nationalgrid

RIIO-T3

Berkswell 275kV

LRR Needs Case Submission – Track 3

Confidential - May 2026

National Grid Electricity Transmission's Business Plan

Electricity Transmission

Reference and summary table

Field	Description
Project name	NGET Berkswell 275kV
TO's preferred re-opener track	Track 3 Eligibility Letter (EL) and Needs Case (NC)
RRP Reference number	NGT20011
BPDT/Scheme reference number	NGT500610
Load Board Reference	As agreed at the load board we are submitting this need case assessment with further detail on areas where there was uncertainty at the point of submission in December 2024 (in our T3 EJP submission).
Investment driver(s)	This is a load driven project, with three customers (at Gate 2) due to be connected: • The prime driver is a demand connection for HS2 • [redacted] customers are also contacted for connection [redacted]
PASE Compliance	The preferred solution D-2 is non PASE aligned. The proposed solution comprises an extension to the existing AIS mesh substation at Berkswell. As mesh extensions are not explicitly defined within the PASE framework, the option is classified as non-PASE aligned. The solution is justified based on site-specific constraints, including land and consenting limitations established through the HS2 Act, the absence of a wider asset health or system driver for full redevelopment, and the need to deliver a proportionate and deliverable intervention. Note: Investment developed and submitted to Ofgem as part of the RIIO-T3 business plan in December 2024 was ahead of the PASE criteria being developed.
Outputs	This investment provides a contracted connection for HS2 Limited, to support the nationally significant high-speed rail link being developed between London and Birmingham.
Short list of strategic options considered	The optioneering sections outlines the long list of options considered for the site and rational for taking forward two shortlisted options, listed below: • **Option D-2:** Mesh Corner extension, remote SGT Location • **Option D-3:** Mesh Corner extension, local SGT Location
Preferred solution and rationale	Our preferred solution is option D-2, which represents the most efficient and proportionate solution to meet the HS2 connection requirement.

	This option: • Meets the investment driver while minimising cost, land and programme risk. • It maximises the use of existing infrastructure and HS2-consented land • Provides the best cable routing options, avoiding complications and potential safety issues that could delay delivery • Provides more space for BESS connection [redacted] • Future proofs the HS2 connection by maintaining sufficient space to accommodate potential additional SGT requirements, if required by HS2 for their future demand needs, avoiding significant reconfiguration of the existing 275 kV substation. Cost-benefit analysis demonstrates that while Option D-3 delivers a marginally lower net present cost than Option D-2, qualitative assessment supports the case for D-2 across technical, operational, environmental and stakeholder considerations.
Expected Forecast Cost	**Estimated capital cost for our preferred solution:** [redacted] (23/24 prices, inclusive of risk & contingency [redacted]
Delivery Year	[redacted]
Applicable Reporting Tables	BPDT 10.5 ET Pipeline Log and RRP 24-25 Scheme_C&V_Calc_Load_Actuals.
Historic funding interactions	PCF funding has not been provided for Berkswell to date: • Berkswell 275kV EJP submitted as part of the RIIO-T3 Business Plan in December 2024. PCF was not awarded at Final Determination nor was optioneering approved. • Feedback last received at Draft Determination in July 2025 that more information with regards to optioneering required. • Berkswell is one of the schemes on the inflight list agreed between NGET and Ofgem discussed at the load board.
Interactive projects	[redacted]
Spend Apportionment	[redacted]

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1. Executive Summary

Project Summary

Berkswell is a load-driven investment to provide a connection to HS2. The proposed intervention is an extension to the existing 275 kV Air Insulated Switchgear mesh substation within land and through consents secured under the High Speed Rail (London – West Midlands) Act 2017, building on a long-standing connection development process that has been ongoing since HS2's initial application in 2012. This submission provides for the nationally important HS2 connection, which supports greater high-speed travel between London and Birmingham.

1.1. Submission Purpose

This paper presents our combined Eligibility Letter and Needs Case report under the Load Re-opener and Price Control Deliverable under Special Condition 3.18 of the Electricity Transmission Licence Conditions.

The purpose of this submission is to request Ofgem's approval of project eligibility against the Load Reopener criteria and seek approval of the project's needs case and preferred solution for the Berkswell scheme. This submission further seeks Pre-Construction Funding (PCF) under Special Condition 3.15 of the licence. RIIO-T3

This paper also provides an update to the Optioneering and Needs Case originally submitted within the RIIO-ET3 Engineering Justification Paper (EJP) for Berkswell 275 kV substation.

1.2. Need

This investment is load-driven and required to meet National Grid Electricity Transmission's obligation to provide a contracted connection for HS2 Limited. The proposal involves extending the existing 275 kV air-insulated mesh substation to provide a new Grid Supply Point (GSP) for HS2. The scope includes two Super Grid Transformers (SGTs), which represent the minimum network assets required to meet HS2's current contracted demand. The design utilises HS2-consented land in a manner that avoids sterilising the site and allows future HS2 requirements to be accommodated efficiently through layout and reserved space only, without committing anticipatory network investment.

Without this investment, we would be unable to meet its contractual and licence obligations to connect customers and maintain an efficient, coordinated and economical transmission system.

1.3. Optioneering to date

We undertook a structured, multi-factor optioneering process to identify a proportionate and deliverable solution in the interests of consumers. We first considered a range of strategic options, including do-nothing, market-based, whole-system, reuse of existing assets and new-build solutions. The options considered included alternative transformer locations, substation configurations and the construction of a new substation, assessed against cost, deliverability, environmental impact and alignment with PASE principles.

The options presented in our T3 EJP submission for the site have been updated following revised requirements from [redacted] This change has influenced the preferred solution, which comprises an AIS extension of the existing Berkswell 275 kV substation.

This option meets the HS2 connection requirement with materially lower delivery and outage risk, makes efficient use of existing infrastructure and land secured under the HS2 Act, and maintains space within the HS2 land allocation to accommodate potential additional SGTs for HS2 demand, if required by HS2, without requiring further works within the existing 275 kV substation. It also provides better long-term operability and asset health outcomes, at only a marginal increase in capex relative to the alternative.

1.4. Cost Estimates

Revised costings provide for a solution that meets HS2 new design requirements a
(inclusive of risk and contingency

1.5. Delivery Program

1.6. Project benefits

This submission provides for the nationally important HS2 connection, which supports greater high-speed travel between London and Birmingham.

2. Introduction

2.1. Context Berkswell 275kV

This paper provides an Optioneering and Needs Case Review, updating information from our T3 EJP submission for Berkswell 275kV substation. It is being submitted as Needs Case Assessment, under the RIIO-T3 (T3) Load Re-opener (LR) mechanism under Special Condition 3.18. Through this submission, we are seeking approval for:

- The project to be assessed under Track 3 EL and NC
- Pre-Construction Funding (PCF) under Special Condition 3.15 (Pre-Construction Funding Re-opener, Price Control Deliverable), and
- Agreement on our optioneering process and preferred solution which supports the connection of High Speed 2 (HS2) traction power to the National Electricity Transmission System (NETS) at Berkswell 275kV by extending the existing four-switch 275kV air-insulated mesh substation to a six-switch mesh configuration in order to provide a new Grid Supply Point (GSP) for HS2.

The extension will accommodate [redacted] Super Grid Transformers (SGTs) and associated switchgear enabling a contracted HS2 demand [redacted]. The solution utilises land and consents secured under the High-Speed Rail (London – West Midlands) Act 2017 and builds on a long-standing connection development process that has been underway since HS2's initial application in 2012.

Subject to Ofgem confirming needs case and PCF funding, we will continue development and intend to submit a Project Assessment in line with the re-opener process in the April 2027 window.

2.1.1. Eligibility & Project Track Statement & PASE

The Berkswell investment is driven by a contracted customer connection for HS2 and is required to provide additional transformation capacity and network interfaces to facilitate the connection of HS2 traction power to the National Electricity Transmission System. The investment is therefore load-driven and meets the eligibility criteria for submission under the RIIO-ET3 Load Re-Opener mechanism.

The project is being submitted under Assessment Track 3 EL and NC as the development is at an advanced stage, with a defined need, a constrained geographical and consenting context, and a clear preferred intervention emerging from the optioneering undertaken to date.

The proposed solution does not align with defined PASE Primary or Variant configurations, as it comprises an extension to an existing AIS mesh substation arrangement, which is not captured within the PASE framework. Further detail is provided within the optioneering assessment in Section 4.4.

