET network was in 2013 ~47km. The installation of [REDACTED] was found to be technically more complex and limited knowledge and expertise from that installation remain within industry leading to more burdensome maintenance requirements. [REDACTED]	As per the quantitative analysis below, Option E-4 is the third lowest TOTEX Value.	ACCC conductor requires specific tension stringing methodologies impacting land take areas during tension stringing. These increased land take areas (whilst not as optimal as [REDACTED]) are known and therefore a 'neutral' rating is appropriate.
	Benefit	Neutral	Neutral	Detractor	Neutral

Optioneering Categories					
Option	Engineering	Environmental	Deliverability	Economic/Consumer Value	Consenting /Stakeholder
Option E-5– Reconductor with [REDACTED]	Use of highest rated conductor using existing infrastructure, thereby maximising capacity on the ZL route however the [REDACTED] is not the highest rated conductor available for the 4WP route.	[REDACTED] Conductor has higher MVH Losses per year against the alternative options suitable for L2 towers per KM. [REDACTED] has higher MVH losses per KM than the alternative options for L6 towers.	First and only installation of [REDACTED] on NGET network was in 2013 ~ 47km. The installation of [REDACTED] was found to be technically more complex and limited knowledge and expertise from that installation remain within industry leading to more burdensome maintenance requirements. [REDACTED] is also only type registered to a single manufacturer creating a sole supplier dependency. [REDACTED] conductors are not extensively installed on the network with limited installation experience.	As set out in the Cost Benefit Analysis section below, Option E-5 is the highest TOTEX Value.	ACCC conductor requires specific tension stringing methodologies impacting land take areas during tension stringing. These increased land take areas (whilst not as optimal as [REDACTED]) are known and therefore a 'neutral' rating is appropriate.
	Neutral	Detractor	Detractor	Detractor	Neutral
Option E-6 – Reconductor with [REDACTED]	Both conductors meet the required rating but neither conductor is the highest rated for the tower types.	[REDACTED] has less MVH Losses per year against the alternative options suitable for L2 towers per KM. [REDACTED] has higher MVH losses per KM than the alternative options for L6 towers.	[REDACTED] Conductors are used extensively across the network, therefore there is sufficient experience in operation and maintenance, However [REDACTED] is not extensively used on the network with only limited installation experience with installation and maintenance.	As set out in the Cost Benefit Analysis section below, Option E-6 is the lowest TOTEX Value.	Set up sites and pulling zones for installation of [REDACTED] conductors require less lay down areas during installation than alternative ACCC conductors. Due to the bend radius requirements of the carbon core during installation of ACCC
	Detractor	Neutral	Detractor	Benefit	Neutral

3.6 Detailed quantitative analysis of short-listed options

3.6.1 Cost estimates of shortlisted options

To assess the shortlisted options, cost estimates have been created for quantitative economic comparison. All capex costs are derived from NGET's latest Cost Book (23/24 prices). Estimating Units Lines (EULs) have been used to generate cost estimates based on the scope of work and the new assets to be acquired for each option. For each EUL, [REDACTED], based on historic project analysis, to account for unforeseen circumstances and to mitigate risks during implementation.

Table 9: Cost Estimate Breakdown

Option	OHL (£m)	Cables (£m)	Substation (£m)	Total (exc. risk) (£m)	BNG (£m)	Total (incl. risk) (£m)
E-1 Reconductor with [REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
E-4 Reconductor with [REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
E-5 Reconductor with [REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
E-6 Reconductor with [REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

3.6.2 Cost drivers

Option E6 has the lowest cost due to the [REDACTED] conductors having a lower EUL when compared to [REDACTED].

The project's cost estimates are based on current market conditions, with ongoing work to refine requirements. Using the cost book, the main factor driving the costs for the shortlisted options are the unit costs of OHLs.

3.7 Cost Benefit Analysis

3.7.1 Purpose and Approach

Our Cost Benefit Analysis (CBA) evaluates the economic efficiency and consumer value of the proposed transmission investments. This analysis aligns with Ofgem's Load Re-opener Guidance and Submission Requirements.

The CBA process integrates monetised benefits such as constraint cost savings, system efficiency improvements, and consumer bill impacts, alongside a comprehensive Whole-Life Cost Analysis (WLCA) that captures capital expenditure, operational and maintenance costs, replacement cycles, carbon impacts, and future extendibility. This dual approach ensures a balanced assessment of both short-term economic benefits and long-term cost efficiency, avoiding the risk of asset stranding or future inefficiencies.

Our CBA considers:

- Robust optioneering and sensitivity testing: We have evaluated credible alternatives, including 'do nothing' and 'do minimum' scenarios, to confirm that the preferred solution delivers the optimal balance of technical performance, environmental impact, and economic benefit.
- Quantification of constraint cost reductions: Using system operator modelling outputs and historical data, we quantify expected savings from reduced system constraints, which translate into direct consumer bill benefits.
- Assessment of delay impacts: The financial consequences of potential project delays on constraint costs and consumer bills are modelled through risk-adjusted scenarios, providing a clear understanding of the value of timely delivery.
- Inclusion of socio-economic benefits: Where quantification is challenging, qualitative evidence supported by stakeholder engagement and regional development plans highlights the wider economic benefits, including job creation and inward investment.
- Consideration of non-monetised benefits: We explicitly identify benefits that are qualitative or not readily monetisable, such as enhanced system operability, resilience, and environmental improvements, ensuring full transparency of the value proposition.
- Alignment with policy and government targets including Net Zero and AI Growth Zones: The CBA reflects the influence of national and local policies, including Clean Power 2030, net zero commitments, and economic growth plans demonstrating how the investment supports the broader energy transition.

We have assessed consumer value by comparing the whole-life costs and benefits of five shortlisted connection and substation delivery options using Ofgem's RIIO-ET3 CBA template. The assessment is completed relative to a counterfactual and on a discounted basis over a 50-year appraisal period (2027–2076), consistent with the CBA methodology.

For each option considered, we have quantified:

- Initial CAPEX investment required
- Future end of life replacement costs

The supporting CBA model quantifies the costs and benefits for this project. Using the Ofgem RIIO-ET3 CBA template spreadsheet, the CBA compares the discounted cost and benefits for consumers for the following four shortlisted options.

- E-1 Reconductor with [REDACTED]
- E-4 Reconductor with [REDACTED]
- E-5 Reconductor with [REDACTED]
- E-6 Reconductor with [REDACTED]

3.7.2 CBA Outcome

Lifetime Cost-Benefit Analysis: The lifetime costs and benefits refer to a 50-year period starting from 2027 until 2076.

Table 10: Lifetime Cost-Benefit Analysis (2023/2024 base prices, central carbon pricing, discounted values)

Option	CAPEX		OPEX	NPV £m
	Initial Investment (£m)	PV of Lifetime Costs (£m)	PV of Monetised Benefits (£m)	Total (£m)
Option E-1				
Option E-4				
Option E-5				
Option E-6				

On the basis of the discounted lifetime CBA results (Table 10), Option E-6 delivers the highest NPV (-1,034.8 2023/2024 base prices) and Option E-1 is close delivering an NPV (-1,070.1). Options E-4 and E-5 are significantly lower with NPVs of (-1,204.7 and -1,209.3) This analysis is subject to confirmation through deliverability, consents/land, outage and risk considerations, and any CBA sensitivities set out in the assumptions below.

