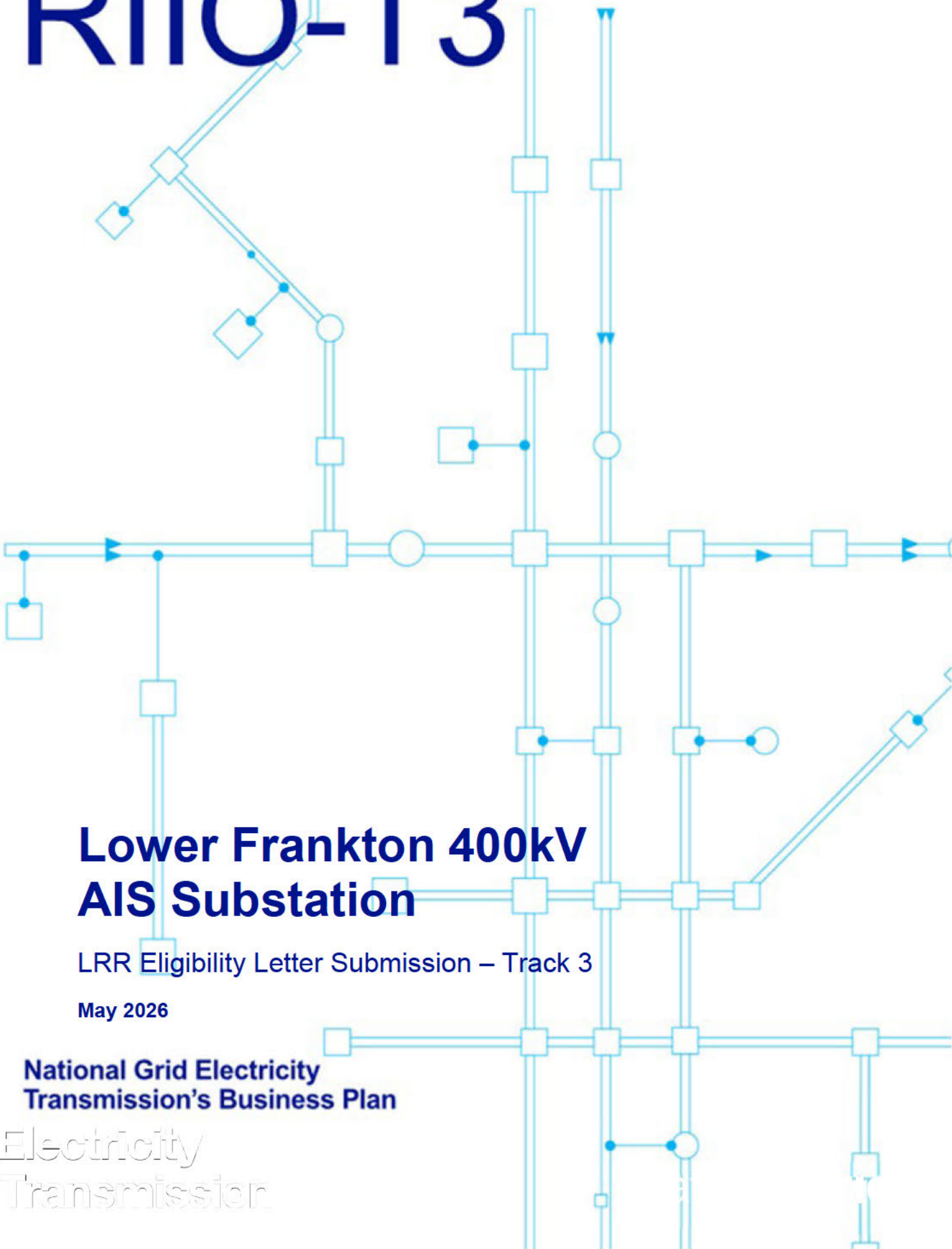


# RIIO-T3



## Lower Frankton 400kV AIS Substation

LRR Eligibility Letter Submission – Track 3

May 2026

National Grid Electricity  
Transmission's Business Plan

Electricity  
Transmission

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Field	Description
Name of Project	Lower Frankton 400kV
TO's preferred re-opener track	Track 3 Eligibility Letter (EL)
RRP References	No OSR created to date. Will be included in RRP26 submission.
BPDT / Project Reference Number	Not Applicable.
Load Board Reference	Not Applicable.
Investment Driver	<p><b>Primary Driver</b></p> <p>Connection of IDNO 132kV substation</p> <p><b>Wider Drivers</b></p> <ul style="list-style-type: none"> <li>potential generation customer connections</li> <li></li> <li>Quad Boosters (QB) – management of increased power flows in the region.</li> </ul>
PASE alignment	The current design is PASE aligned – New build, 400kV Double Busbar AIS substation. This is our provisional preferred option subject to siting reassessment and full Needs Case submission.
Outputs	<ul style="list-style-type: none"> <li>New 24-bay 400/132kV double busbar AIS substation at Lower Frankton,</li> </ul>
Short list of strategic options considered	<p>Two main options were shortlisted for detailed analysis:</p> <ul style="list-style-type: none"> <li><b>Option E-2:</b> New 18 bay, 400kV AIS substation.</li> <li><b>Option E-3:</b> New 24 bay, 400kV AIS substation.</li> </ul>
Preferred solution and explanatory narrative on the rationale	<p>The provisionally preferred option is <b>Option E-3: new 24-bay 400 double busbar AIS substation</b> subject to a siting study reassessment.</p>
Costs	(including contingency in 2023/24 price base).
Delivery Year	
Applicable Reporting Tables	No OSR created to date. Will be included in RRP26 submission.

<b>Historic Funding interactions</b>	We have not received any historic funding for the investment. There are no early asset write-offs (EAWOs) associated with this project.		
<b>Interactive Projects</b>	[REDACTED]		
<b>Spend Apportionment</b>	T2 (FY 2022-2026)	T3 (FY 2027-2031)	T4+ (FY 2032- 2037+)
	[REDACTED]	[REDACTED]	[REDACTED]

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<sup>1</sup> [REDACTED]

# 1. Executive Summary

## Project Summary

This investment creates a new 400kV strategic node at Lower Frankton, ensuring a compliant and enduring transmission connection for [REDACTED] 132kV IDNO substation and its BEGA-supported onshore wind generation. Designed for long-term resilience, it incorporates [REDACTED] Super Grid Transformers (SGTs), a double busbar layout, and a robust [REDACTED] rating to ensure sufficient transformer capacity and fault level protection.

The solution enables future connections, accommodating up to [REDACTED] and adapting as Connection Reform advances. The scheme relieves pressure on existing substations, supports [REDACTED], and enables significant low-carbon energy exports from North Wales.

Designed for long-term resilience, this project embraces a “build it once” approach to minimise environmental and community impacts, aligning with Ofgem’s scalable and adaptable solution preferences.

## Submission purpose

We are seeking approval, under the Load Related Reopener (Special Condition 3.18 of the RIIO-T3 licence), to confirm the eligibility of the identified drivers for the Lower Frankton 400kV substation as a Track 3 EL investment, and to secure Pre-Construction Funding (PCF) under Special Condition 3.15 of the RIIO-T3 licence to progress further development work.

While the submission details the underlying need and drivers, this submission is **not** seeking approval of a full Needs Case at this stage. Instead, we are requesting Ofgem’s agreement that the identified drivers are valid and eligible for consideration under the Load Related Reopener, recognising that further work is required before a preferred solution can be confirmed.

A key component of this further work is the reassessment of the siting study, to confirm whether the current site remains the optimal location when considering the full range of drivers, constraints and stakeholder considerations. The outcome of this work will directly inform the identification of the preferred option, subject to siting reassessment.

A full Needs Case Assessment, identifying the preferred solution and seeking Ofgem’s approval to proceed, will follow in October 2026 once this additional work has been completed.

## Need

Lower Frankton is a primarily load-driven investment required to facilitate the connection of the [REDACTED] 132kV IDNO substation and its associated [REDACTED] BEGA-backed onshore wind connections, [REDACTED]. The project is also driven by wider regional needs, including future direct generation connections, provision of a strategic connection node [REDACTED] and future integration of [REDACTED] Quad Boosters to manage power flows and support wider system operability. The proposed new 400kV connection node provides an enduring platform for future regional connections.

Existing substations in the region, including [REDACTED] Without this investment, we would be unable to provide an efficient and coordinated connection solution for the contracted IDNO connection and would be materially constrained in meeting wider statutory and licence obligations.

## Optioneering and strategic direction to date

We have undertaken a proportionate, multi factor optioneering process to identify the most efficient solution to meet the identified need. We conducted a high-level assessment of strategic options (do nothing, market-based, whole-system, reuse or extension of existing assets, and new-build) to develop a longlist of eight potential options. In identifying a shortlist of options for this site, we have balanced:

- Ability to provide customer with required connection.
- Extension/utilisation of an existing site versus newbuild.
- Ability to facilitate additional future connections and strategic drivers.

Two options, involving a new build 400kV substation were shortlisted for detailed assessment. Of these, Option E-3 is the current preferred solution because it satisfies all current connection drivers whilst providing an enduring “build it once” solution. This is a provisional preferred solution due to the reasons set out within the subheading below. Further supportive evidence and detailed analysis of this option is set out in Section 4.

Table 1 – Longlist Options

Option	Details	Drivers met?	New site?	AIS/ GIS?	Short List?
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 to [REDACTED]	No	No	AIS/GIS	X
Option D-2	Connection to [REDACTED]	No	No	AIS/GIS	X
Option E-1	10 bay, 400kV AIS substation	Part	Yes	AIS	X
Option E-2	18 bay, 400kV AIS substation	Part	Yes	AIS	✓
Option E-3	24 bay, 400kV AIS substation	All	Yes	AIS	✓

## Provisional preferred solution

Subject to the outcome of the siting study reassessment, the provisional preferred option is a new 24-bay 400kV double busbar AIS substation at Lower Frankton. The scheme comprises [REDACTED] Super Grid Transformers, [REDACTED], provision for the [REDACTED] IDNO connection, and capacity to facilitate future direct generation connections, [REDACTED] and potential Quad Booster integration. This is unlike the 18-bay option which would have to be extended to accommodate [REDACTED]. The current design adopts a PASE aligned new-build AIS arrangement and is proposed to proceed via Track 3 EL of the Load Re-opener process.

Due to the chronology of the Lower Frankton project and the evolution of network requirements over time, the scope of the investment that now needs to be accommodated at the site has materially changed since the original siting work was undertaken. What began as a connection led scheme to facilitate an IDNO connection has developed into a multi-driver investment, reflecting increased customer demand, additional direct generation interest, and the identification of Lower Frankton as a strategic connection node for wider network reinforcement [REDACTED]. These developments have increased both the scale and functional requirements of the proposed substation and extend beyond the assumptions that underpinned the earlier siting studies.

As a result, we are currently reassessing the siting study to ensure the preferred location is fully robust against the revised and current set of drivers, constraints and delivery considerations. This work is

intended to confirm that the current site remains the most appropriate location when assessed against the updated scope, including futureproofing, constructability, system integration and stakeholder impacts. Until this reassessment has been completed, it would be inappropriate to select or confirm a final preferred option. Accordingly, while this submission sets out the nature of the need and the investment drivers in detail, we are not seeking approval of a preferred solution at this stage; instead, we are seeking Ofgem's agreement to the eligibility of the identified drivers and the appropriateness of progressing further development work through Pre-Construction Funding before returning with a Needs Case and preferred option.

## **Costs**

The current estimate for the provisional preferred option is [REDACTED] (including [REDACTED] contingency) in 2023/24 prices.

# 2. Introduction

## 2.1 Lower Frankton 400kV

This submission is made under the Load Re-opener and Price Control Deliverable (Special Condition 3.18 of the RIIO-ET3 Licence) for Lower Frankton 400kV substation, new build project.

The application seeks the following determinations from Ofgem:

- approval of project eligibility under the Load Re-opener and Price Control Deliverable (Special Condition 3.18);
- confirmation that the project should proceed via Track 3 EL of the re-opener process; and
- approval of Pre Construction Funding (PCF) under Special Condition 3.15 (Pre Construction Funding Reopener, Price Control Deliverable).

### 2.1.1 Eligibility & Project Track Statement

The project qualifies under Special Condition 3.18 as a primarily load driven investment with secondary drivers linked to facilitation of PSNC and power flow considerations. The investment is scheduled for delivery within the RIIO-ET3 period and beyond, with its forecast costs exceeding the thresholds within volume driver mechanisms.

This submission proposes the Track 3 EL Load Reopener process. Even though the provisional preferred solution is PASE aligned, we will not have confirmation of this option until the outcome of the siting study reassessment is known. A full Needs Case Assessment, confirming the preferred solution and seeking Ofgem's approval to proceed, will follow in October 2026 once this additional work has been completed.

### 2.1.2 Pre-Construction Funding Request

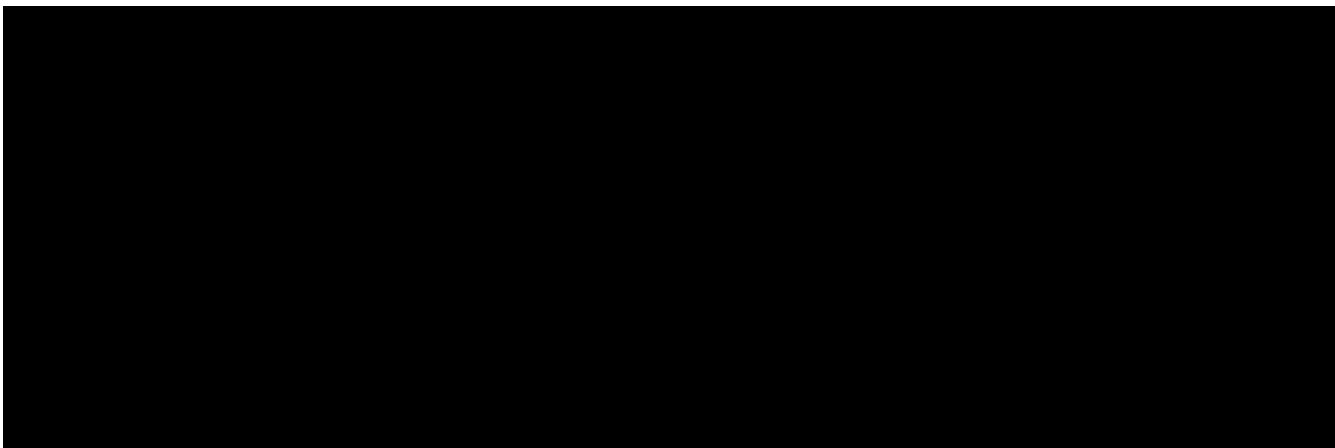
Under Special Condition 3.15 of the Electricity Transmission licence, this investment qualifies for allowances equal to 8.2% of its total forecasted cost [REDACTED] at the time of this Load Re-opener Eligibility Letter submission).