2.1.2. Pre-Construction Funding Request

Under Special Condition 3.15 of the Electricity Transmission licence, this investment qualifies for allowances equal to [redacted] of its total forecasted cost [redacted] at the time of this Load Re-opener Eligibility Letter submission).

Table 1 below summarises the activities covered by the application of these PCF allowances based on forecast 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.

To date, [redacted] has been invested in development activities to date, covering range of activities up to stage 3, as detailed below in **Table 1.** A detailed breakdown of costs will be provided in Project Assessment, [redacted]

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

[redacted]

2.2. Background

2.2.1. Chronology

This investment is required to meet National Grid Electricity Transmission's obligation to provide a contracted connection for High Speed 2 (HS2) Limited. The need for a Grid Supply Point (GSP) at Berkswell, together with the associated land requirements, was established through early optioneering undertaken jointly by NGET and HS2 between 2012 and 2013.

The preferred approach identified at that time was subsequently embedded within the HS2 Hybrid Bill, which was submitted to Parliament in November 2013 and received Royal Assent through the High Speed Rail (London – West Midlands) Act in 2017.

An initial connection agreement between the system operator and HS2 was executed in December 2012. This agreement has since been subject to a number of variations to reflect changes in HS2's programme and evolving technical requirements.

The current proposal reflects HS2's latest confirmed requirement for a [redacted] traction power supply. [redacted]

A summary of the key milestones relating to the development of the HS2 connection at Berkswell is set out below.

2012–2017: Early optioneering and legislative approval

- 2012–2013: NGET and HS2 undertook early optioneering to identify suitable connection options. The Berkswell approach, based on an extension to the existing 275 kV substation, was identified as the preferred solution. The associated land take was defined to support inclusion within the Hybrid Bill.
- November 2013: The HS2 Hybrid Bill was submitted to Parliament, including provision for the scheduled works required to deliver the GSPs.
- 2017: The HS2 Act received Royal Assent, conferring statutory powers and setting constraints on siting, land use and the delivery approach for the HS2 connection infrastructure.

2023: Revised plans for HS2

- October 2023: The UK Government published revised plans for HS2 through the Network North Command Paper, confirming delivery of Phase One while stating that there were no plans at that time to proceed with Phase Two.
- The Government also confirmed that Phase One was expected to be complete in the early 2030s. Berkswell remained a key requirement within this revised programme due to its location on a constrained section of the HS2 route, where there are limited economically viable alternatives for traction power supply.

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

- December 2024: The Berkswell project was submitted as part of NGET's RIIO-ET3 Business Plan through the Early Justification Process.
- July 2025: Draft Determination feedback raised concerns regarding the breadth and robustness of the optioneering assessment, asset health and future optionality. In response, NGET provided additional information during the SQ process which we have incorporated into this submission.

2025-2026: Updated requirements and submission under the Load Re-Opener

- January 2025: HS2 initiated updated requirements for the Berkswell connection [redacted]
- March 2026: Further alignment was undertaken with HS2 to reflect the latest requirements and programme assumptions. The current agreed connection approach comprises two Super Grid Transformers.
- April 2026: Updated optioneering prepared for submission, incorporating design changes [redacted]

2.2.2. Regional & Network Context

NGET's Central Region encompasses the Midlands area and extends its connections to the Northeast, Northwest, Wales, Southwest, and East Anglia. This region plays a pivotal role in integrating the Northern and Southern UK grids. It ensures the stability and equilibrium of the national electricity system while serving as a critical conduit for electricity transmission between Wales and the East of England.

The West Midlands transmission system features 400kV North-to-South circuits, a 400kV outer ring and a 275kV inner ring. The West Midlands, recognised as the UK's industrial core with a robust manufacturing presence in automotive, aerospace, and heavy industries, is prioritising the decarbonisation of these sectors as part of the UK's commitment to achieving net-zero emissions.

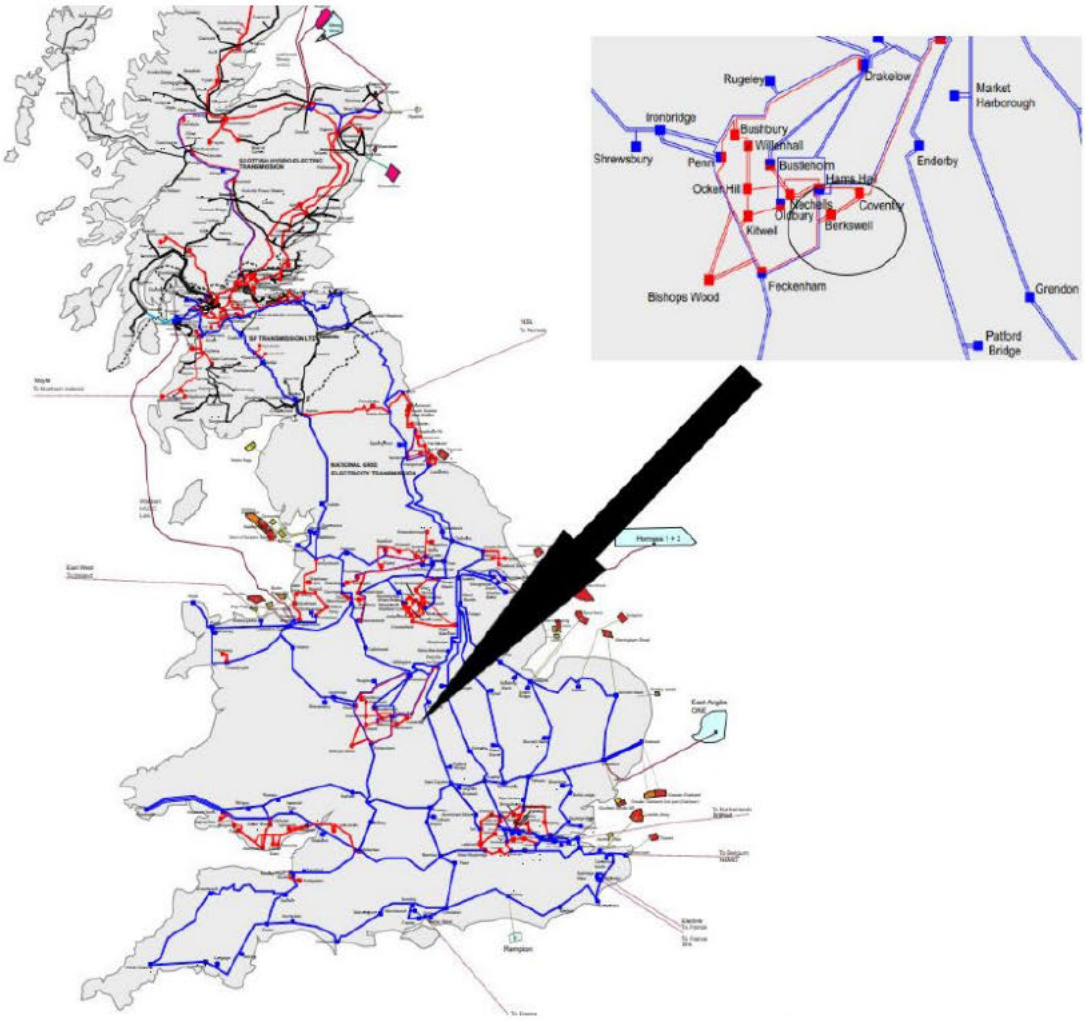
NGET's network plays an essential role in this shift, delivering reliable, low-carbon electricity for industrial processes and incorporating new technologies such as electrified transport and industrial heat pumps. Key urban areas such as Birmingham, Coventry, and Wolverhampton, where energy demand is substantial, depend on NGET's infrastructure for a consistent electricity supply. This underpins their sustainability initiatives, which include the electrification of private and public transport, and the development of the high-speed rail (HS2).

National Grid's electricity transmission strategy in the Midlands focuses on optimising existing 400kV and 275kV networks to accommodate new connections. These includes several strategic upgrades of our 400kV routes to increase capacities, improve power flows through the region and service the new industrial and domestic loads. At present we do not foresee a requirement for uprating Berkswell, nor have any signal from NESO, but continue to assess options to further increase network capability in this region"

HS2 is a high-speed rail project linking Birmingham and London, with four planned stations that are expected to catalyse additional housing, infrastructure and rail development. NGET is proactively considering the potential network impacts of HS2 and the associated regional growth. We have already engaged with NGED to confirm the timing and scope of the proposed Berkswell intervention; no immediate concerns have been identified, and we are jointly maintaining awareness of

prospective developments in the area, including the potential West Midlands gigafactory and advanced manufacturing park proposed at the Coventry airport site (https://greenpowerpark.co.uk). We will continue collaboration with NGED, tracking progress and translating any emerging requirements into our planning to ensure proposed solutions are coordinated with existing plans.

