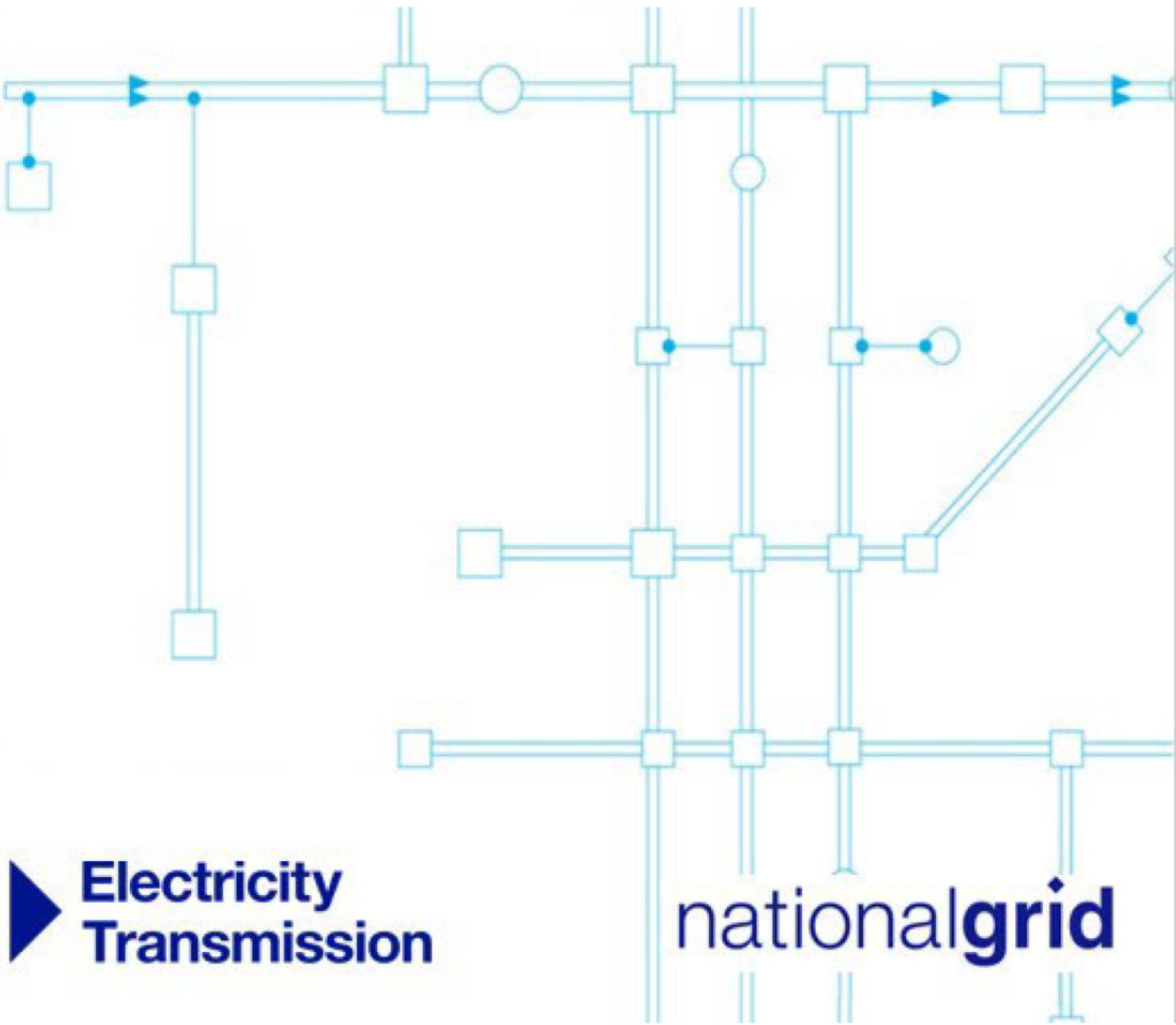
RIIO-T3

Laleham 132kV Extension

Track 3 Needs Case Submission

October 2026



Electricity Transmission

nationalgrid

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Reference and summary table

Field	Description
Project name	Laleham 132kV Extension
TO's preferred re-opener track	Track 3 Needs Case
RRP References	[redacted]
BPDT / Scheme Reference Number	[redacted]
Load Board Reference	[redacted]
Investment driver(s)	This project consists of two drivers: • **Customer connections (Primary):** [redacted] • **SQSS Compliance (Secondary):** maintain compliance against Chapter 3 of the Security and Quality of Supply Standards (SQSS) to resolve the pre-/post-fault overloads on the Supergrid Transformers (SGT) at Laleham.
Project outputs	Extend the existing 132kV GIS substation into a new building and connection with a new busbar section
Short list of strategic options considered	The shortlisted options for Laleham 132kV extension are: • Option D-2: Extend Laleham via new 132kV GIS hall • Option E-1: New 132kV AIS substation in golf course • Option E-2: New 400/132kV AIS substation(s) • Option E-3: New 400kV AIS substation & extend existing 132kV GIS substation
Preferred solution and explanatory narrative on the rationale	We consider that **Option D-2:** Extend Laleham via new 132kV GIS hall is the preferred option for Laleham 132kV extension. Option D-2 was selected as the preferred solution because it offers the strongest overall balance of consumer value, deliverability and environmental

Field	Description
	performance: it has the highest NPV of the shortlisted options, the lowest negative impact on visual amenity compared with a new-build substation, a significantly reduced environmental impact, the most constructable approach from a safety, efficiency and complexity perspective, and the shortest programme with the lowest programme risk.
PASE alignment	The preferred solution for this project is option D-2: Extend Laleham via new 132kV GIS hall. Atypical extensions to SF6-free GIS Double Bus Bar substations are listed as a PASE variant option in Ofgem's Load Reopener guidance published on 01 April 2026. We therefore treat the preferred solution (extension costs are atypical for connection works) for Laleham as PASE compliant.
Costs (23/24 prices)	**Project cost:** [redacted] Risk & contingency)
Delivery year	[redacted]
Applicable reporting tables	BPDT 10.5 ET Pipeline log and 2024-25 RRP E1.11_ET Pipeline Log
Interactive projects	[redacted]
Historic funding interactions	[redacted]
Spend Apportionment	**T2** **T3** **T4+** [redacted]

Executive Summary

Project Summary

This investment extends the existing Laleham 132kV substation to facilitate the timely connection of major low-carbon generation, storage and demand customers in the West-London region, while increasing capacity and operability at a strategically important transmission node. It will support decarbonisation and wider net zero objectives, supporting CP2030 by enabling a large-scale BESS connection.

Submission Purpose

This Track 3 Needs Case seeks approval of the continuing need and preferred solution for the Laleham 132kV Extension. We are also seeking confirmation that Track 2 EL is the appropriate route for this project, recognition of the historic PCF position and approval for the needs case and our preferred solution.

Project Need

The investment is load-driven and required to facilitate [redacted] contracted customer connections at Laleham between [redacted], consisting of data centres and BESS connections.

The investment is also required to maintain SQSS compliance, as contracted demand at Laleham now exceeds the capability of the existing arrangement. System studies indicate that the current Supergrid transformers must be replaced and uprated to meet those requirements securely and reliably.

This need sits within the wider West London context, where rapid growth in electricity demand particularly from data centres is creating material network constraints and driving the need for coordinated transmission reinforcement. At the same time, the project must be developed within a highly space-constrained existing site, bounded by surrounding infrastructure and environmental constraints, which reinforces the need for a proportionate and deliverable reinforcement solution at Laleham.

Optioneering to date

We undertook a structured, multi-factor optioneering process to identify a proportionate and deliverable solution in the interests of consumers. We first considered a range of strategic options, being do-nothing, market-based, whole-system, reuse existing or extension of existing assets, and new-build.

From these, we built a longlist of nine options, from which we shortlisted four for detailed analysis. These detailed options focused either on do-minimum works through extending the existing GIS building/hall, or new-build.

Of these, Option D-2 is our preferred solution because it balances deliverability, futureproofing, consumer value and asset health needs, while avoiding the limitations and risks such as greater land, consenting, stakeholder, environmental and cost risk, associated with building a new substation.