Based on our current forecast we have provided below a breakdown of costs amounting to [REDACTED] as part of this submission. This equates to [REDACTED] of the latest total forecast project costs.

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.

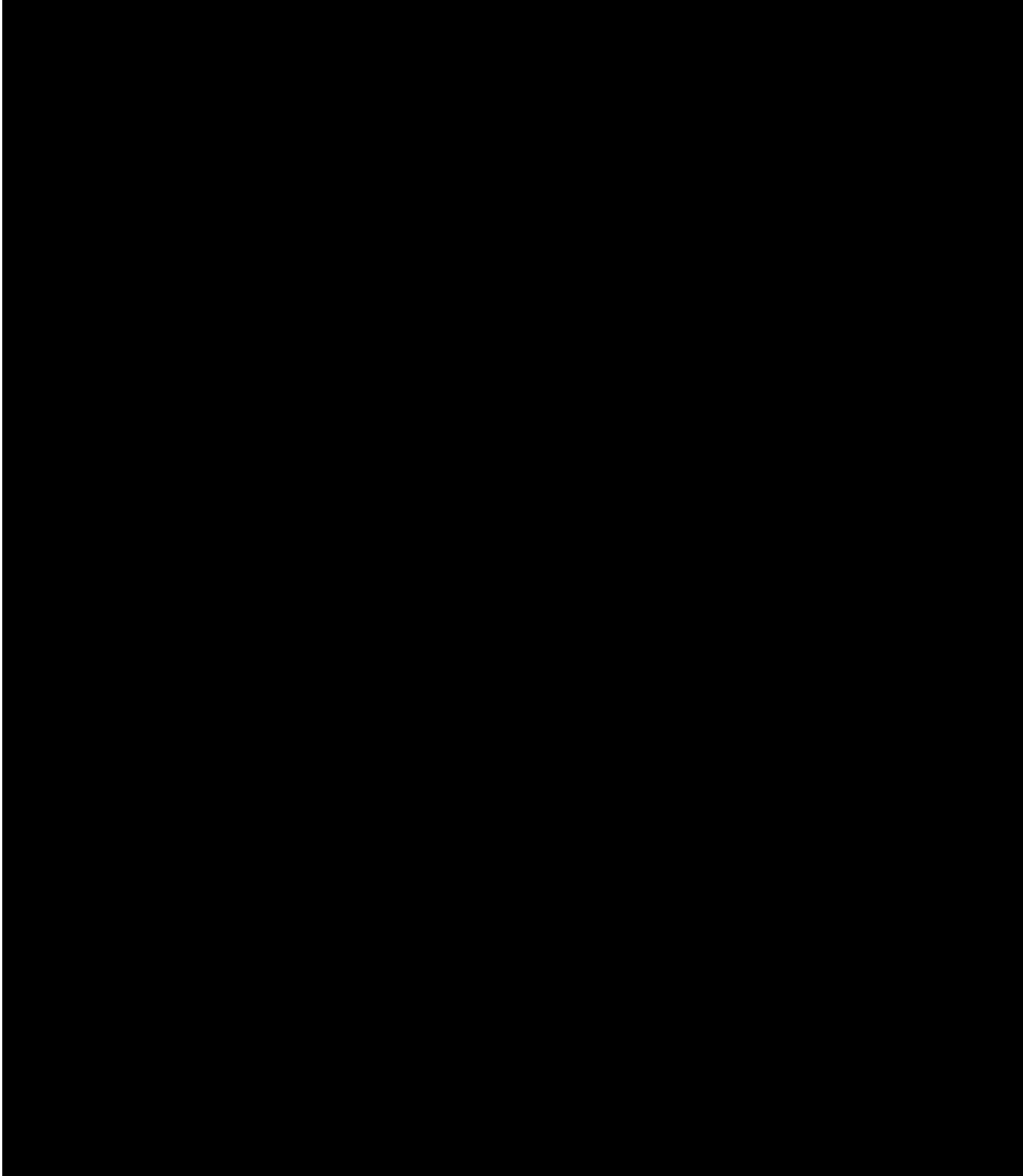
*Table 2 - Estimated costs for pre-construction activities (£m, 23/24 prices)*




## 2.2 Background to the Investment

### 2.2.1 Chronology of investment

The Lower Frankton investment originates from the need to create a new 400kV node in the region. The connection led investment has evolved into a portfolio-optimised one, targeted at meeting multiple needs. The chronology of the investment, drivers and connection dates is covered in Figure 1.





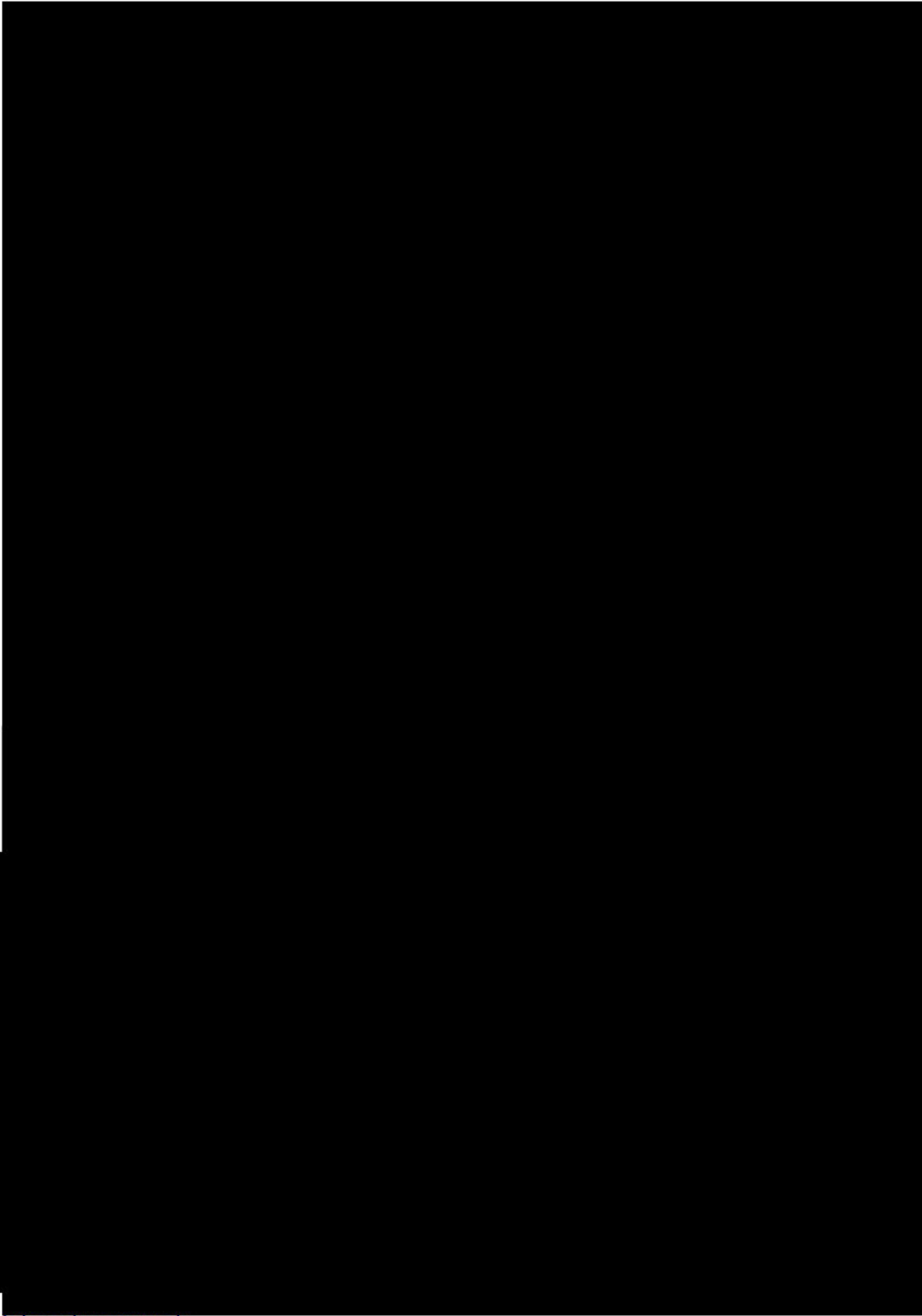
Due to the chronology of the Lower Frankton project and the evolution of network requirements over time, the scope of the investment that now needs to be accommodated at the site has materially changed since the original siting work was undertaken. These developments have increased both the scale and functional requirements of the proposed substation and extend beyond the assumptions that underpinned the earlier siting studies. As a result, we are currently reassessing the siting study to ensure the preferred location is fully robust against the revised and current set of drivers, constraints and delivery considerations. This work is intended to confirm that the current site remains the most appropriate location when assessed against the updated scope, including future-proofing, constructability, system integration and stakeholder impacts.

### 2.2.2 Regional & Network Context

The surrounding region is characterised by a limited number of 400 kV substations, including Legacy (Wrexham), Shrewsbury, Bodelwyddan, Connah's Quay, Capenhurst, Frodsham and Ince, which are sparsely distributed and linked by long transmission corridors between generation-rich North Wales and demand centres in the Midlands and Northwest England. This results in high reliance on individual nodes for bulk power transfers and new connections.

Regional power flows are further shaped by the Western Link interconnector at Flintshire Bridge, facilitating power exchange between England and Scotland. Its interaction with high renewable generation in North Wales drives significant north–south and west–east flows across the Legacy–Shrewsbury corridor, imposing sustained loading and operational constraints on the existing infrastructure and reducing headroom.

North Wales is experiencing strong growth from renewable energy developers and battery storage schemes, predominantly export-driven for transmission to England. Concurrently, rising demand across Shropshire, the Midlands, and the border region, driven by electrification and economic development, presents a regional system challenge. Lower Frankton provides a critical solution to these cross-boundary pressures, enhancing the transmission network's capacity, resilience, and flexibility.



2.2.2.1 Interactive projects



[Redacted]

2.2.3 Site background

Lower Frankton is located in a rural area of Shropshire, with the nearest major settlement being [Redacted]

The substation location is between the existing Ironbridge, Shrewsbury and Legacy substations on the Legacy-Ironbridge-Shrewsbury circuit, refer to Figure 3. However, as mentioned, we are reviewing the substation's siting to ensure the current location remains optimal in light of updated drivers, considering future requirements, construction, system integration and stakeholder impact.

2.2.4 Historical funding

Not applicable – we have received no historic funding for this investment.

2.2.4.1 Early Asset Write Off (EAWO)

This investment proposes a new substation at Lower Frankton. Therefore, previous interventions, estimate of spend using our statutory Fixed Asset Register and estimate of remaining Regulated Asset Value (RAV) on existing assets are not applicable.

3. Drivers & Needs Case

The principal driver for constructing the Lower Frankton substation is to enable the IDNO 132kV connection. The 132kV cannot be connected at existing substations due to electrical and physical space constraints. Additionally, the substation is required to provide future customer connection capacity and enable strategic reinforcement works.