3.7.3 Assumptions of the CBA analysis

- Core assumptions and sensitivities. The CBA results are based on the following high-level assumptions (with sensitivities used to test robustness where appropriate):
- Appraisal period of 50 years (2027–2076), with costs and benefits discounted and presented relative to the counterfactual.
- Cost base: 2023/2024 prices, aligned to the Ofgem RIIO-ET3 CBA template inputs (including treatment of replacement CAPEX and maintenance).
- Carbon: central base case carbon price applied for monetising construction carbon, SF6/alternative gas leakage and losses, with scenario testing for alternative carbon price trajectories.
- Benefits scope applied consistently across options; where option-specific benefits exist (e.g. constraints), the basis and evidence are documented and applied consistently.
- Key sensitivities considered (as applicable): timing/phasing, CAPEX uncertainty ranges, delivery/outage risk, and benefit parameter uncertainty (including losses and leakage assumptions)

3.7.4 Costs

Table 11: Summary of all additional Capex costs (2023/2024 base prices)

	Capex		Total costs (£m)
	Initial works (£m)	Future replacement (40yr) (£m)	
Option E-1			
Option E-4			
Option E-5			
Option E-6			

3.7.5 Benefits

The following benefits have been included within the CBA:

- Carbon cost of construction reduction
- Transmission loss reduction
- Constraint cost reduction
- Summary of all Benefits

Constraint costs included in the CBA have been created using a constraint cost tool. The cost demonstrates the anticipated boundary constraints under outage for replacing conductors. This is particularly useful in this case given not all options have a secondary replacement contributing to the NPV.

Table 12: Summary of constraint costs (2023/2024 base prices)

Option	Boundary Under Constraint	Number of Days Under Constraint	Total Constraint Costs (£m)
Option E-1	B8	420	-522.67
Option E-4	B8	420	-522.67
Option E-5	B8	420	-522.67
Option E-6	B8	420	-522.67

Table 13 presents the summary of all (undiscounted) benefits, including environmental and non-environmental benefits, considering the central base case carbon price.

Table 13: Summary of all benefits

Option	Environmental Benefits		Non-Environmental Benefits	Total Benefits (£m)
	Carbon costs of construction (£m)	Gas leakage (£m)	Transmission loss (£m)	
Option E-1				
Option E-4				
Option E-5				
Option E-6				

3.8 Preferred solution

Following the results of the CBA, the most cost-effective option is E-6 which is reconductoring the ZL route with [REDACTED] and the 4WP route with [REDACTED]. Operating at 90°C is the highest temperature the conductor can be operated, which would achieve a maximum 3190MVA. If GAP at 210°C becomes viable in future, this would achieve 3380MVA, however the circuit would be limited by the [REDACTED] conductor. Therefore, our preferred option is E-1 which is reconductoring the ZL with [REDACTED] to ensure the circuit is futureproof and further intervention is limited. [REDACTED] is also more commonly used on the network therefore we have more performance and operational data, and it has more established routes to market – resulting in lower reliability risk.

Operating [REDACTED] would meet the MVA rating needed to satisfy the Driver. Additionally, [REDACTED] can be operated at three different temperatures (50°C, 75°C and 90°C). Operating at 50°C would not sufficiently provide the MVA required as per the need, leaving operating at 75°C and 90°C the only credible options. Due to the makeup of the circuit, the EBRE circuits would be thermally limited to the [REDACTED] conductor. Therefore, the most aligned solution would be to string at 75°C. However, we will consider installing at 90°C, if there are no disbenefits, to create the maximum capacity for the future without the need to intervene on the asset again should the opportunity present itself. Operating at either 75°C or 90°C will still mean we maximise the circuit rating against the next limiting factor.

In addition to fully delivering the primary Investment driver (i.e. increasing the circuit capacity to at least 3100MVA), reconductoring the circuit with [REDACTED] will address other asset health considerations, while providing more headroom for additional connections.

3.8.1 Project benefits, outputs & deliverables

The preferred option is Option E-1: Reconductor with [REDACTED]. The key outputs and benefits delivered by this option, and how they align to the pillars of our ambition for RIIO T3 are as follows:

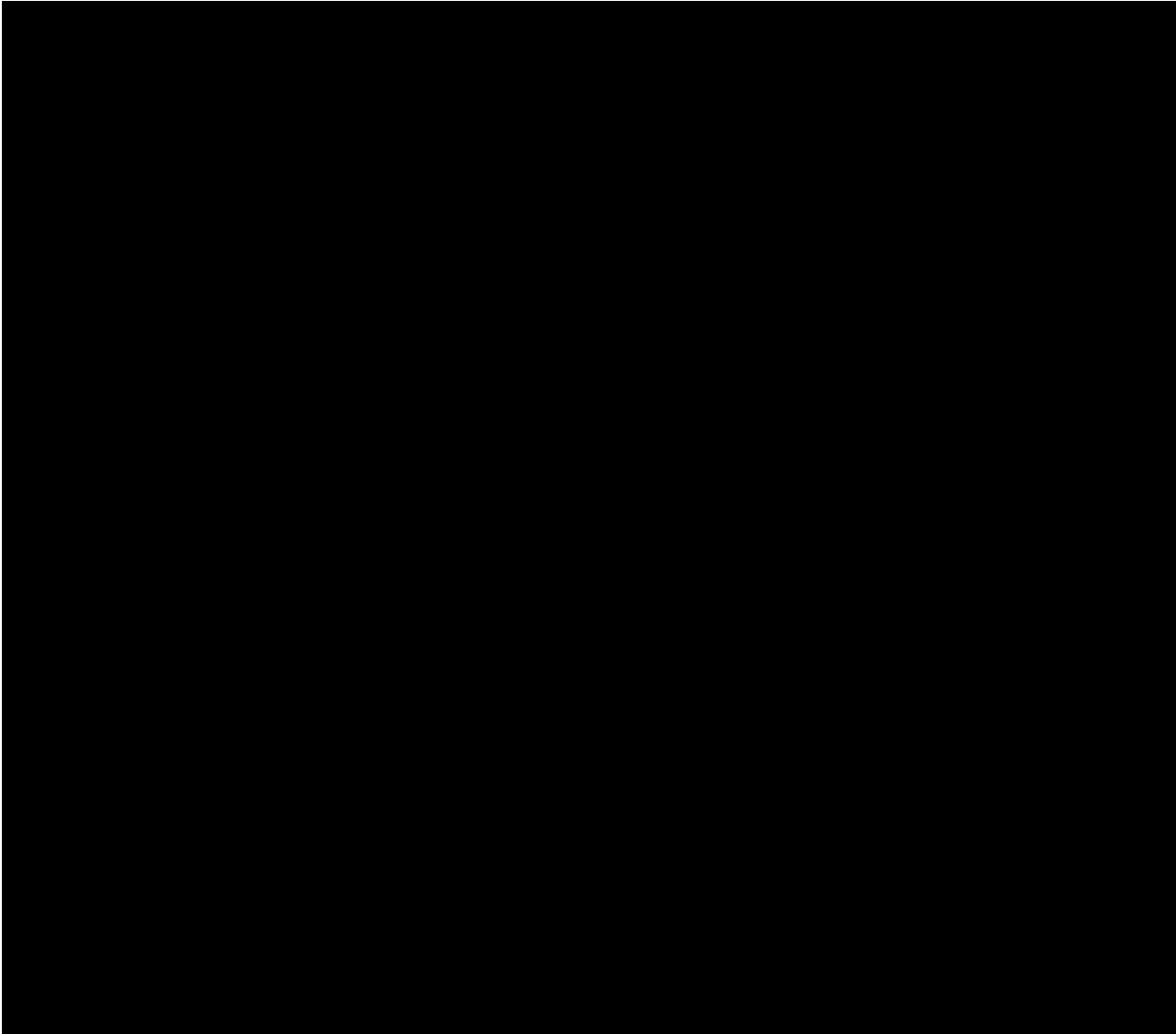
Table 13: Key outputs & benefits

Output & Proposed PCD	<p>The reconductoring of East Claydon Enderby Patford bridge double circuit with [REDACTED] on ZL route and [REDACTED] to meet the NOA/ Refresh driver to increase the [REDACTED] boundary capability by approximately [REDACTED] MW and the [REDACTED] boundary by [REDACTED] MW</p>
	<ul style="list-style-type: none"> • Increasing the circuits' winter post-fault rating from [REDACTED] MVA to [REDACTED] aligning with the next limiting factor of the substation civil infrastructure. • Enhancing the [REDACTED] boundary capability by approximately [REDACTED] MW and the [REDACTED] boundary by [REDACTED] MW • Ensuring network reliability and stability by preventing overloads during fault conditions. • By reinforcing the East Claydon Enderby Patford Bridge circuit and replacing Grade 4 steelwork, we will strengthen the reliability and resilience of our transmission infrastructure including preventing overloads during fault conditions. • This investment will contribute to the net zero energy transition, ensuring smooth integration of new generation sources and aligning with local and regional energy needs. • Carrying out a single programme of works allows for more cost- and time-efficient delivery, aligning with system access opportunities, minimising supply chain risks whilst minimising environmental and local impacts.