Table 1: Summary of optioneering longlist

Option	Details	Drivers met?	New site?	AIS/ GIS?	Short List?
Option A	Do nothing counterfactual option	No	No	NA	No
Option B	Market-based solution	No	No	NA	No
Option C	Non-transmission, whole systems solutions (DNO)	No	No	NA	No
Option D-1	Extension of the existing 132kV GIS building and install a new busbar section	Yes	No	AIS	No
Option D-2	Extend the existing GIS hall with a new 132V GIS building and connection with a new busbar section	Yes	No	GIS	Yes
Option E-1	NGET replaces Laleham 132kV GIS substation with a new 132kV AIS substation in the golf course area north of the existing substation.	Yes	Yes	AIS	Yes
Option E-2	NGET replaces Laleham 132kV & 275kV substations with new 132kV & 400kV AIS substations.	Yes	Yes	AIS	Yes
Option E-3	NGET builds new 400kV AIS substation & extends Laleham 132kV GIS substation.	Yes	Yes	AIS/GIS	Yes
Option E-4	NGET builds new 132kV AIS substation in the quarry area south of the existing Laleham 275kV substation.	Yes	Yes	AIS	No

Cost Estimates

Based on the latest Cost Book (2023/24 prices) and early project estimates, the preferred option, Option D-2, has an estimated total cost of [redacted]m including risk and contingency. The cost for other shortlisted options (23/24 prices, including risk and contingency) are:

- Option E-1: [redacted]
- Option E-2: [redacted]
- Option E-3 [redacted]

Indicative Delivery Program

[redacted]

- [redacted]



1. Introduction

1.1 Laleham 132kV Extension

This paper presents our Track 3 Needs Case under the Load Re-opener and Price Control Deliverable under Special Condition 3.18 for investment to Extend the existing GIS hall at Laleham substation with a new 132V GIS building. Through this submission, we are seeking:

- Approval of the investment need, optioneering and our preferred option (D-2), which is to Extend the existing GIS hall with a new 132V GIS building and connection with a new busbar section
- Confirmation of the Track 3 Needs Case of the re-opener process. The track proposal has been discussed with Ofgem; and
- Pre-Construction Funding (PCF) under Special Condition 3.15 (Pre-Construction Funding Re-opener, Price Control Deliverable).

The investment is driven by contracted connection requirements at Laleham, including data centres, and BESS connections, and is required to meet contractual completion dates between [redacted]

Project Track Statement and PASE

Laleham is driven by contracted customer connections, which cannot be accommodated at the 275/132 kV existing substation because the volume of contracted demand now exceeds the capability of the existing SGT configuration, while further expansion through the current configuration is constrained by the need to maintain SQSS compliance, the site's limited physical space, and fault level and point-on-bar loading limitations on the existing 132kV assets.

Our original proposed Track 2 allocation had been discussed with Ofgem. However, in Draft Determination's for the investments submitted within the May 2026 Load Re-Opener window, Ofgem decided this project should fall within Track 3.

Pre-Construction funding request

[redacted] Needs Case submission).

[redacted]

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

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

Table 2: Estimated costs for pre-construction activities (£m, 23/24 prices)

[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]		[redacted]

1.2 Background

Chronology of Investment

[redacted]

[redacted]

[redacted] NGET progressed Agreements to Vary across the contracted customer portfolio to reflect the adoption of the Non-SF6 GIS solution and the updated delivery programme

[redacted]

[redacted]

Regional & Network Context

London's transmission network comprises an outer 275kV ring of overhead lines and cables and an inner 400kV ring made predominantly of cable circuits, both supplied by a wider external 400kV system. These networks are already undergoing, or are planned for, reinforcement to increase capacity, resilience and long-term futureproofing, reflecting the fact that around 20% of national electricity demand is located in Central and Greater London and is expected to increase further as transport and heat are electrified to support net zero.

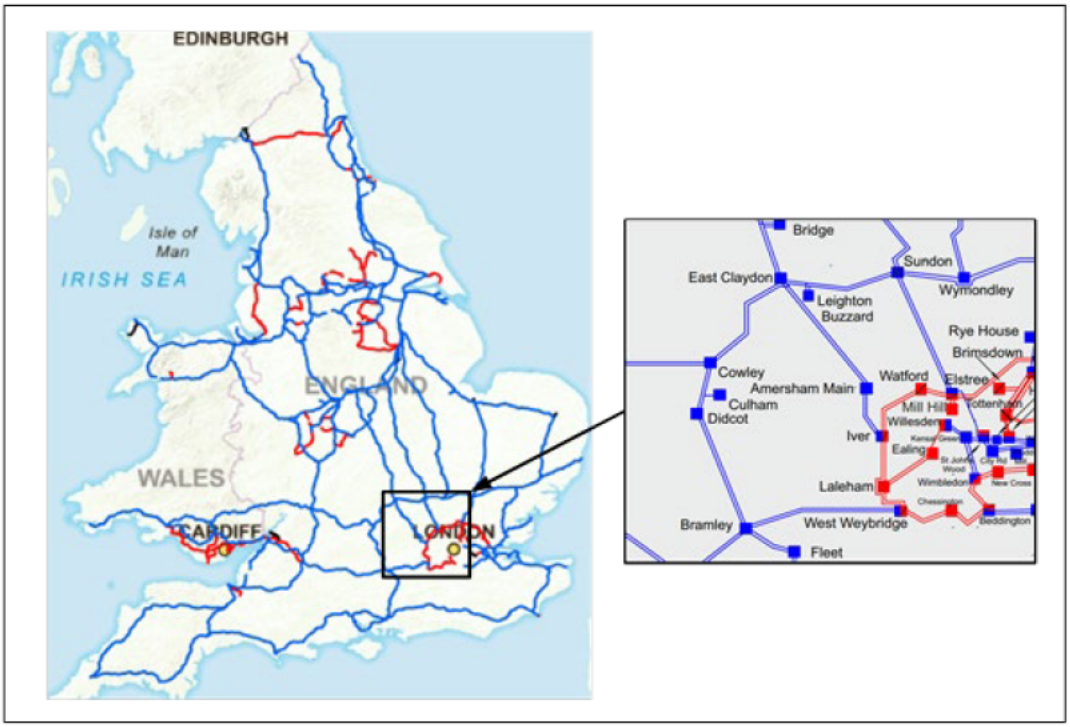
In West London, this growth is being driven particularly by new data centres, concentrated in the M4 corridor due to its digital connectivity, proximity to Heathrow and financial markets, and favourable development conditions.

[redacted]

As additional connection applications have continued to emerge in the area, NGET has continued to evolve its longer-term West London strategy alongside optimising existing network and assets to enable near-term connections. Our long-term West London

strategy was presented at the Ofgem load board in February 2026 [redacted]

Figure 2: Location of the Laleham on NGET's network





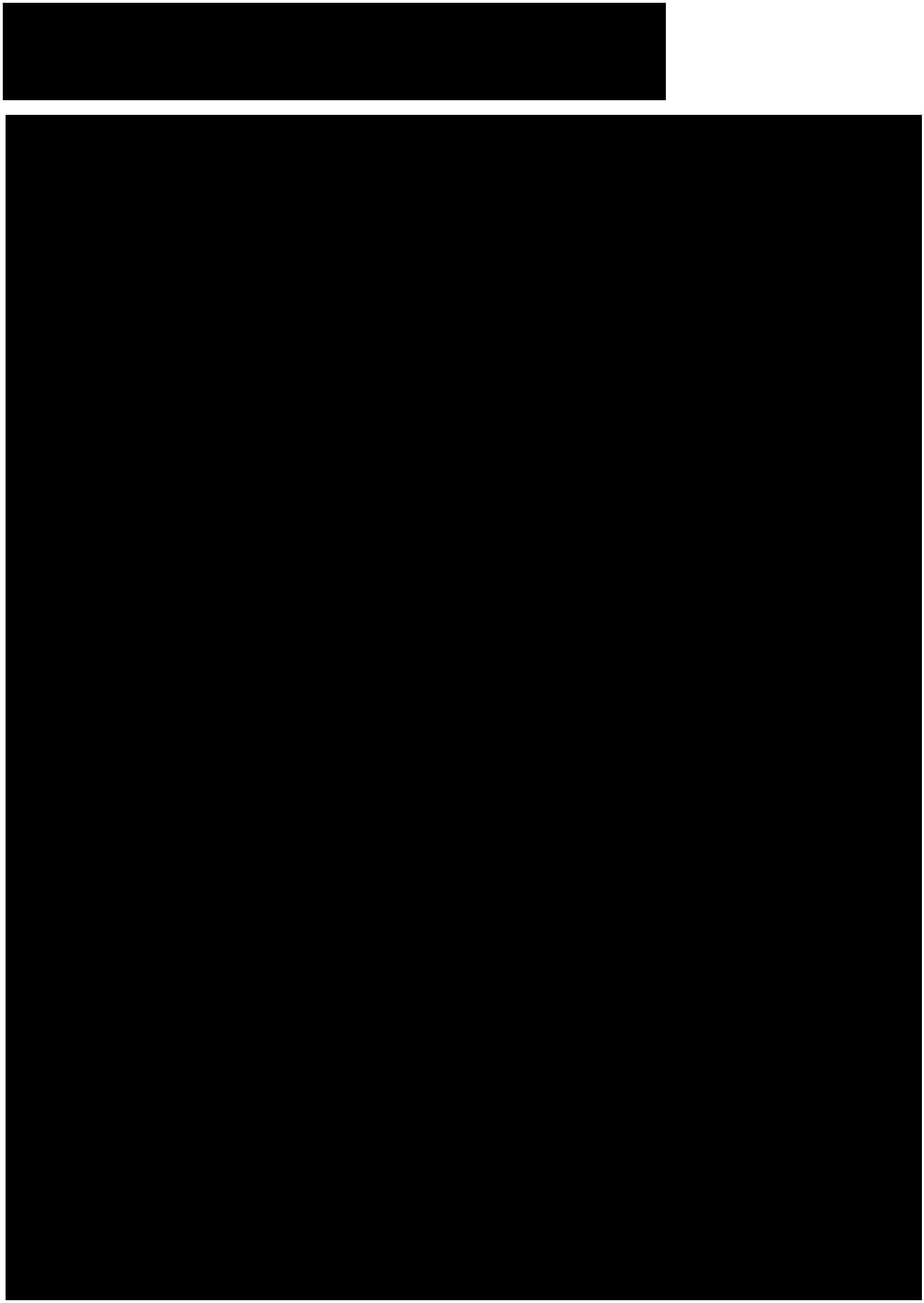
Interactive Projects



Site Background

The customers listed in Table 4 originally applied for a connection to NGET's existing Laleham 132kV substation, which are the closest existing connection point for all customers.