Figure 1: Location of Berkswell site on our network



2.2.3. Interactive Projects

HS2

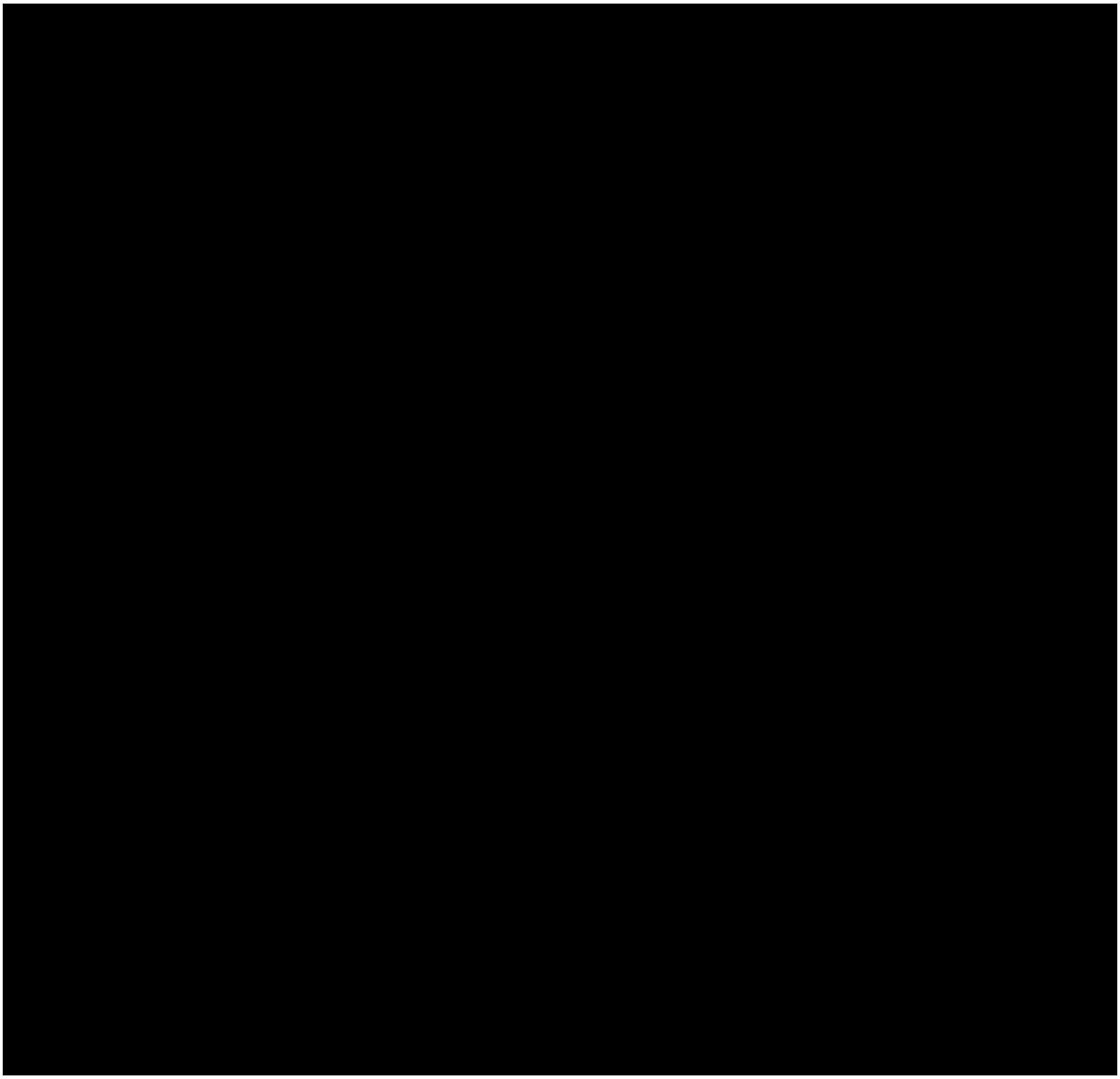
[redacted]

2.2.4. Site Background

Berkswell 275 kV substation is located in Warwickshire, near Coventry, and lies adjacent to the HS2 rail route at Burton Green. Its proximity to the route, together with its existing role within the transmission network, makes Berkswell a suitable and efficient location for the provision of HS2 traction power. The substation is fed by four 275 kV overhead line circuits and operates as an air-insulated (AIS) mesh substation supplying the local distribution network at 132 kV.

The site is spatially constrained, bounded by the HS2 route, the HS2 Auto-Transformer Feeder Station, the existing 132 kV distribution substation supplying the local National Grid Electricity Distribution (NGED) network, and local access arrangements. Land availability is limited to that secured under the High Speed Rail (London – West Midlands) Act 2017. As a result, development opportunities are constrained and focus on modifications or extensions to the existing substation rather than the development of a new standalone site elsewhere.

These physical, environmental and consenting constraints were key considerations in the development and assessment of options. They were considered alongside the need to minimise additional cabling, avoid introducing new planning or land-acquisition risks, and maintain deliverability in line with the HS2 programme timetable. Collectively, these factors informed the optioneering process and the identification of a proportionate and deliverable approach to meeting HS2's contracted connection requirements.



[redacted]

2.2.5. Historical Funding

[redacted]

No funding to date for the extensions to Berkswell for HS2 have been provided to date. All preliminary work, following the final determination decision from Ofgem not to provide PCF, funding to date has been at risk.

2.2.6. Early Asset Write Offs (EAWO)

The estimated Regulated Asset Value (RAV), using our statutory Fixed Asset Register for works, at Berkswell 275kV substation is [redacted]

The most recent investments in 2024 ([redacted]), where additive and are not anticipated to be impacted by this submission. Any assets that are impacted at the site, will be identified in our future Project Assessment.

3. Drivers & Needs Case

3.1. Drivers

The prime driver for this investment is the delivery of a contracted demand connection for HS2 at Berkswell, in accordance with National Grid Electricity Transmission's licence obligation to provide connections to customers with signed connection agreements (Licence Condition D4A). The investment is therefore load-driven and is required to facilitate the connection of HS2 traction power to the National Electricity Transmission System. Two additional BESS connections also scheduled for the site but can be accommodated within the existing site. All connections are gate 2 with a high confidence.

[redacted]

[redacted]

[redacted]

3.2. Customers

A list of contracted customers is provided in **Table 3** below, including ACL dates. NGET's confidence around the customers contracted is high for all customers.

3.3. Asset Health

There are asset health/non-load drivers for interventions at this substation alongside the main load-related drivers for investment.

A summary of the current asset health position at Berkswell 275 kV is presented in **Table 4.** This reflects NGET's most recent (2025/26) assured view of asset condition at the site and is included to provide context for the proposed load-related investment. As to be expected given the intervening period driven by general aging and usage deterioration, asset health conditions have evolved since the RIIO-T3 submission, which was based on 2023/24 asset condition data.

Many of the assets at Berkswell 275 kV substation have low end-of-life (EoL) scores and corresponding low risk classifications. However, as shown in **Table 4,** a subset of assets falls within the higher-risk categories.

Consequently, a number of lead and non-lead assets on the site already meet the criteria for an asset health intervention[2]. A summary of these assets is presented in **Table 5.** These interventions have been included in our T3 non-load investment plan.

[2] In accordance with the decision-making framework set out in 'NGET_RIIO3_NGETQ10_Asset Health Decision Making', submitted as part of our RIIO-T3 Draft Determination response. As per this process, assets with high EoL scores can be assessed as lower risk, and vice versa, subject to the impact of their failure.

This submission seeks funding only for the load-related scope described herein. Where load-related scope delivered through reopeners replaces previously allowed non-load-related (NLR) asset funding included within the T3 Final Determination, the corresponding NLR outputs will not be delivered and therefore the NLR PCDs will act as designed to remove associated NLR funding.

Delivery of asset health interventions will be optimised, taking account of outage availability and practical interactions between activities. Where load-related and asset health interventions coincide, delivery may be coordinated to improve efficiency and minimise disruption. Such coordination does not alter the underlying investment drivers, nor the portfolio-level governance or funding treatment of non-load asset health interventions.