4. Project Delivery

4.1 Proposed deliverability programme

A summary of the schedule is show in Table 15. The delivery date [REDACTED]
[REDACTED] The programme of works considers various factors to ensure its successful execution. System access and resource availability over the ET3 period have been assessed, allowing for indicative outage dates to be identified. These outages are currently estimated to be over two outage seasons completed by FY30.



4.2 Procurement & contracting strategy

The surge in electricity network growth as well as global supply chain disruptions, have resulted in an increasingly constrained supply chain market. Recognising that NGET needs to deliver a RIIO T3 workbook of unprecedented scale, NGET has developed 'Signature Strategies' to identify solutions to the fundamental supply and demand problem that NGET increasingly faces for each of its key asset classes – substations, overhead lines, and cabling and tunnelling.

For OHLs, we are partnering with the supply chain through the Electricity Transmission Partnership to secure long-term commitments, driving efficiency and ensuring the scale-up of key resources such as line workers. Following Front-End Engineering Design (FEED), the project will be progressed through a two staged EPC contract with a pre-allocated partner, with each stage subject to assurance on scope, cost, programme and value for money. This approach, and the use of the ETP, supports delivery pace while maintaining appropriate governance and commercial assurance.

We will also explore the use of the Advanced Procurement Mechanism and bulk purchase of conductor to secure manufacturing slots ahead of need to de-risk delivery and ensure consumer value.

4.3 Risk & risk management

As previously highlighted in the qualitative options analysis, the preferred option does still present some risks; these are detailed in the following table with their respective mitigation measure.

Table 15: Risks and mitigation measures of the proposed Option

Category	Risk	Mitigation measure
Design & Technical Complexities	OHL foundations upgrades may be needed due to loadings of the new Matthew conductor.	A full round of surveys will be undertaken at front end design, such as ground investigations and intrusive foundation inspections, to assess the current ground and soil conditions and the condition of the L2&L6 tower foundations. This will inform whether foundation upgrading/strengthening is needed
	Steelwork strengthening may be needed and condition steelwork on the L2/L6 towers may be required.	Design will run an L2 tower analysis with the loading of the [REDACTED] conductors with analysis for the [REDACTED] conductors on the L6 towers. If the analysis shows steelwork strengthening is required, the additional works will be carried out during the project. Steelwork climbing surveys will be carried out to identify and grade steel degradation. If replacement is needed, steel will be ordered and fitted during the project. For CBA purposes these potential costs have been estimated. These include the procurement of 10% of steel for strengthening and assessment, as well as upgrades to 15% of foundations.
Operation & Maintenance	There is a risk of not having the correct number of strategic spares for the new conductor system and NGET linespersons trained.	NGET's Operations team will ensure that enough strategic spares are available to cover the new [REDACTED] conductor systems. [REDACTED]
Safety, Health & Security	Given the nature of a full OHL refurbishment and more intrusive work to be carried out, there is a risk to protection of 3rd party assets.	NGET will engage early with 3rd parties to ascertain the most suitable protection or closure of each asset. OHL wiring work will be carried out under single circuit outage conditions, and an experienced OHL contractor will be selected in line with NGET safety rules.

Category	Risk	Mitigation measure
Planning, Land & Consent	Not agreeing temporary access work, routes, and timings for OHL refurbishment work with landowners could cause programme delays, safety issues and a worsening of relationships with landowners.	NGET lands teams will engage early with landowners to ascertain the most suitable access routes and timings to access lands. The programme will ensure that sufficient time is given to allow this engagement.
	Ecological consenting and licenses may be needed for SSSI and habitat/species such as Dormouse or Great Crested Newts, which could lead to programme delays.	NGET when planning the job will develop a plan that limits habitat and species displacement. Full ecological surveys on the potential work areas and access routes will be carried out to then engage relevant authorities/agencies to obtain ecological consents/licenses and to develop a plan of works that limits habitat/species displacement. Any Biodiversity Net Gain needed will be identified as part of the environmental surveys however due to this being existing infrastructure and access/enabling works being temporary no habitat should be permanently lost therefore BNG will be low.
Third Party Impact & Network Coordination	3rd party asset owners such as DNO's and Highways England may be affected by the work (e.g., scaffold structures, outages, or closures).	NGET will engage early with 3rd parties to ascertain they are aligned with the project and its timings.
Environment & Sustainability	Some of the works might fall within a Site of Special Scientific Interest (SSSI), which may increase the potential for loss of habitat.	A comprehensive ecological survey of all work sites and access routes allows early engagement of environmental agencies to agree on plan of works that limits habitat/species displacement. Any Biodiversity Net Gain needed will be identified as part of the environmental surveys however due to this being existing infrastructure and access/enabling works being temporary no habitat should be permanently lost therefore BNG will be low.
	There is a carbon cost of construction associated with the works.	The works will seek to minimise the carbon footprint of the Investment in line with NGET's OHL design principles aimed at diminishing the impacts associated with high voltage OHLs and promoting the environmental quality of an area, as well as NGET's commitment to deliver carbon neutral construction by 2026. The CBA/selection of the preferred Investment solution factored in the carbon cost of construction.

Category	Risk	Mitigation measure
Timing of Programme & Resources	The long programme of works will require more resources and a more skilled workforce in an already constrained market.	Early engagement with the market will allow to plan, establish and secure the resources needed for the project.
	Procurement delays for some long lead items (e.g., conductors) may cause an overall delay in the programme of works.	Early engagement with contractors so that the materials can be ordered in a timely manner. There is also a potential for free issues materials (i.e., spares that NGET has already procured for other projects and have not been used).
	Securing and scheduling a suitable outage and delivery window for this project is a significant risk given the criticality of the circuit and desire to minimise impact on any customers.	OHL delivery is contingent on planned system access. Changes to outage availability or assumptions present a risk to critical-path delivery. This risk is managed through early validation of outage requirements, coordinated sequencing across interfacing works, and a delivery strategy that reduces reliance on outages, supported by contingency sequencing to maintain key milestones.
Cost	An increase in exchange prices of metal would increase the £-cost of the preferred solution.	We assume that OFGEM will introduce an appropriate mechanism to address the impact of Real Price Effect inflation.
	Early phase development – no project-specific risk register	We have applied a [REDACTED] risk and contingency uplift to reflect typical project risk and contingency costs. This project is currently in an early phase of development (between stages 4.0 to 4.2) and consequently has less detailed scope definition and no project-specific risk register. The [REDACTED] risk and contingency uplift reflect unaccounted project risks including material deviation from the original scope assumption and unforeseen delays. Derivation of the [REDACTED] is explained in the NGET Cost Assessment and Benchmarking Approach Annex of our submission

5. Conclusion

This document outlines the investment decision making process relating to the proposed strategy for the upgrading the East Claydon - Enderby – Patford Bridge OHL circuit. The works to be undertaken involve reconducting of the ZL OHL circuit by substituting the existing 2x500mm² [REDACTED] conductors with [REDACTED]. Alongside this, the existing 4x400mm² [REDACTED] conductors will be replaced [REDACTED].

