nationalgrid

RIIO-T3

400/132 kV Imperial Park Upgrade

LRR Needs Case Submission – Track 3

May 2026

National Grid Electricity Transmission's Business Plan

Reference and summary table

Field	Description
Name of Project	400/132 kV Imperial Park Upgrade
TO's preferred re-opener track	Track 3 Eligibility Letter (EL) and Needs Case (NC)
RRP References	
BPDT / Project Reference Number	NGNLT30660
Load Board Reference	NGNLT30660
Investment Driver	Customer connections: • Directly contracted customer: [redacted]. Known embedded demand customers: [redacted]
PASE Alignment	The proposed AIS intervention is not a listed PASE Primary or Variant option. We therefore treat this as a non-PASE solution element.
Outputs	Uprating the existing 400/33 kV SGTs to 400/132 kV to enable [redacted] demand, ultimately connecting [redacted] of embedded data centre demand.
Short list of strategic options considered	Three main options were shortlisted for detailed analysis: • **Option E-10**: Construction of a new 400/132 kV GIS substation adjacent to the existing Imperial Park substation consisting of 3 [redacted] • **Option D-4:** Uprating existing SGTs (400/33 kV to 400/132 kV) using one AIS Disconnecting Circuit Breaker (DCB) bay and one conventional AIS bay • **Option D-5**: Uprating existing SGTs (400/33 kV to 400/132 kV) using [redacted]
Preferred solution and explanatory narrative on the rationale	Option D-4 provides timely connection to the data centres' demand through a non-firm connection [redacted]. As compared to the other shortlisted uprating option, Option D-4 is preferred over Option D-5 because it uses only one DCB and has a higher Net Present Value (NPV). Operationally, an AIS circuit breaker and disconnector is preferred where space allows and also reduces requirement for SF6 as circuit breakers can be procured SF6 free, whereas DCBs currently cannot.
Expected Forecast Costs	[redacted]
Delivery Year	[redacted]
Applicable Reporting Tables	BPDT 10.5 ET Pipeline log
Historic funding interactions	There is no historical funding for this project.

Field	Description		
	There are no Early Asset Write Offs (EAWO).		
Interactive projects	[redacted]		
Spend Apportionment [redacted]	T2 (FY 2022 – FY 2026): [redacted]	T3 (FY 2027 – FY 2031) [redacted]	T4+ (FY 2032 – FY 2037+) [redacted]

Table of Contents

Executive summary

Project Summary

The investment will enable the timely and cost-effective connection of major data centre demand in South Wales through an existing transmission interface, while increasing load capacity at the site by [redacted]

It will do so at materially lower cost and to an earlier delivery date than a new-build solution, thereby improving consumer value and supporting customer expectations on connection dates. The preferred solution also avoids the significant land, environmental, ecological and consenting risks associated with a new substation in or near the Gwent Levels SSSI, while making best use of existing assets and infrastructure.

Submission purpose

This Eligibility Letter and Needs Case is being submitted as part of the RIIO-ET3 Load Reopener (LR) mechanism under Special Condition 3.18 (Load Re-opener and Price Control Deliverable) of the Electricity Transmission Licence Conditions.

This submission is requesting Ofgem's approval of project eligibility against the Load Reopener criteria, seeks approval of Pre-Construction Funding (PCF) and seeks approval of the project's needs case and preferred solution for the Imperial Park 400/132 kV upgrade project.

Note:

- **Funding mechanism:** This submission is borderline between LR and Volume Driver. In the absence of clear guidance in Licence and guidance document, we are progressing with a LR combined Eligibility Letter and Needs Case submission, but as the project cost matures, we will proceed using the appropriate regulatory mechanism as set out in the licence.
- **Connection charges**: Imperial Park project is customer-funded and there is no infrastructure costs associated with it. The full cost of the scheme will be funded by the customer via connection charges i.e., consumers will not be paying for any these works. We are submitting the project through LRR because, under the Licence, the Price Control Financial Model (PCFM) treats connection charges as Directly Remunerated Services (DRS) and nets them off revenue. As a result, allowances must include connection charges, so they are only netted off once through the revenue formula. If they are excluded from allowances, they are effectively deducted twice.

Need

This investment is load-driven and upgrades the existing Imperial Park 400/33 kV substation by replacing two existing 400/33 kV [redacted] Super Grid Transformers (SGTs) with two 400/132 kV [redacted] SGTs required to facilitate a contracted connection for [redacted] which will in turn enable two embedded demand customers – [redacted] totalling [redacted] of data centre demand.

The existing substation configuration cannot accommodate the required level of capacity for these customers without reinforcement. Without this investment, we would be unable to meet our contractual and licence obligations to connect customers and maintain an efficient, coordinated and economical transmission system.

Optioneering

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, being do-nothing, market-based, whole-system, reuse or uprating of existing assets, and new-build. Through this process, we considered a broad range of options across three stages, including new-build solutions on the existing site, a siting study to identify alternative new-build locations, and options to uprate the existing substation.

We assessed options through **three stages**. We first (**Stage 1**) tested whether the original firm, SQSS-compliant customer requirement could be met at the existing Imperial Park 400 kV site, but this was not feasible due to site configuration and space constraints. We then developed new-build 400/132 kV substation options at the existing 400 kV site and newly identified site through a siting study, which would provide greater capacity and future expansion potential but carried significant land, environmental and consenting challenges. The identified preferred site could not be secured as the land is owned by the [redacted] and negotiations were unsuccessful – further details are provided in Section 1.2.1.

We then (**Stage 2**) explored new-build substation options on customer-owned and NGED-owned land. These were not progressed because the required land arrangements could not be agreed. We therefore revisited the option of constructing a 400/132 kV GIS substation adjacent to the existing Imperial Park substation (Option E-10). However, this was discounted due to planning, land and ecological challenges.

Following further engagement with [redacted], the connection approach was revised so that [redacted] became the direct connection customer, with [redacted] connecting as embedded demand customers (**Stage 3**). This enabled an existing-site uprating solution to provide customer-accepted non-firm capacity within the required timescales.

We have therefore shortlisted one new-build option, alongside two existing-site uprating options. Option E-10 (new 400/132 kV GIS substation) has been retained in the shortlist **as a reference case only**, rather than as a directly comparable alternative to the uprating options. Of these, Option D-4 is our preferred solution because it is the most proportionate and deliverable solution. We have provided supportive evidence and detailed analysis of our preferred option in Section 3.

Table 1: Summary of optioneering longlist

Option	Details	Drivers met?	New site?	AIS/ GIS?	Short List?
Stage 1					
Option A	Do nothing counterfactual option	No	No	NA	X
Option B	Market-based solution	No	No	NA	X
Option C	Non-transmission, whole systems solutions (DNO)	No	No	NA	X
Option D-1	Connection of the current mesh corner	No	No	AIS	X
Option E-1	New build substation with alternative mesh-based layouts/ configurations, including a 2-switch mesh on NGET land adjacent to existing sub	No	No	AIS	X
Option E-2	New 400/132 kV AIS/GIS substation on land adjacent to the existing Imperial Park substation	Yes	No	AIS/GIS	X
Option E-3	A new 400/132 kV AIS substation with space for a CDM area	Yes	Yes	AIS	X
Option E-4	A New 132 kV AIS and 400 kV GIS using a larger compound and with space for a CDM area	Yes	Yes	Hybrid	X
Option E-5	A New 132 kV/400 kV GIS using a smaller compound and without space for a CDM area	Yes	Yes	GIS	X
Option E-6	Construction of a new 400/132 kV GIS substation at alternate sites (area 9-2 and 4-2 of siting study)	Yes	Yes	GIS	X
Stage 2					
Option E-7	Construction of a new 400/132 kV GIS substation on land available on southlands [redacted] (NGED land)	Yes	Yes	GIS	X
Option E-8	Construction of a new 400/33 kV GIS substation by building SGTs and 33 kV switchgear on customers' land (three different layouts). A separate location for the 400 kV	Yes	Yes	GIS	X
Option E-9	Construction of a new 400/33 kV GIS substation on NGED's land	Yes	Yes	GIS	X
Option E-10	Construction of a new 400/132 kV GIS substation adjacent to the existing Imperial Park substation consisting of 3 [redacted] SGTs	Yes	No	GIS	✓
Stage 3					
Option D-2	Upgrading 400/33 kV SGTs to 400/132 kV, and installing a third 400/132 kV transformer	Yes	No	AIS	X
Option D-3	Installing two new double wound 400/132/33 kV transformers	Yes	No	AIS	X

Option D-4	Uprating existing SGTs (400/33 kV to 400/132 kV) using one AIS DCB bay and one conventional AIS bay	Yes	No	AIS	✓
Option D-5	Uprating existing SGTs (400/33 kV to 400/132 kV) using DCB bays	Yes	No	AIS	✓

Cost estimates

Based on the latest Cost Book and project estimates, the preferred option, Option D-4, has an estimated total cost of [redacted] Pre-Construction Funding is not requested for Imperial Park because the preferred solution is delivered entirely within the current site boundary, is driven by a single downstream contracted customer, and the full cost of the scheme is recovered through customer connection charges, meaning no consumer exposure arises during the development phase.

The cost for other shortlisted options are:

[redacted]

Indicative delivery program

The project is currently planned for staged delivery between 2028 and 2029[redacted]

Project benefits

The investment will enable the timely and cost-effective connection of major data centre demand in South Wales through an existing transmission interface, while increasing load capacity at the site by [redacted]. It will do so at materially lower cost and to an earlier delivery date than a new-build solution, thereby improving consumer value and supporting customer expectations on connection dates. The preferred solution also avoids the significant land, environmental, ecological and consenting risks associated with a new substation in or near the Gwent Levels SSSI, while making best use of existing assets and infrastructure.

1. Introduction

1.1 400/132 kV Imperial Park upgrade

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 upgrade the 400/132 kV Imperial Park substation. Through this submission, we are seeking:

- approval of the investment need and our preferred option; and
- confirmation of the proposed Track 3 EL and NC
- Pre-Construction Funding (PCF) under Special Condition 3.15 (Pre-Construction Funding Re-opener, Price Control Deliverable).

The investment is load-driven, with customer details explained in Section 2.

Subject to Ofgem confirming eligibility and needs case, we will continue development and intend to submit a Project Assessment in line with the re-opener process in the October 2026 window. This investment will be referred as Imperial Park in the rest of the document.

1.1.1 Eligibility, project track statement & PASE

Imperial Park is driven by a contracted customer connection with [redacted] which ultimately will enable data centre demand totalling [redacted]

The existing 400 kV substation is not designed for the level of capacity required for the data centres and any new electricity generation projects, thus requiring us to proceed with this investment pending Ofgem's approval of the investment's eligibility and needs case. The investment is therefore load-driven and triggered by contracted customer requirements and completion dates.

We are submitting this project under Assessment Track 3 EL and NC because the proposed intervention is a transformer uprate at the existing 400 kV AIS single switch mesh site. While single switch mesh AIS is recognised within PASE as a variant substation configuration for new build, the specific intervention (replacement of 400/33 kV transformers with 400/132 kV transformers) is not a listed PASE Primary or Variant option within the PASE framework. We therefore treat this as non-PASE compliant investment.

1.1.2 Pre-construction funding request

Under Special Condition 3.15 of the Electricity Transmission licence, this investment qualifies for allowances equal to 8.2% of its total forecasted cost [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 typical apportionment of PCF and EEW cost on similar type of projects. 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.

[redacted]

1.2 Background

1.2.1 Chronology to the investment

The investment is driven by the requirement to connect [redacted] data centre demand totalling 2[redacted] data centres requested for SQSS compliant N-1-1 firm capacity.

The initial contractual arrangement with [redacted] required us to deliver a firm, N-1-1 and SQSS compliant solution. The initial optioneering was carried out to accommodate this request. The initial indicative solution, after high-level optioneering and exploring options to use existing assets, assumed a new 400/132 kV 'Imperial Park B' substation, which would be SQSS compliant and provide N-1-1 firm capacity.

However, after preliminary ecology survey and detailed siting study to identify potential sites, it was concluded that the solution would need to be built on land owned by the [redacted] (preferred site after detailed siting study – see Appendix A).