Further detail on wider site-level asset health interventions is provided within the RIIO-T3 Asset Health Portfolio EJP and associated supporting documentation, which should be referenced for completeness.

3.4. NESO

There are no additional NESO related activities impacting this site, other than the customer connections noted.

4. Optioneering

4.1. Strategic Options

Our standard optioneering process requires us to consider the following strategic options:

Table 6: Strategic Options Summary Table

Option Number	Option Name	Option Description
A	Do nothing	The network is kept in its current state, and no new connections are facilitated.
B	Market based solution	Increased customer demand is accommodated through the procurement and use of ancillary services only.
C	Whole systems solution	The required customer connection is accommodated by a DNO.
D	Make use of existing assets	Facilitating the requested connection by utilising the existing substation (extension, uprating, etc.)
E	New build	Facilitating the requested connection by building a new substation.

A long-list of five options was initially identified to address the HS2 connection requirement and detailed in our EJP submission for T3[3]. These included a do-nothing option, a market-based solution, two variants of extending the existing Berkswell substation, and the construction of a new double busbar substation.

As noted in the EJP submission, the do-nothing (A) and market-based options (B) were discounted as they would not meet National Grid's licence obligations to provide a physical connection for a contracted customer. A whole system solution was also discounted as this project is not suitable for a DNO given location and capacity (C). A new double busbar substation (E) was also considered but rejected (see siting below).

Two credible options were taken forward for detailed assessment under option D in the EJP, now updated after revised requirements from the customer HS2:

- **Option D-2:** Mesh Corner extension, remote SGT Location; and
- **Option D-3:** Mesh Corner extension, local SGT Location.

4.2. Siting

The preferred site was selected over a new build at a new site as:

- Existing Berkswell 275kV substation is adjacent to the HS2 connection site where **land requirements were established in 2012–2013 and embedded in the HS2 Act.**
- Location minimises distance to the HS2 route and aligns with HS2 directive to limit construction away from the track, reducing land-take and consenting complexity.

Design at the current site can accommodate all Gate 2 contracted connections for BESS.

[3] Refer to: RIIO-T3 Berkswell 275kV NESO driven EJP (December 2024)

4.3. Long list of options considered

Options A, B and C were discounted as they would not enable the HS2 connection and would therefore fail to meet contractual and licence obligations. Option E-1 was also discounted following consideration of consumer value and economic efficiency based on the historical context of when this decision was made.

Historical context:

- Initial planning work was undertaken in 2012 to support the HS2 Hybrid Bill.
- At that time, there was no identified or foreseeable demand for a new substation.
- This work pre-dated the Net Zero 2050 commitment and the subsequent ambition to fully decarbonise electricity generation by 2035 and was undertaken during the RIIO-T1 regulatory period.
- HS2 connection dates were originally set for 2024, which influenced early optioneering assumptions.

Current submission and optioneering:

- Assumptions have been revisited in light of evolving demand signals and revised connection requirements from HS2.
- The updated optioneering assessment, based on this revised information, is presented below and identifies a solution capable of meeting the required connection dates.

Table 7: Longlist of options

Options	Technical Description	Relevant Diagrams or Layout References	Consenting Risks & Environmental Impact	Rationale for taking/ or not taking forward the option to shortlisted assessment.
Option A-1: Do nothing **Rejected**	No new connections are facilitated.	n/a	n/a	• **Contractual and Licence compliance -** NGET has a connection agreement with HS2 Ltd. and existing transmission assets do not currently connect HS2 to the NETS. There are no planned alternative transmission assets that would enable this connection.
Option B-1: 'Market-based' solution **Rejected**	Increased customer demand is accommodated through the procurement and use of ancillary services only.	n/a	n/a	• **Contractual and Licence compliance -** Market-based' solutions are not a substitute for the provision of a physical customer connection. This option was therefore discounted similar to Option A-1.
Option C-1: 'Non-transmission, whole systems solution **Rejected**	The required customer connection is accommodated by a DNO	n/a	n/a	• **Contractual and Licence compliance -** DNO-based' solutions are not a substitute for the provision of a physical customer connection. This option was therefore discounted similar to Option A-1.

Options	Technical Description	Relevant Diagrams or Layout References	Consenting Risks & Environmental Impact	Rationale for taking/ or not taking forward the option to shortlisted assessment.
Option D-2: Mesh Corner extension, remote SGT Location **Shortlisted**	Mesh corner connection from extended substation with SGTs located remotely in a **separate compound** to the existing 275kV substation. Revised layout with two SGTs	Figure 4	• Consents partly covered under the HS2 Act (2017). Cable solution requires additional HS2 land take, increasing consenting risk • Covered under the HS2 Environmental Statement	• **Contractual and Licence compliance:** • **Deliverability:** Dependent on HS2 relocating attenuation ponds location (now confirmed) • **Engineering:** Utilises existing infrastructure. Design updated to make use of land aligned to where HS2 were wanting to connect and construct their ATFS - negating the need for a long 25kV cable route. • Meets customer requirements and provides space for future expansion.
Option D-3: Mesh Corner extension, local SGT Location **Shortlisted**	Mesh corner connection from extended substation with SGTs located **within the extended existing 275kV compound**. Revised layout with two SGTs	Figure 5	• Consents partly covered under the HS2 Act (2017). • Covered under the HS2 Environmental Statement	• **Contractual and Licence compliance:** Requirement to have noise enclosures on all SGTs may impact design • **Engineering:** Noise enclosures on SGTs may result in larger units which need to be positioned not to clash with planned BW ESS Connection. • Originally utilises existing infrastructure given no further drivers existed at the time but design is now very restricted. • Requires longer 25kV cable run to HS2 ATFS.
Option E-4: New double busbar substation **Rejected**	New offsite build to meet HS2 needs and provide additional capacity	n/a	• New land required as not utilising land covered under the HS2 Act (2017).	• **Contractual and Licence compliance:** Insufficient land to install an AIS double bus bar substation between the existing substations (132kV & 275kV), HS2 ATFS and the HS2 track. • **Engineering:** The remaining land is insufficient to construct an AIS double busbar substation. • **Deliverability** Selection of a new AIS or GIS substation would have elongated the programme significantly beyond the current HS2 connection dates. (remains true with anticipated revised dates.) • **Engineering:** Challenges in maintaining the feeder circuits into the existing substation whilst also installing 2 new feeder circuits into the new substation.

4.3.1. Influence of stakeholders on shortlisting:

Customer

HS2 (customer) and legislative framework materially constrain credible options: HS2 required GSP works to be delivered as scheduled works under the HS2 Act, with infrastructure located close to the railway and land defined through the Hybrid Bill.

As a result, options requiring additional land outside the Act footprint (e.g., new-build AIS/GIS double busbar substations) are not credible without significant consenting/land acquisition and programme delay.

Community

NGET has a high-level stakeholder and community relations strategy for its Phase 1 HS2 GSP in Berkswell with the following objectives:

- Protecting and enhancing NGET's reputation in the area by keeping the local community and key stakeholders informed, as appropriate, about the work being done and the impact it might have on them.
- Responding in a timely manner to enquiries from the local community and stakeholders.
- Being mindful of the work of HS2 and other HS2 contractors and their collective impact locally.

The community relations methodology and approach focus on keeping people informed at the start of the work - what we are doing, why, preparatory work; updates when work starts - regarding traffic movements and public rights of way, key milestones and activities and project completion. Our community relations helpline is widely publicised on comms materials with the HS2 helpline, and we also liaise regularly with the HS2 Community Engagement Team.

The key principles are ensuring that the view of people changes from 'we didn't know about this work' to 'we have been made aware'; and adapting our activity as work progresses to respond to any communications challenges as they arise; or contract programme changes.

This involves:

- **Community Engagement:** Community relations activity includes engagement with key political stakeholders, residents and businesses. We will hold briefing meetings with parish and ward councillors or engage with residents/businesses by letter about development work.
- **Joint HS2 information:** We utilise HS2's website and 'In Your Area' sections to publicise our activities. We can offer support at consultation events to provide information about the work we're doing. The scheme has an individual communications plan which sets out appropriate comms channels, consultation approach and responsibilities. This is discussed and agreed with the relevant HS2 engagement manager before actioning.