The existing Laleham facility consists of two substations as represented in Figure 4 below:



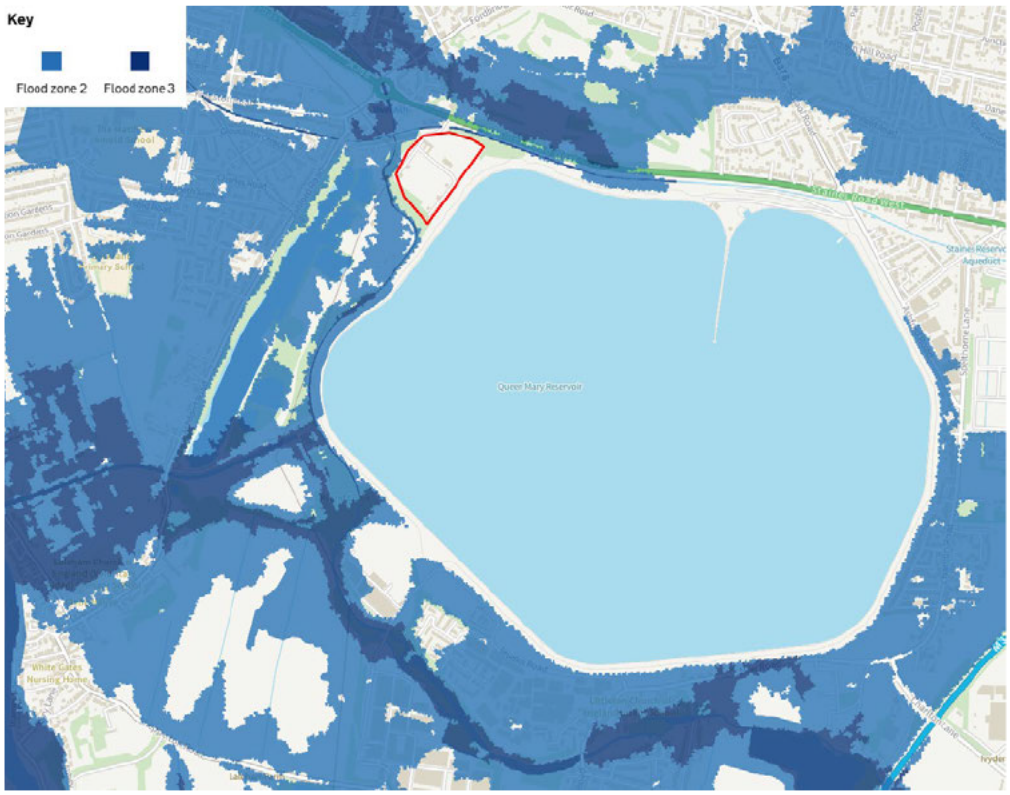
[redacted]

As shown in Figure 4, the site is tightly space constrained on all sides by:

- A308 Dual Carriageway;
- A Neighbouring Quarry; and,
- Queen Mary Reservoir

There is an elevated risk of flooding due to the proximity of the existing substation to the Queen Mary Reservoir. Flooding risk is considered in the optioneering as a site-specific engineering and deliverability constraint, with new-build options being weakened by their location within Flood Zones 2 and 3. The proximity of the existing site (highlighted in the red line boundary) to flood zones 2 & 3 is highlighted in Figure 6.

Figure 6: Proximity of the Laleham site to Flood Zones 2 & 3



In addition to the constraints associated with constructing electricity infrastructure within flood risk zones, the existing Laleham site is also surrounded by Green Belt land. Figure 7 below illustrates the challenges of building a new substation in comparison to

extending the existing substation within permitted development rights, in the area surrounding the existing Laleham substation.

The optioneering undertaken for this project sought to identify solutions that balance the need for timely delivery with the objectives of minimising environmental impacts, taking account of stakeholder perspectives, and limiting harm to the Green Belt. This is discussed in further detail in Section 4. In Figure 7, the green shaded area represents Green Belt land, while the red line denotes the boundary of the existing Laleham substation.

Figure 7: Green belt land[1] surrounding the existing Laleham site



[redacted]

[1] **Source**: https://www.planning.data.gov.uk/map/?dataset=green-belt&q=TW17+0QR&type=postcode#51.4165097784051,-0.4624390755988088,13.369582322945279z

[redacted]

Historical Funding

An overview of historic T1 and T2 asset health interventions for the Laleham 275kV substation is presented in Appendix A.

Early Asset Write Off (EAWO)

[redacted]

2. Drivers & Needs Case

The customer ACL dates presented in this submission reflect the existing contracts. 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 Project Assessment.

The key drivers for this investment are:

Table 3: Drivers Table

Type	Description	Date
Customer Connections	[redacted]	[redacted]
	[redacted]	[redacted]
SQSS compliance	[redacted]	[redacted]

2.1 Customer

Table 4 below provides our latest view of customers connecting to Laleham and their current gate status following Connections Reform.

Table 4: Customer/customer confidence table





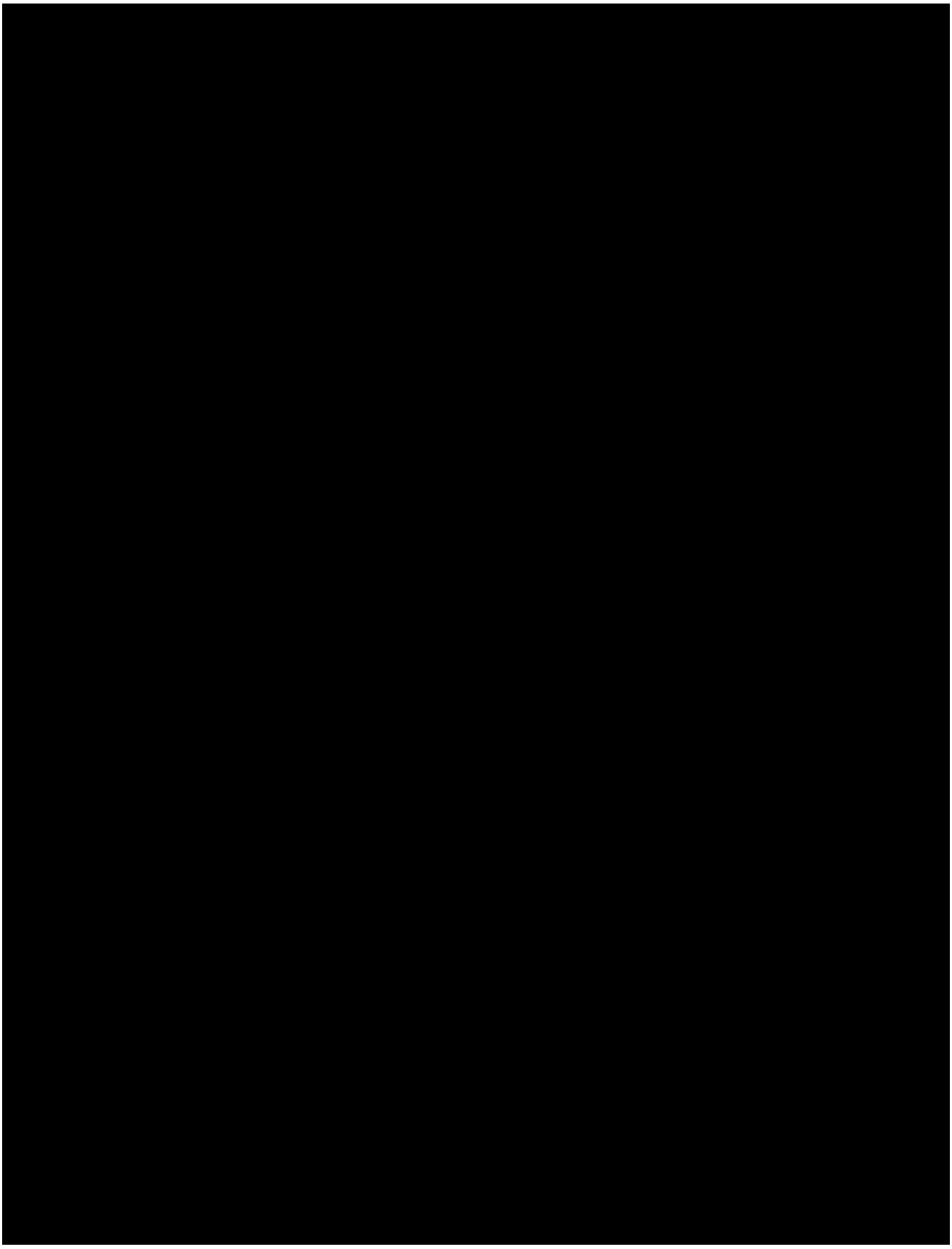
[redacted]