The land required for construction of the substation on the freehold land of [redacted] under delegation of [redacted] NGET engaged with [redacted] with proposals to negotiate a lease or acquisition of the necessary land rights to construct the substation, but negotiations were unsuccessful. [redacted] set out that there was a clear strategy for the site that benefitted both regional and national employment and economic strategy, there was no provision to allow NGET to proceed with their proposals in this location.

[redacted]

Given the dialogue with the [redacted] and an inability to acquire the land via [redacted] pursuit of this land interest was no longer viable. As a result, the new-build option was discounted due to various reasons including environmental and land deliverability constraints. These are explained in Section 3.3.

Consequently, the contractual arrangement with the data centres had to be revisited, with their contracts being terminated, and it was decided that a new contract with [redacted] would be the optimal solution, by connecting data centres as embedded demand customers [redacted]. In collaboration with the data centres and [redacted] the revised non-firm approach was offered to [redacted] which is to uprate the existing Imperial Park 400 kV AIS substation by replacing two 400/33 kV [redacted] SGTs with two 400/132 kV [redacted] SGTs, enabling [redacted] to connect at 132 kV and

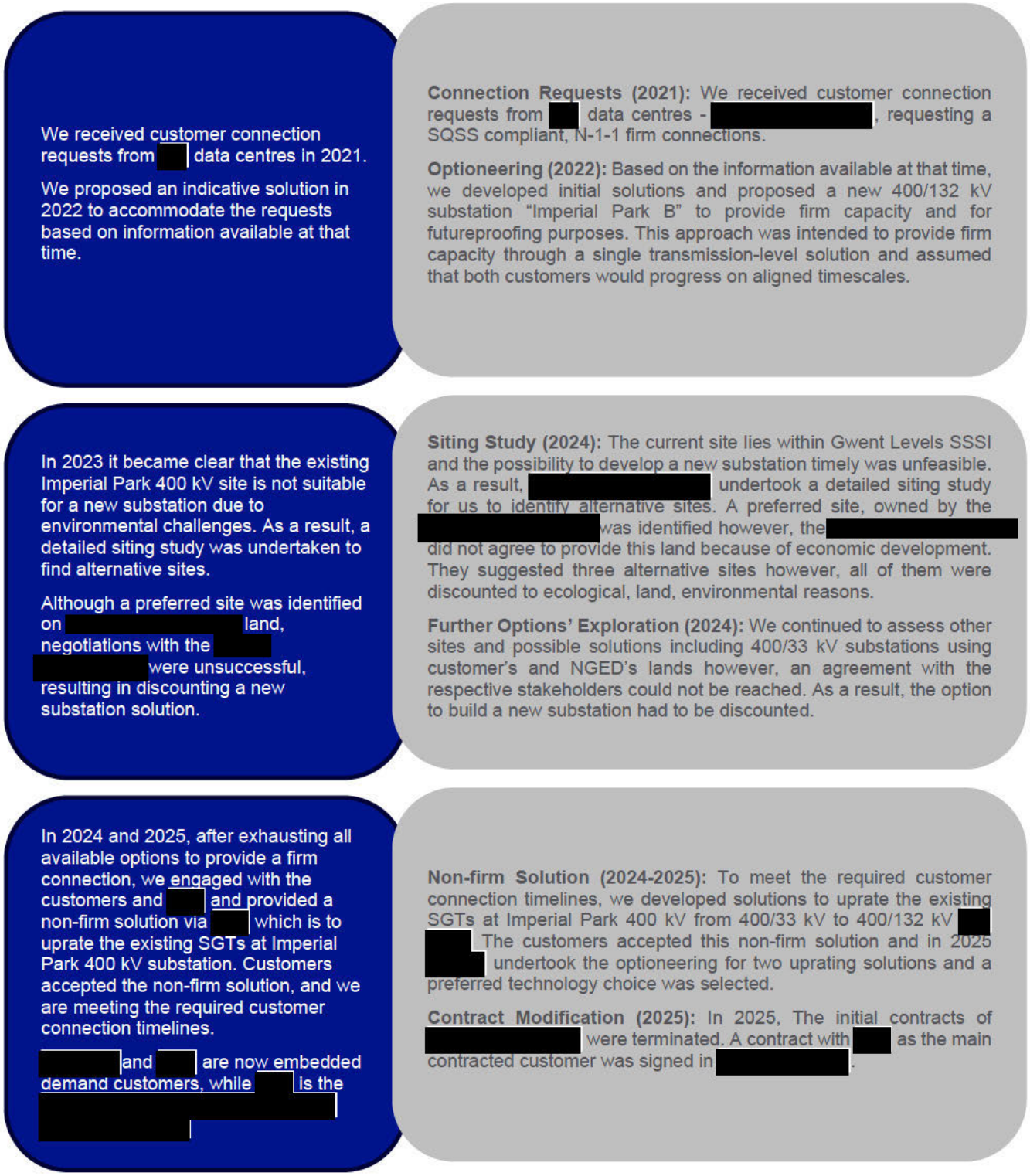
supply the embedded data centre demand. As a result, the estimated project cost has reduced from [redacted] to [redacted], and the delivery programme has been brought forward, enabling earlier connection of the data centre demand.

The current connection arrangement for this investment is:

[redacted]

Figure 1 shows how the scope of works has evolved over time due to no suitable land options being available and customer's asynchronous commercial and programme milestones.

Figure 1: Summary of chronology

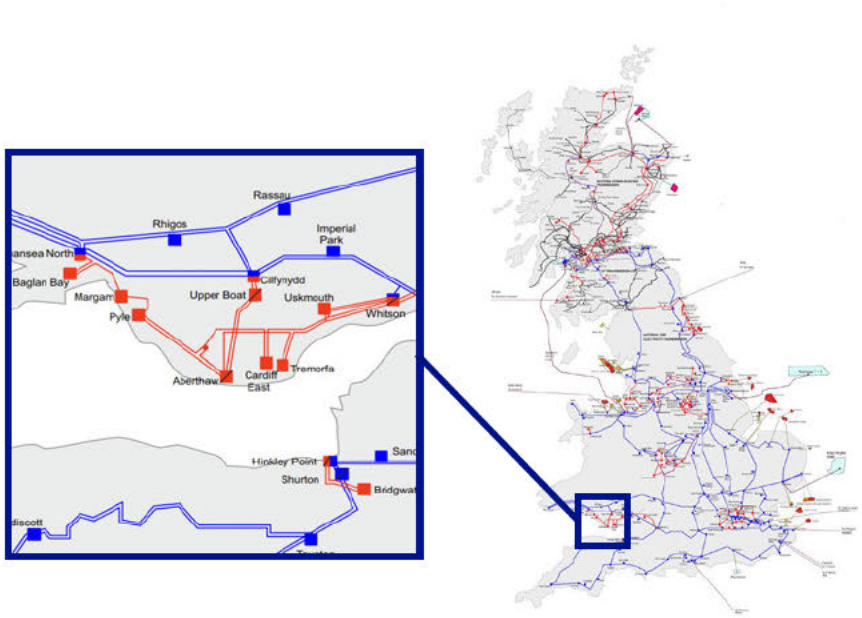


1.2.2 Regional & network context

The existing Imperial Park 400 kV AIS substation is a critical node on South Wales power flow. It occupies a strategically important position within South Wales, a region serving approximately one million households and 2.3 million people and supporting one of the UK's largest industrial hubs. The region is also expected to experience sustained growth in industrial and data-driven demand, reinforcing the importance of a robust transmission interface at Imperial Park. Figure 2 below provides a schematic illustration of the existing network in the South Wales region.

[redacted]

Figure 1: Location of the Imperial Park site on our network



1.2.3 Interactive projects

[redacted]

[redacted]

[redacted]

[redacted]

1.2.4 Site background

Imperial Park 400/33 kV AIS substation, constructed in 1998, is located just to the south of Imperial Park industrial park, on the Southwest edge of Newport. The substation is located on the Wentloog Levels between Cardiff and Newport within an SSSI. [redacted] It lies within an SSSI site with numerous watercourses. The SF6 33 kV switchboard is owned [redacted] is also within the same building envelope. The original driver to build the existing Imperial Park substation was to serve industrial development in the area, as a result of which it proceeded with an [redacted].

[redacted]

[redacted]

Figure 5: Aerial view of the Imperial Park substation

1.2.5 Historical funding

There is no historical funding associated with the investment covered by this document.

1.2.6 Early Asset Write Offs (EAWO)

There are no EAWOs at Imperial Park. [redacted]

2. Drivers & needs case

Imperial Park is a load-driven investment required to deliver contracted demand associated with [redacted] data centre customers, [redacted] and [redacted] totalling [redacted] now progressing as embedded demand via the existing connected customer [redacted]

The customer ACL dates presented in this submission reflect the existing contract. The testing and setting of ACL dates for customer contracts within scope of connections reform is ongoing throughout 2026. Confirmation of agreed ACL dates will therefore be presented in the next stage of submission which is the Project Assessment.

[redacted]

We are obligated to connect customers in an efficient and timely manner. The data centres have achieved planning and started construction. [redacted] have entered into contracts with suppliers, arranged the FID and are in the process of achieving planning. The existing 400 kV substation is not designed for the level of capacity required for the data centres and any new electricity generation projects.

This investment enables timely and cost-effective connection of the [redacted] embedded demand customers in South Wales, an AI-designated growth zone, and aligns with the Government's ambition to connect data centres quickly – data centres are classified as Critical National Infrastructure (CNI) by the UK Government[1]. An earlier connection date will be provided to [redacted] and [redacted] with this solution as opposed to 2032 for a new substation in that area.

[redacted]

[1] Data centres to be given massive boost and protections from cyber criminals and IT blackouts - GOV.UK

2.1 Customer

2.2 Asset health

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

A summary of the current asset health position at Imperial Park is presented in Table 5. 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. 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.

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.

[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.

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. Optioneering

3.1 Strategic options

In line with our standard optioneering process, we considered the following broad 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 summary of the optioneering process is provided below. Further detail regarding the process is provided in Section 3.3. To simplify the detailed optioneering process related to this investment, we have summarised it in three main stages for clarity.

[redacted]

Due to licence and contractual obligations and the inability to facilitate connection requests, Options A, B and C were discounted early in our optioneering process (during Stage 1). Option E was the preferred solution to meet contractual obligations at the time, which was the focus of Stage 2. When Option E was ruled out due to physical feasibility, Option D was revisited and required a change to the connection contracts.

3.2 Siting

As Option E would require a new site, we conducted a siting study. We employed the support of [redacted] in conducting a detailed review of possible suitable sites, based on both AIS and GIS substation configurations. The scope of the study focused on a corridor [redacted] and [redacted], spanning a distance between [redacted] (Imperial Park substation terminal and tower next to terminal tower). Figure 7 provides an aerial view of the varying sites considered as part of this study, summarised below. However, since the preferred site could not be secured because an agreement[redacted], who owns the area, could not be

reached, we discounted the new-build option and proceeded to Stage 3 of our optioneering. The details of siting study are provided in Appendix A.

[redacted]

3.3 Longlist of options considered

Within each of the five option categories, set out in Section 3.1, we designed a range of options and assessed them based on the balanced scorecard categories. In line with our standard optioneering process. Due to the complex optioneering chronology of this project, a short summary of our optioneering is first presented below:

Stage 1 (2022-2023):

- Option A: Baseline counterfactual 'do nothing' – ***discounted*** due to contractual and licence obligations.
- Option B: Market-based solution – ***discounted*** due to its inability to provide a viable and compliant connection.
- Option C: Whole systems solution – ***discounted*** due to contractual and licence obligations.
- Option D: Make use of existing assets.
    - Option D-1: Connection of the current mesh corner/ existing sub – ***discounted***: Connections off the current mesh corner at Imperial Park for [redacted] data centres was discounted, as the requirement from [redacted] data centres [redacted] and [redacted]) is for a fully resilient SQSS compliant solution which is not possible with existing sub configuration.
- Option E: Build a new substation.
    - Option E-1: New-build using an alternative mesh-based layouts, including a 2-switch mesh – ***discounted*** due to network limitations with respect to OHL flows and because this solution would not cater to the required capacity. This option will not be SQSS compliant for [redacted] data centres.