[Redacted]

Table 3 - Lower Frankton investment drivers

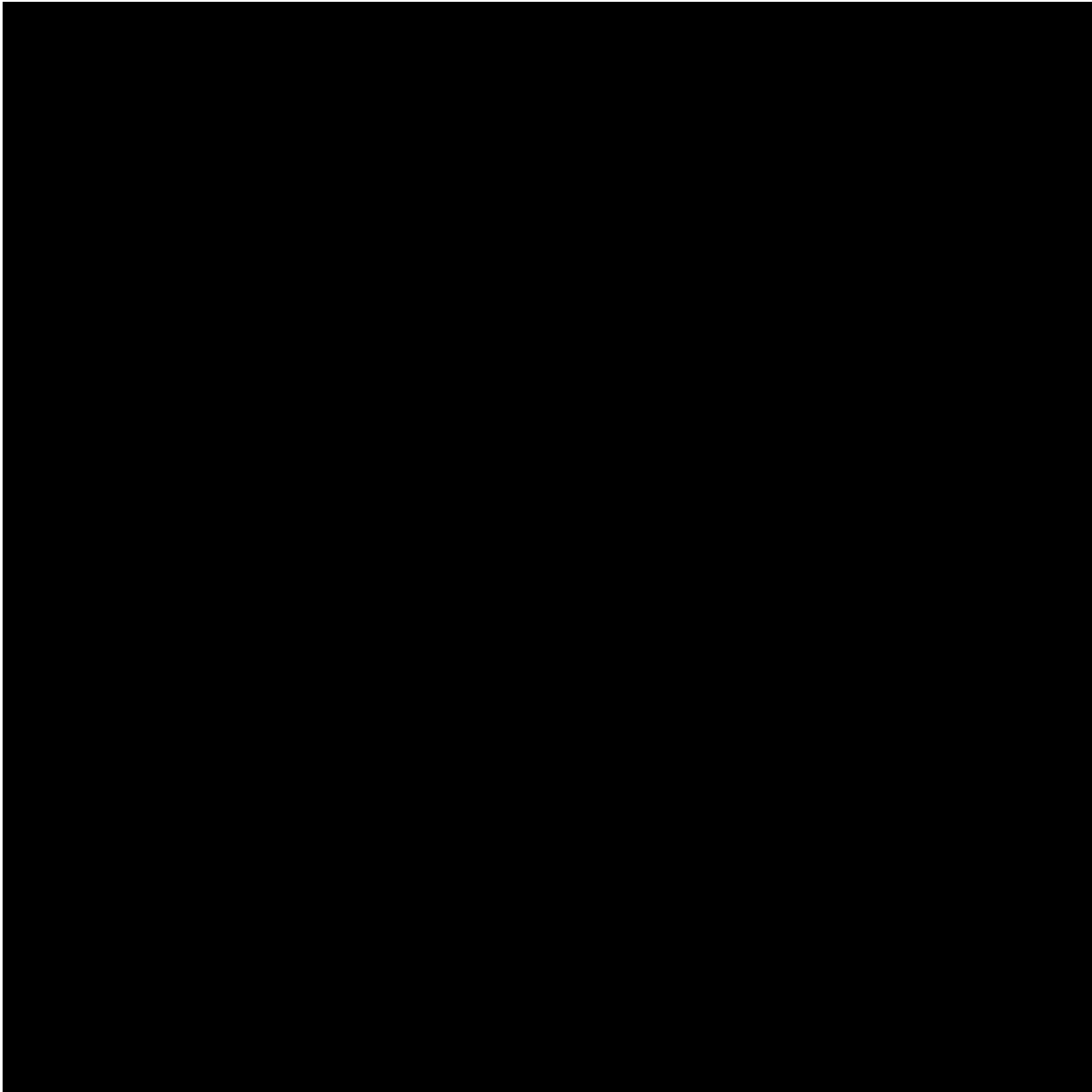
Summary of Primary Drivers		Date
<p>[Redacted] IDNO connection</p>	<p>A new 132kV IDNO substation for [Redacted] with associated BEGA-backed onshore wind requirements drives the need for a new transmission connection point and substantial transformer capacity.</p> <p>[Redacted]</p>	<p>[Redacted]</p>

<p>generation customer connections &amp; future capacity</p>	<p>Connection of [redacted] connections. Owing to potential attrition through [redacted] the substation provides significant future capacity.</p>	<p>[redacted]</p>
<p>Strategic network interaction</p>	<p>[redacted] considered multiple connection options and determined Lower Frankton to be the preferred option when considering technical, environmental and socio-economic data. [redacted]</p> <p>[redacted]</p>	<p>[redacted]</p>
<p>Wider system operability - Quad Boosters (QB)</p>	<p>QBs are phase-shifting transformers that adjust the phase angle on transmission circuits. They are essential tools for: controlling real-power flows, preventing circuit overload, maximising boundary transfer capability, balancing power across parallel paths, and facilitating renewable integration and efficient system operation.</p> <p>[redacted] QBs are required due to customer-driven background flows and wider system needs. Lower Frankton substation, once built, will enable these QBs to be integrated into the transmission network.</p> <p>[redacted]</p>	<p>[redacted]</p>

### 3.1 Customer

[redacted]

[redacted]





## 3.2 Asset Health

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

# 4. Optioneering

We follow a structured, multi-factor optioneering process to select the most economic and efficient solution, in the interest of consumers. We start by assessing the most suitable strategic options.

## 4.1 Strategic Options

In line with our standard optioneering process, we considered the following broad strategic options, Strategic/long list options are shown in in Table 5.

Table 5 – 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.

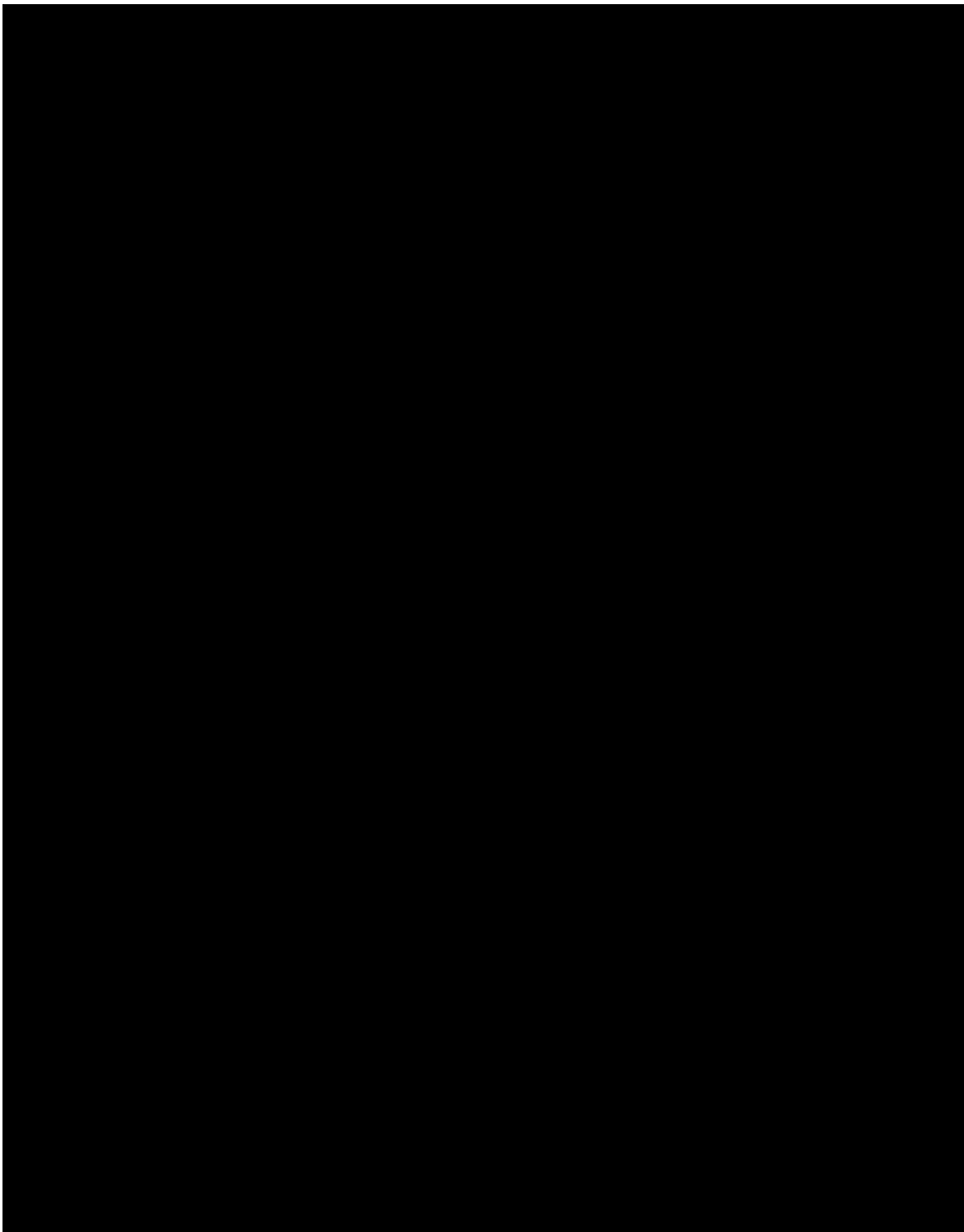
We discounted Options A, B and C due to the inability of these options to facilitate the connection requests. We discounted Option D due to physical constraints at existing substations impacting expansion. As detailed below our initial high-level assessment concluded that the drivers could be effectively met through a new substation (Option E). A descriptive rationale is provided in Section 4.3, Table 8.

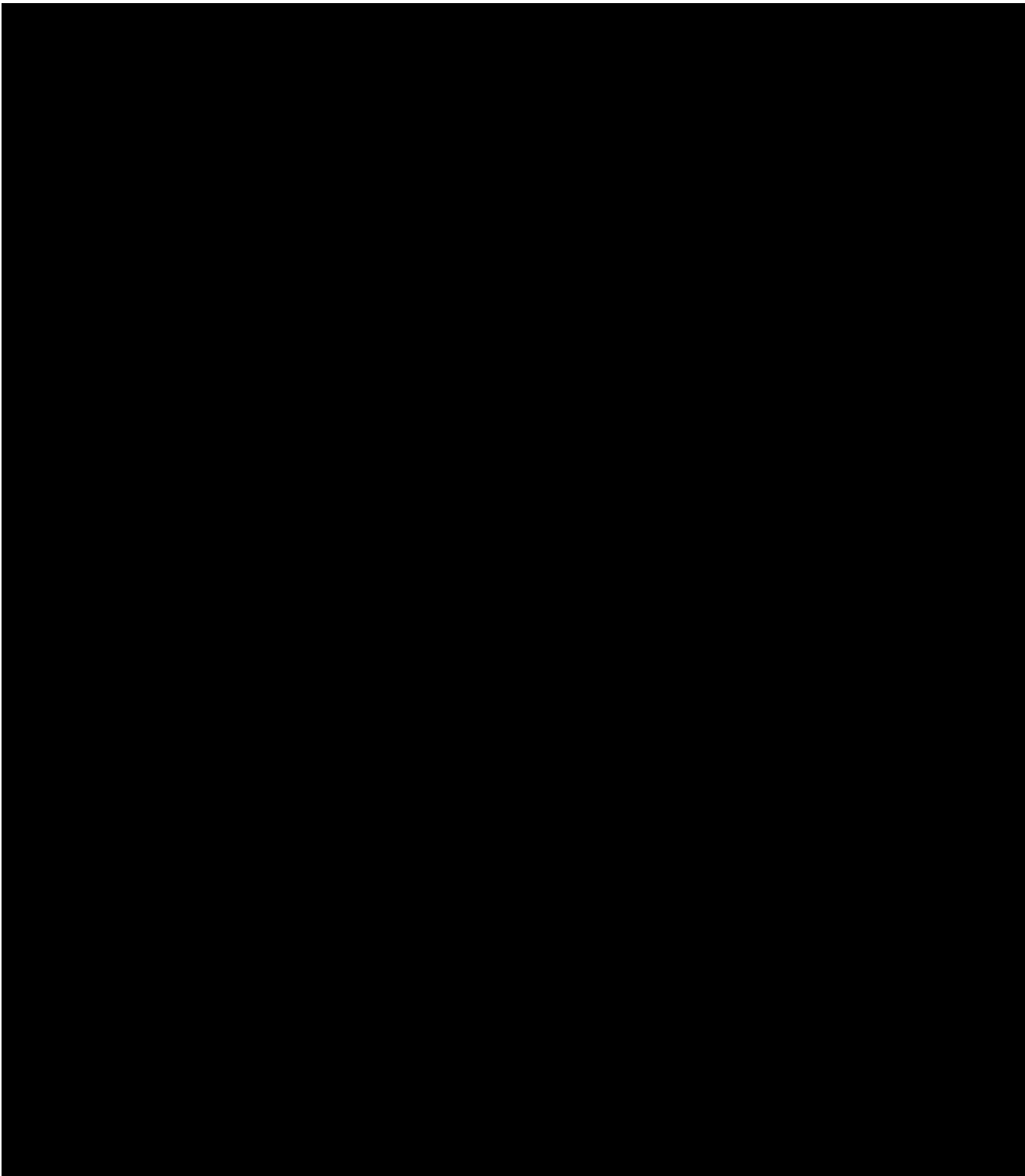
## 4.2 Siting

[REDACTED]

[REDACTED]

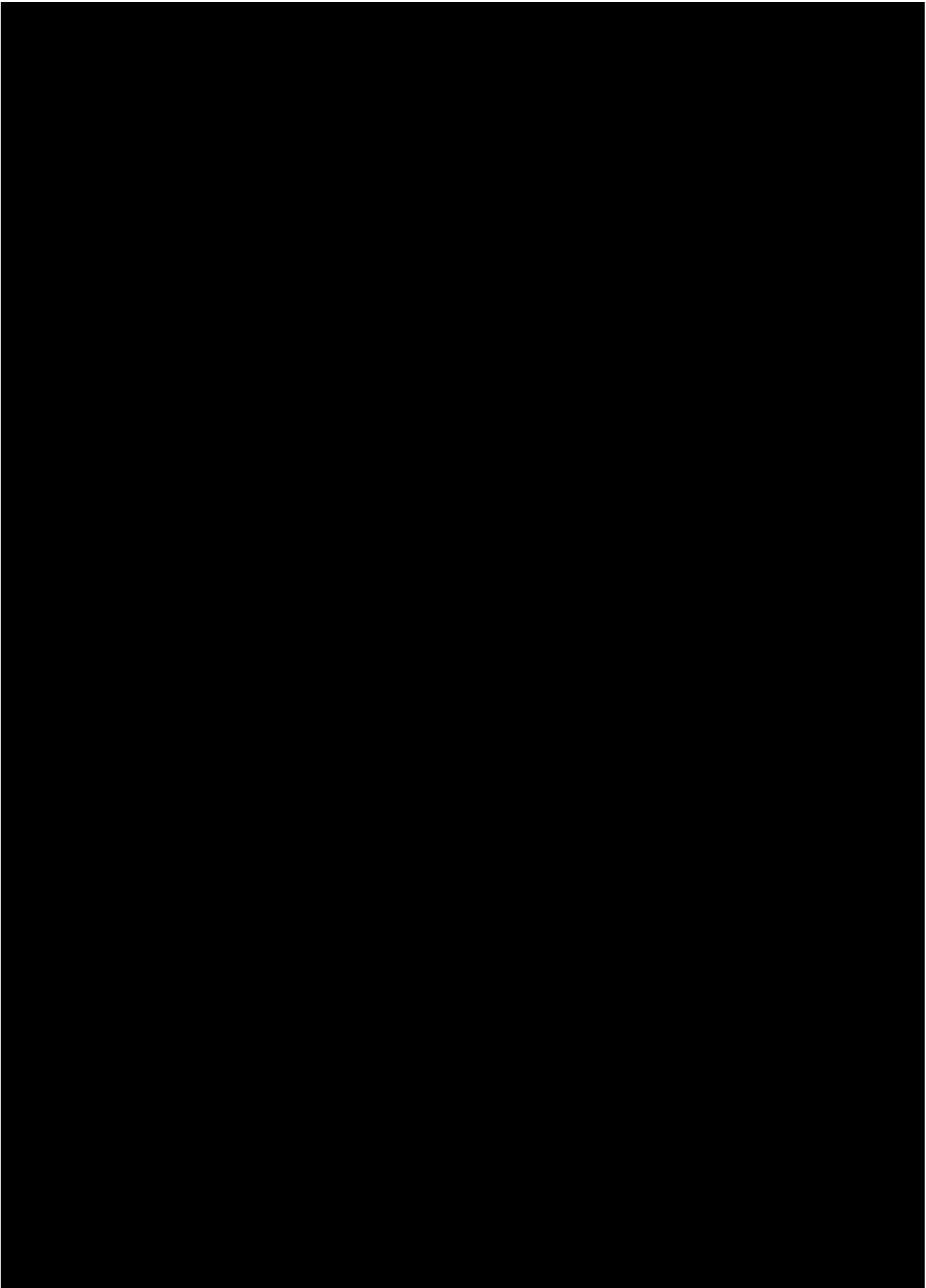
[REDACTED]