4.4. Shortlisted Options

Short listed options taken forward:

- **Option D-2**: Mesh corner connection from extended Berkswell 275kV substation with SGTs located remotely in a separate compound (credible – taken forward for assessment)
- **Option D-3:** Mesh corner connection from extended Berkswell 275kV substation with SGTs located within the extended 275 kV compound (credible – taken forward for assessment)

Additional Considerations for short listed options:

- The land around Berkswell has been acquired by HS2 for their works with some land parcels close to the existing substation still under NG ownership. The land acquired by HS2 will eventually be sold back to NG or a long lease agreement put in place post commissioning.
- The extension at Berkswell will include an allowance for extended security fencing to comply with the current security site specifications. Biodiversity Net Gain (BNG) is complied with via the HS2 "No Net Loss (NNL)".

- As part of the HS2 Act there was a requirement for a connection to the Burton Green trackside feeder station. Berkswell substation was the ideal location to accommodate this and as such the options to extend the existing 275kV Substation was identified.

PASE compliance

Our short-listed options are Non-PASE aligned.

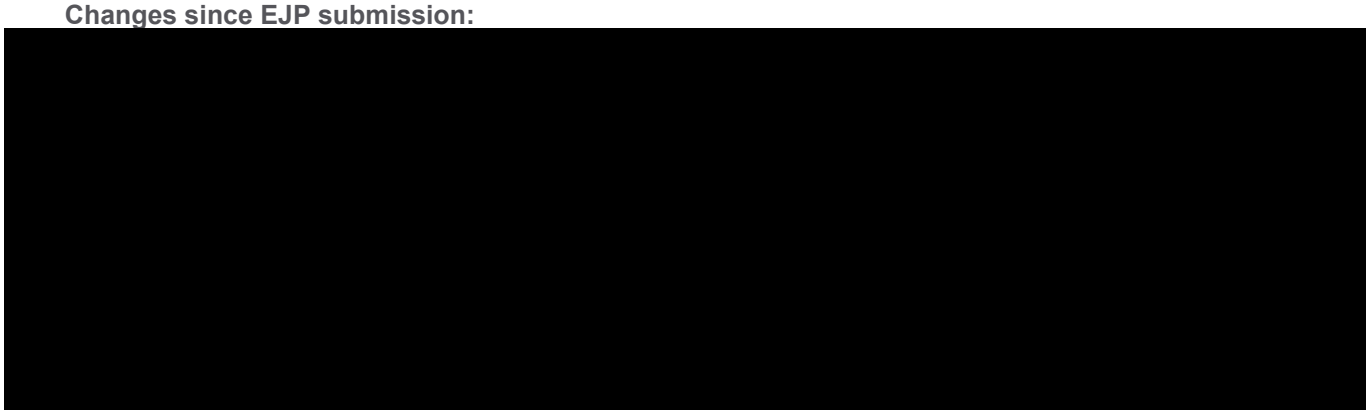
- The proposed solution comprises an extension to the existing AIS mesh substation at Berkswell and does not align with defined PASE Primary or Variant configurations, as extensions to existing mesh arrangements are not explicitly captured within the PASE framework.
- The selected approach is driven by site-specific and programme constraints, including land and consenting parameters established through the HS2 Act, which limit the feasibility of alternative configurations. There is no underlying asset health or wider system driver that would justify a more extensive redevelopment of the substation.
- Alternative PASE-aligned options, including the development of a new substation or material reconfiguration of the existing site, were considered but discounted as they would introduce additional land requirements, increased consenting and delivery risk, and materially greater scope without a corresponding system need.
- The proposed mesh extension therefore represents a proportionate and deliverable intervention, making efficient use of existing infrastructure while meeting the defined project requirements and maintaining alignment with the overarching PASE principles of efficiency, standardisation, and long-term operability.

4.4.1. Option D-2: Mesh corner connection from extended substation with SGTs located remotely in a separate compound

This option (Figure 4) requires a connection to the SGTs outside of the existing 275kV footprint and housed within a separate compound (fully within the HS2 land allotment) and therefore involves additional costs associated with HV cabling works to this location. However, it offer a less constrained layout at Berkswell given the location of the existing terminal tower (YYE001) in between the 275kV substation and the HS2 trackside feeder station.

The layout delivers two SGT bays to meet the current HS2 requirement, with space within the HS2 land allocation to accommodate up to two additional SGTs, if required by HS2, without requiring reconfiguration of the existing 275 kV substation.

Changes since EJP submission:



[4] Any additional works highlighted blue would be for HS2 to complete at their cost.

4.4.2. Option D-3: Mesh corner connection from extended substation with SGTs located within the extended 275kV compound

This option (Figure 5) requires a connection to the SGTs within an extended footprint of the 275kV substation, however this solution could be constrained by clearances and orientation of equipment in the land-take available. It does not utilise the HS2 land allotment to the north-east of the tower.

Changes since EJP submission:

4.5. Detailed qualitative analysis of shortlisted options

Qualitative analysis was carried out to understand the strengths and weaknesses of the two shortlisted options **(Table 8).** The different features of the options were assessed and assigned a ranking from “detractor” to “benefit”.

Table 8: Qualitative Analysis of Short-Listed Options

	Optioneering Categories				
Option	**Engineering**	**Environmental**	**Deliverability**	**Economic/Consumer Value**	**Consenting /Stakeholder**
Option D-2	**Design:** • Compatible with existing Berkswell infrastructure. • Land availability constraints could mean that a separate compound cannot be achieved. • Higher costs due to separate compound and additional cable run **Future:** • Revised option meeting the customers new updated requirements (2 SGT). Provides HS2 customer with additional flexibility to expand.	**Emissions:** • Limited ability to connect additional customers and assist with decarbonisation. • If new customers were to apply, then this could trigger the build of a new substation.	**Delivery Risk:** • Outages required on current Berkswell site. • Additionally will need potential coordination with other works at Berkswell.	**Capex:** • Constructing a Separate compound for SGTs provides space to accommodate HS2 future capacity increases without the need for any significant intervention by NGET.	**Land:** • All land is within the HS2 land take. **Planning and concent:** • Consents obtained under the HS2 Act (2017).
	Benefit	Neutral	Neutral	Benefit	Neutral
Option D-3	**Design:** • Compliments the existing infrastructure. • Compatible with existing Berkswell infrastructure. • Orientation of equipment could be constrained by clearances required. • Shorter cable run. **Future:** • Revised option has no space for any future HS2 SGTs without substantial substation expansion works.	**Emissions:** • Limited ability to connect additional customers and assist with decarbonisation. • If new customers were to apply, then this could trigger the build of a new substation.	**Delivery Risk:** • Layout requires both Feckenham and Ocker Hill circuits on outage concurrently to allow for safe construction of the gantries. • Greater risk of requiring outages on current Berkswell site, given space limitations with this design and interaction of BW ESS BESS connection cabling and the SGT location / foundations.	**Capex:** • Limited future expansion especially given the infrastructure being built in the vicinity and Berkswell being a Mesh design. **Capex (future):** • Under this option any future expansion / connection would require a significant reconfiguration, and further extension works of Berkswell impacting directly on the consumer.	**Land:** • All land is within the HS2 land take. **Planning and concent:** • Consents obtained under the HS2 Act (2017).
	Neutral	Neutral	Detractor	Neutral	Neutral

4.6. Detailed quantitative analysis of short-listed options

4.6.1. Cost estimates of short-listed 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, we have applied a [redacted], based on historic project analysis, to account for unforeseen circumstances and to mitigate risks during implementation.

Table 9: Cost Estimate Breakdown

Options	OHL (£m)	Cables (£m)	Substation (£m)	Total (exc. risk) (£m)	BNG 5%	Total (incl. 13.8% risk) (£m)
Option D-2:	[redacted]					
Option D-3:						

Option D-3 is lower cost than Option D-2 because D2 includes for the cabling to the SGTs in the separate compound and other associated works.

4.6.2. Cost drivers

The project's cost estimates are based on current market conditions, with ongoing work to refine requirements. The baseline funding request is supported by high-cost confidence and robust EUL (Estimating Units Lines) assessments.

Using the cost book, the main factors driving the costs for the shortlisted options are:

- Unit costs of SGTs;

Operational cut and fill works for substation area.

4.7. Cost Benefit Analysis

4.7.1. Purpose an 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:

(i) Initial CAPEX investment required

(ii) Future end of life replacement costs

The supporting CBA model quantifies the costs and benefits for this project. Using the Ofgem RIIO-T3 CBA template spreadsheet, the CBA compares the discounted cost and benefits for consumers for the following two shortlisted options.