- Option E-2: New-build 400/132 kV AIS/GIS option on land adjacent to the existing Imperial Park 400 kV substation to provide a firm N-1-1 connection – discounted due to site being within Gwent Levels SSSI.

Given these constraints, we moved to a wider search for feasible new-build sites through a detailed siting study (see Appendix A), considering both AIS and GIS layout options:

Stage 2 (2023-2024):

- Option E-3: New 400/132 kV AIS – ***discounted***
- Option E-4: New 132 kV AIS and 400 kV GIS– ***discounted***
- Option E-5: New 132 kV/400 kV GIS using a smaller compound – ***discounted***

Site feasibility outcomes for Options E3, E4 and E5:

- Options E-3 and E-4 were considered from a site feasibility perspective. Following a site visit and completion of the OASTs, it became apparent that the topography within most of the study area severely reduced NGET's ability to deliver a site of those sizes and therefore, those options did not progress further for detailed engineering layout design.
- Option E-5 had to be discounted after detailed assessment of our preferred site from the siting study (Area 5-1). Due to space constraints, it was assessed that a full GIS solution would be required. In addition, the preferred site could not be secured due to reluctance of the [redacted] who told NGET that they have earmarked that area for economic development.
- Option E-6: New 400/132 kV GIS substation using a smaller compound, without a CDM area on alternate sites identified through siting study – discounted due suboptimal solution, less consumer value and delays in programme.

NGET then explored further new build solutions on other sites in the vicinity:

- [redacted] Option E-7: New 400/132 kV GIS on land from [redacted] to the east of Dyffryn – ***discounted*** because the land has similar ecology constraints as other sites, and this option would require NGED not fulfilling their contractual arrangements with [redacted]
- Option E-8: New split 400/33 kV GIS substations with 33 kV substation on customer land i.e., [redacted] and [redacted] – ***discounted*** because [redacted] did not agree for NGET to use their land.
- Option E-9: New 400/33 kV GIS on NGED land – ***discounted*** because this option would mean NGED to cancel their substation, which would stop them meeting their contractual obligations.
- Option E-10: New 400/132 kV GIS substation on land adjacent to existing Imperial Park 400/33 kV substation – ***shortlisted only for cost comparison purposes.***

After all new build options were exhausted, the preferred approach transitioned to uprating the existing Imperial Park substation.

Stage 3:

NGET then developed options to reconfigure existing substation including extension to provide a non-firm, cheaper solution to connect the data centres as embedded demand customers:

- Option D-2: Upgrade existing 400/33 kV SGTs to 400/132 kV SGTs – [redacted] – discounted because the option is not viable technically, and will also require build/ extension in SSSI land.
- Option D-3: NG to install two new double wound 400/132/33 kV transformers [redacted] – discounted because it's a bespoke transformer and would add significantly to timescales.
- Option D-4: Uprating the existing SGTs from 400/33 kV to 400/132 kV using one AIS DCB Bay and one conventional AIS Bay – shortlisted.
- Option D-5: Uprating the existing SGTs from 400/33 kV to 400/132 kV using two DCB bays – shortlisted.

Table 7 below provides the summary of all identified options. Each option has been evaluated against a comprehensive set of criteria, ensuring a thorough analysis of their viability and alignment with project objectives. Each of these is assessed against the following criteria:

- Consumer Value/Economic Performance
- Engineering
- Environmental
- Consenting & Land
- Deliverability

Table 7: Longlist table

Option	Option Title	Technical Description	Relevant Diagrams or Layout References	Consenting Risks & Environmental Impact	Rationale for taking/ or not taking forward the option to shortlisted assessment.
[redacted]					
A [not taken forward]	Do Nothing	The network is kept in its current state, and no new connections are facilitated.	Not applicable	Not applicable	• **Contractual and Licence compliance:** Compliant customer connection not delivered, and it would be against NGET's contractual and license obligations.
B [not taken forward]	Market-based solutions	Increased customer demand is accommodated through the procurement and use of ancillary services only.	Not applicable	Not applicable	• **Contractual and Licence compliance:** Compliant customer connection not delivered, and the option does not comply with NGET licence obligations to provide connections.
C [not taken forward]	Whole systems solution	The required customer connection is accommodated by a DNO instead of NGET.	Not applicable	Not applicable	• **Contractual and Licence compliance:** Compliant customer connection not delivered. • **Deliverability:** There is not enough capacity available in the local DNO network. [redacted]
D-1: [not taken forward]	Connection of the current mesh corner	Extending the existing substation by providing connections off the current Mesh Corner.		• Due to SSSI land, there are material environmental and consenting risks.	• **Engineering:** The existing substation footprint and mesh configuration **do not allow additional of 400/132 kV SGT bay(s) to accommodate two DC customers**. Addition of 400/132 kV SGT bay(s) would require extension of substation boundary into SSSI land. This is also not an SQSS compliant solution. • **Deliverability:** Due to the level of power required for the customers an extension to the existing substation is not feasible. • **Planning, land and consent:** Extension of current mesh corner bar in existing sub footprint is not possible. Appropriate space is not available in the sub to support bar extension. Extension to the east of sub is needed to extend the bar. The existing site is within SSSI land. Extending within the SSSI would carry materially higher environmental and consenting risks.
E-1 [not taken forward]	New 400/132 kV AIS/GIS substation on NGET land adjacent to existing sub	New build substation with alternative mesh-based layouts/ configurations, including a 2-switch mesh on NGET land adjacent to existing sub		• Due to SSSI land, there are material environmental and consenting risks.	• **Engineering:** Not technically viable due to the impact on existing overhead line power flows through Imperial Park. Could have provided an SQSS compliant solution for [redacted] data centre but not SQSS compliant solution [redacted]. • **Deliverability:** Initially this option was considered when there was only a connection request from [redacted] However, after [redacted] connection request, this was discounted because of additional capacity requirement and network limitation. • **Planning, land and consent:** The existing site is within SSSI land. Proceeding within the SSSI would carry materially higher environmental and consenting risks.

Option	Option Title	Technical Description	Relevant Diagrams or Layout References	Consenting Risks & Environmental Impact	Rationale for taking/ or not taking forward the option to shortlisted assessment.
E-2 [not taken forward]	New 400/132 kV AIS/GIS substation	New 400/132 kV AIS/GIS substation on land adjacent to the existing Imperial Park substation.		• The site is located within Flood Zone 3 for fluvial and tidal sources and has several small watercourses within and surrounding the site, making it more susceptible to flooding. • Due to SSSI land, there are material environmental and consenting risks.	• **Planning, land and consent:** Preliminary ecological survey identified site being within SSSI Gwent Levels. The OHL and any other associated infrastructure should avoid any further encroachment onto SSSI land where feasible. [redacted] **Proximity to residential area:** The site is [redacted]
[redacted]					
E-3 [not taken forward]	New 400/132 kV AIS substation	A new 400/132 kV AIS substation with space for a CDM area.		• Some areas are [redacted] / saline estuary, making outdoor AIS unsuitable. • Higher consenting risk due to proximity to scheduled monuments, ancient woodland, limited screening and sensitive receptors.	This option was discounted because the site layout options were deemed unfeasible for an AIS layout due to multiple challenges such as: • **Deliverability:** This option was based on the largest substation footprint, and this scale of development could not be accommodated easily within the available unconstrained land parcels across the corridor. • **Engineering:** The topography across most of the area sited severely reduced NGET's ability to deliver this, as it would require significant cut-and-fill and associated earthworks. • **Planning, land and consent:** The larger AIS footprint also created greater interaction with constraints such as Public Right of Way (PRoW), public roads, sensitive receptors and environmental features, meaning the constraints were judged to outweigh the benefits compared with the smaller GIS-based layouts taken forward. • **Environment:** In some areas, Option E-3 was specifically ruled out because outdoor AIS was unsuitable [redacted] estuary, which further narrowed the number of viable sites.
E-4 [not taken forward]	New 132 kV AIS and 400 kV GIS substation	A New 132 kV AIS and 400 kV GIS using a larger compound and with space for a CDM area.		• Several areas for this layout are affected by heritage and landscape constraints, including potential impacts on the setting of scheduled monuments and greater exposure to sensitive receptors. • Several sites also presented additional consenting risk due to ancient woodland / habitat interactions, existing wind turbine conflicts and the need for substantial mitigation.	This option was discounted because the site layout options were deemed unfeasible due to multiple challenges such as: • **Deliverability:** Although smaller than the AIS Option E-3 layout, it still required a substantial substation footprint plus a separate CDM area, limiting the amount of unconstrained land available across the corridor. • **Engineering:** After site visit and back-check review, it was found that the topography across much of the study area continued to constrain E-4 sites, with many locations requiring significant cut-and-fill and associated construction complexity. • **Environment:** Several other sites for Option E-4 were discounted because they directly impacted PRoW or public roads, were close to sensitive receptors, or created conflicts with heritage and environmental constraints, meaning the constraints outweighed the benefits.

Option	Option Title	Technical Description	Relevant Diagrams or Layout References	Consenting Risks & Environmental Impact	Rationale for taking/ or not taking forward the option to shortlisted assessment.
E-5 [not taken forward]	New 132 kV/400 kV GIS substation	A New 132 kV/400 kV GIS using a smaller compound and without space for a CDM area at the preferred site from siting study's result – Area 5-1. Initially a 132 kV AIS and GIS arrangement which was then replaced with a full 400/132 kV GIS because of the space constraints		• Due to the proximity of tidal and surface water flood risk areas to the west, south and east and uncertainties of site location about topography, a detailed site-specific Flood Consequence Assessment (FCA) would be required to further quantify tidal and surface water flood risk. • The site has functionally linked land with SSSI Gwent Levels 200 metres to the south and would likely host protected species. Robust assessment and mitigation would be needed to enable the development of the site.	This option was mainly discounted due to space constraints after detailed evaluation of all sites and specifically the preferred site, Area 5-1 (owned by [redacted]), as well as the reluctance by [redacted] to give this land: • **Planning, land and consent:** The site is earmarked by the [redacted] or economic development. Negotiations with the [redacted] ere carried out however, we did not get the approval to use this land. • **Deliverability:** After detailed evaluation of the site, it was understood that the space available would only be suitable for a full GIS 400/132 kV substation. However, the main bottleneck to progress was the reluctance of [redacted] to approve the works on this site.
E-6 [not taken forward]	New 400/132 kV GIS substation	Construction of a new 400/132 kV GIS substation at alternate sites (area 9-2 and 4-2 of siting study)		• High environmental and consenting risk associated with development of a new sub, requiring extensive surveys, statutory consultation and mitigation measures. • Proximity to sensitive ecological receptors, including functionally and hydrologically linked habitats to the Gwent Levels SSSI, increasing NRW involvement and programme risk. • Woodland and ancient woodland impacts arising from required new 400 kV OHL connections. • Likely presence of protected species. • Flood risk and drainage constraints, with both sites requiring a Flood Consequence Assessment (FCA) and SAB approval due to proximity to low-lying land and ordinary watercourses. • Landscape, visual and amenity impacts, particularly at Area 9-2 which has a higher number of nearby residential receptors and Public Rights of Way, increasing risk of objection. • Heritage and archaeology risk, including proximity to scheduled monuments (Area 4-2) and high archaeological potential on undisturbed land.	The secondary site options have been reviewed as suboptimal due to: • **Planning, land and consent:** Requirements for new 400 kV Overhead Line routes ([redacted] cumulative Overhead Line required to connect substations in alternative locations); Significant earthworks required to level site ready for construction; Programme impact for design, surveys. Planning consent, etc. – [redacted] Likely result in CPO of land rights; Additional customer cable route challenges (crossing the M4); • **Environment:** Impact on SSSI/RAMSAR wetland habitat; 400 kV OHL to turn in from ancient woodland. • **Proximity to residential area and disruption to the local area.** • **Consumer Value**: Less efficient spend profiles resulting in lower consumer value.