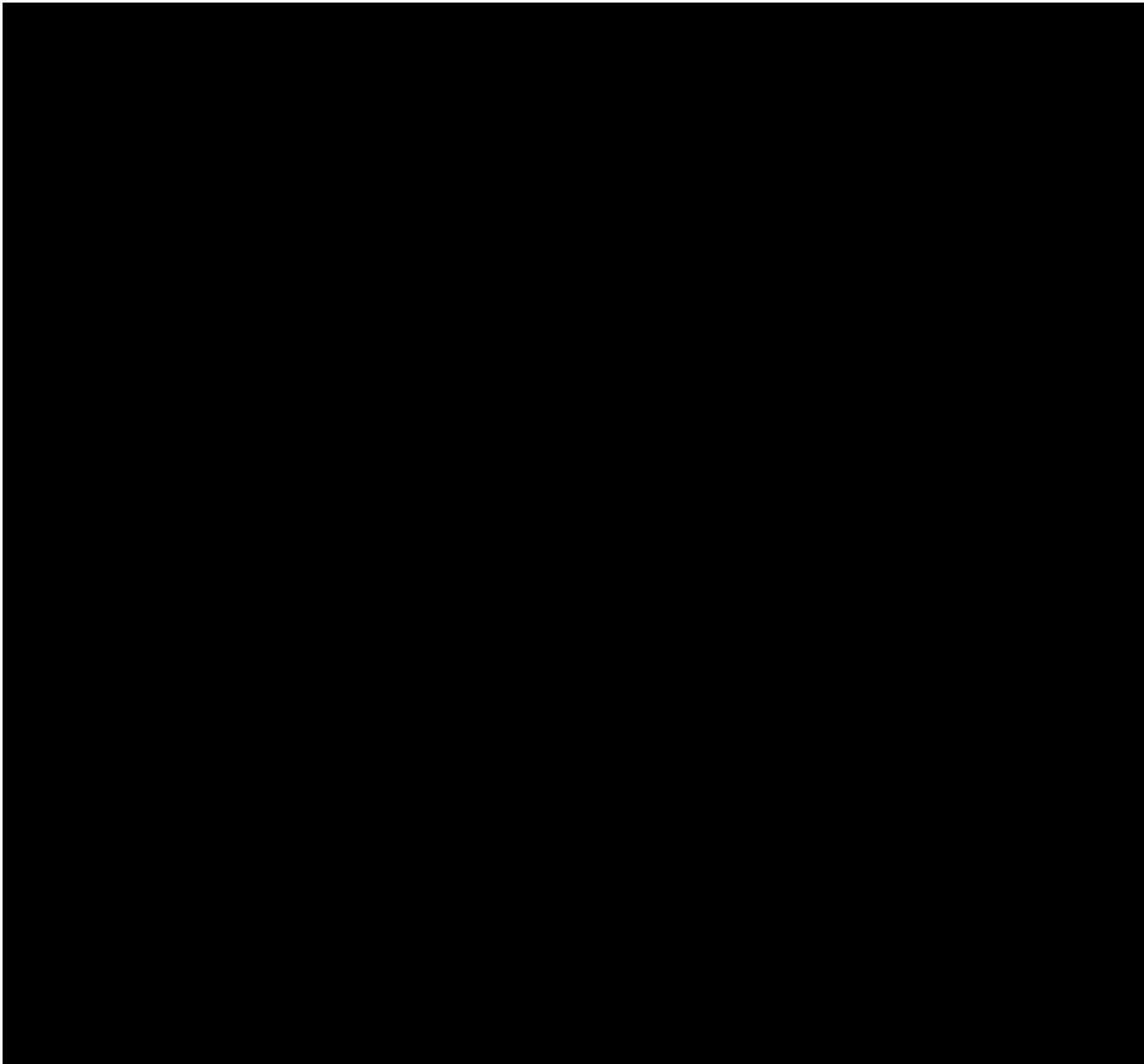


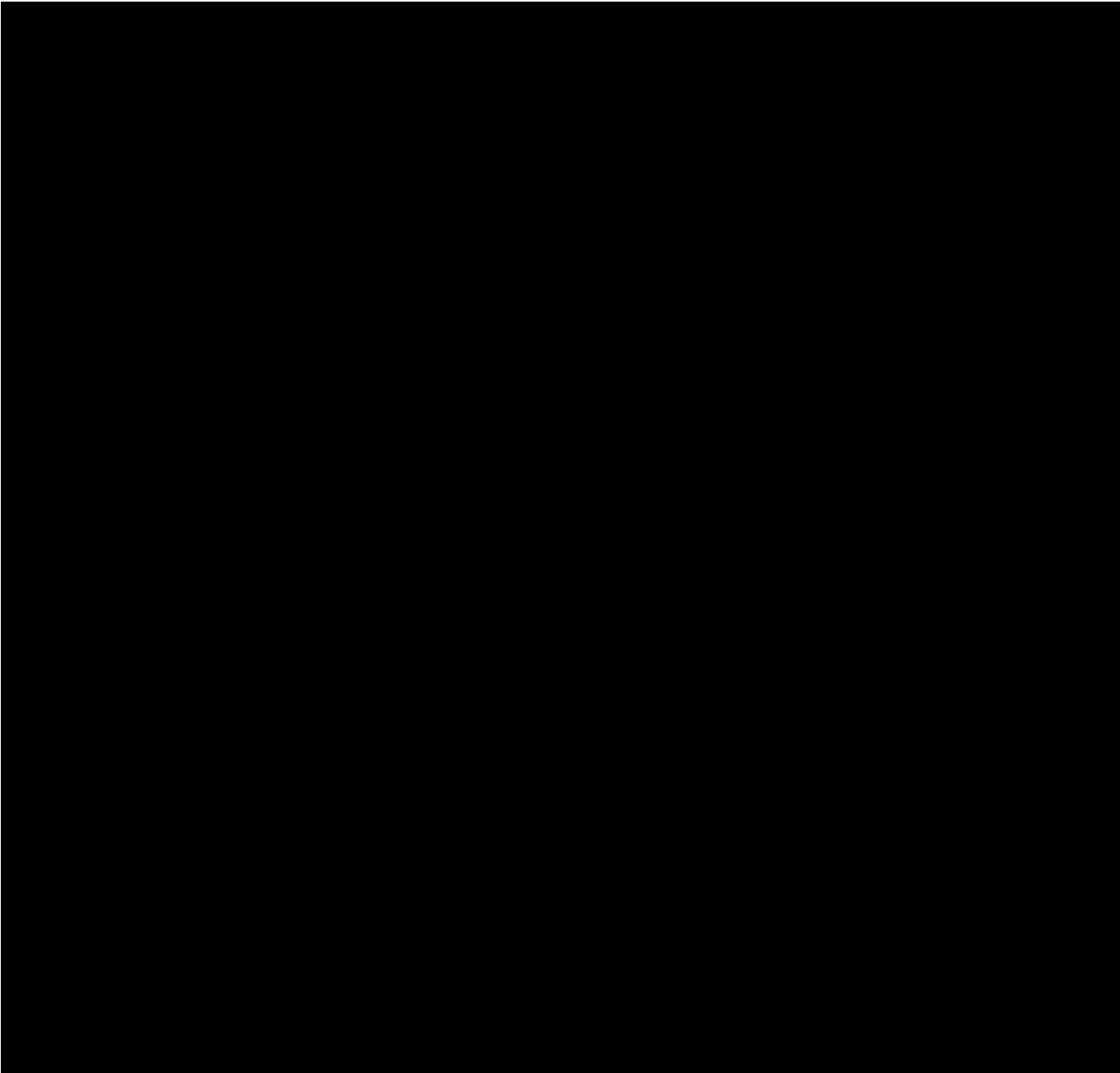


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<sup>2</sup> Grade 1 or 2 ALC are considered the highest two categories for agricultural land. Natural England advises where possible, direct development to poorer quality land rather than higher quality land.