In addition to delivering the primary investment driver (i.e. Increase [REDACTED] boundary capacity by [REDACTED] MW, and [REDACTED] boundary capacity by [REDACTED] MW), the preferred option offers a robust and deliverable solution within the required [REDACTED] timescales. The use of proven technology on existing infrastructure reduces delivery risk, avoids unnecessary repeat interventions, and ensures strong alignment with NGET's regional strategy and strategic investment principles.

The preferred option minimises the need for repeat asset-health driven interventions associated with a secondary, ageing OHL Conductor, driver as a direct outcome of addressing the primary investment driver. Delivering these works as a single, coordinated programme enables efficiencies and defers the requirement for future replacement of degraded OHL assets.

The investment has a forecast expenditure of £[REDACTED] and is expected to be delivered [REDACTED]. The proposed solution offers significant design and network resilience benefits compared to other options:

- Replacing the conductor system will limit number of asset health interventions, avoiding a double programme of works and a double mobilisation of construction.
- Providing the required [REDACTED] capacity to meet future demand while also being the most cost-effective solution for the consumer.

This submission outlines a preferred solution to satisfy the investment drivers. It seeks confirmation of eligibility under Special Condition 3.18, confirmation of eligibility for PCF under Special Condition 3.15, confirmation of re-opener Track 3 EL and NC and formal approval of the preferred option.

Table 16: Project Summary

<p>Main drivers</p>	<p>Load related: Increase [redacted] boundary capability by [redacted] MW and the [redacted] boundary capability by [redacted] MW to address power flow demands and system stability.</p> <p>Identified as a [redacted] project, aligning with the UK Government’s strategic commitment to delivering clean power across the grid by [redacted] while maintaining security of supply.</p>
<p>Selected Option</p>	<p>Option E-1 – [redacted]</p>
<p>Estimated Cost & Timing</p>	<p>Estimated Cost</p> <ul style="list-style-type: none"> Estimated capital cost: [redacted] (2023/24 prices, Inc. Risk & contingency) <p>Timing: Achieve 3100MVA by [redacted]</p>
<p>Outputs</p>	<p>The preferred option will deliver key outputs for consumers and the wider network by increasing the [redacted] boundary capability by [redacted] MW and the [redacted] boundary capability by [redacted] MW.</p> <p>The investment will enable the following outputs:</p> <ul style="list-style-type: none"> Increase [redacted] boundary capability by [redacted] MW and the [redacted] boundary capability by [redacted] MW And Increase the Post Fault Rating of the circuit to [redacted] to support future Generation and Demand. Contribute to Net Zero by utilising existing infrastructure to minimise the impact on communities, and deliver under a single programme of works for efficient delivery