Option	Option Title	Technical Description	Relevant Diagrams or Layout References	Consenting Risks & Environmental Impact	Rationale for taking/ or not taking forward the option to shortlisted assessment.
Stage 2 part (ii) (2023- 2024) – Further three general footprints were considered on various other sites including DNO's and customers' land.					
E-7 [not taken forward]	New 400/132 kV GIS substation	Construction of a new 400/132 kV GIS substation on land available on southlands from [redacted] (NGED land).		• Environmental and ecological constrains: Like some other sites explored, this site would also require mitigation for dormice. In addition, towers/ OHL turn ins would need consenting through the SSSI, delaying the timely connection needed for the customers. • Consenting required for construction works through the SSSI area. • Proximity to the [redacted] introduces moderate landscape and visual sensitivity	Land available from WG – WG indicated that we can have any land available to the [redacted]: • **Contractual compliance:** This option would require NGED not to fulfil its connection agreements with [redacted] and [redacted]. • **Environment:** Like some other sites explored, this site would also require mitigation for dormice. In addition, towers would need consenting through the SSSI, delaying the timely connection needed for the customers. • **Deliverability:** The mock up layout shows the footprint would get very close to the [redacted] substation and so there may not be enough space.
E-8 [not taken forward]	New 400/33 kV GIS substation on customer's land	Construction of a new 400/33 kV GIS substation by building SGTs and 33 kV switchgear on customers' land (three different layouts). A separate location for the 400 kV.		• Assent required from NRW due to the site's proximity to the SSSI (approximately 200 m south of the site) and Nant-y-moor Reen running approximately 100 m south of the site. • Approval from Sustainable Drainage Approval Body (SAB) required due to the need to alter the existing ponds and consider the hydrological connection with nearby reens. • Legal agreement required to obtain 3rd party land. Needs to include space for landscaping and NBB. • Flood risk constraints present, with parts of the site affected by Flood Zone B/C1 and surface water flood risk, necessitating a Flood Consequence Assessment and mitigation.	• **Planning, land and consent:** The proposed layout required getting approval from [redacted] and [redacted] to use their land. After reviewing the proposal, [redacted] confirmed that they could not accommodate NGET's substation on their land. • **Environment:** Although not located within the SSSI, the site possesses hydrologically linked habitats to the Gwent Levels SSSI.
E-9 [not taken forward]	New 400/33 kV GIS substation on NGED's land	Construction of a new 400/33 kV GIS substation on NGED's land.		• Environmental and ecological constrains: Like some other sites explored, this site would also require mitigation for dormice. In addition, towers/ OHL turn ins would need consenting through the SSSI, delaying the timely connection needed for the customers. • Consenting required for construction works through the SSSI area.	• **Contractual compliance:** This option would require NGED's substation to be cancelled, and NGED not to fulfil its connection agreements with [redacted] and [redacted]. • **Environment:** Like some other sites explored, this site would also require mitigation for dormice. In addition, towers would need consenting through the SSSI, delaying the timely connection needed for the customers

Option	Option Title	Technical Description	Relevant Diagrams or Layout References	Consenting Risks & Environmental Impact	Rationale for taking/ or not taking forward the option to shortlisted assessment.
				• Proximity to the Dyffryn housing estate introduces moderate landscape and visual sensitivity	
E-10 [taken forward only for cost comparison purposes]	New 400/132 kV GIS substation	Construction of a new 400/132 kV GIS substation adjacent to the existing Imperial Park substation consisting of 3 [redacted] SGTs.	SLD and layout is included in Section 3.4	• The site is within Gwent Levels SSSI – requires assent from NRW which could delay the timeline of connection. • Approval from Sustainable Drainage Approval Body (SAB) is required due to existing drains. • Section 278 agreement is required from the Highway Authority for connection to the highway network. • The site is located within Flood Zone 3 for fluvial and tidal sources and has several small watercourses within and surrounding the site, making it more susceptible to flooding. • Potentially requires Section 37 consent due to the need for additional OHL towers.	A reconsideration of the existing leased land was done to develop a new 400/132 kV substation using a smaller, full GIS footprint. Although discounted on below mentioned feasibility grounds, it was retained in the shortlist solely for cost comparison to demonstrate that it remained more expensive than the other shortlisted options: • **Planning, land and consent:** The site is within SSSI Gwent Levels. The OHL and any other associated infrastructure should avoid any further encroachment onto SSSI land where feasible. This option also requires connection to the highway network requiring agreement with the Highway Authority. In addition to this, while NGET owns the land of the site, further land in the vicinity is required for development, for [redacted] hich a legal agreement may be required to obtain third party land. **roximity to residential area:** [redacted] • **Environment:** The site poses significant ecological concerns by encroaching on the Gwent Levels SSSI.
Stage 3 (2025) – Uprating existing SGTs after no site or land was available to build a new substation.					
D-2 [not taken forward]	Upgrade existing 400/33 kV SGTs to 400/132 kV SGTs – Drop down a third 400k line, install a third 400/132 kV transformer	NG to install two new 400/132 kV [redacted] transformers to replace 400/33 kV SGTs. [redacted] to install a new indoor 132 kV board at Imperial Park substation, [redacted]		• The site is within Gwent Levels SSSI – requires assent from NRW which could delay the timeline of connection. • Approval from Sustainable Drainage Approval Body (SAB) is required due to existing drains. • Potentially requires Section 37 consent due to the need for OHL tower modification • Temporary diversion in SSSI land – consenting required on SSSI land	This option would be developed in stages, starting with the upgrade of the 2 [redacted] SGTs as a matter of priority. However, customers would have to agree that there's huge risk with the second stage because of: • **Engineering:** There are massive interfaces with tower mods associated with this option and the substation bus configuration is complex. In addition, temporary diversions would be needed into the SSSI land. • **Outages:** Long outages for [redacted] • **Deliverability:** Installation of 3rd line bay and 3rd SGT bay on existing site resulting in delay in programme timelines.

Option	Option Title	Technical Description	Relevant Diagrams or Layout References	Consenting Risks & Environmental Impact	Rationale for taking/ or not taking forward the option to shortlisted assessment.
D-3 [not taken forward]	Installing new SGTs / Uprating existing SGTs	NGET to install two new double wound 400/132/33 [redacted]		• The site is within Gwent Levels SSSI – requires assent from NRW which could delay the timeline of connection. • Approval from Sustainable Drainage Approval Body (SAB) is required due to existing drains.	• **Engineering:** There are technical challenges with installing bespoke double wound transformers due to additional engineering complexity around specification. • **Planning and consent:** Because it was bespoke, the unit would have required additional design development, supporting evidence, testing, type registration and any necessary deviation / derogation approvals, extending the procurement and approval timeline. • **Deliverability:** A bespoke transformer would increase delivery risk through longer manufacturing lead times, greater risk of design changes or non-compliance during approval.
D-4 [taken forward]	Installing new SGTs / Uprating existing SGTs	Uprating existing SGTs (400/33 kV to 400/132 kV) using one AIS DCB bay and one conventional AIS bay.	SLD and layout is included in Section 3.4	• The site is within Gwent Levels SSSI – requires assent from NRW which could delay the timeline of connection. The assent has been arranged in December 2025.	• **Consumer value:** The uprating solution is less costly than a new build option. • **Planning, land and consent:** Replacing the existing SGTs with new ones doesn't require any consenting approvals because the work is within existing operational boundary of the existing substation. We will use our permitted development rights. • **Deliverability:** Easy to construct as technology is well known. • **Customer acceptance:** The solution to uprate brings delivery date in line with customer's timeline and all stakeholders are satisfied with this option despite being non-firm.
D-5 [taken forward]	Installing new SGTs / Uprating existing SGTs	Uprating existing SGTs (400/33 kV to 400/132 kV) using DCB bays.	SLD and layout is included in Section 3.4	• The site is within Gwent Levels SSSI – requires assent from NRW which could delay the timeline of connection. The assent has been arranged in December 2025. • Approval from Sustainable Drainage Approval Body (SAB) is required due to existing drains.	• **Consumer value:** The uprating solution is less costly than a new build option • **Planning, land and consent:** Replacing the existing SGTs with new ones doesn't require any consenting approvals because the work is within existing operational boundary of the existing substation. We will use our permitted development rights. • **Deliverability:** Easy to construct as technology is well known. • **Customer acceptance:** The solution to uprate brings delivery date in line with customer's timeline and all stakeholders are satisfied with this option despite being non-firm.

In developing and evaluating these options, we have had to balance a set of material constraints and trade-offs to identify a solution that best delivers for consumers. Below, we set out the principles underlying the design and assessment of the options and then summarise the optioneering process.

Land availability and consenting have been key factors in evaluating site options. The Imperial Park site's environmental sensitivity, including its Site of Special Scientific Interest (SSSI) status, led to the rejection of the initial substation proposal due to protected species identified in ecological surveys. Additional studies and consultations with the [redacted] resulted in three alternative sites, but each faced challenges such as ecological and technical constraints, limited space, proximity to residential areas, and SSSI designation. While development within an SSSI is possible, it increases complexity and risks due to more surveys, mitigations, and approvals needed from bodies like Natural Resources Wales (NRW), reducing confidence in timely delivery and risking non-compliance with regulations such as the Horlock Rules and Electricity Act 1989.

Another important consideration was to develop a solution capable of connecting customers in a timely manner. As mentioned in Section 3, timely connection of data centres is critical, given the UK Government's focus on supporting and growing the AI sector and to increase Britain's stake across AI value chains. The preferred solution enables a staged delivery profile and avoids a later delivery associated with a new-build substation option.

Based on the rationale stated, three of the 18 options were shortlisted for detailed analysis: D-4, D-5, and E-10.

3.3.1 Influence of stakeholders on shortlisting

Influence of [redacted] and [redacted] to provide a firm, SQSS compliant connection initially

The original concept for a new 400/132 kV substation was developed to provide a firm SQSS compliant solution as requested by the data centres. The existing Imperial Park 400 kV substation is configured as a single-switch mesh, which limited the ability to integrate additional circuits or transformer connections. Options involving connections from the current mesh corner, extension of the existing arrangement and alternative mesh configurations were explored but were not viable due to practical design constraints and the interaction with existing overhead line flows. As a result, initially, a single solution in the form of a new 400/132 kV substation was offered to the customers which would be SQSS compliant (Option E-5).

Role of [redacted] and challenges to secure preferred land

The new-build substation option adjacent to existing Imperial Park substation was primarily constrained by environmental and land deliverability issues. Preliminary ecological and siting work identified that the surrounding area is subject to SSSI-related constraints, creating significant consenting and programme risk for any adjacent new-build solution. In addition, land options identified through the siting process, including land under [redacted], could not be secured within the required programme. On that basis, the new-build option was not considered deliverable within the timescales required to meet the customer connection need.

[redacted]

3.4 Shortlisted options

This subsection provides a description of the three shortlisted options:

- E-10: Construction of a new 400/132 kV GIS substation adjacent to the existing Imperial Park substation consisting of 3 [redacted] SGTs.

- D-4: Uprating existing SGTs (400/33 kV to 400/132 kV) using one AIS DCB Bay and one Conventional AIS Bay.
- D-5: Uprating existing SGTs (400/33 kV to 400/132 kV) using two DCB Bays.

As stated in the Executive Summary, Option E-10 has been retained in the shortlist to provide a benchmark against the solution originally developed to meet the customers' initial firm, SQSS-compliant connection requirements. As such, it delivers a materially different set of outputs to Options D-4 and D-5, including:

- Firm capacity rather than non-firm capacity;
- Materially greater long-term expansion potential; and
- A new strategic transmission node rather than optimisation of an existing one.

Following changes to the connection arrangements and customer acceptance of a non-firm solution via [redacted] the additional outputs delivered by Option E-10 were no longer required to meet the established need. However, the option has been retained to demonstrate:

- The scale and cost of the 400/132 kV GIS solution that would otherwise be required to deliver firm, future-proofed capacity at this location; and
- The relative consumer value of the preferred uprating solution when benchmarked against a credible new-build alternative.

3.4.1 Option E-10 – Construction of a new 400/132 kV GIS substation adjacent to the existing Imperial Park substation consisting of [redacted]

NGET considered offering a new build substation as that was the only available option at that time to provide a firm, SQSS compliant N-1-1 solution, as requested by [redacted] data centre customers.