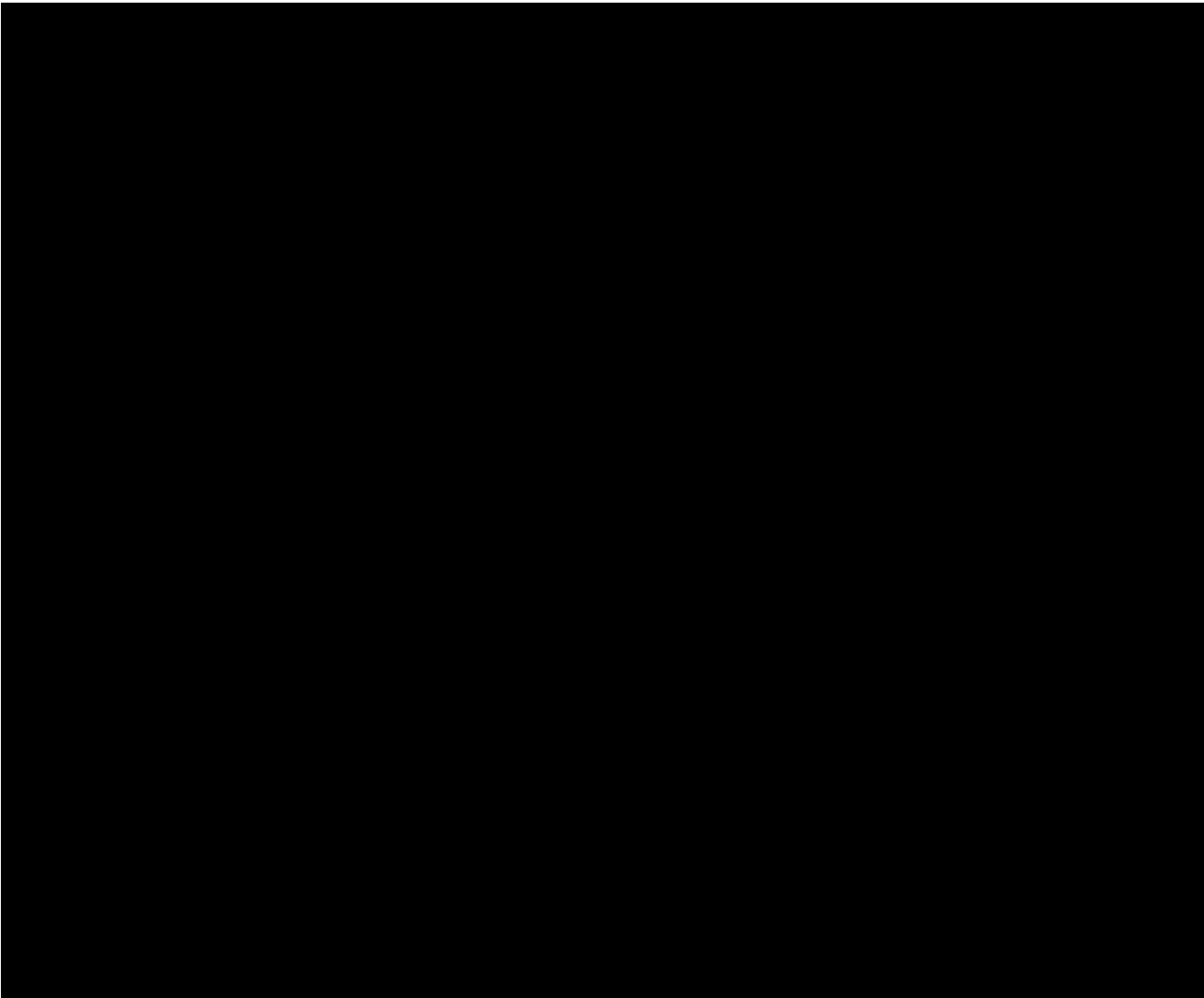


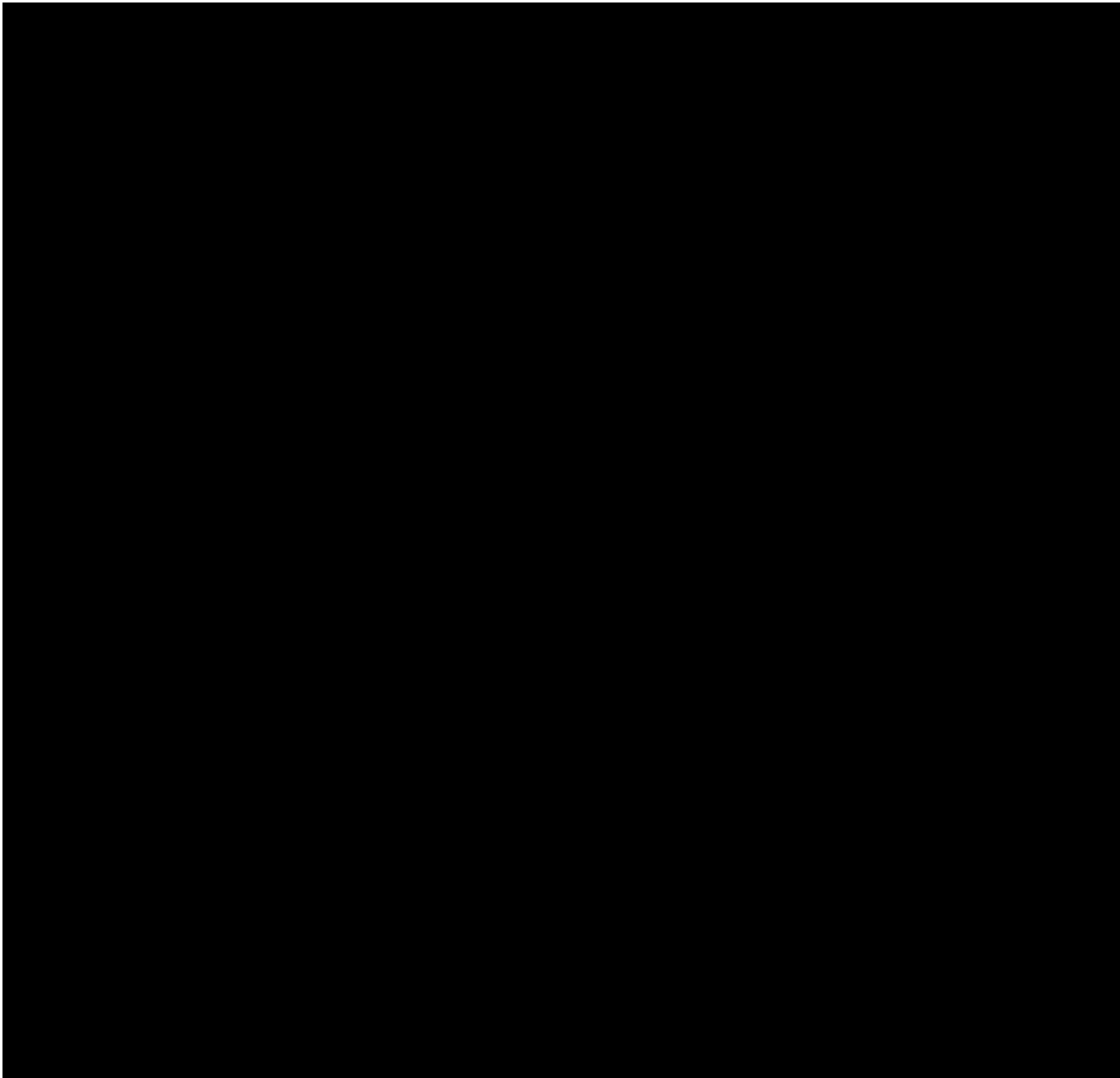




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<sup>3</sup> Cheshire Node A is the former internal project name, now replaced with Lower Frankton.





### 4.3 Longlist of options considered

In line with our internal processes and Ofgem's *Load Re-opener Guidance*, we have undertaken a proportionate multifactorial assessment of the options to identify the option that offers the best overall outcome for consumers. The assessment is summarised below.

Table 7 – Summary of long list options and down selection

Option	Technical Description	Relevant Diagrams or Layout References	Consenting Risks & Environmental Constraints	Rationale for rejecting or taking forward the option
<b>Option A: Do nothing</b> <b>Not progressed</b>	The network is kept in its current state, and no new connections are facilitated.	N/A	N/A	<b>Engineering:</b> Compliant customer connection not delivered. The Do-Nothing option was therefore discounted as it would go against NGET Licence Obligations.
<b>Option B: Market-based solution</b> <b>Not progressed</b>	Increased customer demand is accommodated through the procurement and use of ancillary services only.	N/A	N/A	<b>Engineering:</b> Compliant customer connection not delivered. New customer connections require physical connections to the transmission network. The market-based option was discounted as it does not enable this.
<b>Option C: Non-transmission, whole systems solution</b> <b>Not progressed</b>	The required customer connection is accommodated by a DNO instead of NGET.	N/A	N/A	<b>Engineering:</b> Not progressed because [REDACTED]
<b>Option D-1: Connection to [REDACTED] substation</b> <b>Not progressed</b>	Connection to [REDACTED] Substation.	No drawing	Works within existing operational substation boundary reduce consenting risk. [REDACTED]	<b>Engineering:</b> The substation would not be able to accommodate these additional connections. [REDACTED] <b>Consumer value:</b> The option would not deliver the future connection benefits [REDACTED] as a new substation option could.

Option	Technical Description	Relevant Diagrams or Layout References	Consenting Risks & Environmental Constraints	Rationale for rejecting or taking forward the option
<p><b>Option D-2:</b> Connection to [REDACTED] substation <b>Not progressed</b></p>	<p>Connection to [REDACTED] Substation.</p>	<p>No drawing</p>	<p>Works within existing operational substation boundary reduce consenting risk.</p> <p>[REDACTED]</p>	<p><b>Engineering:</b> The substation would not be able to accommodate these additional connections. [REDACTED] construction projects to the east and west of the substation. <b>Consumer value:</b> The option would not deliver the future connection benefits [REDACTED] as a new substation option could.</p>
<p><b>Options E-1:</b> 10 bay, 400kV AIS <b>Not progressed</b></p>	<p>Provision of a grid connection [REDACTED] only, without full substation bay build-out.</p> <p>The Substation would be [REDACTED]</p>	<p>No drawing</p>	<p>Smaller footprint compared to larger new build, therefore has lower ecological/ environmental impact.</p> <p>[REDACTED]</p>	<p><b>Engineering:</b> Provides IDNO customer connection to the National Electricity Transmission System (NETS). <b>Consumer value:</b> [REDACTED]</p> <p><b>Stakeholder impact:</b> [REDACTED]</p> <p><b>Consent and Land:</b> [REDACTED]</p>
<p><b>Option E-2:</b> 18 bay, 400kV AIS <b>Progressed to shortlist</b></p>	<p>New-build 18-bay substation providing sufficient firm capacity for forecast growth.</p> <p>[REDACTED]</p>	<p>See 4.4</p>	<p>Larger substation footprint compared to Option E-1 creates [REDACTED]</p>	<p>Encompasses majority, but not all, drivers into the proposed AIS substation and includes some future proofing so progressed to shortlist. Outputs of further analysis contained within Table 8.</p>

Option	Technical Description	Relevant Diagrams or Layout References	Consenting Risks & Environmental Constraints	Rationale for rejecting or taking forward the option
	[REDACTED]		[REDACTED]	
<b>Option E-3:</b> 24 bay, 400kV AIS <b>Progressed to shortlist</b>	Larger new-build 24-bay substation providing maximum future capacity and operational flexibility. [REDACTED]	See 4.4	Larger substation footprint compared to E-1 and E-2 [REDACTED]	Encompasses all the drivers into the proposed AIS substation and includes sufficient future proofing aligned to build it once principles so progressed to shortlist. Outputs of further analysis contained within Table 8.

In summary, Options A-C were rejected due to their failure to deliver compliant physical connections. Using existing substations in Option D (D-1, D-2) were rejected due to [REDACTED]. Option E-1, 10 bay new build substation, was rejected due to it lacking future-proofing and not enabling wider drivers [REDACTED] which would necessitate future expansion, increasing whole-life cost and disruption.

Options E-2 (18-bay AIS) and E-3 (24-bay AIS) were progressed to shortlist because they provide a new-build compliant connection and introduce future capacity but to varying degrees.

### 4.3.1 Stakeholder influence on shortlisting

[REDACTED]

[REDACTED]

[REDACTED]

Engagement with Shropshire Council led to a direction to complete a formal planning pre-application accompanied by a paid Planning Performance Agreement (PPA). [REDACTED]

Nonetheless, we remain cognisant of the concerns held by the local community and MPs about GGCs Vyrnwy Frankton project, particularly regarding the visual impact of the proposed 31-mile overhead line. We were aware of these issues when undertaking the shortlisting process, aiming to balance considerations of community impact against system need, especially when evaluating sites that may not naturally screen the substation.

## 4.4 Shortlisted Options

- **Option E-2:** New 400kV Double Busbar AIS Substation 18 bay
- **Option E-3:** New 400kV Double Busbar AIS Substation 24 bay

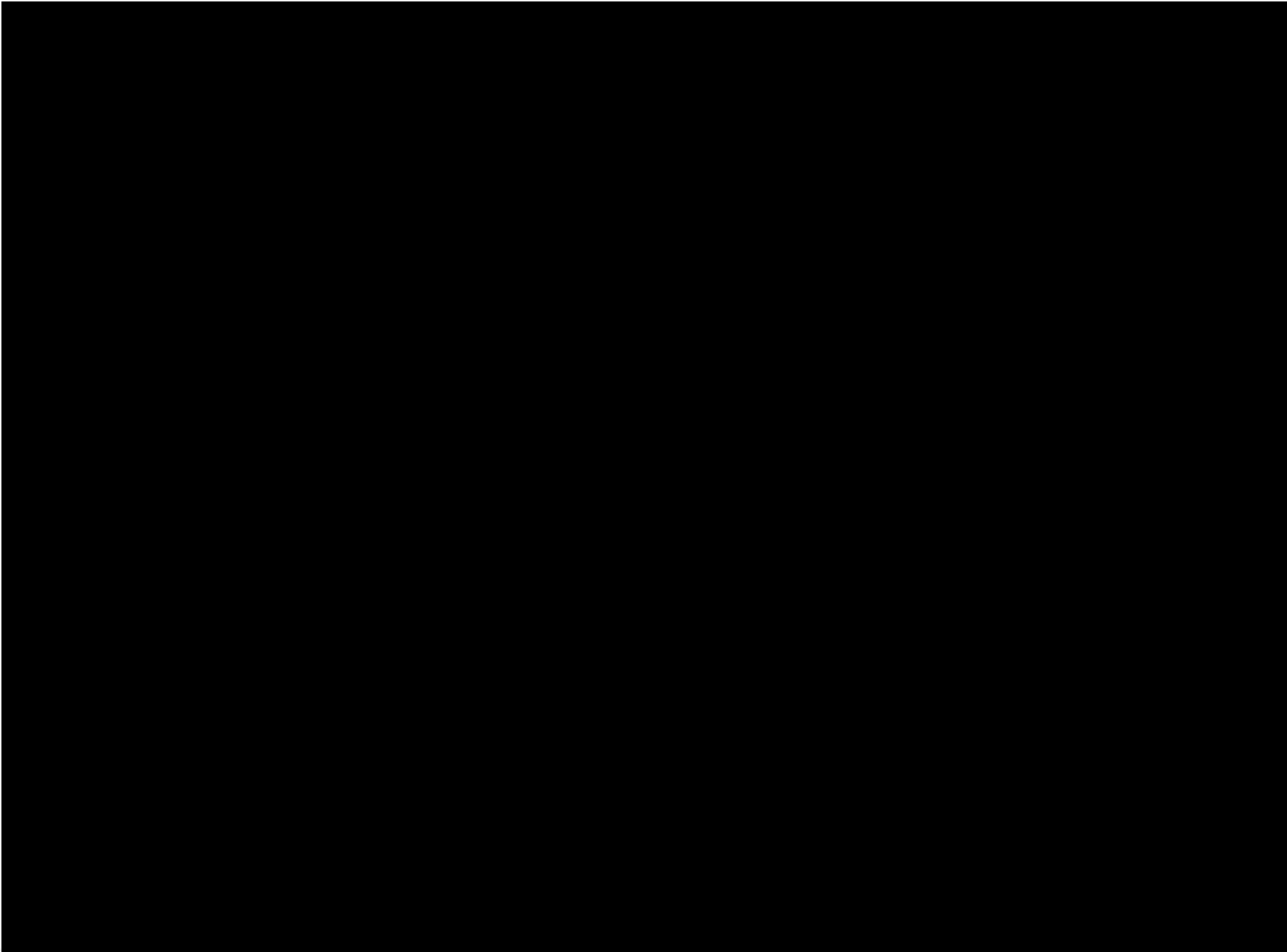
### 4.4.1 Description of short-list options considered

**Option E-2 – New 18 bay, AIS, 400kV substation.**

Construction of a new 18 bay 400kV double busbar AIS substation [REDACTED]. This option includes a new double turn in from the existing circuit and consists of:

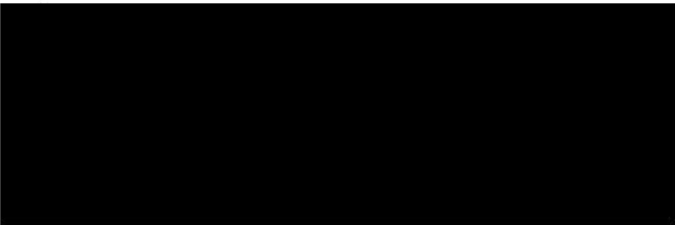
[REDACTED]

The substation will also have a [REDACTED] to improve network resilience and fault level robustness. The length of the diversion would [REDACTED]