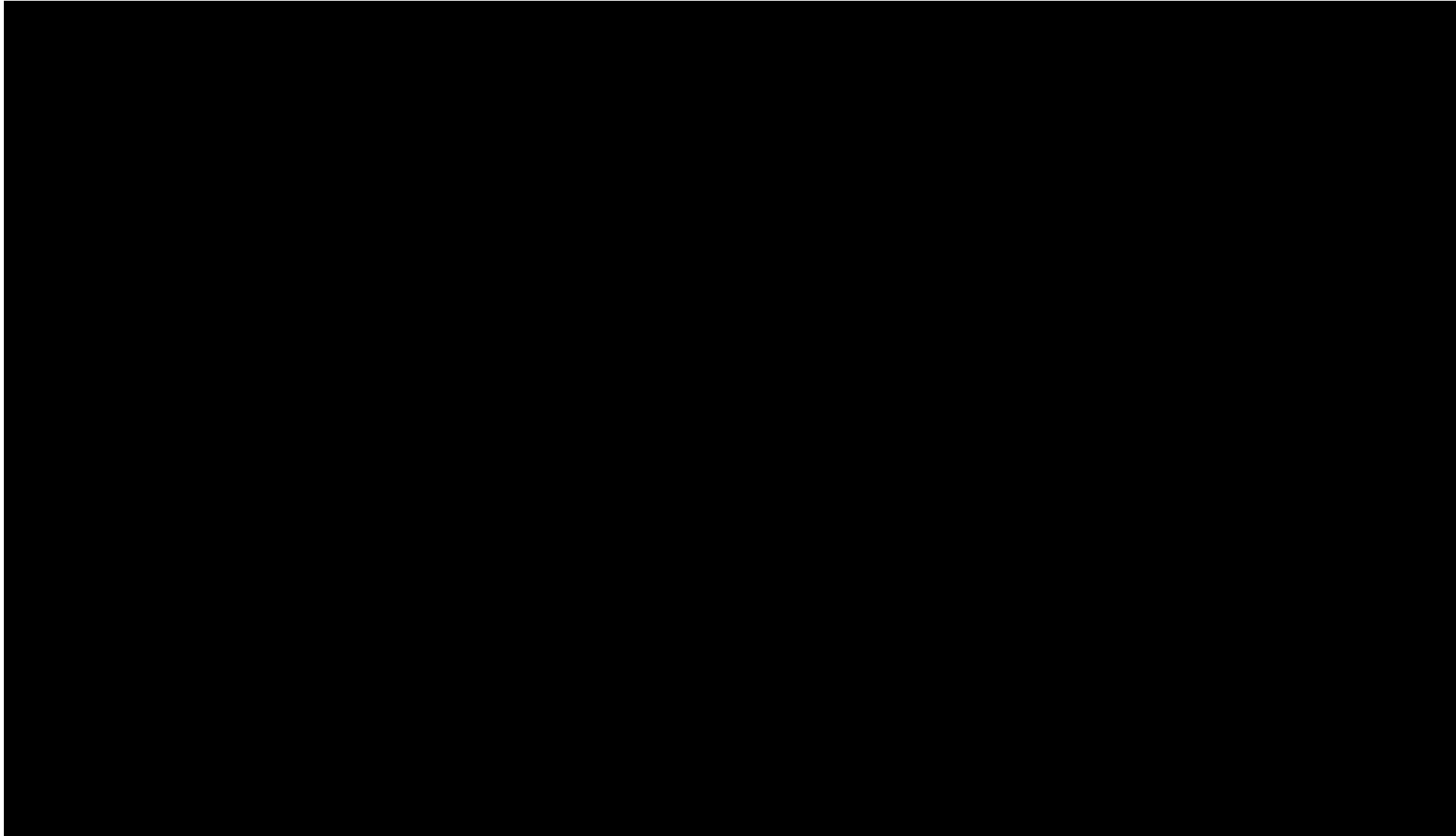
6. Appendices

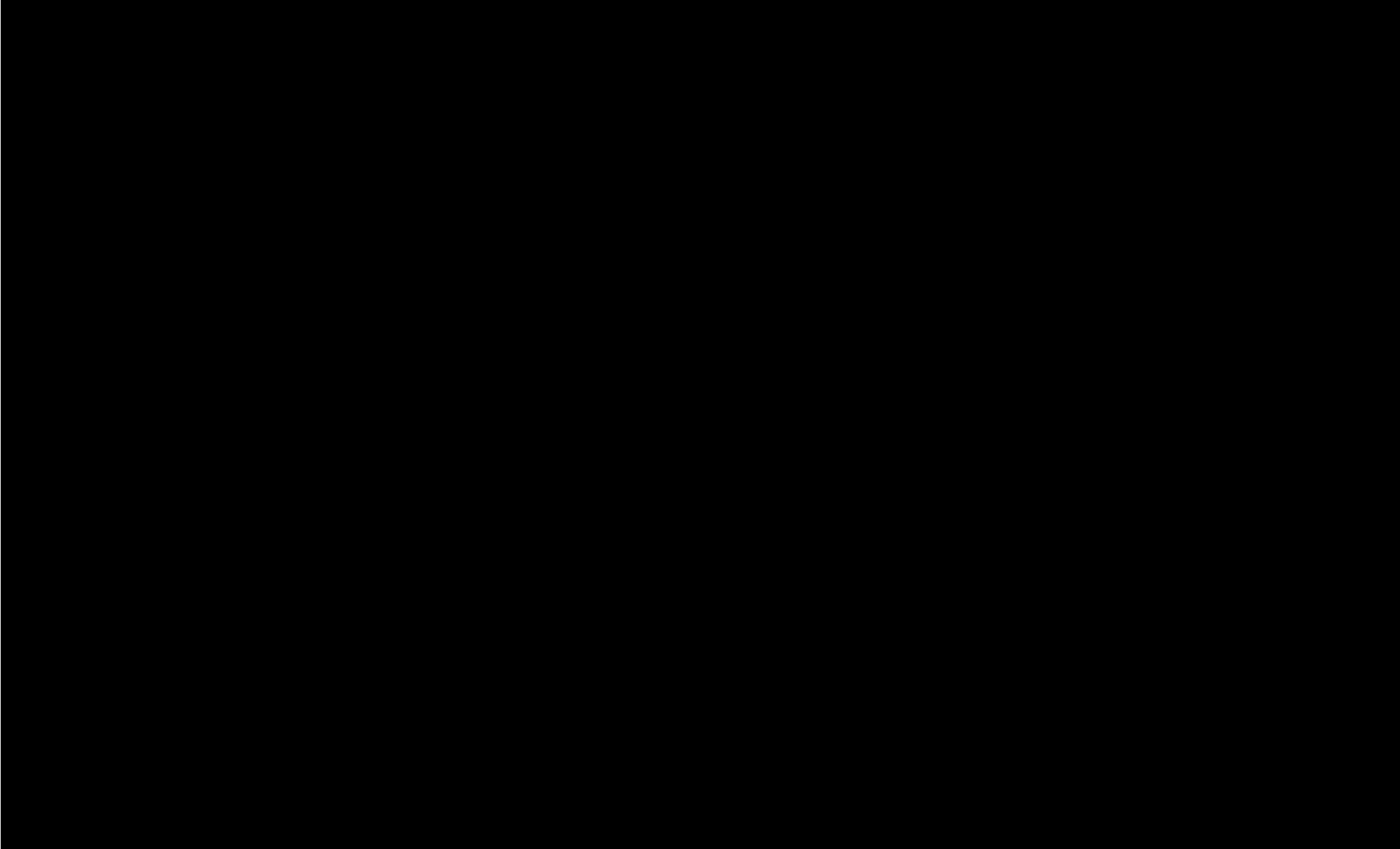
6.1 Appendix A: Acronyms

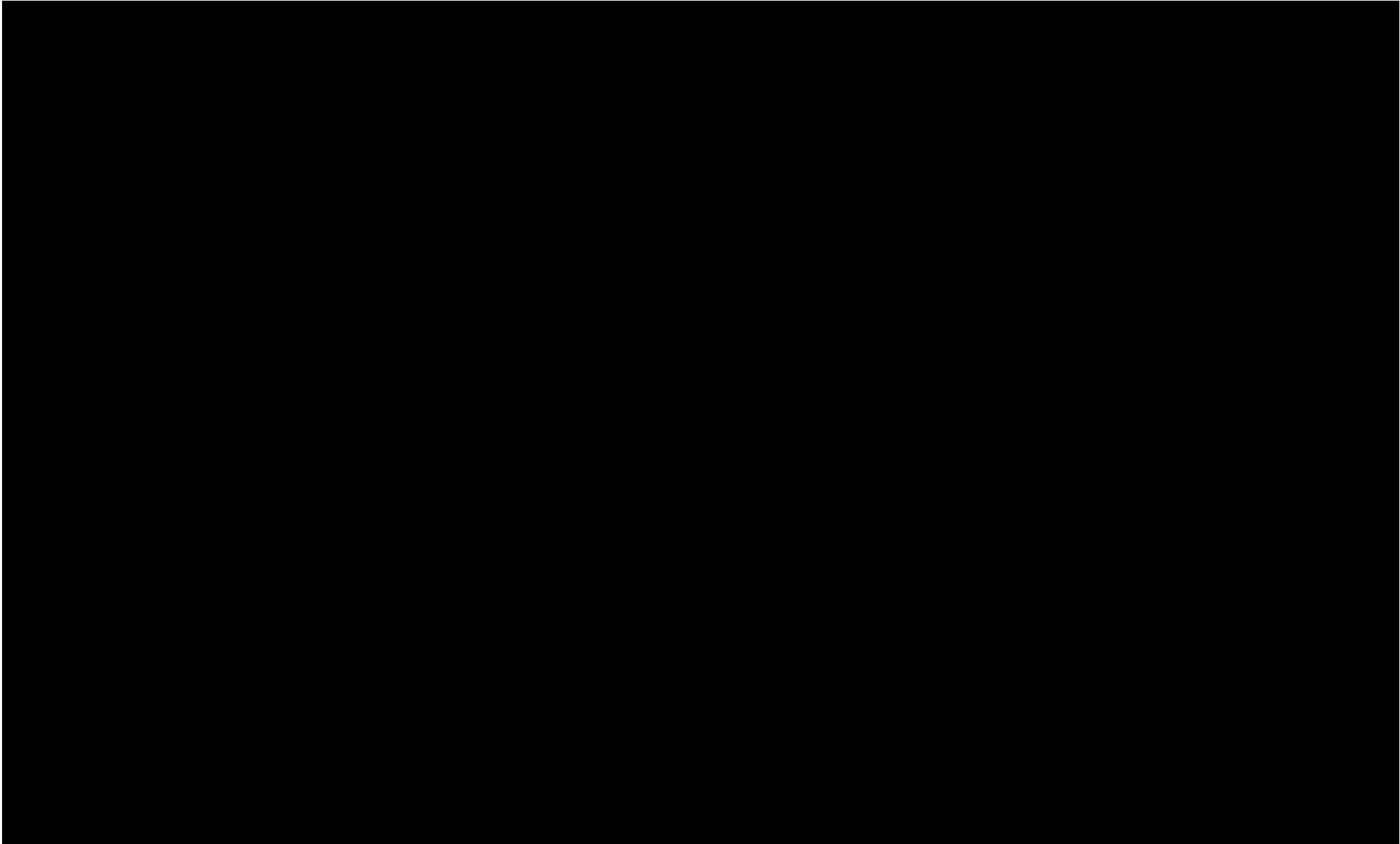
Table A.1 - Acronyms:

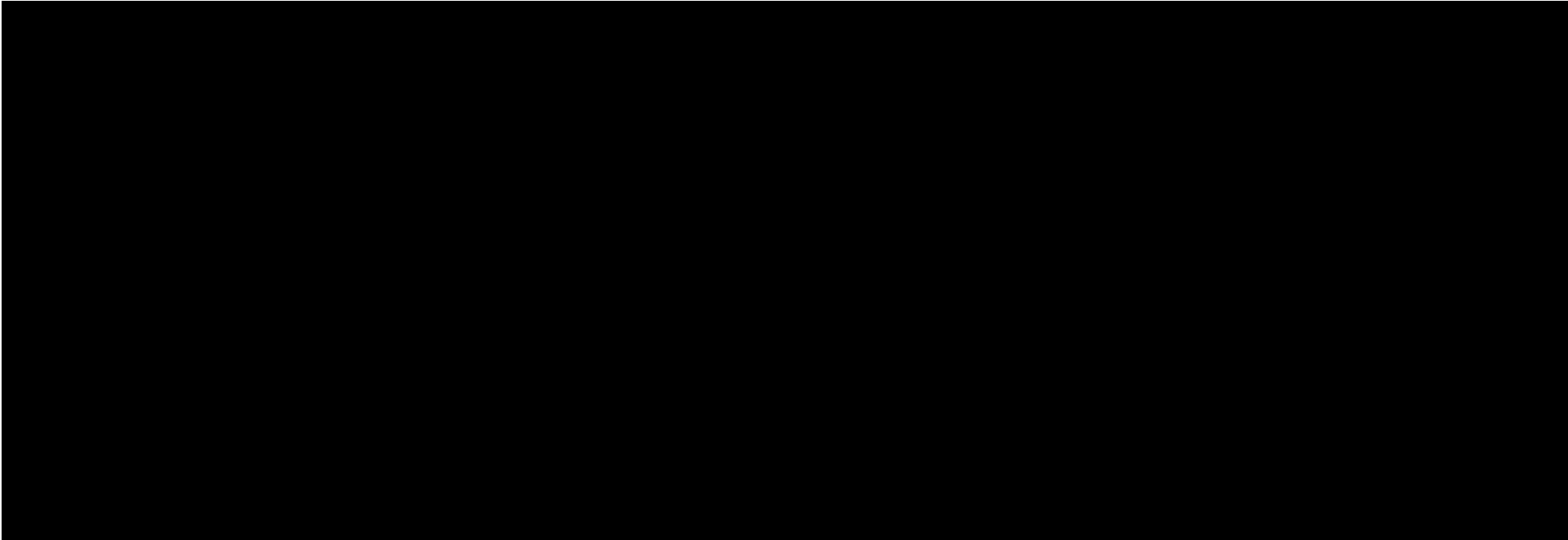
Acronym	Definition
ACCC	Aluminium Conductor Composite Core
BPDT	Business Plan Data Template
CBA	Cost Benefit Analysis
CSNP	Centralised Strategic Network Plan
CP2030	Clean Power 2030
DCO	Development Consent Order
DNO	Distribution Network Operator
EAWO	Early Asset Write Offs
EBRE	East Claydon Enderby Patford Bridge Reconductoring
EEW	Early Engineering Works
EPC	Engineering Procurement and Construction
EJP	Engineering Justification Paper
EoL	End of Life
EPC	Engineering Procurement and Construction
FEED	Front End Engineering Design
HND	Holistic Network Design
IFR1	Feckenham-Ironbridge Reconductoring Project
MVA	Megavolt Ampere
MW	Megawatt
NESO	National Energy System Operator
NGET	National Grid Electricity Transmission
NOA	Network Options Assessment
OHL	Overhead Line
PASE	Pre-Approval of Solutions by Engineering framework (from Ofgem)
PCF	Pre-Construction Funding
RAV	Regulated Asset Value
RIIO T3	Revenue = Incentives + Innovation + Outputs - Electricity Transmission 3 (Regulatory Period)
SQSS	Security and Quality of Supply Standard
SSSI	Site of Special Scientific Interest
tCSNP	Transitional Centralised Strategic Network Plan
TWR	Transmission Works Review