Initially, a preferred site was chosen through a detailed siting study. The preferred option from the siting study would need to be built on land owned by the [redacted] which they refused to give to NGET because they had earmarked it for economic development; therefore, it could not be obtained using NG's statutory compulsory purchase powers. Negotiations were conducted with the [redacted] to demonstrate best endeavours. The micro siting options report are listed in Appendix A where an appraisal was conducted of the options provided by [redacted]. The three site options were considered unsuitable because of several reasons including:

- Ecology / SSSI sensitivity
- Flood risk / drainage
- Design / future expansion: limited land availability (only for site A)
- Land / deliverability
- Technical complexity
- Landscape / residential amenity
- Cost

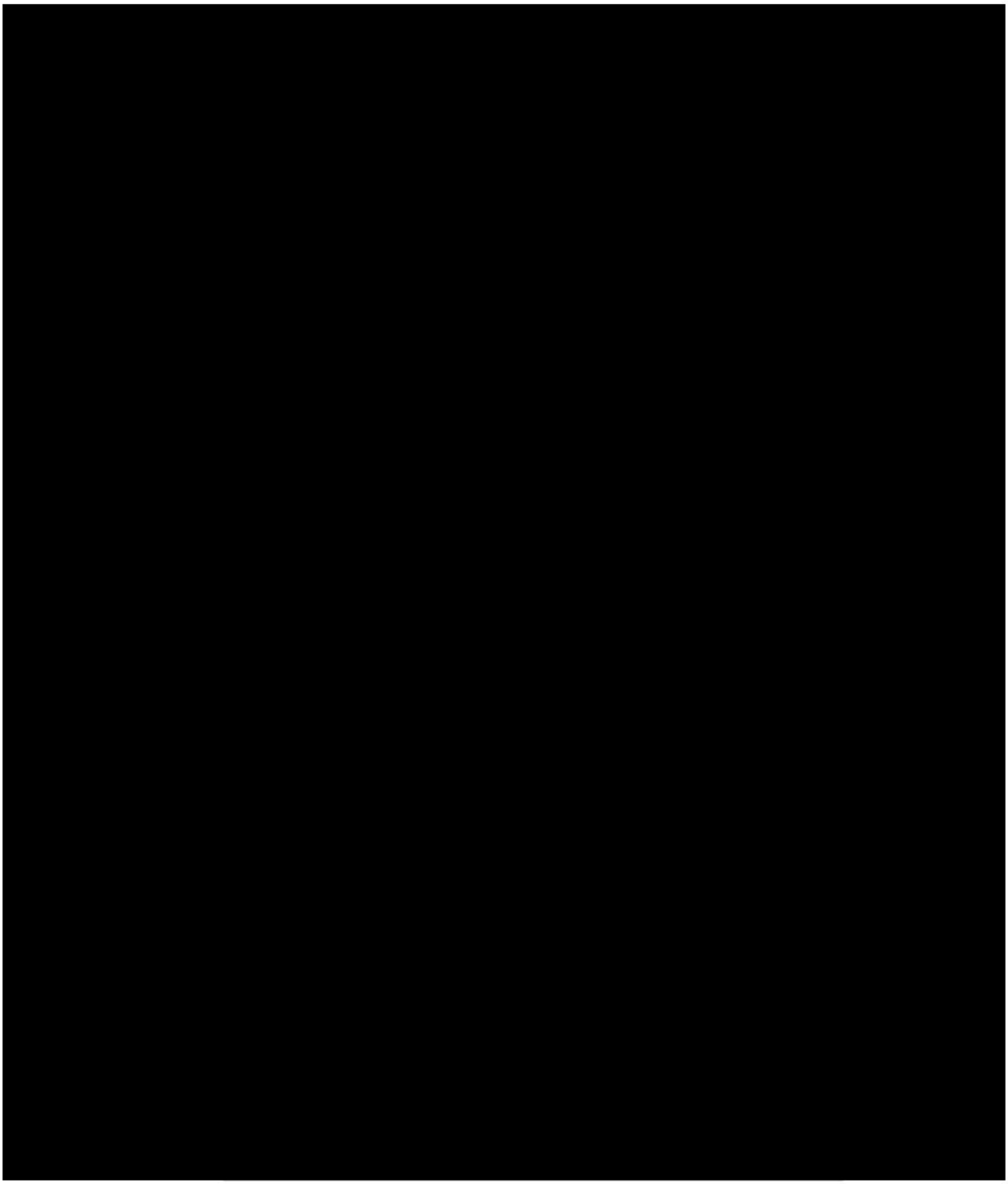
As a result, the existing site was considered as the preferred option to accommodate the proposed development.

The proposed programme was a single solution in the form of a new 400/132 kV GIS substation. The indicative scope of work is detailed below:

[redacted]

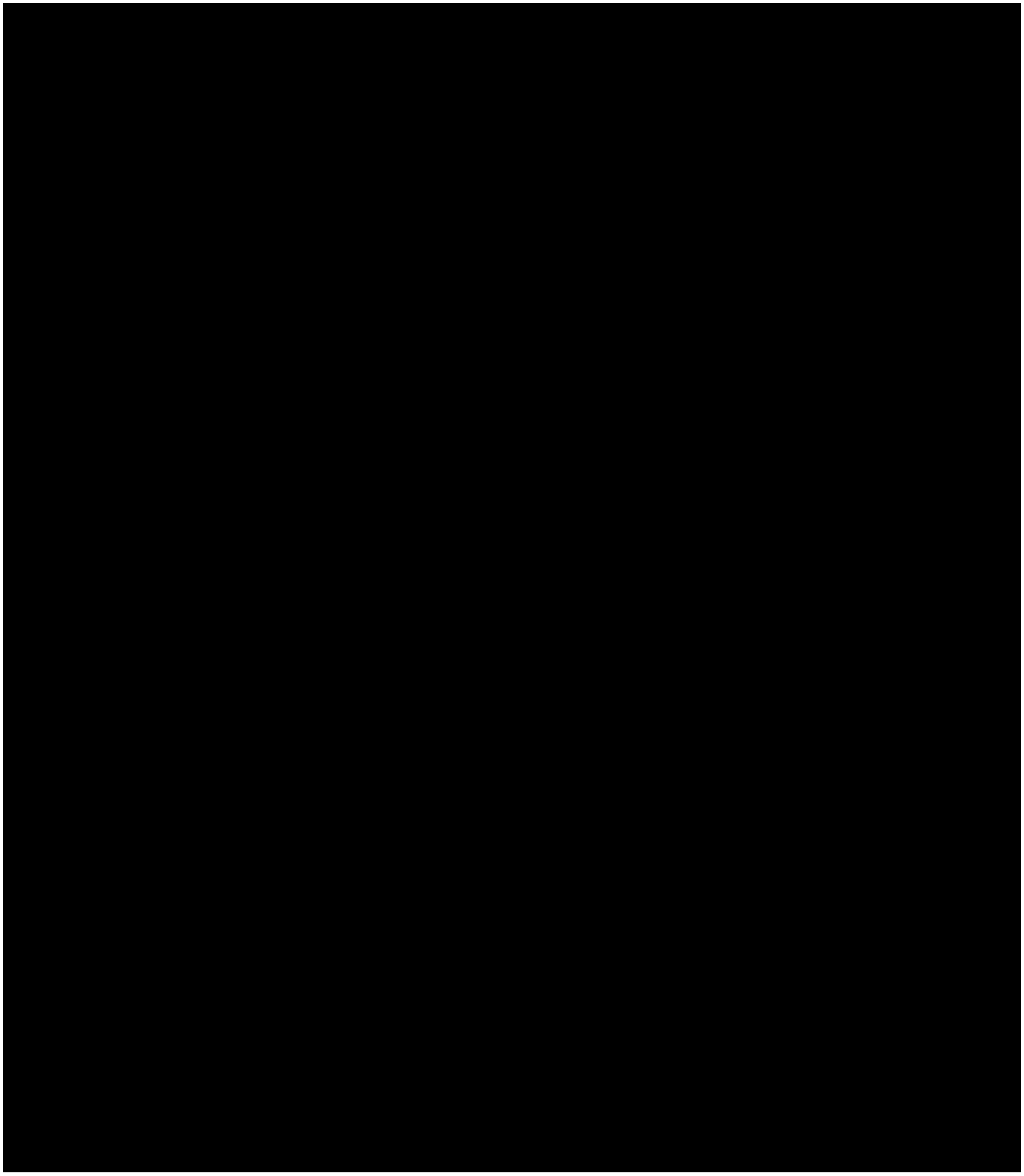
3.4.2 Option D-4: Uprating existing SGTs (400/33 kV to 400/132 kV) using one AIS DCB bay and one conventional AIS bay

In this proposed option, we considered to install two new 400/132 kV [redacted] transformers to replace the existing 400/33 kV SGTs at the existing Imperial Park 400/33 kV AIS substation. [redacted] This option has DCB (disconnecting CB) for SGTD1 bay and conventional disconnect and CB for SGT2A bay.



3.4.3 Option D-5: Uprating existing SGTs (400/33 kV to 400/132 kV) using Disconnecting Circuit Breakers

This option is similar to D-4, with the only difference being using DCB for both SGTs. Upgrading 2 SGTs as part of the chosen solution will be a lower carbon option than the previous option of building a new substation. Out of the two upgrade options considered, option D-4 has marginally more carbon than the Option D-5. This is to do with the Option D-4 having a separate disconnector and circuit breaker rather than a DCB. The other option also [redacted] The carbon difference is not influential in the selection of the preferred design as the outage and operational benefits of the preferred option outweigh this.



3.5 Detailed qualitative analysis of shortlisted options

Table 8: Detailed qualitative assessment table

	Optioneering Categories				
Option	**Engineering**	**Environmental**	**Deliverability**	**Economic / Consumer Value**	**Consenting / Stakeholder**
Option E-10: New 400/132 kV GIS substation adjacent to the existing Imperial Park substation	✓ Provides **improved network configuration** and **greater operational flexibility**. ✓ Delivers a new 400/132 kV GIS substation with three [redacted] SGTs and SQSS-compliant configuration.	[redacted] × The option poses **significant ecological concerns by encroaching on the Gwent Levels SSSI**. × **Limited space available for the landscaping** scheme within the site. × Mitigation would be required to achieve minimum 10% Net Biodiversity Benefit (NBB).	× **Challenges around land acquisition** poses a material delivery risk. × The **expected [redacted] for this solution is 2032** which is not complaint with Data Centres' timelines.	× This is the **highest-cost shortlisted option** and therefore offers materially weaker consumer value than the uprating options. ✓ **Provides futureproofing** due to a new substation with 3 SGTs and provision for future extension.	× **Land consent is an issue** because of SSSI status – assent required from Natural Resources Wales (NRW). × **Approval from SAB required** due to the existing drains. × **Potentially requires Section 37 consent** due to the need for additional OHL towers. × **Section 278 agreement is required** from the Highway Authority for connection to the highway network. × We own the land of the site, however **further land in the vicinity is required for the development**. Legal agreement may be required to obtain 3rd party land.
	Strong Benefit	Detractor	Strong Detractor	Detractor	Strong Detractor
Option D-4: Uprating existing SGTs (400/33 kV to 400/132 kV) using one AIS DCB bay and one conventional AIS bay	✓ **Known technology**, so low risk of design faults and **easier to construct**. ✓ **Ease of operation and maintenance** due to standard AIS Circuit breaker being selected for [redacted] ✓ **Innovation design** as type registered ester oil SGTs are used. ✓ **Proposed outages are lower than Option D-5** [redacted]	✓ No extension of the existing substation thus **reducing the carbon footprint**. ✓ **No local and visual impacts** because the work is within existing operational boundary. ✓ An AIS solution requiring **no additional footprint as compared to option E-10**. ✓ **Less carbon footprint** because of installing one SF6 DCB.	✓ **In line with customer programme and timelines** of embedded Data Centres' demands. ✓ DCBs presently have a [redacted] for this option was already ordered. If we select Option D-5 [redacted] which will have a longer lead time than conventional DS and CB.	✓ Lower cost than a new 400/132 kV GIS substation and Option D-5. ✓ Reduced outage requirements further **lower overall project cost**. ✓ **Supports timely connection** of strategic data centre demand – [redacted] ✓ **No futureproofing**. ✓ The solution **creates an additional [redacted] of non-firm capacity**.	✓ NGET-owned land – **does not require land extension** beyond our current fenced substation. Permitted development. ✓ The site is within a SSSI designated area and so the solution is based on no extension to the existing operational fence and **will be under permitted development**.