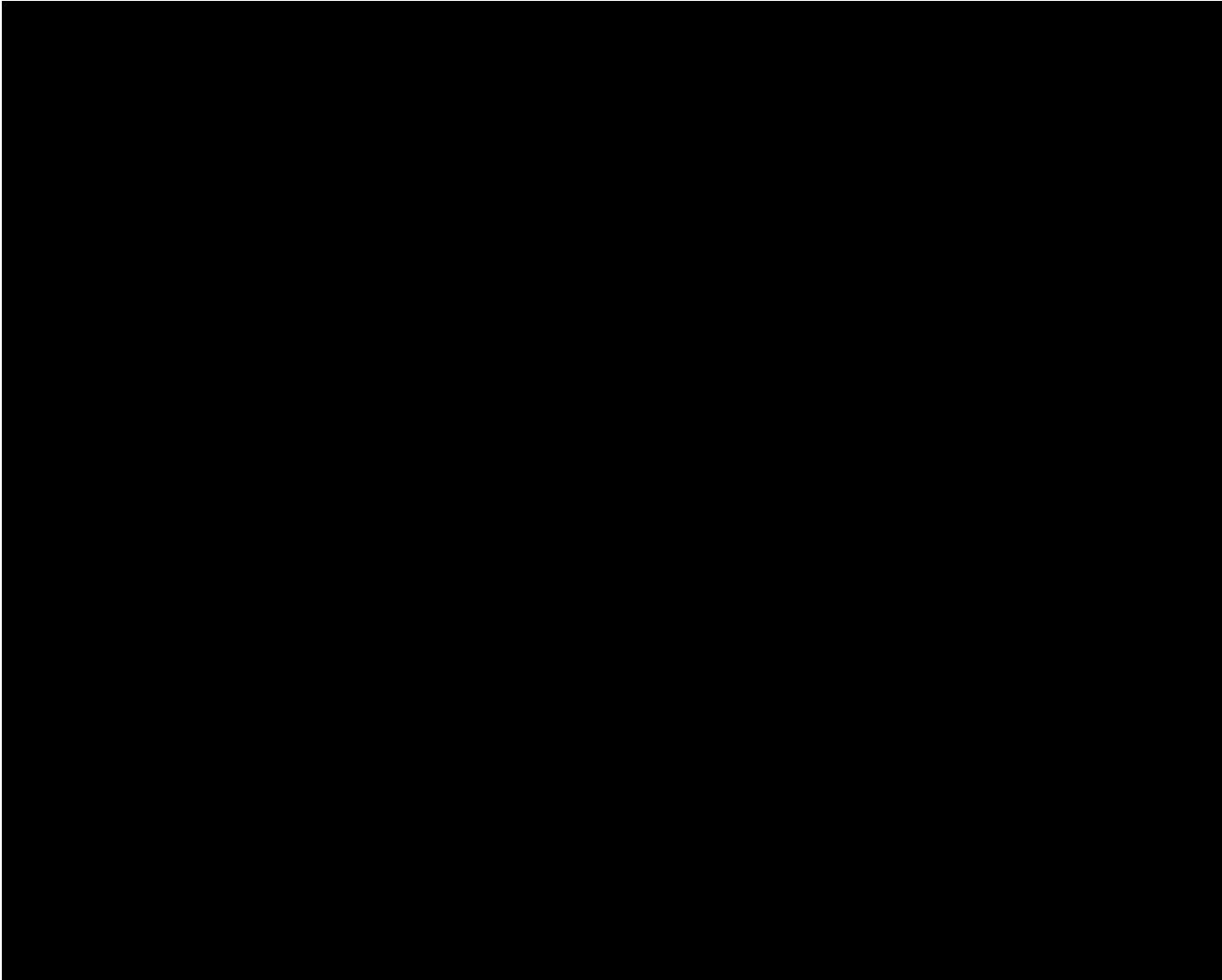
**Option E-3 – New 24 bay, AIS, 400/132kV substation.**

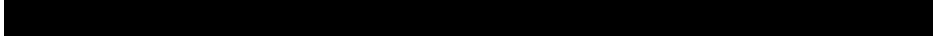
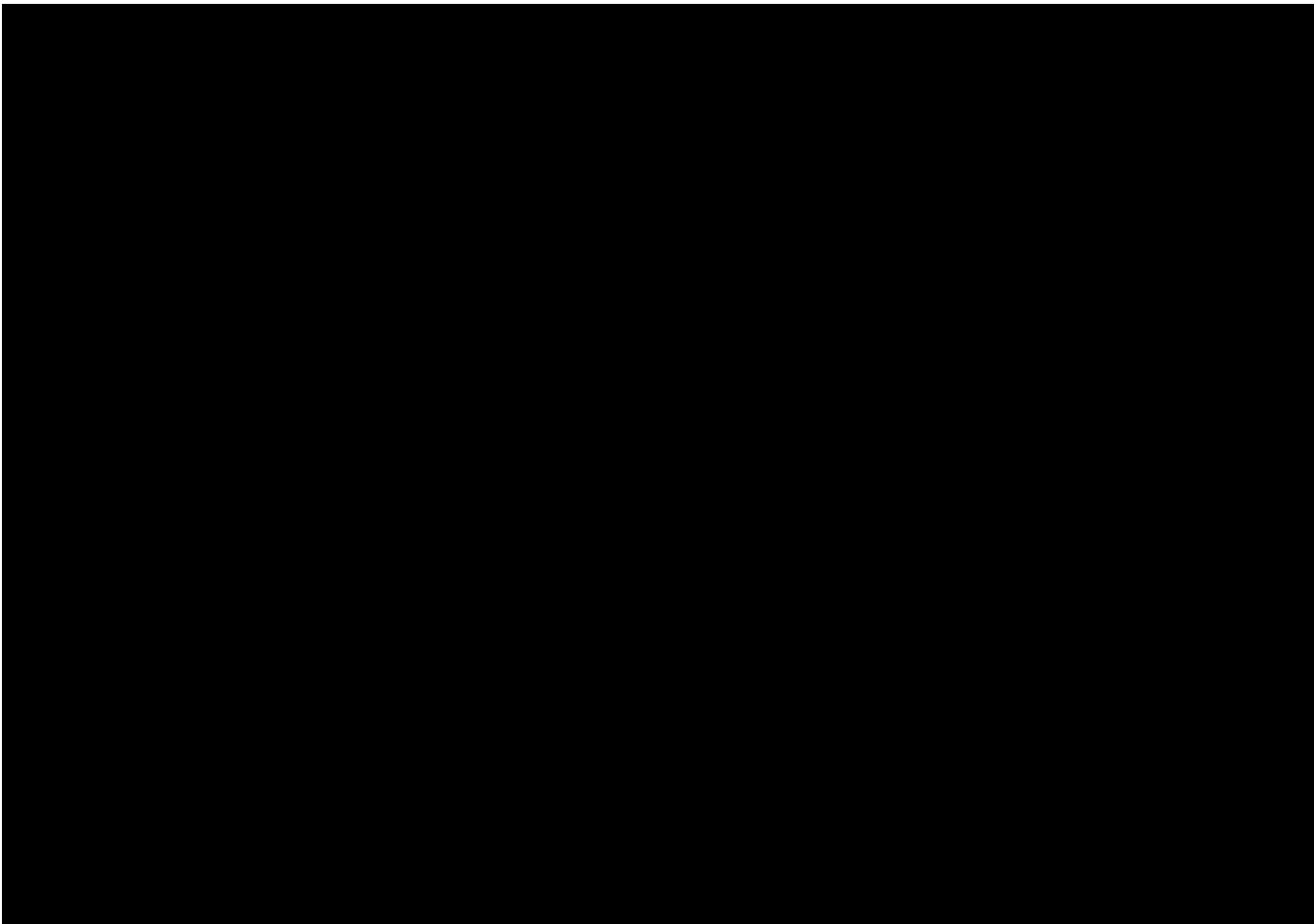
Construction of a new 24 bay 400kV double busbar AIS substation to [redacted]  
[redacted] The option consists of:



The substation will also have [redacted]  
[redacted] The length of the diversion [redacted]  
[redacted]

This substation would meet the needs of both the IDNO [redacted]  
[redacted]





In appraising these two options, we undertook a proportionate, multifactor qualitative assessment to determine which option delivers the best overall outcome for consumers, while meeting the investment drivers. The results are summarised in Table 8.

## 4.5 Qualitative assessment of shortlist

Table 8 – Indicative multifactorial analysis

Optioneering Categories					
Option	Engineering	Environmental	Deliverability	Economic/Consumer Value	Consenting /Stakeholder
Option E-2 18 bay Substation	<p>[REDACTED]</p> <p>This option provides the ability to connect the IDNO, and [REDACTED]</p> <p>AIS Construction [REDACTED] to accommodate future network requirements, however this is yet to be type registered.</p> <p>The viaducts along the A-roads present challenge to th [REDACTED]</p>	<p>[REDACTED] The initial baseline is yet to be completed, and the impact is yet to be understood.</p> <p>Option has reduced immediate environmental impact compared to Option E-3, [REDACTED]</p> <p>[REDACTED]</p> <p>The substation build will [REDACTED]</p> <p>A long access road will be required to facilitate the [REDACTED]</p>	<p>The supply chain are aware of construction intention, [REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>Option would have a slightly shorter construction period [REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p>	<p>There is a significant amount of renewable generation due to connect at Lower Frankton supporting the regional and national targets for decarbonisation.</p>	<p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p>

	<p>[Redacted]</p> <p>[Redacted]</p>	<p>substation creating</p> <p>[Redacted]</p>	<p>[Redacted]</p> <p>[Redacted] are required for both builds although.</p> <p>[Redacted]</p>		
	Benefit	Neutral	Benefit	Benefit	Benefit
<p>Option E-3 24 Bay Substation</p>	<p>As for Option E-2 however Option E-3 facilitates:</p> <p>The future requirement for the connection</p> <p>[Redacted]</p>	<p>As for Option E-2 however this option:</p> <p>Has slightly</p> <p>[Redacted]</p>	<p>As for Option E-2 however:</p> <p>In spite of a slightly</p> <p>[Redacted]</p>	<p>As for Option E-2.</p>	<p>As for Option E-2 however:</p> <p>Option E-3 has</p> <p>[Redacted]</p> <p>Option E-3 also</p> <p>[Redacted]</p>
	Strong Benefit	Neutral	Strong Benefit	Benefit	Benefit

### 4.5.1 Qualitative assessment output

Provisionally, dependent upon the outcome of the siting study reassessment, option E-3 is preferred because it delivers the stronger overall outcome on the key differentiators, even though it has a slightly larger upfront footprint:

- E-3 provides all the same core capability as E-2 while also being able to [REDACTED]
- Removing the need for [REDACTED], reduces delivery risk by avoiding later mobilisation, internal resourcing and system access/outage constraints associated with returning to extend the site. Option E-3 aligns more closely with “build it once” principles.

[REDACTED] On environmental and land take grounds, both could be [REDACTED]

- Furthermore, while E-3 may be [REDACTED]

Overall, Option E-3 reduces [REDACTED]. The option is designed as an enduring, long-term solution for the region and in this regard aligns closely with Ofgem’s desire for adaptable, future proofed designs, a key fundamental of PASE.

### 4.5.2 PASE Alignment

Based on the optioneering undertaken to date, the provisionally preferred option would be expected to align with PASE.

However, we are not in a position to formally commit to a preferred solution. We will return with a Needs Case, including confirmation of the preferred solution and its PASE alignment, once the siting reassessment work mentioned earlier has concluded.

## 4.6 Quantitative analysis of shortlist options

### 4.6.1. Cost estimates of shortlist options

To assess the shortlisted options, cost estimates have been created for quantitative economic comparison. All capex costs are derived from NGET’s latest Cost Book (23/24 prices). Estimating Units Lines (EULs) have been used to generate cost estimates based on the scope of work and the new assets to be acquired for each option. For each EUL, we have applied a 13.8% contingency, based on historic project analysis, to account for unforeseen circumstances and to mitigate risks during implementation.

Table 9: Cost Estimate Breakdown

Options	[REDACTED]
Option E-2 18 bay Substation	[REDACTED]
Option E-3 24 Bay Substation	[REDACTED]

Option E-2 is lower cost than Options E-3 based on our current estimate of costs but will be updated ahead of Needs Case submission.

### 4.6.1.1 Cost drivers

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

- Major Plant and Equipment: A significant proportion of the total cost is driven by the procurement and installation of high value primary assets, including:
  - [REDACTED] Super Grid Transformers, which have long manufacturing lead times and specialist transport and installation requirements.
  - [REDACTED] Quad Boosters, required to manage power flows [REDACTED]. These assets are large, complex and have bespoke delivery and installation requirements, contributing materially to overall cost [REDACTED].

[REDACTED] Substation Infrastructure and Civil Works: The construction of a new 400kV AIS double busbar substation represents a major cost driver. [REDACTED]

- Overhead Line (OHL) Works: [REDACTED] these works are required to integrate the new substation into the existing network and must be delivered on a constrained operational corridor with limited outage availability.

[REDACTED] Land Acquisition and Access: Land acquisition for the substation footprint, access roads and laydown areas is a key cost driver. [REDACTED]

### 4.6.2 Cost-Benefit Analysis

#### 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 two shortlisted options.

- Option E-2 - 18 bay Substation
- Option E-3 - 24 Bay Substation

### CBA Outcome

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

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

Option	Initial CAPEX investment required	Future end of life replacement costs	NPV
Option E-2	£1.2m	£0.5m	£0.7m
Option E-3	£1.5m	£0.8m	£0.7m

On the basis of the discounted lifetime CBA results (Table 11), Option E-2 delivers the highest NPV (£0.7m 2023/2024 base prices). While Options E-3 delivers an NPV (£0.7m 2023/2024 base prices) it is provisionally preferred because it provides the enduring “build once” solution, avoiding replacement costs. Further information is supplied in 4.7.

This 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).