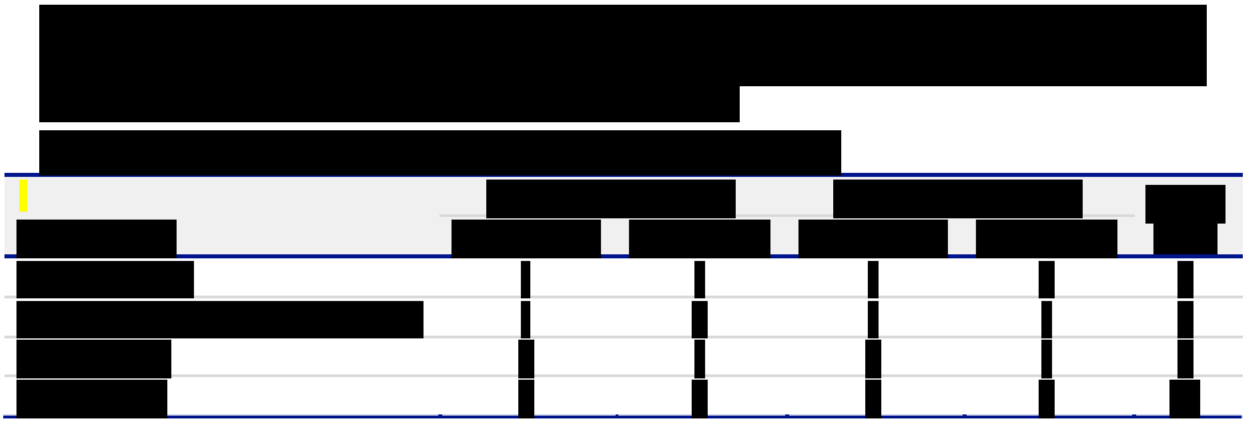


2.2 Asset Health

Though the selection of the preferred load-driven intervention will affect how we manage the health of the assets at this site, there is currently no fundamental asset health driver for interventions that is considered likely to affect the scope or timing of this project. [redacted]

Summaries of the current asset health position at the Laleham 275kV and 132kV substations are presented in Table 5 and Table 6. 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. [redacted]





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

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

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

[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.

3. Optioneering

We follow a structured, multi-factor optioneering process to select the most economic and efficient solution, in the interest of consumers. In line with the Electricity Transmission Design Principles, our optioneering process takes into account engineering, environmental, deliverability, economic and stakeholder factors. We start by assessing the most suitable strategic options.

3.1 Strategic Options

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

Table 8: 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.

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. As detailed below, our initial high-level assessment concluded that the drivers could be effectively met by extending the existing Laleham substation. A descriptive rationale is explained in Section 4.3, Table 9.

3.2 Siting

A separate siting study was not undertaken because the strategic optioneering process identified extension of the existing Laleham substation as the preferred strategic option, not requiring selection of an alternative site.

3.3 Long List of Options Considered

Table 9: Longlist table of options

Option	Technical Description	Relevant Diagrams or Layout References	Consenting Risks & Environmental Constraints	Rationale for rejecting or taking forward the option
A: Do nothing **Rejected**	The network is kept in its current state, and no new connections are facilitated.	**N/A**	• N/A	• **Contractual and Licence compliance:** Compliant customer connection not delivered, and it would be against our contractual and licence obligations.
B: Market-based solution **Rejected**	Increased customer demand is accommodated through the procurement and use of ancillary services only.	**N/A**	• N/A	• **Contractual and Licence compliance:** Compliant customer connection not delivered, and the option does not comply with our licence obligations to provide connections.
C: Whole systems solution **Rejected**	The required customer connection is accommodated by a DNO.	**N/A**	• The volume of connections in the region would require extension regardless of site, carrying similar constraints as Option E.	• **Contractual and Licence compliance:** Compliant customer connection not delivered, and the option does not comply with our licence obligations to provide connections • **Deliverability:** the DNO confirmed it is not viable to accommodate any further physical connections on its network in its current state.
D-1: Extend existing Laleham GIS hall **Rejected**	Extension of the existing 132kV GIS building and install a new busbar section	**N/A**	• Minor planning application	• Offers no significant benefits above option D-2 and is significantly less constructable. • **Deliverability:** Extending an existing live GIS hall would introduce safety and construction complexity, making it materially less practical to deliver than a new standalone building with busbar extension.

Option	Technical Description	Relevant Diagrams or Layout References	Consenting Risks & Environmental Constraints	Rationale for rejecting or taking forward the option
D-2: Extend Laleham via new GIS hall **Progressed**	Extend the existing GIS hall with a new 132V GIS building and connection with a new busbar section	[redacted]	• Benefitting from permitted development rights, no requirements for further consents	• **Deliverability:** This option supports timely delivery by remaining within existing NGET operational land, removing land acquisition and major consenting dependencies from the programme. • **Engineering:** A non-SF_6 GIS extension is preferred because it provides a compact solution that integrates efficiently with the existing GIS hall and accommodates the required number of bays. • **Environmental:** Retaining development within the existing site footprint minimises ecological, landscape and visual impacts relative to new-build options in surrounding greenbelt land. • **Economic / Consumer Value:** The proposed extension takes the site to its maximum feasible capacity, uses available future-proofing space from previous works and enables all contracted connections without unnecessary overbuild.
E-1: New AIS substation **Progressed**	NGET replaces Laleham 132kV GIS substation with a new 132kV AIS substation in the golf course area north of the existing substation.	[redacted]	• Would require a major planning application, with the potential for Compulsory Purchase of land, which would introduce significant delays to the project.	• **Consenting / Stakeholder:** Although this option delivers a compliant connection, it depends on acquisition of a substantial parcel of third-party green belt land, materially increasing land, planning and stakeholder risk. • **Engineering:** The option requires significant new 275kV infrastructure, including new SGTs and associated bays, increasing overall technical scope. • **Economic / Consumer Value:** Consumer value is weakened by the additional land purchase and compensation costs associated with development within the golf course area
E-2: New AIS substation(s) **Progressed**	NGET replaces Laleham 132kV & 275kV substations with new 132kV & 400kV AIS substations.	[redacted]	• Would require a major planning application, with the potential for Compulsory Purchase of land, which would introduce significant delays to the project.	• **Environmental:** the largest footprint [redacted] of all shortlisted solutions, resulting in materially greater land take and environmental impact than an in-site extension. • **Consenting/stakeholder:** This option introduces significant consenting and stakeholder risk through the requirement of building on green belt land. • **Engineering:** much larger and more complex new-build system design. • **Economic / Consumer Value:** Although it avoids some investment in 275kV infrastructure, it still requires major 132kV

Option	Technical Description	Relevant Diagrams or Layout References	Consenting Risks & Environmental Constraints	Rationale for rejecting or taking forward the option
				GIS investment and delivers poorer value than the more proportionate D-2 option.
E-3: New AIS substation, Extended GIS Substation **Progressed**	NGET builds new 400kV AIS substation & extends Laleham 132kV GIS substation.	[redacted]	• Would require a major planning application, with the potential for Compulsory Purchase of land, which would introduce significant delays to the project.	• **Environmental:** This option requires a significant green belt footprint [redacted] for the new 400kV substation, making it materially more intrusive than the preferred in-boundary extension. • **Economic / Consumer Value:** As with E-2, E-3 requires major 132kV GIS investment and therefore also delivers poorer value than the more proportionate D-2 option.
E-4: New AIS substation **Rejected**	NGET builds new 132kV AIS substation in the quarry area south of the existing Laleham 275kV substation.	N/A	• Would require a major planning application, with the potential for Compulsory Purchase of land, which would introduce significant delays to the project.	• **Consenting / Stakeholder:** This option depends on acquisition of substantial third-party land and is exposed to significant stakeholder and landowner risk associated with the quarry site. • **Deliverability:** The option would be extremely difficult to construct, with major geotechnical, utilities and construction risks likely to delay delivery. • **Economic / Consumer Value:** Consumer value is materially weakened by potentially significant compensation exposure, including quarry leasehold and business extinguishment costs.