Option	Optioneering Categories				
	Engineering	**Environmental**	**Deliverability**	**Economic / Consumer Value**	**Consenting / Stakeholder**
	✓ **Requires less outage time** than Option D-5.		✓ [redacted] date is in line with customer's expectation.		
	Benefit	Benefit	Strong Benefit	Benefit	Benefit
Option D-5: Uprating existing SGTs (400/33 kV to 400/132 kV) using DCB bays	× DCB is **lesser-known technology**, so health, safety and operational procedures need to be developed further. × DCB **adds complexity to operation and maintenance** – relatively new technology, not abundantly available in the network and asset operations have less experience working on them. There is not any physical / visible disconnector which visibly disconnects the circuit like in the conventional disconnectors. Also, **secondary design will be complex** because both disconnectors and circuit breaker is within one assembly.	✓ No extension of the existing substation thus **reducing the carbon footprint**. ✓ **No local and visual impacts** because the work is within existing operational boundary. ✓ An AIS solution requiring **no additional footprint as compared to option E-10**. × **More carbon footprint** because of installing two SF6 DCBs.	× **Construction will take longer**, thus longer electrical outages. ~6 months. × DCB **adds complexity to operation and maintenance**. × [redacted]	✓ **Materially lower cost than a new 400/132 kV GIS substation** and slightly higher cost than Option D-4. ✓ **Supports timely connection** of strategic data centre demand – [redacted] × **No futureproofing**. ✓ The solution **creates an** [redacted]	✓ NGET-owned land – **does not require land extension** beyond the current NGET fenced substation. Permitted development. ✓ The site is within a SSSI designated area and so the solution is based on no extension to the existing operational fence and **will be under permitted development**.
	Neutral	Benefit	Neutral	Benefit	Benefit

3.5.1 PASE

The relevant PASE-aligned comparators for Imperial Park were new-build substation solutions recognised within Ofgem's PASE framework. The project's siting and optioneering considered both AIS and GIS new-build footprints, but technology and configuration were not fixed at the outset. The uprating solutions (Options D-4 and D-5) were taken forward after these credible new-build alternatives were assessed and found to be materially constrained in the Imperial Park context. The uprating of SGTs is not listed as a PASE Primary or Variant option.

Deliverability and timely connection

The main advantage of the uprating option over the relevant PASE-aligned new-build alternatives is deliverability. The optioneering shows that new-build options faced material barriers linked to the Gwent Levels SSSI, ecology, flood risk, drainage, access, highway interfaces, topography and land constraints. By contrast, the uprating options make use of the existing transmission node and avoid the need to secure and consent a wholly new substation platform in a highly constrained area. Timely delivery is paramount due to the involvement of Critical National Infrastructure data centres. [redacted] customers were fully engaged through optioneering and accepted the uprating solution on a non-firm basis.

Whole-life efficiency and consumer value

The consumer value case is that the uprating options provide a better overall outcome once realistic delivery, and consenting risks are considered. New-build alternatives would have required substantial additional scope associated with land, environmental mitigation, flood and drainage measures, access arrangements and third-party dependencies. The uprating options instead upgrade capability at an existing strategic site, avoiding the cost and programme burden of pursuing a new-build solution where no unconstrained site was identified.

Necessity of the solution

The uprating options were not selected prematurely. The project considered do-nothing, whole-system alternatives, mesh-based arrangements, and new-build substations on and away from the existing site. Those options were discounted for evidenced reasons, as stated in Section 3.3. The uprating solutions therefore emerged only after other alternatives had been tested and found not to provide a practicable route forward.

3.6 Detailed quantitative analysis of shortlisted 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 (23/34 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] contingency, based on historic project analysis, to account for unforeseen circumstances and mitigate risks during implementation.

Option D-4 is the lowest capex cost, making it the most cost-effective option. Option E-10 is the most expensive option due to a new-build substation. Options D-4 and D-5 have a small difference in their total cost.

3.6.1.1 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:

- 400/132 kV [redacted] SGTs
- Mesh section bay for the 400 kV AIS substation

3.6.2 Cost Benefit Analysis

3.6.2.1 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:

(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-ET3 CBA template spreadsheet we have assessed all shortlisted options quantitatively. As set out in section 3.4, the three shortlisted options include:

- **Option E-10**: Construction of a new 400/132 kV GIS substation adjacent to the existing Imperial Park substation consisting of 3 [redacted] SGTs
- **Option D-4:** Uprating existing SGTs (400/33 kV to 400/132 kV) using one AIS DCB Bay and one Conventional AIS Bay
- **Option D-5**: Uprating existing SGTs (400/33 kV to 400/132 kV) using two AIS DCB Bays

3.6.2.2 CBA Outcome

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

[redacted]

On the basis of the discounted lifetime CBA results (Table 10), Option D-4 delivers the highest NPV [redacted] and therefore represents the preferred option on consumer value grounds. This analysis is subject to confirmation through deliverability, consents/land, outage and risk considerations, and any CBA sensitivities set out in the assumptions below.

3.6.2.3 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).

3.6.2.4 Costs

3.6.2.5 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 benefits, including environmental and non-environmental benefits.

3.7 Preferred Solution

Based on the detailed qualitative and quantitative analysis, our preferred option is Option D-4, which represents the best consumer value and has the highest NPV among all shortlisted options.

This solution addresses the direct demand connection customer ([redacted] and embedded demand customers ([redacted] & [redacted] As compared to the other shortlisted uprating option, Option D-4 is preferred over Option D-5 because it uses only one DCB. Operationally, an AIS circuit breaker and disconnector is preferred where space allows and also reduces requirement for SF6 as circuit breakers can be procured SF6 free, whereas DCBs currently cannot.

The preferred solution consists of upgrading the existing Imperial Park 400 kV substation by replacing [redacted] 400/33 kV SGTs to [redacted] 400/132 kV SGTs to provide customer accepted non-firm capacity [redacted]. The uprating involves replacement of existing SGT bays with one 400 kV AIS DCB bay and one 400 kV conventional AIS bay. The preferred option will result in an earlier connection date for the data centres as compared to other solutions.

[redacted]

3.7.1 Project benefits, outputs & deliverables

Table 13: Summary of outputs and benefits

Output & Proposed PCD	Deliver [redacted] demand connection to [redacted] at Imperial Park 400 kV AIS substation by replacing 2 [redacted] 400/33 kV SGTs with [redacted] 400/132 kV SGTs, to ultimately enable [redacted] embedded demand connection for [redacted] data centres.
Deliver the grid of tomorrow	• Delivers additional capacity in the existing substation to manage embedded customers ([redacted] & [redacted] demand requirements. • Creates an additional [redacted] of non-firm capacity that unlocks power in the region cheaper and quicker. • Aligns with the broader Great Grid Upgrade initiative to modernise and expand the electricity transmission network to support the energy transition.
Do the right thing for our consumers, communities and environment	• AIS site upgrade rather than building a new GIS 400/132 kV substation; upgrading existing infrastructure is a cost-effective solution that meets customer demands promptly. [redacted] • Improved relationship and reputation among data centre customers by delivering quickly through solving problems and collaborating on solutions. • Improved relationship with [redacted] due to reduced impact on their economic development plans for the land. • Upgrade minimises resource usage and avoids ecological impacts associated with constructing a new substation. • Net gain confirmed out of scope as works are within the operational boundary; works outside boundary to lay new 132 kV cables do not impact habitats and fall out of scope of net gain. • Enhances grid capacity in the local area for economic development as data centres are considered to be important to UK's economic growth.[3]

[3] According to a November 2024 report by TechReport – a trade association – data centres are currently contributing £4.7 billion in Gross Value Added (GVA) annually to the UK economy.

3.7.2 Futureproofing

The preferred uprating solution at Imperial Park does not provide material future expansion beyond the immediate connection need, and any future MW demand would trigger a separate new substation requirement.

However, it creates an additional [redacted] of non-firm capacity. Whilst this is not SQSS compliant, it unlocks power in the region cheaper and quicker, where expedition of connection is the main concern for the customer. The required outcome of this investment is to increase capacity at Imperial Park to meet increased customer demand of the two data centres much sooner than the alternative solutions. This aligns with national strategic priorities to connect data centres: [redacted]

The optioneering demonstrated that delivering future-proofed, firm capacity at Imperial Park would require a new-build substation with substantial additional land take, environmental impact and cost. Given the highly constrained SSSI context of the site and the absence of a confirmed future requirement at this location, such an approach would expose consumers to unnecessary cost and risk.

Importantly, the absence of future-proofing at Imperial Park does not create a strategic gap in the South Wales network. Future demand growth and system reinforcement are being considered through a range of planned and emerging investments across the region, where site availability, configuration and timing are more appropriate to support long-term capacity growth.

On that basis, the preferred solution focuses on meeting the clearly defined, time-critical customer need, while maintaining optionality to pursue future reinforcement through separate, better-aligned investments should system demand materialise.

4. Project delivery

4.1 Proposed Deliverability Programme

Based on the system access requirements for the preferred solution (i.e. outages cannot be taken pre-/post-clock change for winter peak resilience reasons) and the planned staged delivery of the investment, the proposed programme of works is outlined in Table 14.

[redacted]

Table 15 below shows the key milestones and associated dates.

[redacted]

As stated in Section 1.2.1, during Stage 4.3 of our internal BP500 process, the programme was rebased following [redacted] update on 132 kV GIS lead times: although the TOCO states [redacted], the working [redacted] expected to submit a modification application when the next window opens to align dates. Therefore, the above programme doesn't reflect new [redacted] as we don't have the revised programme at the time of drafting this submission.

4.2 Procurement & contracting strategy

Our preferred procurement strategy is to have one contractor deliver all the works in order to minimise interface risks and ensure consumer value.

Recognising that we need to deliver a RIIO-T3 workbook of unprecedented scale, we have 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. The procurement strategy for this project is to award the full scope of work to [redacted] who have been allocated as the enterprise partner for the southwest region through direct allocation. [redacted]

[redacted] have been contracted to do the 4.4 detailed design for the phase 1 works which has been completed. They will also provide the Phase 2 4.4 design to be directly handed to [redacted] by [redacted]. M group will be awarded a staged ECI contract to support [redacted] and liaise with sub-contractors in phase 1, [redacted], Stage 2 will be built in [redacted].

4.3 Risk & risk management

As previously highlighted in the SWOT analysis, the preferred option does still present some risks; these are also listed in the CBA summary. Refer to the high-level risk assessment and associated mitigation in Table 16 below.

Table 16: Risk Summary Table

Risk Description	Mitigation Measures
System Access & Outages: Outage unavailability for SGT1A and/or SGT2A, could delay delivery by up to one outage season (approximately 6 months).	• Early alignment of contractor programme with outage booking • Ongoing coordination with NESO planners • Staged and offline construction to minimise outage durations
Third-Party Dependency: [redacted]	• Programme rebased in 4.3 of BP500, with ongoing alignment with [redacted] • Contractual provisions in [redacted] connection agreement; [redacted]
Procurement & Supply Chain: Delay in long-lead equipment, including SGTs, DCB, post insulators and 132 kV cables could delay the programme and escalate costs.	• SGTs and DCB already procured • Early identification of remaining long-lead items • Use of conventional AIS equipment where possible • Close supply-chain monitoring through main works contractor
Planning & Environmental Consents: Delay in SSSI-related approvals (e.g. NRW assent, SAB approval) could delay or resequence works, impacting programme confidence.	[redacted] Early engagement with [redacted] • Prior SAB approval and SSSI assent secured where required • All primary works contained within existing operational boundary and delivered under permitted development • This risk is being mitigated in full

Risk Description	Mitigation Measures
Site Constraints & Logistics: Restricted site access and SGT delivery logistics, including requirement for off-site transhipment due to constrained footprint could increase construction risks and delay delivery.	• Proven logistics strategy confirmed • Specialist hauliers appointed • Defined transhipment areas with land agreements to be secured in advance • No reliance on new land take within SSSI

5. Proposed working arrangements

5.1 Details of proposed working arrangements between TOs

There are no current working arrangements with TO's as there have been no drivers from TO's for additional capacity.