#### 4.6.2.1 Costs

Table 11 - All capex costs considered within CBA (23/24 price base)

Option	
Option E-2	
Option E-3	

#### 4.6.2.2 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.

Table 12: Summary of all benefits

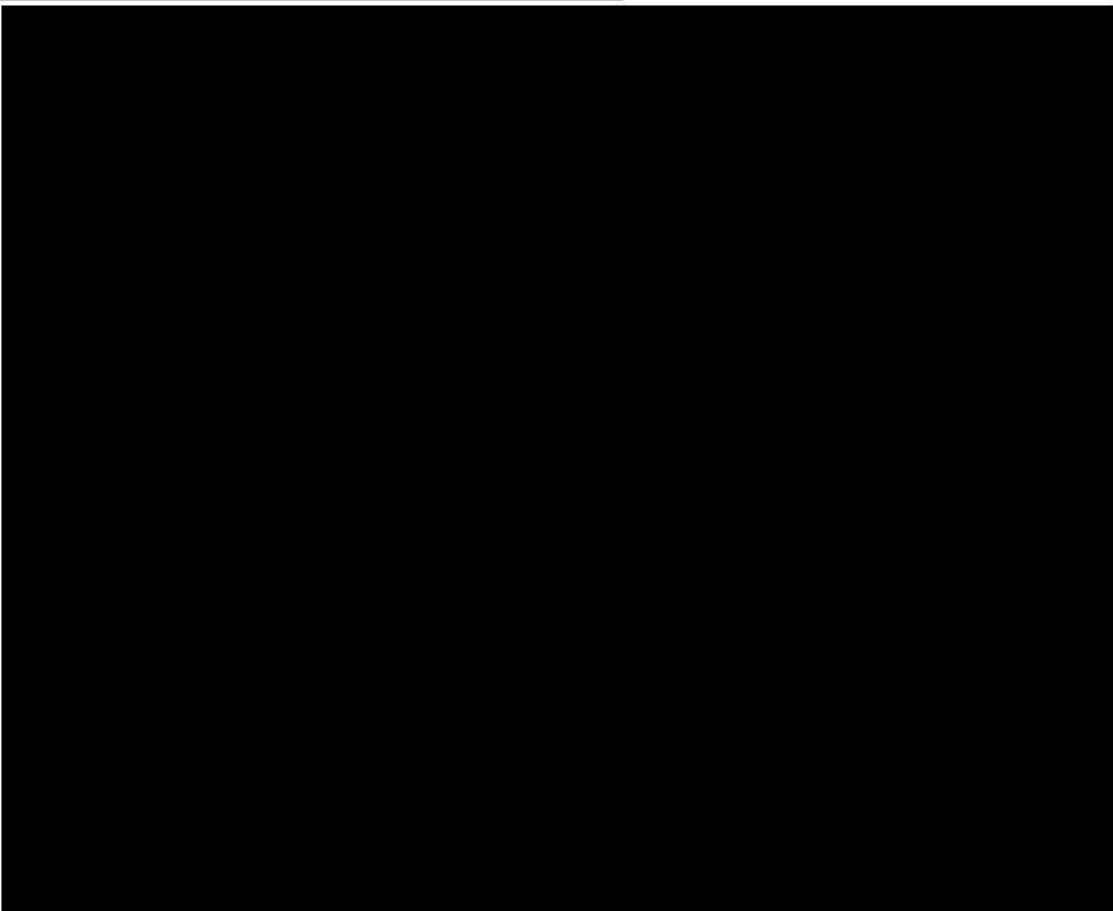
Option	
Option E-2	
Option E-3	

### 4.7 Provisionally Preferred Solution

Despite performing less favourably in the indicative CBA, our provisionally preferred option is Option E-3. The option performs better in the qualitative multifactorial analysis. Option E-3 aligns with 'build it once principles' and sufficiently future-proofs the site to include [REDACTED] from the

outset and further capacity to connect additional customers as required. Doing so up-front avoids [REDACTED] that Option E-2 would need, in turn reducing delivery, outage, resource risk as well as repeat community and environmental disruption

This option provides:



#### 4.7.1 Project benefits and outputs

- Provision of a compliant and enduring transmission connection for the [REDACTED] 132kV IDNO substation [REDACTED].
- Delivery of sufficient transformer capacity and fault level resilience through [REDACTED] SGTs, double busbar [REDACTED].
- Enables easier connections [REDACTED].
- Provides a strategic node for the region [REDACTED] which will enable large volumes of low carbon generation [REDACTED] to be exported from North Wales to demand centres.
- Designed as a long term, enduring solution that minimises environmental and community impacts by building once rather than extending later, aligning with Ofgem's preference for adaptable, future proofed designs and proportionate optioneering.

#### 4.7.2 Future proofing

The predominant benefit of Option E-3 is that its configuration is intentionally designed to host all known and [REDACTED]

[REDACTED] approach purposefully mitigates the risk of restricting future connections or necessitating substantial rework, thereby adhering to 'build it once' principles and aligning with NESOs Electricity Transmission Design Principle's to "anticipate future needs to minimise recurring updates".<sup>4</sup>

The substation [REDACTED] in a double bus bar arrangement which future proofs the site, providing long term flexibility and operability, aligning with our strategic commitments to deliver the grid of tomorrow.

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<sup>4</sup> At time of writing the ETDP is yet to be implemented but is expected to retain this requirement in any final version.

## 5. Delivery

Dependent upon the outcome of the reassessment of the siting study, the confirmed delivery date is subject to appointment of the main works contractor and will be influenced by contractor capacity, sequencing of works and resourcing availability at the time of award. At time of writing, [REDACTED]

### 5.1 Procurement and Contracting Strategy

The project is currently being supported by [REDACTED] and they are continuing to develop the provisionally preferred option and FEED activities.

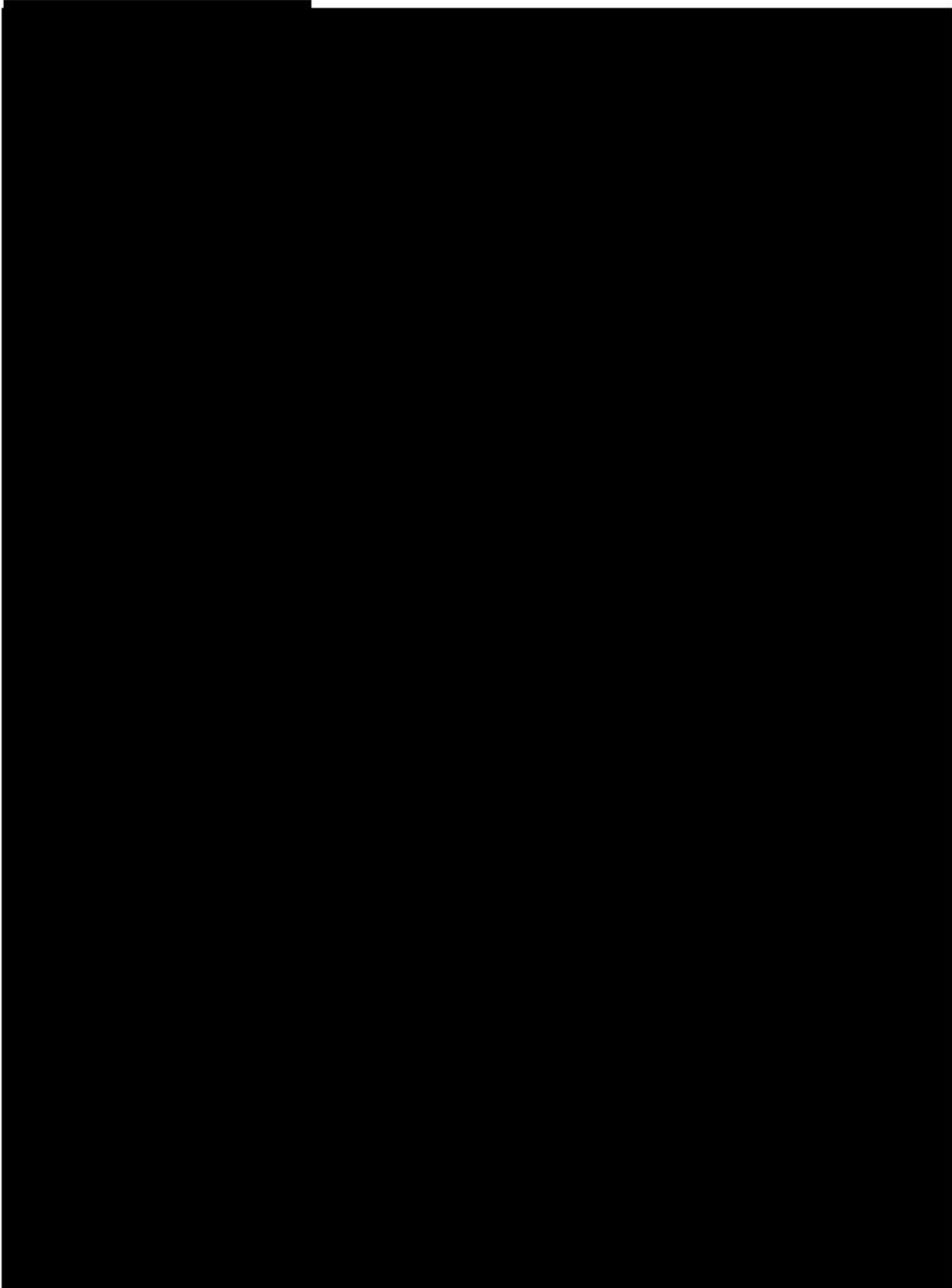
The proposed procurement is for the project to be delivered via the newly instigated Electricity Transmission Partnership (ETP), which was launched in September 2025. ETP establishes a partnering approach to allocation of substation construction projects to our supply chain contractors to ensure that we continue to deliver value for consumers. This will take advantage of utilising regional allocation where it is mutually beneficial to further enhance growth and social value. [REDACTED]

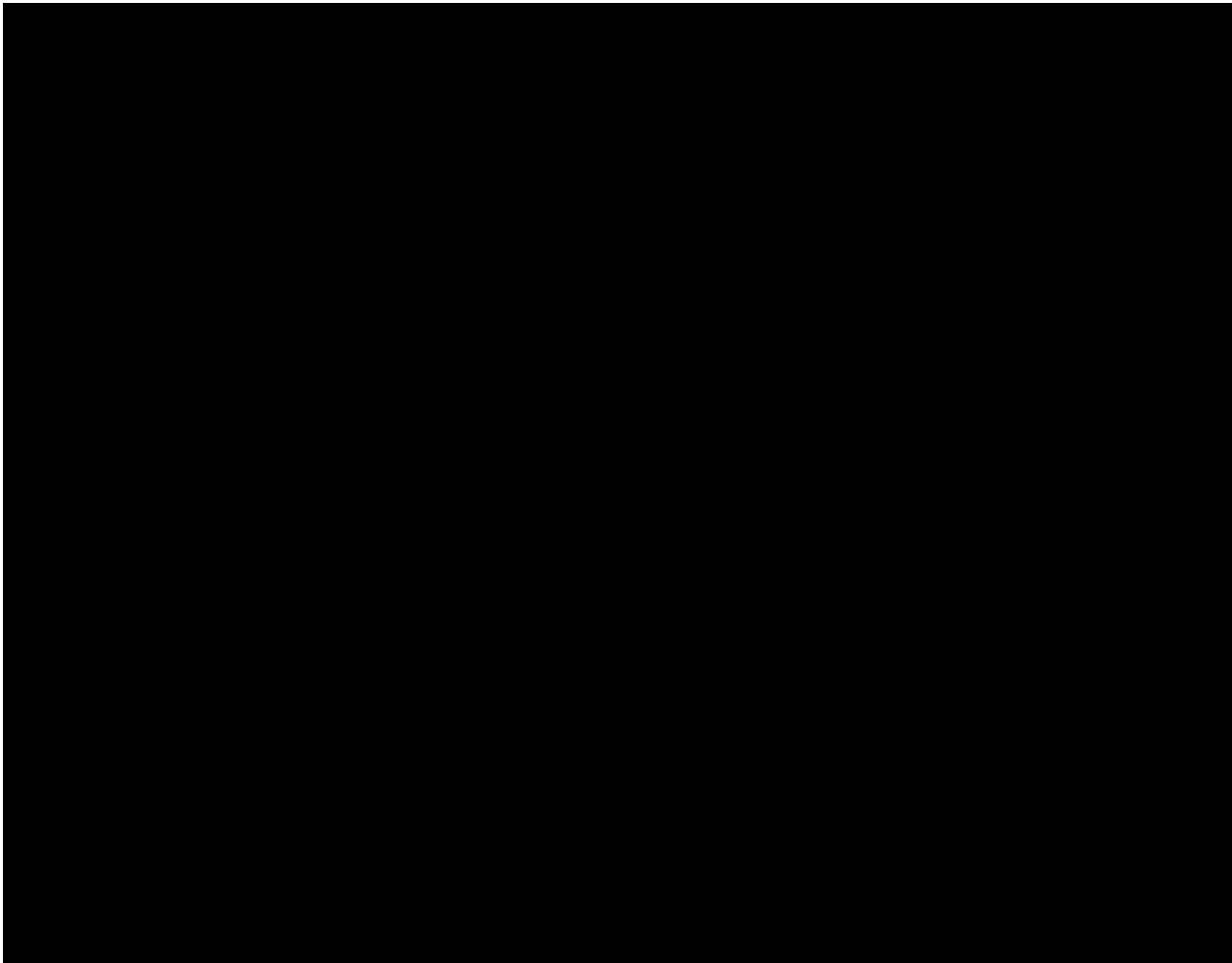
Beyond the Main Works Contractor, to reduce delays in long lead items such as SGTs and QBs we will pursue, through a bulk purchasing programme, early procurement for the SGTs [REDACTED] for the QBs. We will seek to use the Flexible Procurement allowances under the APM to overcome potential supply-chain constraints, where identified.

Due to the stage of the investment, specifics as to contracting arrangement or the date of any contract award remain to be decided. These will be set out within the Needs Case or Project Assessment as appropriate.

## 5.2 Risk and risk management

A snapshot of current delivery risks are listed below along with mitigations. As risks continue to evolve, an updated detailed view of risk and mitigations will be supplied within the Needs Case or Project Assessment submission.