Based on the rationale explained in Section 4.3, we have discounted Options A, B and C because they will not allow us to facilitate the connection requests and consequently, we will not meet our contractual and licence obligations.

Option D-1 was discounted as it offered no significant benefits above D-2, whilst carrying additional complexities.

Option E-4 was also discounted due to the major consenting and program risks, alongside the material cost impact involved with the compensation of the quarry.

Options D-2, E-1, E-2 and E-3 were progressed to the shortlist for their ability to meet the project drivers.

Influence of stakeholders on shortlisting



Greenbelt Considerations

NGET recognises that development on Green Belt land can have significant implications for local stakeholders, planning authorities and communities, particularly where new infrastructure creates additional visual impact for local residents. Green Belt impact was therefore a key consideration in the shortlisting and assessment of options for this project, alongside the need to deliver five customer connections in a timely manner and unlock the associated consumer benefits of economic growth and decarbonisation.

The existing Laleham site is constrained by surrounding flood risk areas and Green Belt land, meaning options requiring new or additional land take would be expected to increase environmental impact, stakeholder sensitivity and consenting risk. This was a material factor in discounting AIS-based solutions, which would require a significantly larger footprint and therefore have greater potential to harm the Green Belt, increase visual and community impacts, and introduce additional planning risk that could delay delivery of the five connections.

By contrast, the preferred solution can be delivered on existing NGET land and through permitted development rights, reducing the need for additional Green Belt development and providing a more deliverable planning and consenting route. NGET therefore placed significant weight on minimising Green Belt harm and associated stakeholder impacts when shortlisting options, concluding that an AIS solution was not viable in this location.

3.4 Shortlisted Options

The shortlisted options for Laleham 132kV extension are:

- Option D-2: Extend Laleham via new 132kV GIS hall
- Option E-1: New 132kV AIS substation in golf course
- Option E-2: New 400/132kV AIS substation(s)
- Option E-3: New 400kV AIS substation & extend existing 132kV GIS substation

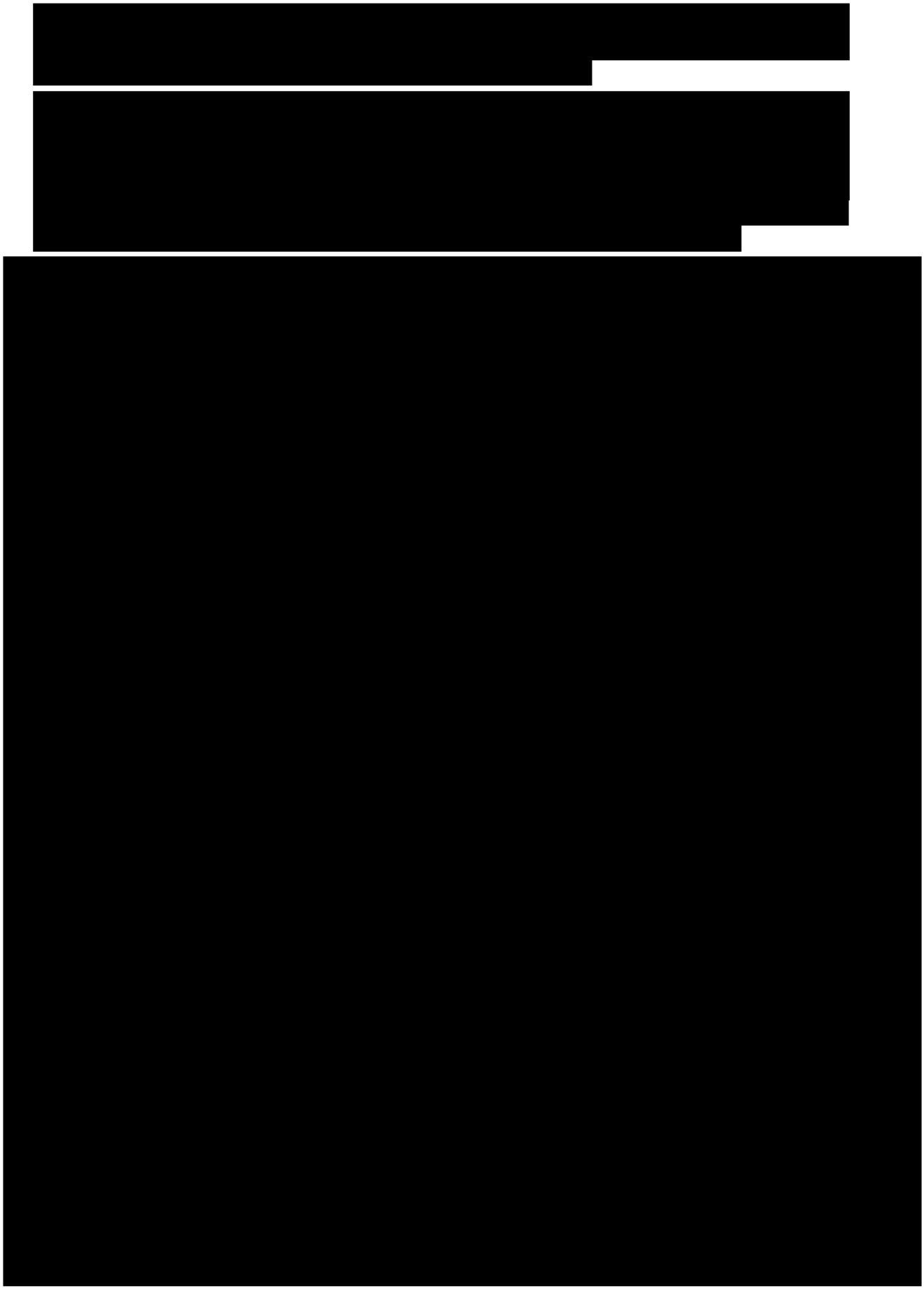
Option D-2: Extend Laleham via new 132kV GIS hall

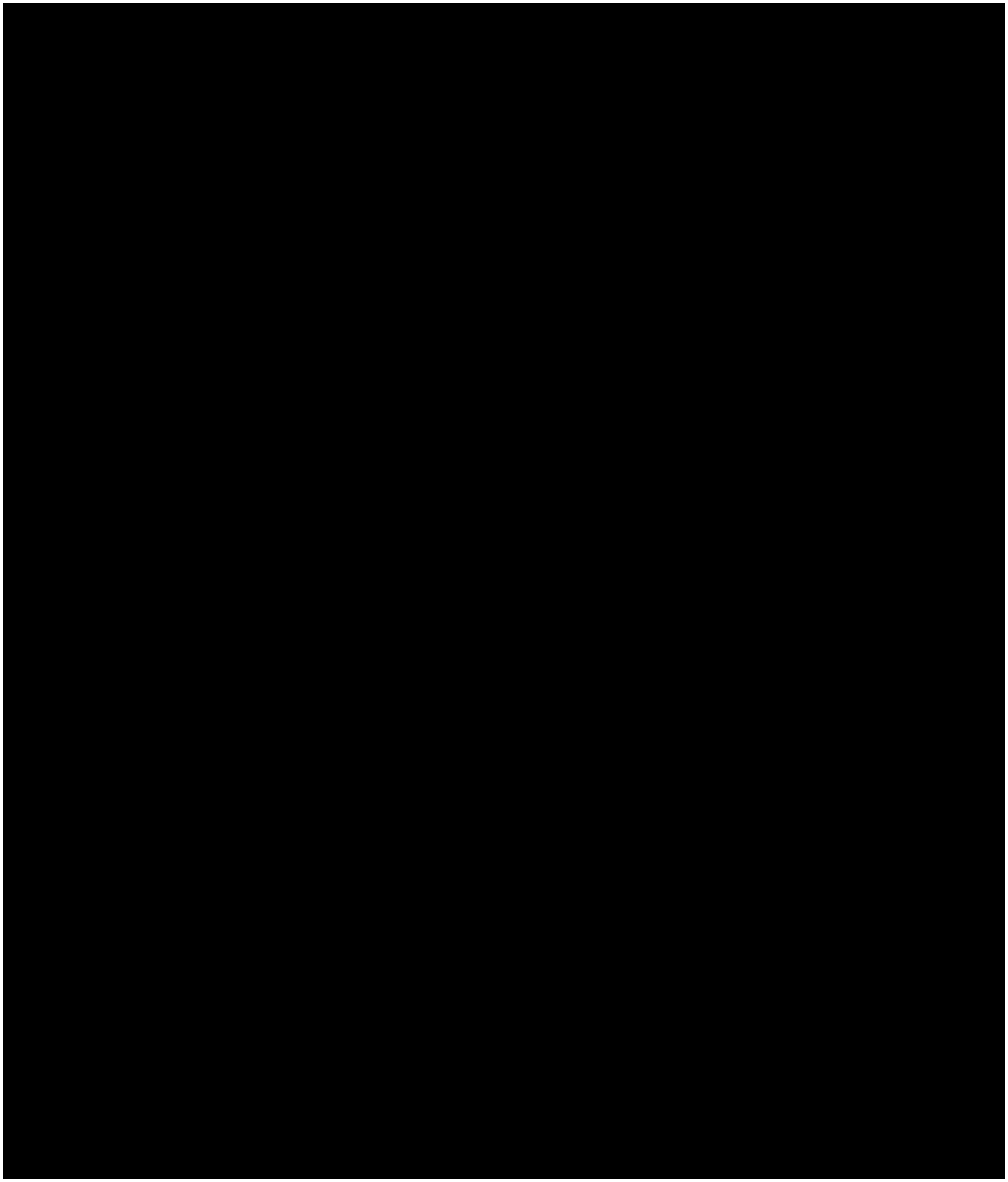
[redacted]

[3] Source: extracted from PDD-100770-LAY-003-02-rev01

[redacted]

[4] Source: extracted from PDD-206292-LAY-001 Rev 01





3.5 Detailed Qualitative Assessment

Table 10, below, provides a summary of our detailed qualitative assessment of the optioneering categories; engineering, environmental, deliverability, economic & consumer value and consenting and stakeholder impact, for the four shortlisted options.