5.2 Details of proposed working arrangements between DNOs

As described in Section 3.3 above, we engaged with NGED during the optioneering process to identify a viable solution. However, there is insufficient capacity available within the local DNO network. [redacted]

In addition, discussions were held with NGED regarding the potential construction of a new 400/132 kV or 400/33 kV substation on land owned by NGED as part of their new substation development. However, as explained in Section 3.3, this option was not progressed, as NGED has specific licence obligations [redacted]

We also engaged with [redacted] throughout the optioneering and siting process and identified a workable solution by maximising the capacity of the existing substation. [redacted]

6. Conclusion

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

The preferred option D-4 upgrades the existing Imperial Park 400 kV substation by replacing two SGTs.

Table 17: Investment Summary

Main Drivers	Load – connecting [redacted] of directly contracted [redacted] demand.
Preferred Options	**Option D-4:** Upgrading [redacted] 400/33 kV SGTs to [redacted] 400/132 kV SGTs. The preferred solution creates [redacted] additional non-firm capacity.
Estimated Cost & Timing	**Total forecasted expenditure:** [redacted] **Indicative delivery timeline:** • The first SGT [redacted]) will be commissioned in [redacted] • The second SGT ([redacted] will be commissioned in [redacted] [redacted]
Outputs	Delivery of [redacted] contracted [redacted] demand connection to [redacted] at Imperial Park 400 kV AIS substation, by replacing 2 [redacted] 400/33 kV SGTs with [redacted] 400/132 kV SGTs, to ultimately enable [redacted] embedded demand connection for [redacted] data centres.

Appendices

Appendix A: Siting Study

As mentioned in Section 1.4, a detailed siting study was undertaken to find a suitable site for a new Imperial Park B 400/132 kV substation after we discounted the initial proposal of extending the substation and building a new substation at the existing site due to substation configuration challenges and environmental constraints i.e., the existing being within SSSI land.

The study assessed options across a [redacted] along the existing overhead line route, extending 2km either side, with the aim of identifying the most cost-effective and deliverable location while limiting environmental and visual impacts as far as possible. The study area was divided into 10 segmented zones to support comparison. The study was designed to test whether a new substation could be delivered in a way that was acceptable from environmental, planning, technical and cost perspectives. It drew on a high-level options appraisal supported by environmental specialists, the FEED team and planning/lands input.

The siting study followed a staged process. First, a constraints mapping exercise was carried out using publicly available environmental and planning data, including data from [redacted] interactive map. This was used to identify areas where development would be less viable or where significant impacts on receptors could arise. The data was layered within GIS/AGOL to support interrogation of potential sites. A planning review was then undertaken, including relevant development

lan policies and major planning applications. Areas considered heavily constrained were discounted early, and the remaining areas were taken forward for further search.

Following this, we identified a long list of site options, reviewed them using aerial imagery and street view, and then undertook a site visit and challenge/review workshops to refine the options and populate an Options Appraisal Summary Table (OAST) for shortlisted locations.

Key factors considered in shortlisting sites:

The study considered a broad set of factors to determine which sites could realistically be shortlisted.

A. Environmental and planning constraints

The study sought to avoid or minimise impacts on key receptors and designated areas. Environmental constraints specifically considered included: landscape and visual amenity, ecology, cultural heritage, flood risk and drainage. Constraint datasets included national and local designations such as SSSI, SAC, SPA, Ramsar sites, ancient woodland, listed buildings, scheduled monuments, flood zones, settlements and residential buffers.

This was a major filtering factor because sites that were too constrained from a consenting or environmental protection perspective were considered less viable and could be discounted at an early stage.

B. Availability of sufficient space / site footprint

A key consideration was whether unconstrained land parcels could physically accommodate the required substation footprint. Initially, two larger layouts were tested:

- Option 1 – 400/132 kV AIS substation with CDM area, landscaping and BNG [redacted]
[redacted] Option 2 – 132 kV AIS + 400 kV GIS with CDM area, landscaping and BNG [redacted]

After further review, it became clear that the topography and land constraints across much of the study area severely limited the ability to accommodate sites of this size, so a third, smaller layout was developed:

- Option 3 – 132 kV AIS + 400 kV GIS with a smaller footprint (220m x 200m) and more flexible external CDM/landscaping/BNG arrangements. This was later changed to a full 400/132 kV GIS option due to space constraints on the shortlisted sites.

This smaller footprint materially improved the number of sites that could be considered and was a significant step in narrowing the search.

C. Proximity to residential and other sensitive receptors

The study considered the need to minimise proximity to existing and proposed residential properties and other sensitive receptors, as well as the likely visibility of the site and ability to screen it through existing vegetation, buildings or landform. This was important in assessing landscape/visual effects, noise and local amenity impacts.

D. Technical deliverability

Technical considerations were central to shortlisting. These included:

- terrain/slope and the amount of cut and fill required;
- ease of site access from the highway network;
- suitability for abnormal indivisible loads (AIL);
- complexity and length of the connection to the existing OHL;
- proximity to utilities, watercourses and other infrastructure; and
- construction and delivery issues.

This was important because even where environmental effects could potentially be mitigated, some options carried materially higher engineering complexity, programme risk and cost.

E. Connection efficiency and associated infrastructure

The study also assessed the need to minimise the distance to the existing OHL and avoid excessive additional infrastructure such as long access roads, extensive OHL diversions or underground cable crossings. This directly affected constructability, cost, programme and consenting risk.

F. Land acquisition and deliverability

The shortlisting process also considered whether sites were realistically deliverable from a land acquisition perspective and whether known development plans or land ownership issues could sterilise or prevent delivery.

Shortlisting of potential sites

Across the study, we considered five Option 1 layouts, 13 Option 2 layouts and 17 Option 3 layouts. Following constraints review, aerial assessment, site visits and technical challenge, three candidate sites were shortlisted for detailed comparison:

- Area 4-2 (Option 3)
- Area 5-1 (Option 3)
- Area 9-2 (Option 3)

These three sites were taken forward because, relative to the wider long list, they were the most credible options when balancing environmental, planning, technical and cost considerations.

The three shortlisted sites were compared across landscape and visual, heritage, flood risk/drainage, transport, technical complexity and cost.

- Area 4-2 benefited from limited nearby residential receptors and good screening, but it had more challenging access, greater cut and fill requirements, and more complex connection and construction requirements. It would also require a longer access road and more OHL works.
- Area 9-2 had the greatest number of nearby residential receptors, more visual sensitivity, more difficult connection requirements, greater OHL changes, and additional risks associated with flood proximity and a nearby high-pressure gas main.

- Area 5-1 was considered the strongest option overall because it had fewer nearby residential receptors, benefitted from an industrial backdrop and some screening, had the most convenient highway access, required the least cut and fill, and involved the shortest and least complex OHL connection works. It was also best located for straightforward customer cable routes.

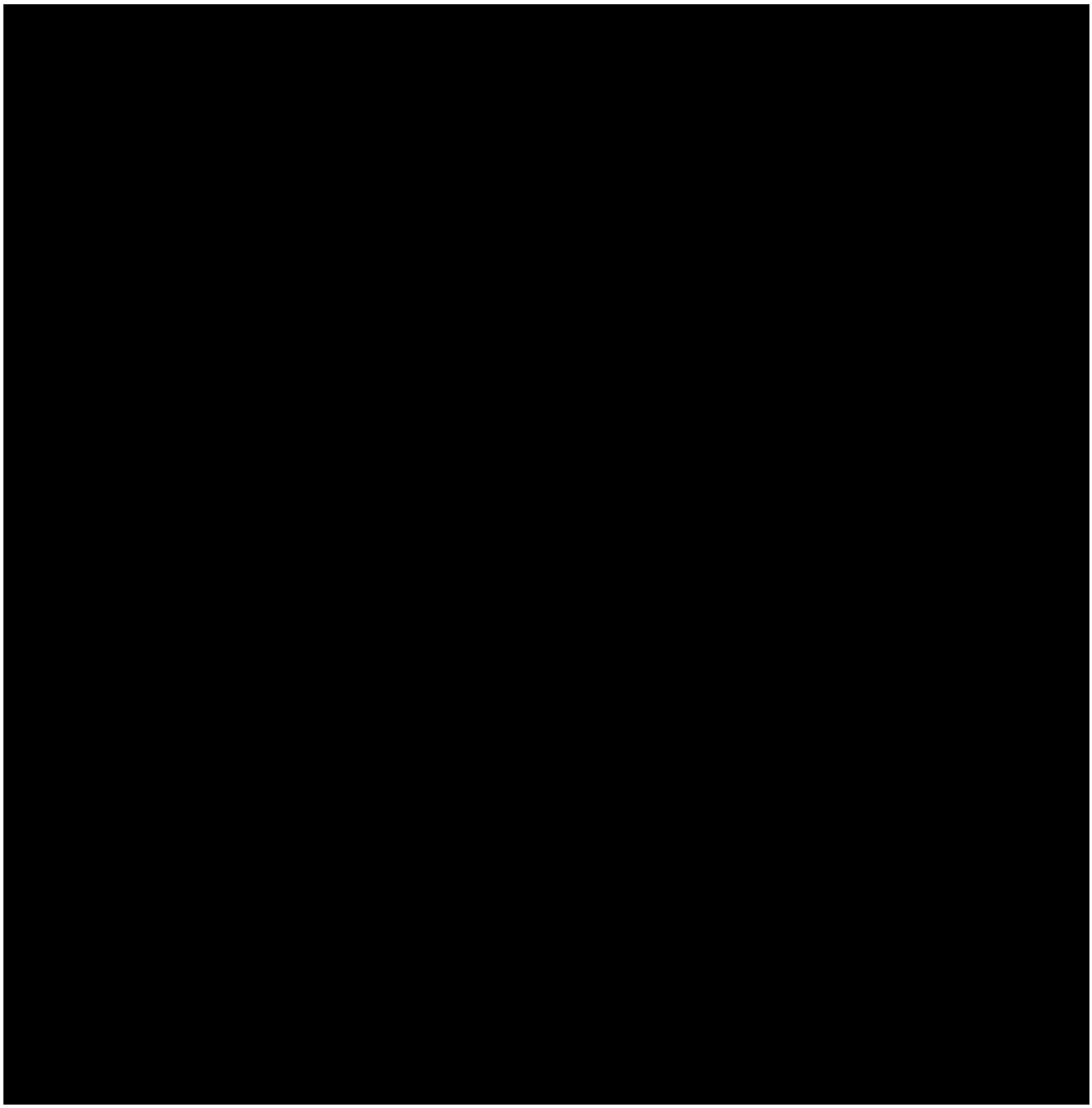
On that basis, Area 5-1 was identified as the preferred site from a technical and cost standpoint, while also performing comparatively well from a transport and landscape/visual perspective. Although it was not the preferred option ecologically, the study concluded that its impacts could potentially be managed through mitigation and that its benefits significantly outweighed the constraints. In addition to that, after comparison of preferred sites it was also included that due to the limited space available, a full GIS 400/132 kV substation should be considered.