- Option D-2: Mesh corner connection from extended substation with SGTs located remotely in a separate compound
- Option D-3: Mesh corner connection from extended substation with SGTs located within the extended 275kV compound

4.7.2. 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	Initial Investment (£m)	PV of Lifetime Costs (£m)	PV of Monetised Benefits (£m)	NPV (£m)
Option D-2	[redacted]			
Option D-3				

On the basis of the discounted lifetime CBA results **(Table 10),** Option D-3 delivers the highest NPV [redacted] Option D-2 delivers a less preferable NPV [redacted] The preferred solution is **Option D-2**, which provides a proportionate and deliverable response to the HS2 connection requirement at Berkswell. The option minimises land take and programme risk,

maximises use of existing infrastructure and HS2-consented land, and avoids the additional complexity and delivery risk associated with alternative configurations. It also supports the progression of the BWESS connection and allows for future HS2 expansion within the existing land allocation. When considered alongside the cost-benefit assessment and qualitative factors, Option D-2 represents the most balanced solution and offers the greatest confidence in efficient delivery.

This analysis is subject to confirmation through deliverability, consents/land, outage and risk considerations, and any CBA sensitivities set out in the assumptions below.

4.7.3. 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-T3 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).

4.7.4. Costs

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

	Capex		
	Initial works (£m)	Future replacement (40yr) (£m)	Total costs (£m)
Option D-2	[redacted]		
Option D-3			

4.7.5. Benefits

The following benefits have been included within the CBA:

- SF6 / Alternative gas leakage reduction
- Carbon cost of construction reduction
- Transmission loss reduction
- Summary of all Benefits

Table 12 presents the summary of all (undiscounted) benefits, including environmental and non-environmental benefits, considering the central base case carbon price.

Table *12*: 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 D-2	[redacted]			
Option D-3				

4.8. Preferred solution

Our preferred solution

The preferred option is Option D-2, which involves extending the existing Berkswell 275 kV air-insulated substation from a four-switch to a six-switch mesh arrangement, with the HS2 traction transformers located within the extended compound.

Option D-2 best meets the investment driver while minimising cost, land take and programme risk. It maximises the use of existing infrastructure and HS2-consented land, avoids the additional cabling and complexity associated with a remote transformer compound, and performs strongly across technical, operational, environmental and deliverability considerations. It also provides HS2 with space for expansion.

The cost-benefit assessment indicates that the credible options perform similarly from a whole-life consumer value perspective. When considered alongside the qualitative assessment, Option D-2 represents the most efficient and proportionate solution to meet the HS2 connection requirement and provides the greatest confidence in deliverability, in particular as it requires fewer outages.

Why we have selected option D-2?

We have selected Option D-2 in spite of it being [redacted] or consumers from an initial capex perspective, because overall the benefits justify the marginally higher costs:

- meets the investment need and lowers overall delivery risk for both HS2 and the other connection customers,
- has a more robust deliverability given its design, avoiding the need for simultaneous critical outages,
- provides better flexibility to match HS2 construction programme, and
- future proofs the HS2 connection, providing space for HS2 to expand within their land allotment without the need for any further Berkswell intervention. This would be at their cost should it be required (without additional cost to consumers).

4.9. Project benefits, outputs & deliverables

[redacted]. It will also provide two SGT bays with provision (space) for two future SGT bays (future proofing/extendibility). The preferred solution utilises upgraded existing structures and planned in-situ asset replacements to minimise disruption, consenting challenges and environmental impacts.

Table 13: Summary of Outputs and Benefits

Output & Proposed PCD	Deliver new Gate 2 demand connection at Berkswell 275kV for HS2, by extending the substation.
• **Increase connection capacity and operability:** Provides for connections through the extension of the 275kV station into a new external compound adjacent to the existing station, with two new SGTs (expandable to four) for HS2. • **Maintain future expandability:** Future proofs the HS2 connection by maintaining sufficient space to accommodate potential additional SGT requirements, if required by HS2 for their future demand needs, avoiding significant reconfiguration of the existing 275 kV substation. • **Enable decarbonisation outcomes:** Facilitates additional new storage connections – supporting additional renewable energy across the system, lower curtailment and balancing the system – using existing available spare capacity. This will help reducing system carbon intensity and enabling efficient use of low-carbon generation • Minimise local impacts: Minimise visual and local environmental impact by combining the scope into a single site extension. • Support net zero and local opportunity: Facilitate progress to net zero and local economic opportunities through the energisation of the HS2 rail link. • Reduce land and programme risk: Use of land acquired for HS2, reducing land acquisition risk.	

4.10. Future proofing

The design includes space to accommodate future requirements of HS2 should they arise within their 2017 land allotment. It also retains and leverages existing substation infrastructure, enabling staged asset interventions and reducing the need for additional offline infrastructure.

The project will also connect additional contracted drivers [redacted] that can be accommodated through the retained/extendible arrangement.

Any further need for a new connection to a NGET substation in the vicinity of Berkswell may result in a new substation being triggered, subject to future optioneering.

5. Project Delivery

5.1. Proposed deliverability programme

A detailed programme of works for Option D-2 is outlined below, indicating our plans [redacted]

Key Dependencies

1. The critical site surveys, which involve ground investigations, are to be carried out by HS2 on NGET's behalf. These surveys are not expected to impact the design of the preferred solution but could condition the programme of works by delaying it further in time, thereby incurring delay costs.
2. Other equipment will be procured by the contractor between Q3 2025 and Q4 2027.
3. As contracts have not yet been placed, the programme set out in this section is indicative. The final contractual delivery scope and detailed programme will be confirmed and presented as part of the Project Assessment submission.

5.2. Procurement and 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

[5] Note: All years are "Calander Years", with Q1 commencing Jan 1st

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.

The signature strategy relevant to this investment relates to the substations category and is based on geographically focused, long-term partnerships with suppliers. These partnerships are established on the basis of defined performance metrics and are intended to support portfolio delivery through appropriate allocation of schemes and tailored commercial and delivery models, while accommodating uncertainty in workload and programme development.

In line with this approach, Berkswell is being developed within NGET's established regional Electricity Transmission Partnership (ETP) supply-chain arrangements. The project is expected to adopt a two-stage Early Contractor Involvement (ECI) contracting strategy, enabling early collaboration with the supply chain to support design development, cost refinement, programme certainty and risk reduction. As contracts have not yet been placed, full contractual arrangements, including scope, programme, risk allocation and commercial terms, will be finalised and presented as part of the Project Assessment submission.

5.3. Risk & risk management

Table *14*: Risk Summary Table

Risk	Mitigation Measure
Additional land: There are legislative issues linked to land constraints (HS2 Act). Any additional land outside the scheduled works footprint could materially delay programme if additional third-party land/consents are required.	Design progressed within the HS2 Act footprint and uses existing substation extension solution established in 2012–2013
Technical Design: HS2's trackside demand and control is still evolvingand may result in additional future requirements which might alter the final solution.	Configuration has been further developed; [redacted]
Protestor Action: Protestor action was a major issue during earlier HS2 construction works elsewhere along the route (including our ZC OHL diversion for HS2). This caused significant delay and overspend on the projects in those areas. More recently the threat level does appear to have reduced, but that may change.	Engage with HS2 security team to understand threat levels and what wider security measures will be in place at the time of the substation construction
Construction activities: The area surrounding the substation may still have HS2 construction activities present. This may constrain or complicate NGET's construction activities, if the engagement between the two parties is not mutually beneficial.	Engage with HS2 and their contractors to ensure design and construction activities are coordinated. Looking for synergy opportunities where appropriate.
Third Party Impact & Network Coordination: Ongoing engagement with NGED to track development.	Early engagement with NGED has created awareness of possible interactions but unlikely to affect this project.
Outage Availability/Late Cancellation: Unavailability or late cancellation of outages by NESO. There is a likelihood of other NGET works within the area that could impact outage availability	Attend outage planning and coordination meetings with interfacing projects. Ensure outages are booked in the plan as early as possible.