Table 10: Detailed qualitative assessment of shortlisted options

Option	Optioneering Categories				
	Engineering	**Environmental**	**Deliverability**	**Economic/Consumer Value**	**Consenting /Stakeholder**
Option D-2: Extend Laleham via new 132kV GIS hall	• Non-SF6 GIS extension integrated into the existing 132kV substation, using available future-proofed space. Connects all contracted customers and meets the identified need, but takes the site to its practical limit with little scope for further reinforcement without a full rebuild. • Technically robust and sufficient for known demand, but with limited long-term expandability.	• All works remain within the existing site boundary, avoiding greenfield and green belt impacts. Environmental effects are relatively minor compared with new-build options, with only a small increase in materials for the new GIS hall. • Low environmental impact and materially better than new-build alternatives.	• The new GIS hall can be built largely offline, reducing interaction with live equipment and improving safety, programme certainty and construction risk, but an outage is still needed for connection. • It avoids many of the land, consent and third-party dependencies faced by alternative options. • Strong delivery advantage from offline construction and reduced external risk.	• Makes efficient use of existing land and infrastructure, avoiding the higher cost and risk of a new substation. Delivers all contracted connections with good cost certainty and avoids speculative investment in unconfirmed future capacity. • Strong near-term consumer value through lower-risk delivery and controlled cost exposure.	• Can be delivered under permitted development within the existing operational site (area of [redacted] meaning no additional consenting is required. Extending using the existing site avoids new land acquisition, green belt impacts and material planning risk. [redacted] • [redacted] minimal [redacted] delay risk
		Benefit	Strong benefit	Benefit	Strong benefit
E-1: New AIS 132kV substation	• Flat terrain helps site formation, but flood zone location and potential running sand introduce engineering risk. No clear technical advantage is identified to offset these constraints. • Some site formation benefits, but overall	• Flat terrain reduces earthworks and no designated habitats or protected species have yet been identified nearby. However, the site lies within a Woodland Priority Habitat network, so ecological sensitivity remains uncertain.	• The substation can be built offline, which is a delivery benefit, but an outage is still needed for connection. • Deliverability is weakened by UXO risk, land acquisition requirements and associated programme uncertainty.	• The need for substantial land purchase, consenting and potential delay increases cost and uncertainty. Any civil benefits from flat terrain are unlikely to outweigh these wider cost and risk impacts. • Weaker consumer value due to added land, cost and	• The site requires acquisition of [redacted] land and formal consents, creating significant land and planning risk. The [redacted] is situated on green belt land, which would add significant consenting and programme risk. The footprint for this option is [redacted]

Table 10: Detailed qualitative assessment of shortlisted options

Option	Optioneering Categories				
	Engineering	**Environmental**	**Deliverability**	**Economic/Consumer Value**	**Consenting /Stakeholder**
	engineering disadvantages remain.	• Some local environmental positives, but these are offset by unresolved ecological and floodplain concerns.		programme risk without clear offsetting benefit. • New build option introduces significant cost increase over option to extend existing substation	• Proximity to residential areas and likely traffic impacts further increase stakeholder sensitivity. • [redacted]
	Detractor	Neutral	Detractor	Detractor	Strong Detractor
E-2: New AIS 400 & 132kV substation(s)	• Coherent new-build 400kV and 132kV AIS solution with future provision for additional SGTs and bays. • OHL interconnection between substations avoids long cable routes and complex pipeline crossings. • A 400kV double busbar solution is aligned to the long term wider network strategy of uprating to 400kV and can be extended easier than the existing 275kV mesh corner. • Allows for greater capacity, removes need for interbus transformers long term.	• Greenfield development affecting grassland and woodland, requiring EIA and ecological mitigation. • Located in Flood Zone 2 with additional ground risk from historic landfill and groundwater conditions	• The substation can be built offline, which is a delivery benefit, but an outage is still needed for connection. • Relatively straightforward internal layout and short cable runs within the compound. • Delivery complexity from new OHL works, pipeline proximity and uncertain ground conditions.	• Provides future-proofed strategic capacity and avoids long inter-site cable costs. • Large-scale dual-substation build and environmental mitigation weaken near-term consumer value. • New build option introduces significant cost increase over option to extend existing substation • A 400kV double busbar solution is aligned to the long term wider network strategy of uprating to 400kV and can be extended easier than the existing 275kV mesh corner.	• Requires multiple environmental and technical consents for greenfield development, which would add [redacted] • Avoids multi-landowner cable routing, reducing stakeholder complexity relative to Option E-3.

Table 10: Detailed qualitative assessment of shortlisted options

Option	Optioneering Categories				
	Engineering	**Environmental**	**Deliverability**	**Economic/Consumer Value**	**Consenting /Stakeholder**
	• Offers greater network resilience due to double busbar arrangement and dedicated bay arrangements, reduces outage requirements for maintenance works				
	Benefit	Detractor	Neutral	Benefit	Neutral
New AIS 400kV substation, Extended GIS 132kV Substation	• Requires long 132kV cable connections between sites, increasing design and interface complexity. • Greater exposure to derating, jointing and fault risk compared to Option E-2. • Allows for greater capacity, removes the need for interbus transformers long term. • Offers greater network resilience due to double busbar arrangement and dedicated bay arrangements, reduces outage requirements for maintenance works	• Same greenfield environmental impacts as Option E-2, plus additional impacts from long cable route. • Cable corridor crosses sensitive areas, increasing mitigation requirements	• The substation can be built offline, which is a delivery benefit, but an outage is still needed for connection. • Long multi-stage cable route with trenchless sections, utility crossings and multiple interfaces. • Increased programme and construction risk from land access and integration with live GIS site.	• Significantly higher cost driven by new build substation, long cable route and complex installation requirements. • No commensurate strategic benefit over Option E-2 to justify added cost and risk. • A 400kV double busbar solution is aligned to the long term wider network strategy of uprating to 400kV and can be extended easier than the existing 275kV mesh corner.	• Requires [redacted] consents plus extensive third-party land agreements for cable routing. • Large [redacted] adds additional [redacted] and programme risk. • Higher risk of [redacted] programme delay than Option E-2
	Benefit	Detractor	Detractor	Neutral	Detractor

Outcome of the qualitative assessment

Option D-2 is the preferred option because it provides the most economic and deliverable solution for Laleham, achieving both investment drivers of meeting all contracted customer connection requirements and maintaining SQSS compliance within the required timescales while materially reducing delivery, consenting and stakeholder risk.

The option uses a standalone non-SF6 132kV GIS extension within NGET's existing operational boundary, integrating directly with the existing indoor GIS substation through a new GIS hall and enabling much of the construction to be undertaken offline, which reduces interface risk with live assets, improves safety and supports programme certainty.

The [redacted]

The new-build options (E-1, E-2 & E-3) offer credible long-term benefits, including greater future proofing, increased capacity, easier future expansion, improved resilience and potential alignment with a wider 400kV strategy; however, these benefits are less compelling when weighed against the immediate timing of customer connections, the higher cost and land requirements, and the significant consenting and programme risks associated with Options E-1, E-2 and E-3.

On balance, Option D-2 represents the strongest "least regrets" solution, providing the best overall outcome across deliverability, environmental impact, consumer value and timely connection delivery.

Considerations for the West London Strategy

[redacted]

- [redacted]

PASE

Atypical extensions to SF6-free GIS Double Bus Bar substations are listed as a PASE variant option in Ofgem's Load Reopener guidance published on 01 April 2026. We therefore treat the preferred solution (extension costs are atypical for connection works) for Laleham as PASE compliant.

3.6 Detailed Quantitative Analysis of Shortlisted Options

Cost Estimates of Shortlisted Options

To assess the shortlisted options, cost estimates have been created for quantitative economic comparison. All capex costs are derived from NGET's latest Cost Book (23/24 prices). Estimating Units Lines (EULs) have been used to generate cost estimates based on the scope of work and the new assets to be acquired for each option.