Why the preferred site still could not proceed

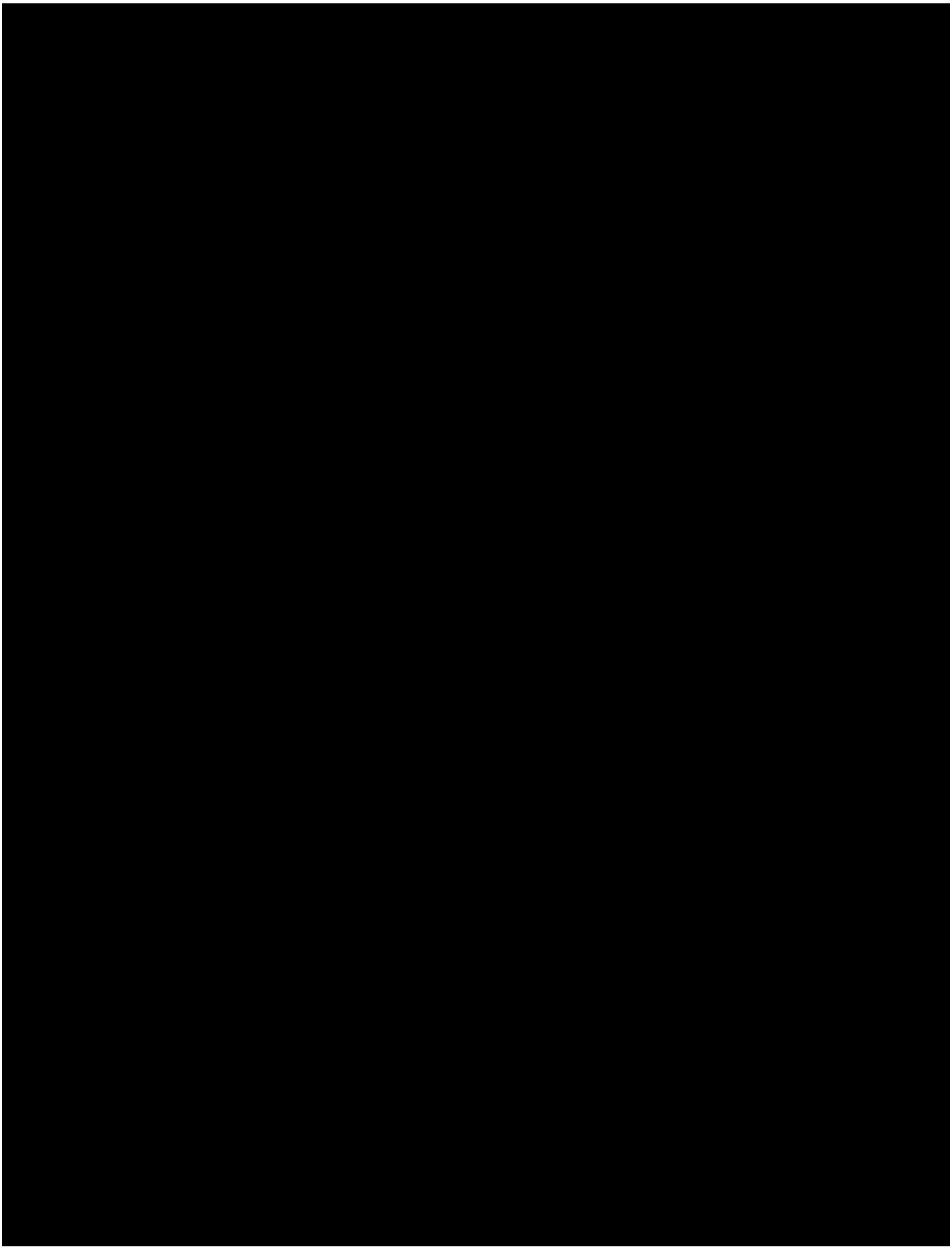
Despite emerging as the preferred candidate, Area 5-1 could not ultimately be progressed because it was on land owned by the [redacted], and we were unable to secure agreement to acquire it. The land was earmarked for other development, and statutory compulsory purchase powers could not be used to obtain that land, as explained in Section 1.2.1.

[redacted] suggested three alternative sites and a second siting study was undertaken to reconsider these, but these were also constrained by combinations of SSSI/ecological issues, flooding, pond relocation, customer land access constraints, cost and deliverability concerns. The conclusion reached was that no suitable land option remained available that aligned with the customer's timetable and project requirements.

Appendix B: Imperial Park 400 kV substation T1 and T2 asset interventions



Appendix C: System Design Table



Appendix D: Glossary

Table 20: Glossary

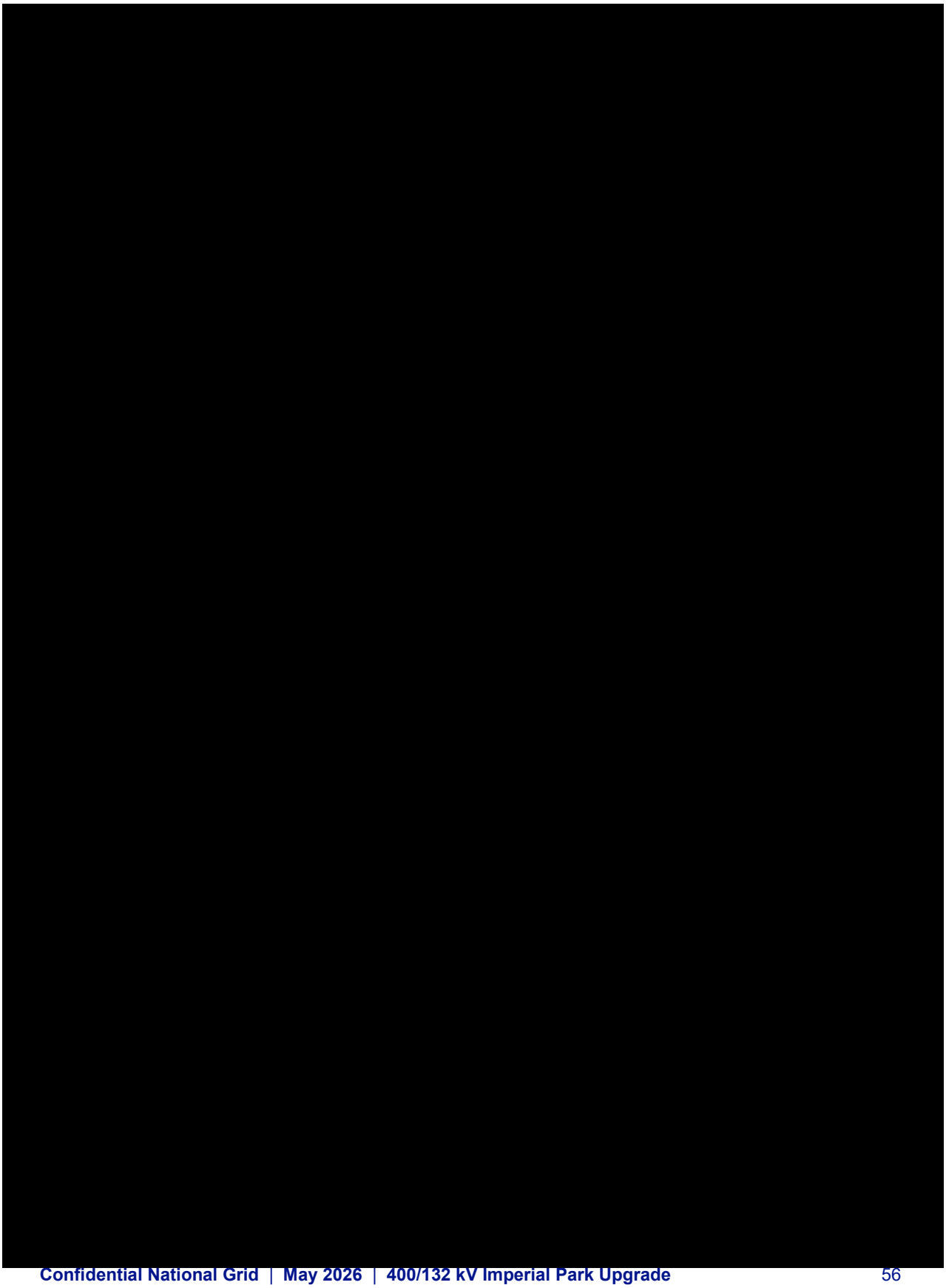
Abbreviation	Description
ACL	Available For Commercial Load
ACSR	Aluminium Core Steel Reinforced
AIS	Air Insulated Switchgear
APM	Advanced Procurement Mechanism
BESS	Battery Energy Storage System
BP	Business Plan
BPDT	Business Plan Data Template
CAI	Closely Associated Indirect
CBA	Cost Benefit Analysis
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

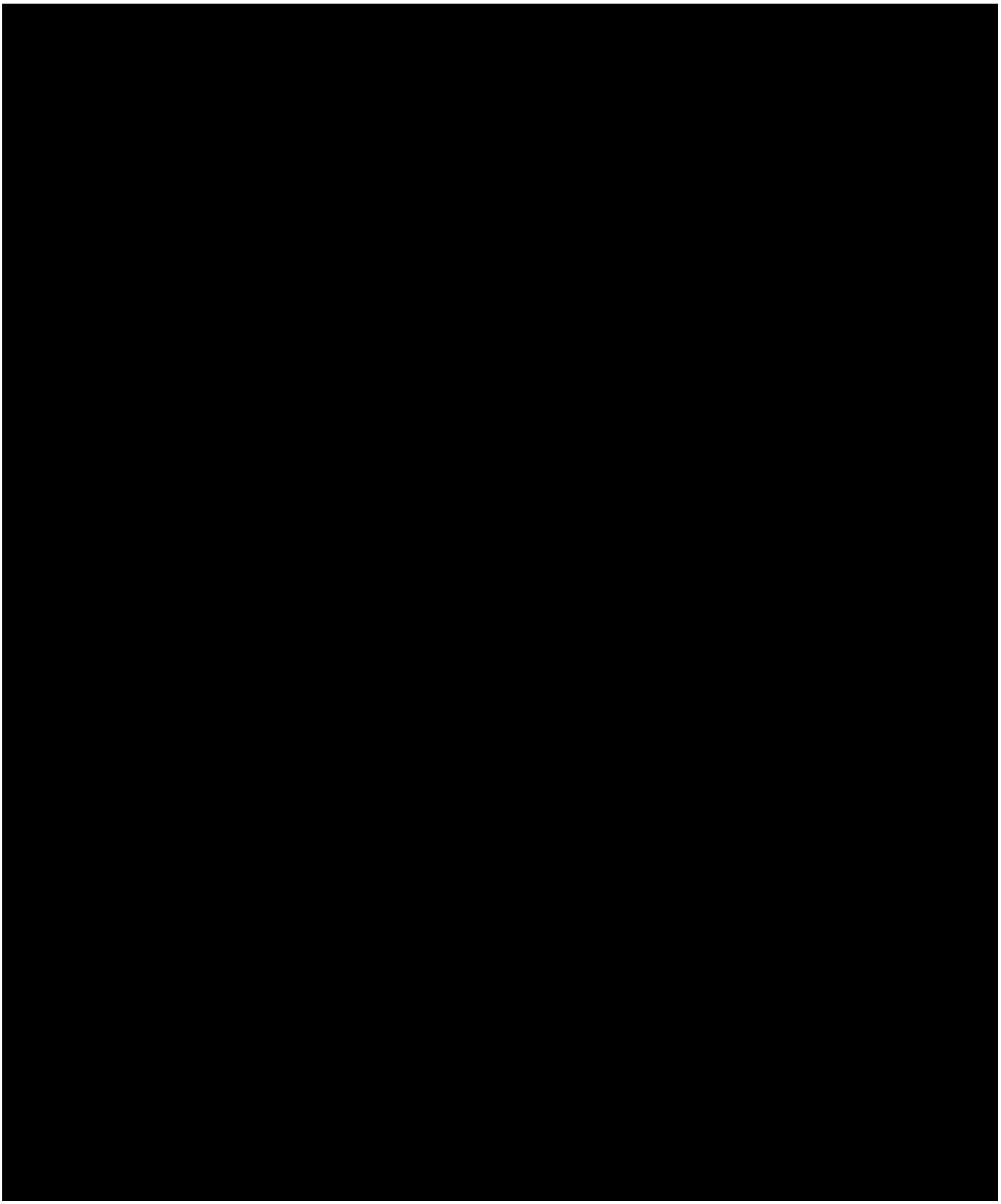
Abbreviation	Description
GLA	Greater London Authority
GW	Giga Watt
HDD	Horizontal Directional Drilling
HV	High Voltage
HWUP	Hackney Waltham Cross Uprating
IEC	International Electrotechnical Commission
kW	Kilo Watt
LLTI	Long Lead Time Items
LTDS	Long-Term Development Statement
LV	Low Voltage
LVAC	Low 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
tCOE6	Tonnes of Carbon Dioxide Equivalent
TCPA	Town And Country Planning Association

Abbreviation	Description
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

Appendix E: Details of proposed development for Options D-4 and D-5

The details of the proposed development for Option D-4:





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