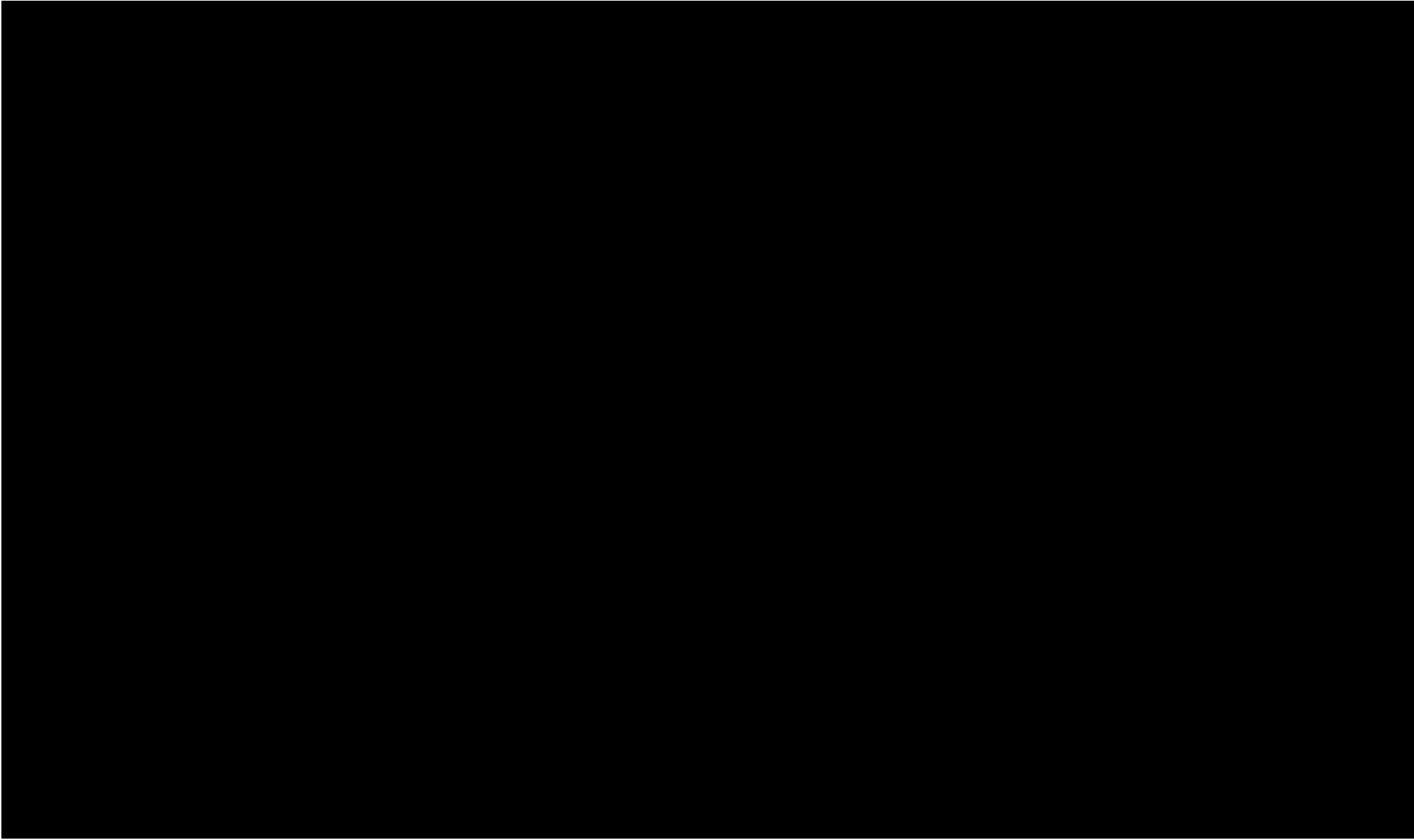
## 6. Conclusion

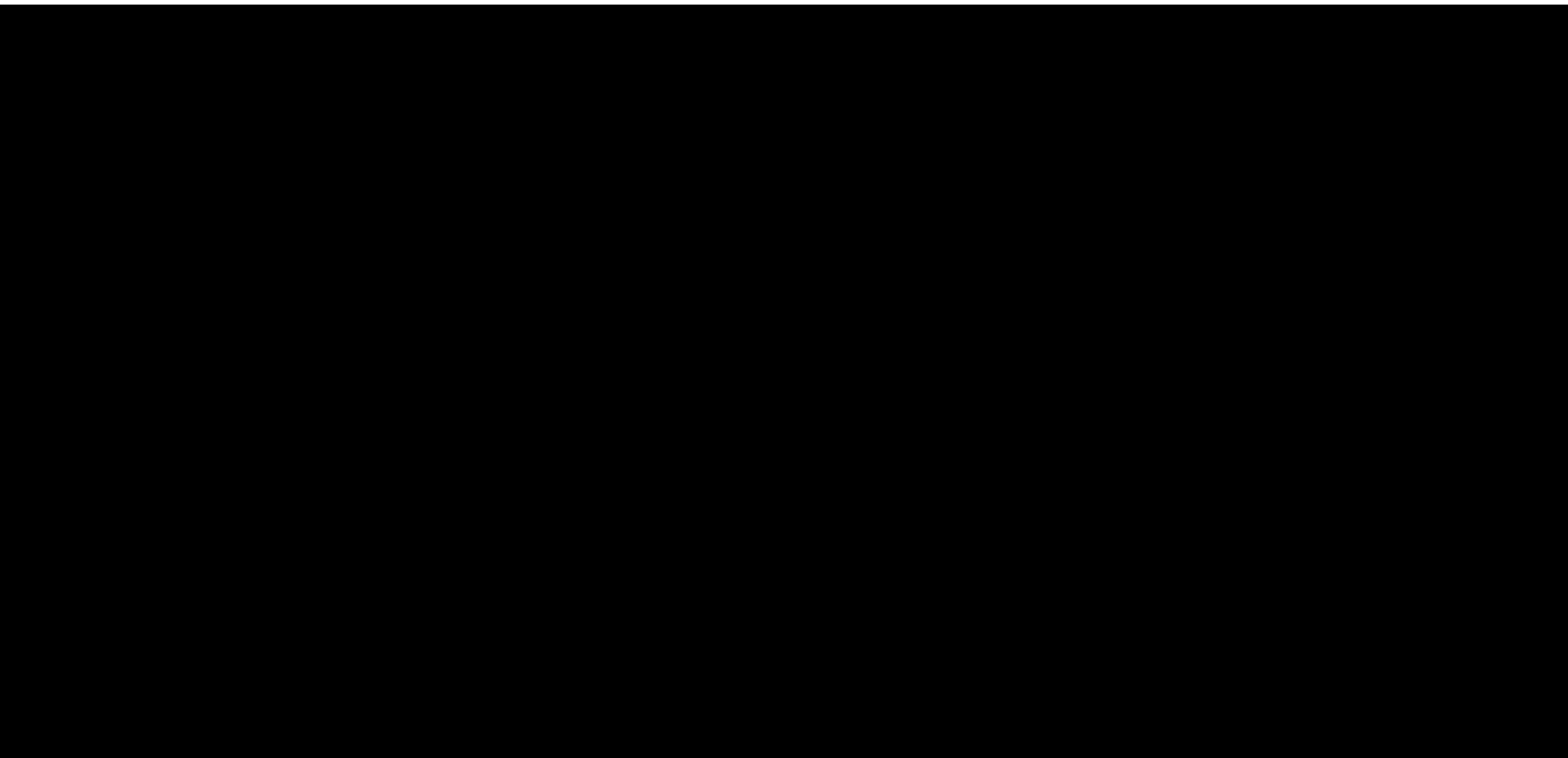
This submission outlines a provisionally preferred solution to satisfy the investment drivers, but this solution is dependent upon the outcome of the siting study reassessment. It therefore seeks confirmation of eligibility under Special Condition 3.18, confirmation of eligibility for PCF under Special Condition 3.15 and confirmation of re-opener Track 3 EL.

The provisionally preferred option E-3 consists of a new, 400kV AIS 24 bay substation, with [REDACTED] SGTs. A reassessment of the siting study is underway and is due to complete in [REDACTED].

<b>Main Drivers</b>	Connection of the contracted [REDACTED] 132kV IDNO substation [REDACTED]
<b>Preferred Options</b>	Our provisionally preferred option is Option E-3: construction of a new 24-bay 400/132kV AIS substation at Lower Frankton, connected via a double circuit turn-in from the existing 400kV Legacy–Ironbridge–Shrewsbury corridor. [REDACTED]
<b>Estimated Cost &amp; Timing</b>	<p><b>Cost (23/24 price base):</b></p> <ul style="list-style-type: none"> <li>Total (inc. risk/contingency) [REDACTED]</li> </ul> <p><b>Indicative delivery timeline:</b></p> <p>[REDACTED]</p>
<b>Outputs</b>	<p>Delivery of a new 24-bay 400kV double busbar AIS substation at Lower Frankton, providing:</p> <ul style="list-style-type: none"> <li>a compliant connection platform for the [REDACTED] IDNO [REDACTED] SGTs;</li> <li>capacity for future regional direct generation connections;</li> <li>facilitation of [REDACTED] and future flexibility (including provision for Quad Boosters);</li> <li>improved operability, resilience and flexibility on a constrained corridor;</li> <li>enabling low-carbon generation connections</li> </ul> <p>We propose a Price Control Deliverable for this investment relating to the delivery of the works and the associated outputs as follows:</p> <p><b>Construct a new 24-bay 400kV AIS substation at Lower Frankton [REDACTED]</b></p>

# Appendix 1: System Design Table





# Appendix 2: Glossary

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<b>ACE</b>	Advanced Commissioning Engineer
<b>ACL</b>	Available For Commercial Load
<b>ACSR</b>	Aluminium Core Steel Reinforced
<b>AIS</b>	Air Insulated Switchgear
<b>APM</b>	Advanced Procurement Mechanism
<b>BESS</b>	Battery Energy Storage System
<b>BP</b>	Business Plan
<b>BPDT</b>	Business Plan Data Template
<b>CAI</b>	Closely Associated Indirect
<b>CBA</b>	Cost Benefit Analysis
<b>CPO</b>	Compulsory Purchase Order
<b>CSNP</b>	Centralised Strategic Network Plan
<b>DC</b>	Direct Current
<b>DCO</b>	Development Consent Order
<b>DC TC</b>	Direct Current Time Constraint
<b>DESNZ</b>	Department for Energy Security and Net Zero
<b>DISC</b>	Disconnecter
<b>DLR</b>	Docklands Light Railway
<b>DNO</b>	Distribution Network Operator
<b>ECC</b>	Estimated Cost of Construction
<b>EEW</b>	Early Enabling Works
<b>EJP</b>	Engineering Justification Paper
<b>EoL</b>	End-Of-Life
<b>ESO</b>	Energy System Operator
<b>ET</b>	Electricity Transmission
<b>EU</b>	European Union
<b>EUL</b>	Estimating Units Lines
<b>ESW</b>	Earth Switch
<b>FEED</b>	Front End Engineering Design
<b>FES</b>	Future Energy Scenarios

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<b>FY</b>	Financial Year
<b>G3</b>	Green Gas for Grid
<b>GEC</b>	General Electric Company
<b>GIB</b>	Gas Insulated Busbar
<b>GIS</b>	Gas Insulated Switchgear
<b>GLA</b>	Greater London Authority
<b>GW</b>	Giga Watt
<b>HDD</b>	Horizontal Directional Drilling
<b>HV</b>	High Voltage
<b>HWUP</b>	Hackney Waltham Cross Upgrading
<b>IEC</b>	International Electrotechnical Commission
<b>kW</b>	Kilo Watt
<b>LLTI</b>	Long Lead Time Items
<b>LTDS</b>	Long-Term Development Statement
<b>LV</b>	Low Voltage
<b>LVAC</b>	Low Voltage Ac
<b>M&amp;E</b>	Mechanical And Electrical
<b>MITs</b>	Main Interconnected Transmission Systems
<b>MSIP</b>	Medium Sized Investment Project
<b>MVA</b>	Megavolt-Amperes
<b>MW</b>	Mega Watt
<b>NESO</b>	National Energy System Operator
<b>NETS</b>	National Electricity Transmission System
<b>NG</b>	National Grid
<b>NGED</b>	National Grid Electricity Distribution
<b>NGET</b>	National Grid Electricity Transmission
<b>NOA</b>	Network Options Assessment
<b>NOMs</b>	Network Output Measures
<b>NPV</b>	Net Present Value
<b>OHL</b>	Overhead Line
<b>ORPS</b>	Obligatory Reactive Power Service
<b>PCD</b>	Price Control Deliverables
<b>PCF</b>	Pre-Construction Funding

<b>SF6</b>	Sulfur Hexafluoride
<b>SAP</b>	Senior Authorised Person
<b>SGT</b>	Super Grid Transformer
<b>SLD</b>	Single Line Diagram
<b>SPV</b>	Special Purpose Vehicle
<b>SSMD</b>	Sector Specific Methodology Document
<b>SSSI</b>	Site of Special Scientific Interest
<b>STC</b>	System Operator Transmission Owner Code
<b>SuDS</b>	Sustainable Drainage Solutions
<b>TBC</b>	To Be Confirmed
<b>tCO2e</b>	Tonnes of Carbon Dioxide Equivalent
<b>TCPA</b>	Town And Country Planning Association
<b>TCSNP</b>	Transitional Centralised Strategic Network Plan
<b>TWB</b>	Through-Wall Bushing
<b>UK</b>	United Kingdom
<b>UKPN</b>	UK Power Networks
<b>UKPN EPN</b>	Eastern Power Networks
<b>UKPN LPN</b>	London Power Networks
<b>UKPNS</b>	UK Power Networks Services
<b>UXO</b>	Unexploded Ordnance
<b>VCA</b>	Voltage Compliance Assessment
<b>XPLE</b>	Cross-Linked Polythene

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