[redacted]

Table 11: Cost Estimate Breakdown

Unit	Option D-2 Cost [redacted]	Option E-1 Cost (£m)	Option E-2 Cost (£m)	Option E-3 Cost (£m)
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Option D-2 is the lowest capex cost, making it the most cost-effective option. Option E-2 is the most expensive option because it has the greatest scope, and does not reuse any existing substation infrastructure, unlike all other shortlisted options. The difference in total costs as per Table 11 [redacted]

Cost Drivers

The project's cost estimates are based on current market conditions, with ongoing work to refine requirements.

The differences in costs across the four shortlisted options is primarily driven by the scope of work under each option as well as the land take and planning consent requirements. Using the cost book, the main factors driving the costs for the shortlisted options are:

- D-2: Switchgear costs and SGT uprating
- E-1: Golf course land acquisition, trenchless crossings under A308/aqueduct, flood mitigation, proximity to existing 275kV cables.
- E-2: Two new substations, duplicate facilities, OHL/gantry works, Esso pipeline constraints, historic quarry/landfill ground risk.
- E-3: 3km 132kV cable route, trenchless crossings, multiple third-party assets, cable joints, live GIS extension interface.

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, the CBA compares the

discounted cost and benefits for consumers for the following four shortlisted options.

- D-2: Extend Laleham via new 132kV GIS hall
- E-1: New AIS 132kV substation
- E-2: New AIS 400 & 132kV substation(s)
- E-3: New AIS 400kV substation, Extended GIS 132kV Substation

CBA Outcome

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

Table 12: Lifetime Cost-Benefit Analysis (2023/2024 base prices, central carbon pricing, discounted values)

Option	Initial Investment (£m)	PV of Lifetime Costs (£m)	PV of Monetised Benefits (£m)	NPV (£m)
Option D-2	[redacted]	[redacted]	[redacted]	[redacted]
Option E-1	[redacted]	[redacted]	[redacted]	[redacted]
Option E-2	[redacted]	[redacted]	[redacted]	[redacted]
Option E-3	[redacted]	[redacted]	[redacted]	[redacted]

On the basis of the discounted lifetime CBA results (Table 12), Option D-2 delivers the highest NPV ([redacted] 2023/2024 base prices) and therefore represents the preferred option on consumer value grounds. While Options E-1 and E-3 deliver NPVs of [redacted] respectively), Option E-2 ranks lowest on NPV [redacted] analysis is subject to confirmation through deliverability, consents/land, outage and risk considerations, and any CBA sensitivities set out in the assumptions below.

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).

Costs

Table 13: Summary of all additional Capex costs (2023/2024 base prices)

Option	Capex		Total costs (£m)
	Initial works (£m)	Future replacement (40yr) (£m)	
Option D-2	[redacted]		
Option E-1			
Option E-2			
Option E-3			

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

Table 14: Summary of all benefits

Option	Environmental Benefits		Non-Environmental Benefits	Total Benefits (£m)
	Carbon costs of construction (£m)	Gas leakage (£m)	Transmission loss (£m)	
Option D-2	[redacted]			
Option E-1				
Option E-2				
Option E-3				

3.7 Preferred Solution

Based on the qualitative and quantitative analysis we consider that Option D-2: Extend Laleham via new 132kV GIS hall is the preferred option for Laleham 132kV extension. The 132kV GIS substation extension & 275/132kV SGT uprating included in the scope of the preferred solution, consists of:

- [redacted]
  - [redacted]



Option D-2 was selected as it has the advantage of the highest NPV, in combination with its significant qualitative benefits over the other options within the shortlist:

- It has the lowest negative impact to visual amenity compared to a new build substation option,
- Has significantly reduced environmental impact as compared to new build substation option,
- Is the most constructable from a safety, efficiency, and complexity standpoint,
- Offers the shortest programme with the least programme risk.

This option accommodate all the drivers specified in the scope of works and maintaining SQSS compliance.

Project Benefits & Outputs

The preferred option for this project is **Option D-2: Extend Laleham using new GIS hall.**

The key outputs and benefits delivered by this option, and how they align to the pillars of our ambition for RIIO-ET3 are as follows:

Summary of Outputs and Benefits

The extension of the existing 132kV Laleham substation via a new non-SF_6 GIS hall, with associated connection works and SGT uprating/replacement, as set out under preferred Option D-2, by will deliver the following outputs and benefits.

- Enable the contracted customer portfolio at Laleham, comprising
- Deliver a proportionate "least-regrets" reinforcement within the existing site that takes Laleham to its maximum feasible capacity and supports NGET's wider West London regional strategy in an area of rapid, data-centre-led demand growth.

- Deliver the preferred solution within NGET's existing operational boundary using a non-SF_6 GIS extension, avoiding additional land take, green belt impacts and major planning processes.
- This approach reduces consenting, visual and environmental impacts relative to new-build alternatives, while still enabling the timely connection of a major low-carbon generation [redacted] and demand customers and supporting wider decarbonisation and net zero objectives.
- [redacted]
- Continue coordinated engagement with customers, local stakeholders and regional partners as part of a collaborative delivery approach for both the Laleham project and the wider West London reinforcement programme.

4. Delivery

A programme of works for option D-2: Extend Laleham using new GIS hall, **is** outlined below in Figure 15. This illustrates the key milestones for Customer, National Grid and Contractor award critical pathways.



4.1 Procurement & Contracting Strategies



[redacted]

4.2 Risk & Risk Management

Through SWOT analysis we have identified 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 15 below.

A full qualitative Risk Assessment will be carried out prior to contract award with the EPC Contractor, with the output updated accordingly.

Table 15: Risk Summary Table

Category	Risk	Mitigation Measure
Design & Technical Complexities	• **Technical Risks:** Integration of new switchgear and transformers with existing infrastructure may lead to compatibility issues.	• Engage with Main Works Contractor on an ECI basis to allow early design activities to be performed to ensure compatibility before equipment is specified and ordered. • Lessons learnt to be incorporated from recent projects that have experienced the same challenge.
Planning, Land & Consent	• **Regulatory Compliance Risks:** Changes in regulations or standards may affect project scope or require additional approvals. • **Environmental Risks:** The use of non-SF_6 switchgear may require additional environmental assessment, and any existing contamination may create delivery challenges.	• Engage with regulatory bodies early in the project to ensure compliance and secure the necessary approvals. • Undertake appropriate environmental assessments and remediation where required, ensuring all equipment and works remain compliant with environmental requirements
Thid Party Impact & Network Co-ordination	• **Construction Risks:** Construction activities may disrupt existing operations or create safety hazards. • **Operational Risks:** Transition to new equipment may lead to operational disruption or require additional training for staff. • **Community Impact Risks:** Construction may result in noise, traffic disruption or other impacts on the local community. • **Stakeholder Engagement Risks:** Insufficient engagement with key stakeholders may lead to opposition or delay.	• Develop a comprehensive construction management plan, including safety protocols, sequencing and communication arrangements to minimise disruption. • Maintain clear communication with Site Operations and ensure site representation forms part of the core project team. • Plan a phased transition to new equipment, provide training for personnel and develop operational procedures for the new assets. • Engage with the community and wider stakeholders early, provide regular updates and implement measures to minimise disruption and respond to concerns promptly.

Category	Risk	Mitigation Measure
Timing of Programme & Resources	• **Supply Chain Risks** [redacted] • **Project Schedule Risks:** Delays in any phase of the project could impact customer energisation dates. • **Change Management Risks:** Changes in scope, design or requirements during delivery may create confusion and delay. • **Resource Availability Risks:** Shortages of skilled labour or specialist contractors may affect programme and quality.	• Order transformers early through the bulk purchase framework and advance GIS procurement as an early activity within the ECI contract. • Use the ECI strategy to accelerate key activities where possible and reduce uncertainty on long-lead items. • Conduct thorough testing and commissioning before full operation and monitor programme performance closely. • Apply formal change control processes so that any change is evaluated, documented and communicated clearly. • Plan resource needs early, secure specialist capability in advance and consider cross-training where appropriate.
Cost	• **Cost Overruns:** Unexpected construction, equipment or compliance costs may arise. • **Financial Risks:** Changes in material prices or funding availability may affect the project budget	• Develop and maintain a detailed budget with appropriate contingencies, and monitor spend regularly against that budget. • Lock in prices with suppliers where possible and maintain contingency to manage unexpected financial pressure.

5. Conclusion

This Load Reopener outlines the investment needs case for a 132kV GIS (Non-SF6) substation extension at Laleham and describes the outputs from the optioneering and CBA process that led to the identification of the preferred solution. The drivers for this investment are the connection of [redacted] customers and the requirement to meet SQSS compliance.

The proposed solution is option D-2: Extend Laleham via new GIS hall. Option D-2 is the most economical solution overall and will enable NGET to satisfy all contracted connections, whilst also maintaining SQSS compliance to resolve the pre-/post-fault overloads on the supergrid Transformers at Laleham.