Risk	Mitigation Measure
Additional HS2 governance and compliance requirements: To ensure compliance with the HS2 Act and to commence construction activities, there are a significant number of compliance activities required to be able to demonstrate the works will not breach any HS2 requirements, such as the Undertakings and Assurances. HS2 approval is required before NGET can commence construction activities, this could cause significant delay and increase costs.	HS2 requirements need to be clearly articulated as part of the NGET ETP contract and award process. Early engagement with the HS2 compliance team should ensure the requirements are understood and the plan for approval is in place to mitigate delay.
Spatially constrained site: Space is very limited at Berkswell with very little room to extend. Constrained by the HS2 route, existing 275kV and 132kV substations and public highway. HS2 connection points are also in close proximity to the BW ESS connection. This makes the layout, design and construction coordination at Berkswell particularly challenging	Ensure that design and construction activities are coordinated and that there is early engagement with all parties
Supply Chain: Due to global demand the market is seeing significant lead times and challenging market conditions on many integral pieces of equipment and resources.	Where possible, seek early Contract Award with Mains Works Contractor so long lead items can be procured.
Cost: Early phase development – no project-specific risk register	[redacted]. This project is currently in an early phase of development and consequently has less detailed scope definition and no project specific risk register. The [redacted] risk and contingency uplift reflects unaccounted project risks including material deviation from the original scope assumption and unforeseen delays.

6. Conclusion

This Needs Case sets out the justification for extending the existing 275 kV substation at Berkswell to meet the contracted connection requirements for High Speed 2 (HS2).

It summarises the outcomes of the updated optioneering and cost-benefit assessment and explains why the identified solution represents a proportionate and deliverable response to the HS2 traction demand, consistent with the approach established through the RIIO-T3 Early Justification Process.

The primary driver for the investment remains the HS2 demand connection. In parallel, non-load asset health interventions and two battery energy storage system (BESS) connections are progressing at the site under separate funding arrangements. While these activities are outside the scope of this submission, delivery coordination will be required to optimise outages and minimise disruption. Where load-related works interact with asset health interventions, scope and funding will be managed to ensure no duplication of allowances.

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.

Assurance and Point of Contact

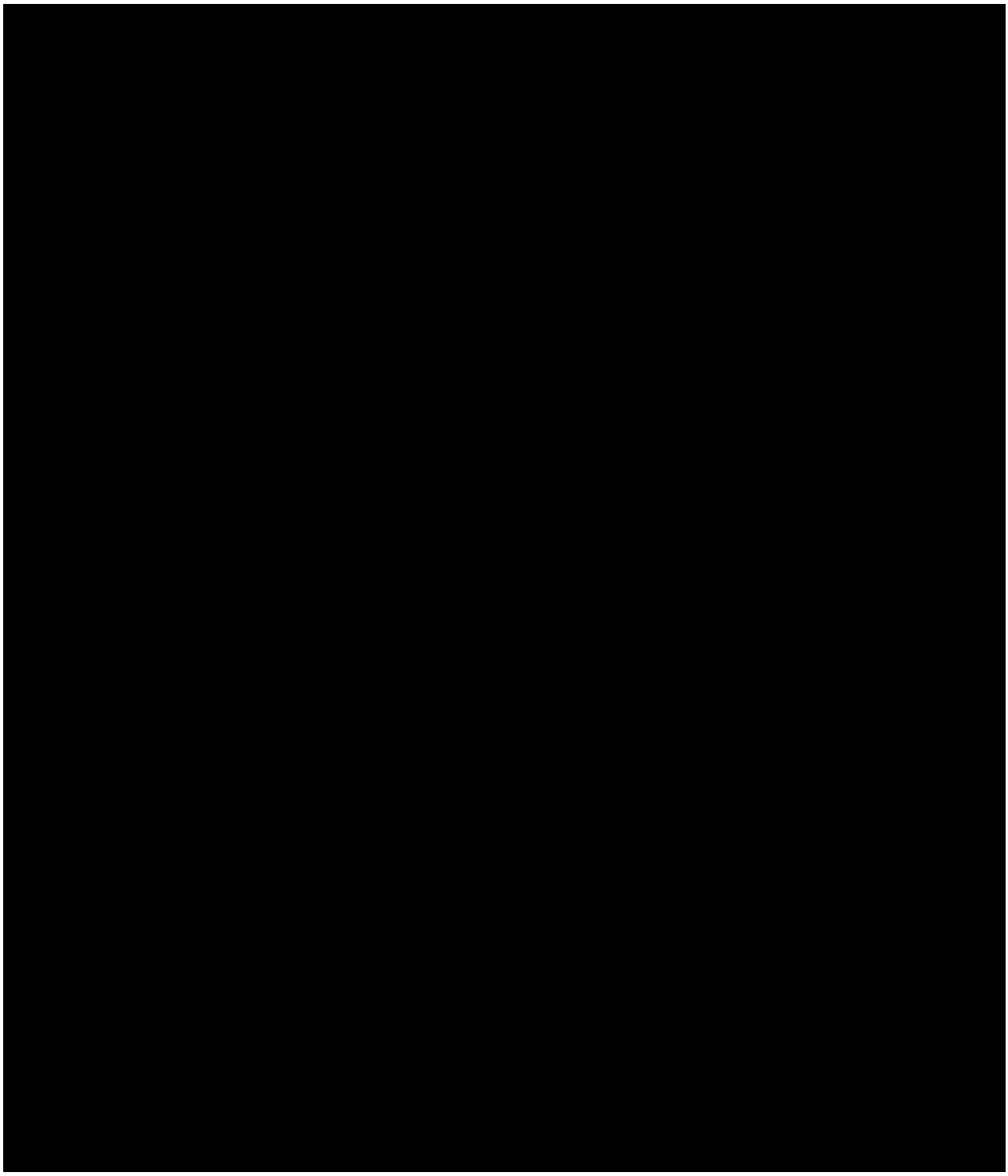
Attached to this submission is the assurance statement letter, providing written confirmation in line with the assurance requirements set out in Ofgem's Re-opener Guidance and Application Requirements Document, dated May 2026.

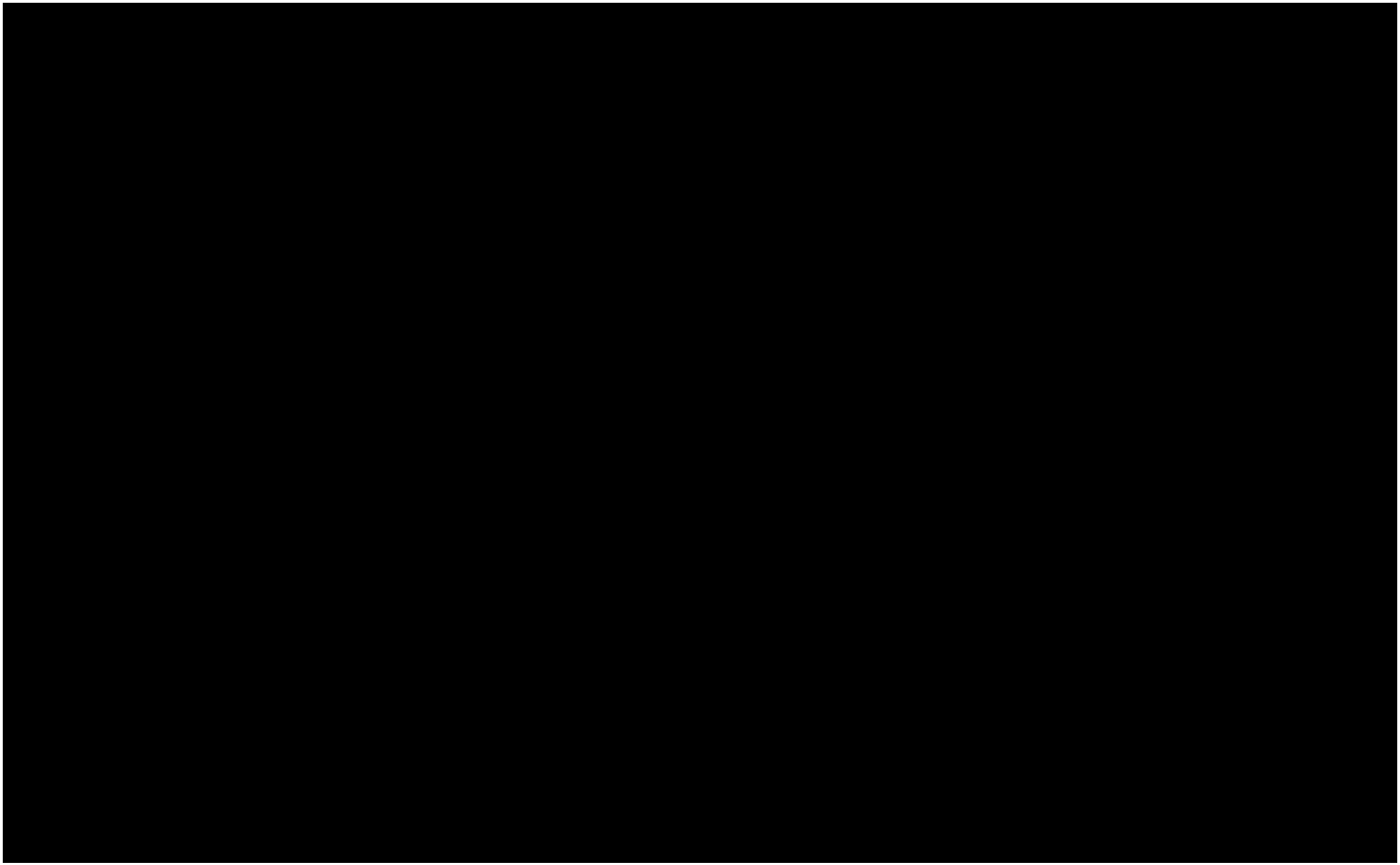
This confirmation is provided by the Head of Future Price Controls, Electricity Transmission where they are accountable for re-opener submission for National Grid Electricity Transmission (NGET) including any changes to these allowances. They provide the following statements below regarding how this application has been prepared and submitted in relation to each of the four assurance points requested by Ofgem:

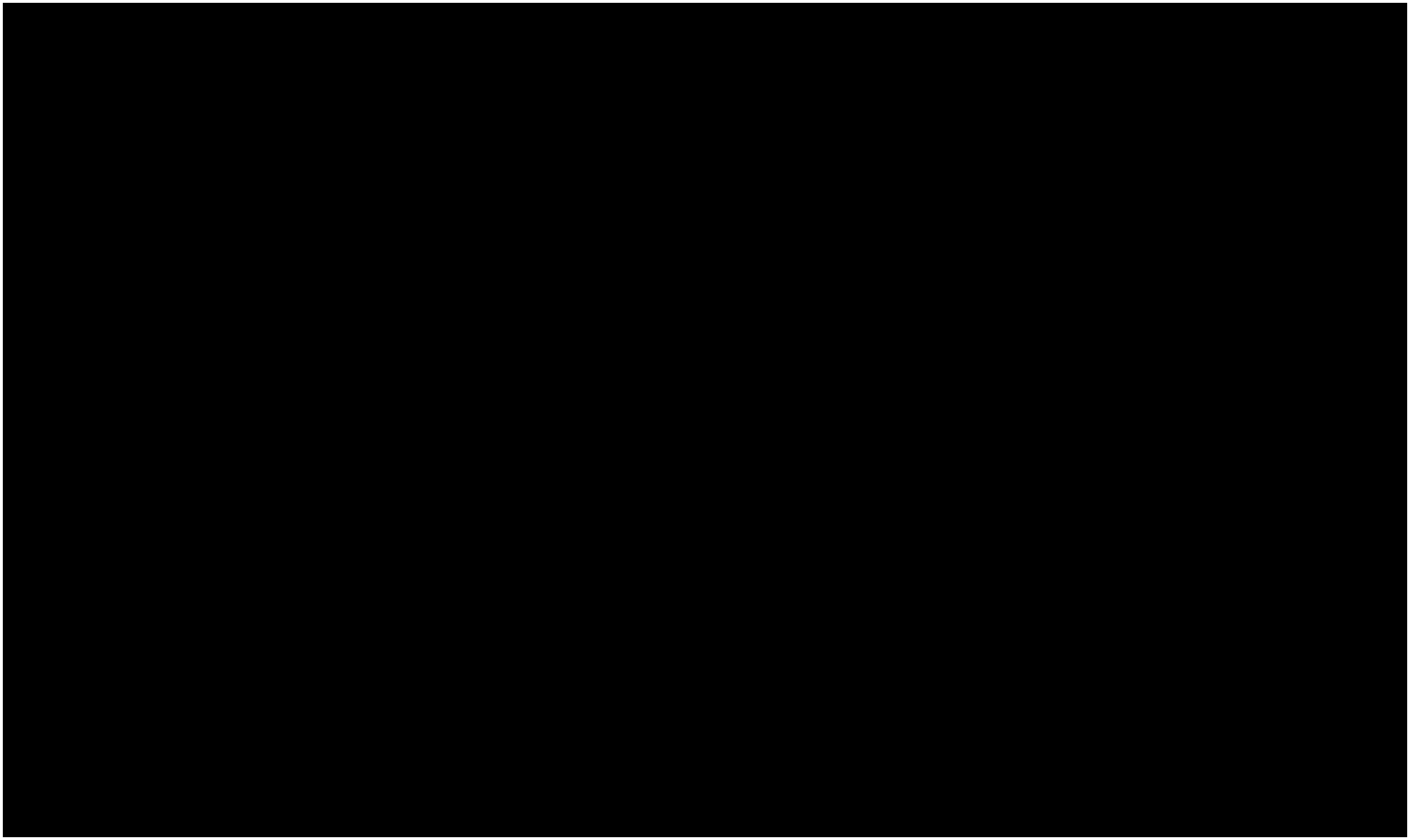
a. All the technically feasible options for this project have been considered, and the methodology used for the analysis undertaken (both qualitative and quantitative) allows a fair comparison between all credible options.
b. It is accurate and robust, and that the proposed outcomes of the submission are financeable and represent best value for consumers.
c. There are quality assurance processes in place to ensure the licensee has provided high-quality information to enable Ofgem to make decisions which are in the interests of consumers.
d. The application has been subject to internal governance arrangements and received sign off at an appropriate level within the licensee.

[redacted]

Appendices







Appendix D - Glossary

Table *15*: Glossary

Abbreviation	Description
ACL	Available For Commercial Load
ACSR	Aluminium Core Steel Reinforced
AIS	Air Insulated Switchgear
APM	Advanced Procurement Mechanism
BESS	Battery Energy Storage System
BP	Business Plan
BPDT	Business Plan Data Template
CAI	Closely Associated Indirect
CBA	Cost Benefit Analysis
CPO	Compulsory Purchase Order
CSNP	Centralised Strategic Network Plan
DC	Direct Current
DCO	Development Consent Order
DC TC	Direct Current Time Constraint
DESNZ	Department for Energy Security and Net Zero
DISC	Disconnector
DLR	Docklands Light Railway
DNO	Distribution Network Operator
ECC	Estimated Cost of Construction
EEW	Early Enabling Works
EJP	Engineering Justification Paper
EoL	End-Of-Life
ESO	Energy System Operator
ET	Electricity Transmission
EU	European Union
EUL	Estimating Units Lines
ESW	Earth Switch
FEED	Front End Engineering Design
FES	Future Energy Scenarios
FY	Financial Year
G3	Green Gas for Grid
GEC	General Electric Company
GIB	Gas Insulated Busbar
GIS	Gas Insulated Switchgear
GLA	Greater London Authority
GW	Giga Watt
HDD	Horizontal Directional Drilling
HV	High Voltage
HWUP	Hackney Waltham Cross Uprating
IEC	International Electrotechnical Commission

kW	Kilo Watt
LLTI	Long Lead Time Items
LTDS	Long-Term Development Statement
LV	Low Voltage
LVAC	Low Voltage Ac
M&E	Mechanical And Electrical
MITS	Main Interconnected Transmission Systems
MSIP	Medium Sized Investment Project
MVA	Megavolt-Amperes
MW	Mega Watt
NESO	National Energy System Operator
NETS	National Electricity Transmission System
NG	National Grid
NGED	National Grid Electricity Distribution
NGET	National Grid Electricity Transmission
NOA	Network Options Assessment
NOMs	Network Output Measures
NPV	Net Present Value
OHL	Overhead Line
ORPS	Obligatory Reactive Power Service
PCD	Price Control Deliverables
PCF	Pre-Construction Funding
SF6	Sulfur Hexafluoride
SGT	Super Grid Transformer
SLD	Single Line Diagram
SPV	Special Purpose Vehicle
SSMD	Sector Specific Methodology Document
SSSI	Site of Special Scientific Interest
STC	System Operator Transmission Owner Code
SuDS	Sustainable Drainage Solutions
TBC	To Be Confirmed
tCO2e	Tonnes of Carbon Dioxide Equivalent
TCPA	Town And Country Planning Association
TCSNP	Transitional Centralised Strategic Network Plan
TWB	Through-Wall Bushing
UK	United Kingdom
UKPN	UK Power Networks
UKPN EPN	Eastern Power Networks
UKPN LPN	London Power Networks
UKPNS	UK Power Networks Services
UXO	Unexploded Ordnance
VCA	Voltage Compliance Assessment
XPLE	Cross-Linked Polythene

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