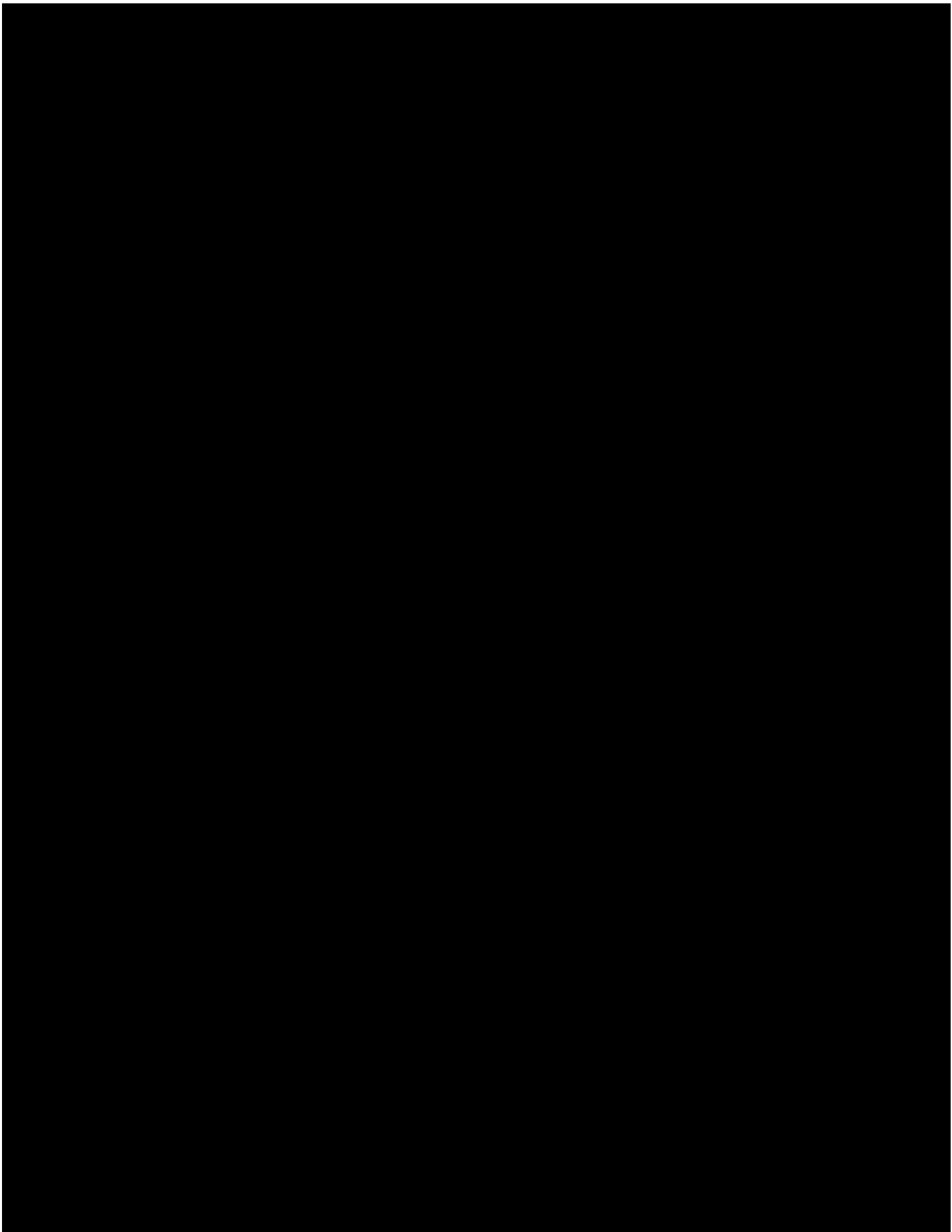
6.2 Appendix B: System Design Table

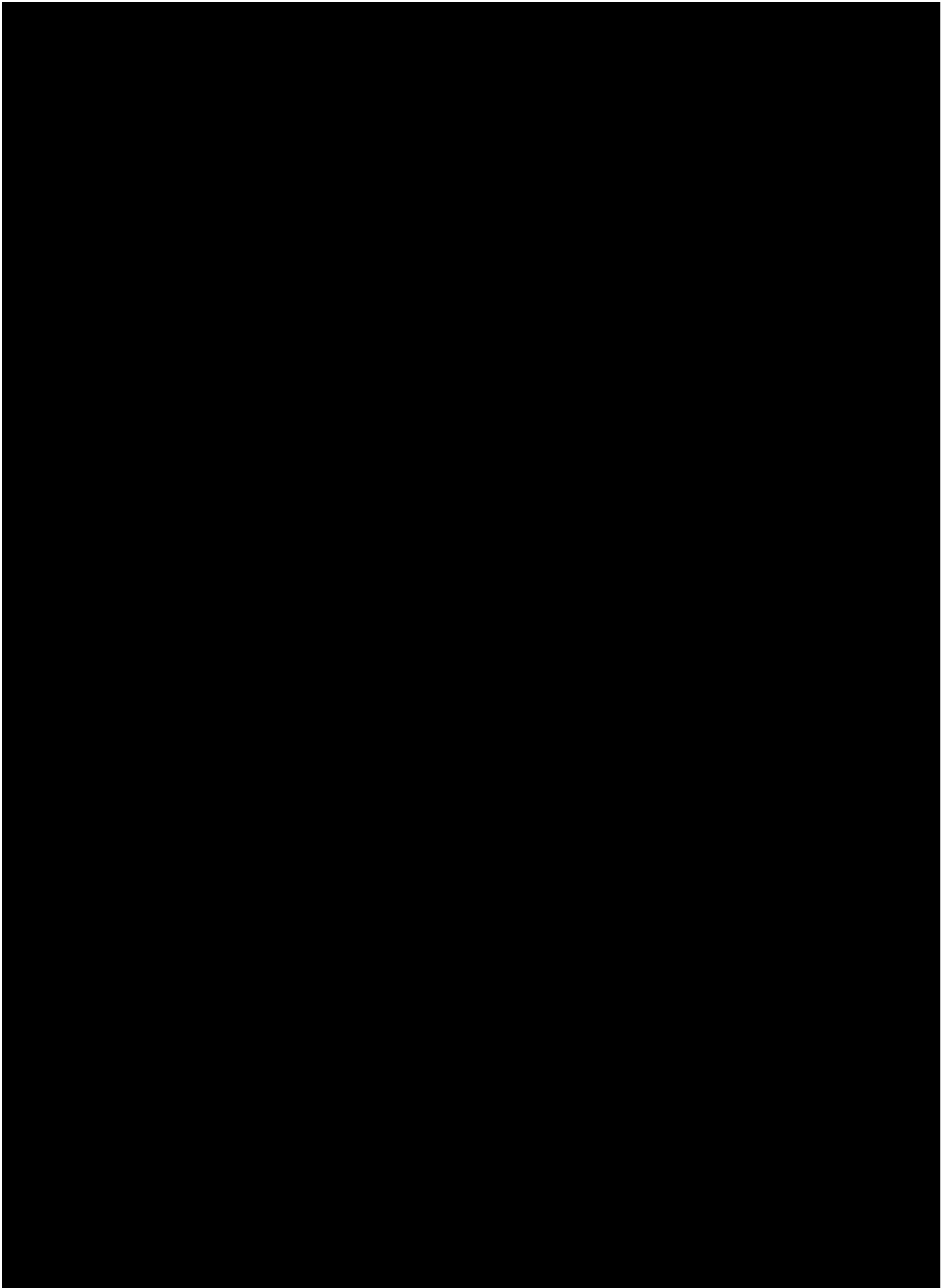


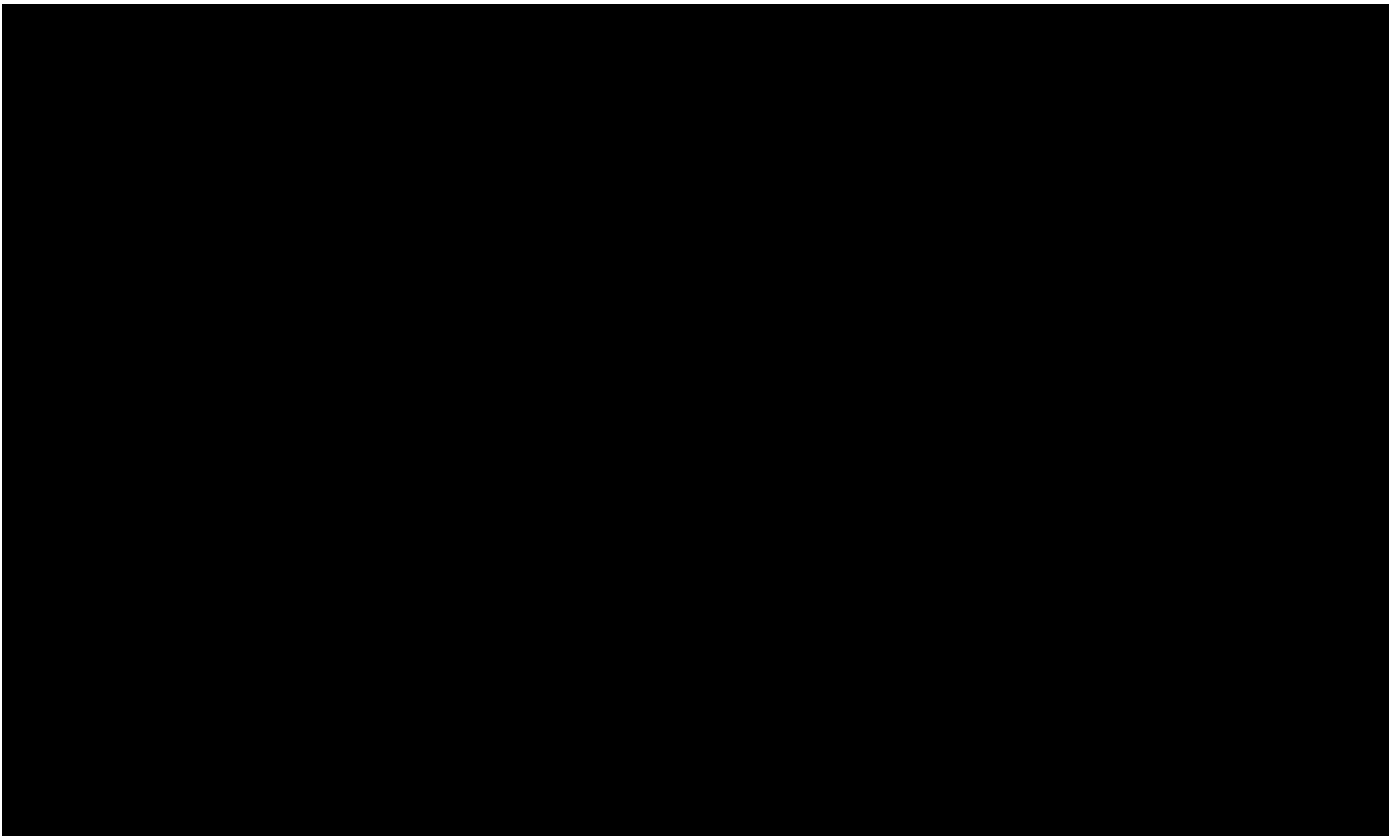












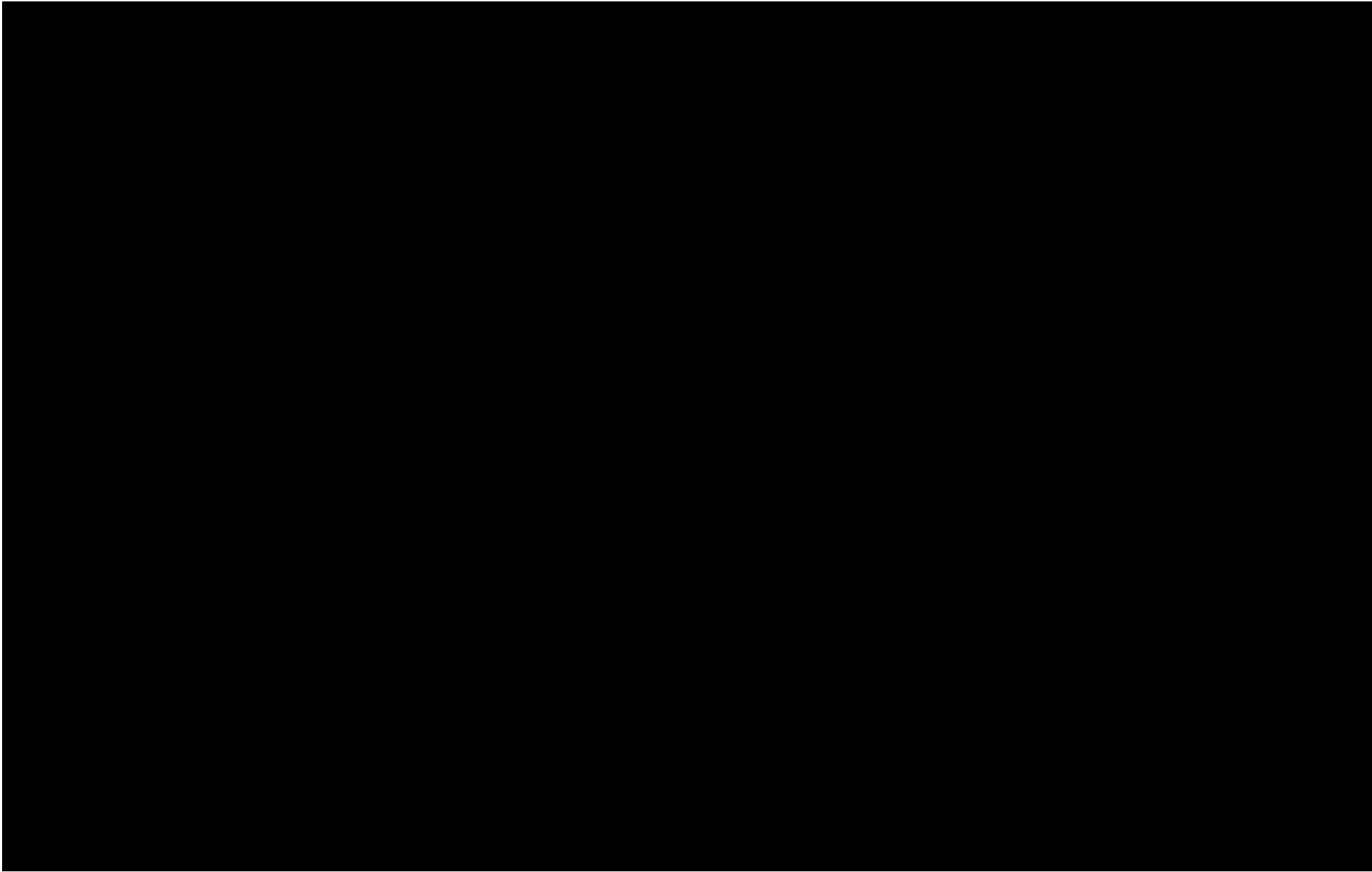
6.4 Appendix D: Additional Crossings Photos

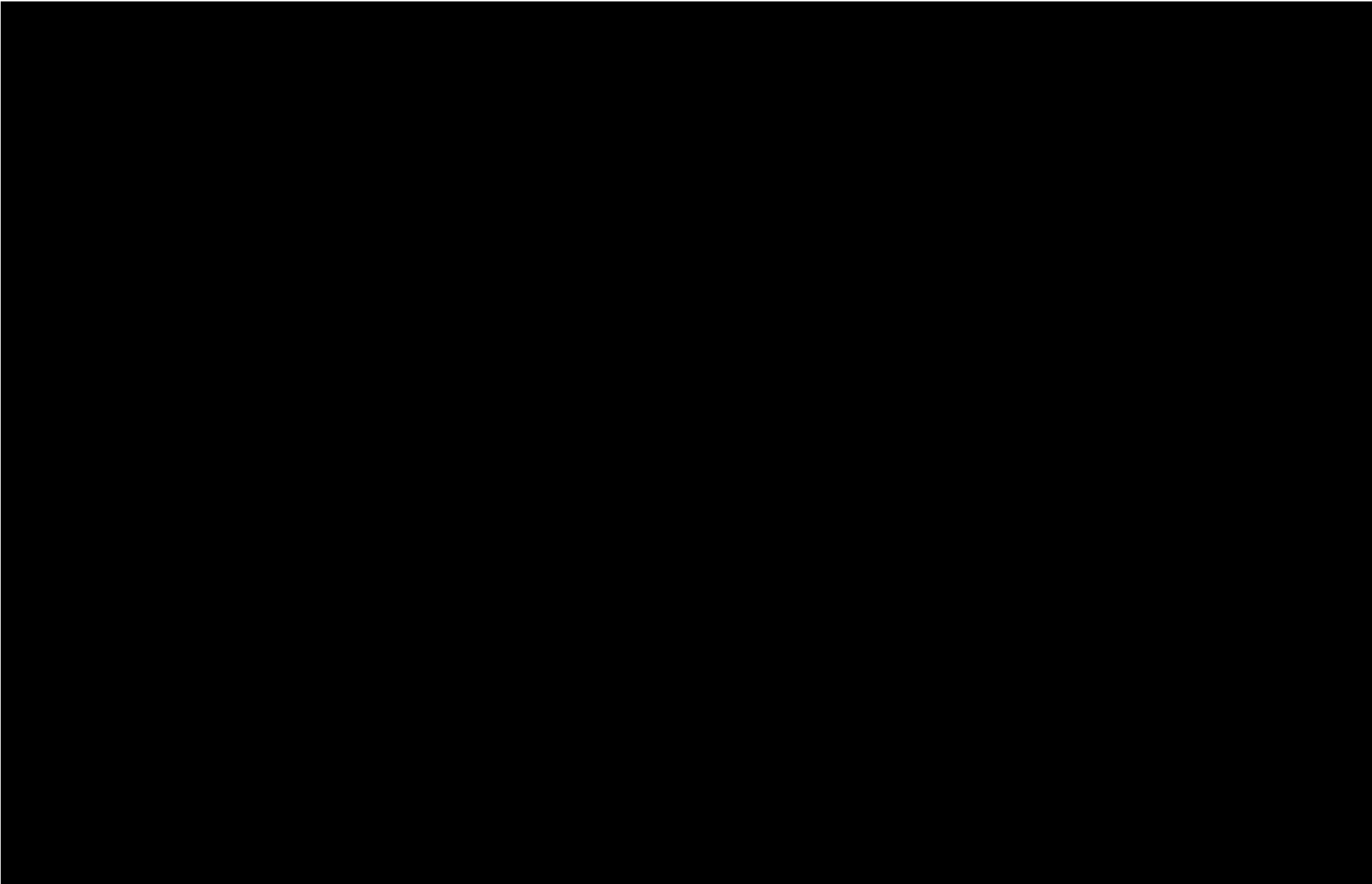
Figure D.1 – M1 motorway crossing at span ZL145-ZL146



Figure D.2 – M1 motorway crossing at span ZL228-ZL







6.6.2 Appendix F.2: [REDACTED] Steelwork Summary

Table F.2 – [REDACTED] Steelwork summary:

[REDACTED]	Volume	Unit
Total number of zones across the whole route	3420	Zones
Total number of Grade 5 and 6 zones across the whole route	0	Zones
Percentage of 5&6 of towers across the route	0	%
Total weight across the route	3042.48	tonnes
Total weight of Grade 5 and 6 across the route	0	tonnes
Total number of Grade 4 zones across the whole route	714	tonnes
% of Grade 4	20.88	%
Total Weight of Grade 4	635.18	tonnes
Survey Date Min	06/06/2012	
Survey Date Max	03/07/2019	

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