There are known uncertainties and risks associated with Option D-2 that have been captured in this Load Reopener, such as supply chain, project schedule and community impact risks. To ensure our successful delivery of this project, collaboration with all stakeholders involved in the proposed investment and within the Laleham site is critical.

This Track 3 Needs Case outlines the preferred solution and seeks approval of the continuing need under Special Condition 3.18, approval of the continuing investment need for PCF under Special Condition 3.15, confirmation of Track 3 Needs Case and formal approval of the preferred option. The Price Control Deliverable (£m) associated with this investment proposal is as follows:

Table 16: Investment Summary

Investment Summary	
Main Drivers	Primary investment driver for the Laleham project are customer connections. [redacted] Secondary investment driver for the Laleham project is SQSS compliance. At Laleham, contracted demand now exceeds the capability of the existing SGT arrangement, requiring investment to replace and uprate the transformers to maintain SQSS compliance and connect new demand securely and reliably.
Selected Option	The proposed solution is option D-2: Extend Laleham via new GIS hall.
Estimated Cost & Timing	• **Project cost:** [redacted] 23/24 prices, inc. Risk & contingency)
Outputs	The preferred investment at Laleham will deliver key outputs for consumers and the wider network by extending the existing 132kV substation.

Investment Summary

The investment will enable the following outputs, aligned to the pillars of our ambition for RIIO-ET3:

- **Deliver the grid of tomorrow:** Enable [redacted]
- **Do the right thing for our consumers, communities and the environment:** Deliver the preferred solution within the existing site, avoiding additional land take and major planning requirements while reducing environmental and consenting impacts relative to new-build alternatives.
- [redacted]

Appendix A
Glossary

Table 17: Table of abbreviations and definitions

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	[redacted]
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

Abbreviation	Description
G3	Green Gas for Grid
GEC	General Electric Company
GIB	Gas Insulated Busbar
GIS	Gas Insulated Switchgear
GLA	Greater London Authority
GW	Giga Watt
HDD	Horizontal Directional Drilling
HV	High Voltage
HWUP	Hackney Waltham Cross Uprating
IEC	International Electrotechnical Commission
ISS	Integrated Security System
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

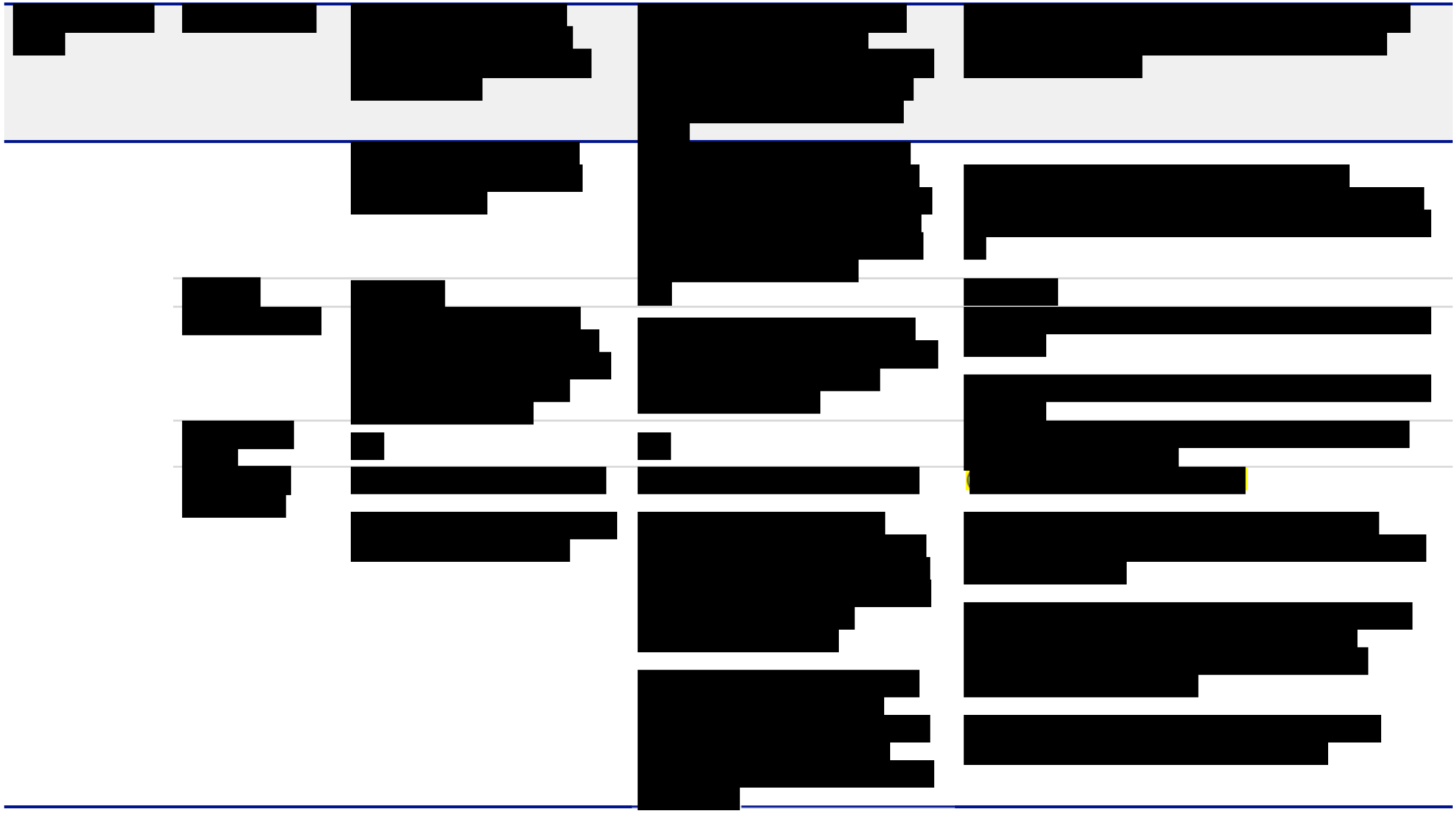
Abbreviation	Description
SGT	SuperGrid Transformer
SLD	Single Line Diagram
SPV	Special Purpose Vehicle
SSMD	Sector Specific Methodology Document
SSSI	Site of Special Scientific Interest
STC	System Operator Transmission Owner Code
SuDS	Sustainable Drainage Solutions
TBC	To Be Confirmed
tCO2e	Tonnes of Carbon Dioxide Equivalent
TCPA	Town And Country Planning Association
TCSNP	Transitional Centralised Strategic Network Plan
TWB	Through-Wall Bushing
UK	United Kingdom
UKPN	UK Power Networks
UKPN EPN	Eastern Power Networks
UKPN LPN	London Power Networks
UKPNS	UK Power Networks Services
UXO	Unexploded Ordnance
VCA	Voltage Compliance Assessment
XPLE	Cross-Linked Polythene

Appendix B

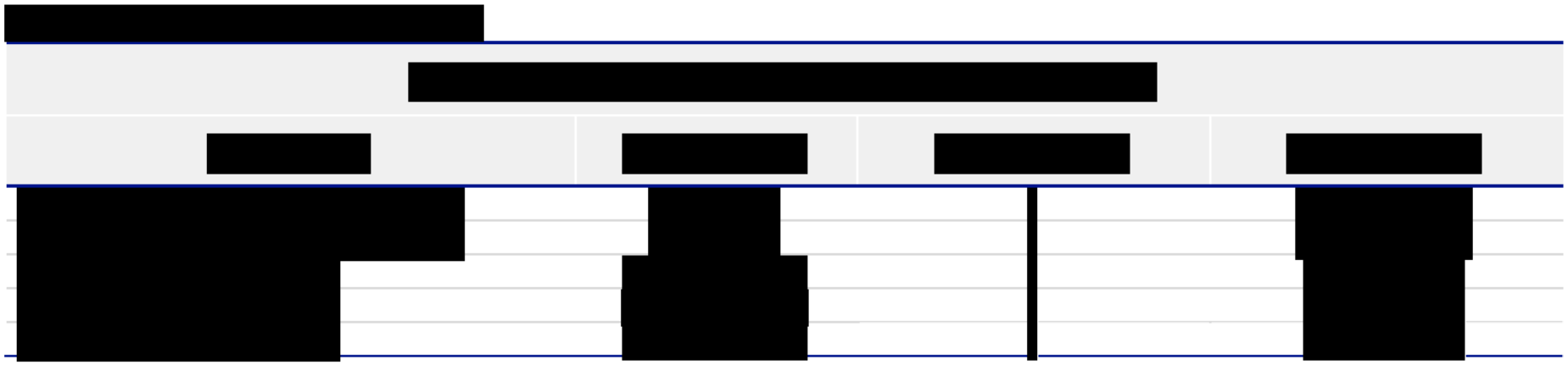
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