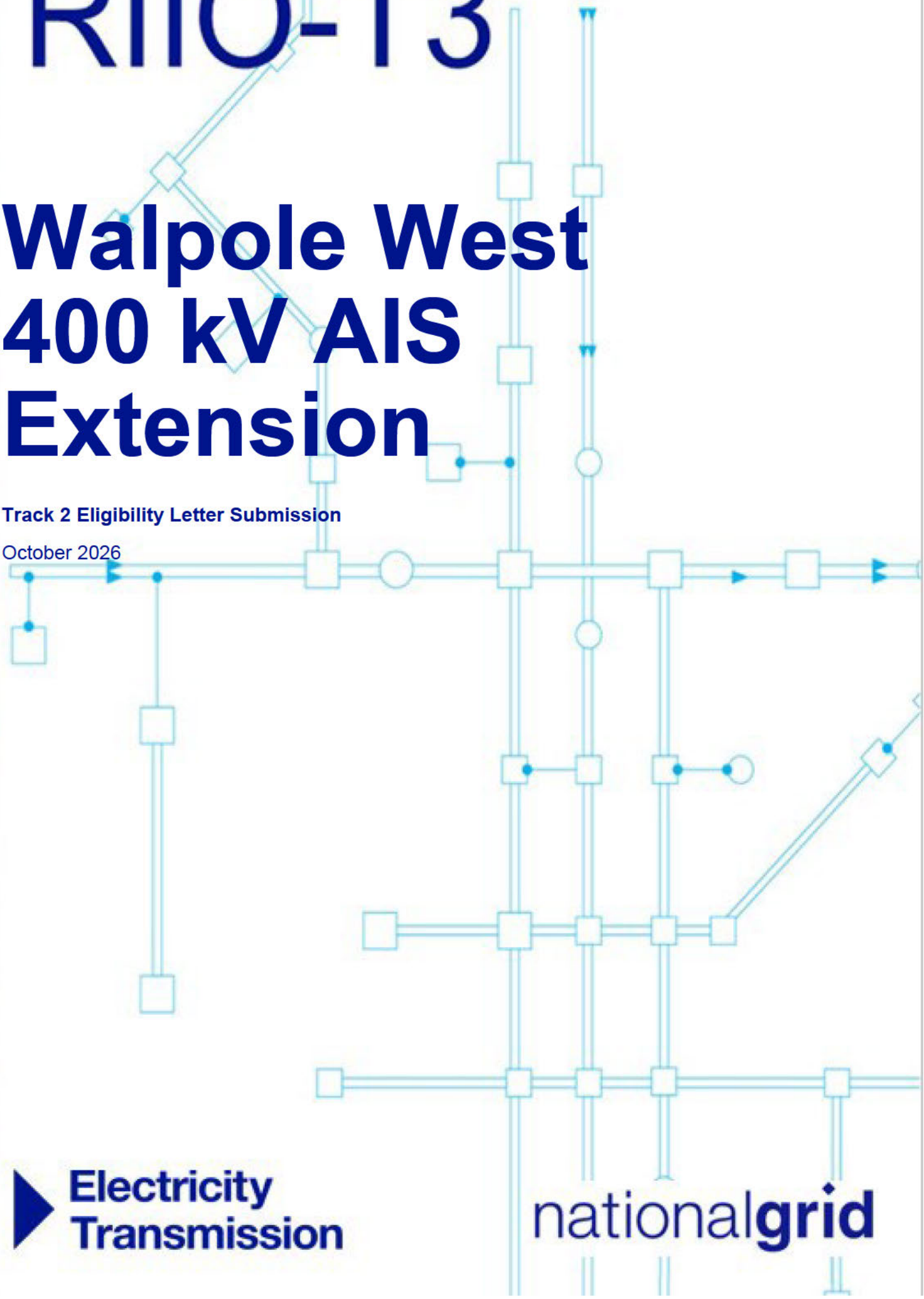
RIIO-T3

# Walpole West 400 kV AIS Extension

**Track 2 Eligibility Letter Submission**

October 2026



Electricity Transmission

nationalgrid

# Contents


**Reference and summary table** iii

**Executive summary** v

**1. Introduction** 1

1.1 Walpole West 400 kV AIS Extension 1
Eligibility, Project Track Statement and PASE 1
Preconstruction funding request 1

1.2 Background 3
Chronology of investment 3
Regional and network context 3
Site background 7
Historical funding 8
Early Asset Write Offs (EAWO) 8

**2. Drivers and need case** 9

2.1 Customer 10

2.2 Asset health 13

**3. Optioneering** 14

3.1 Strategic options 14

3.2 Longlist of options considered 15
Stakeholder influence on shortlisting 20

3.3 Shortlisted options 21
Description of shortlisted options considered 24

3.4 Qualitative assessment of shortlist 28
Qualitative assessment output 30
PASE alignment 30

3.5 Quantitative analysis of shortlist options 31
Cost estimates of shortlist options 31
Cost Benefit Analysis 32

3.6 Preferred solution 36
Project benefits and outputs 40

**4. Delivery** 41

4.1 Delivery year and indicative timeline 41

4.2 Procurement and contracting strategy 43

4.3 Risks and risk management 43

**5. Conclusion** 45

**Appendix A Glossary** A1

**Appendix B System design table** B1

## List of Figures

Figure 1: Summary of chronology 3
Figure 2: NGET network map highlighting the location of the investment in the East Anglia region 5
Figure 3: Future Network Picasso diagram highlighting the investment location in the East Anglia region 5
Figure 4: Walpole Substation Site 7
Figure 5: Customer location (yellow) 13
Figure 6: Western boundaries for the 400 kV Walpole substation 15
Figure 7: Cabling route 23
Figure 8: Western boundaries for the 400 kV Walpole substation 27
Figure 9: Updated Option D-7 layout 39
Figure 10: Indicative programme of work for Walpole West 400 kV AIS Extension 42
Figure 11: Option D-1: [redacted] extension of the existing Main and Reserve busbars 2 using rigid busbars C1
Figure 12: Option D-2: [redacted] extension of the existing Main and Reserve busbars 2 using rigid busbars with an "S" C2
Figure 13: Option D-3: [redacted] extension of the existing Main and Reserve busbars 2 using rigid busbars with an "S" shape with feeder bay back-to-back with new Bus Coupler 4 C3
Figure 14: Option D-4: [redacted] extension of the existing Main and Reserve busbars 2 using flexible and rigid busbars with feeder bay back-to-back with new Bus Coupler 4 C4
Figure 15: Option D-5: [redacted] extension of the existing Main and Reserve busbars 2 using rigid busbars with access from the south C5
Figure 16: Option D-6: [redacted] extension of the existing Main and Reserve busbars 2 using rigid busbars with the SGT located on the north side of the busbar C6
Figure 17: Option D-7: [redacted] extension of the existing Main and Reserve busbars 2 using rigid busbars (updated post selection of preferred solution) C7
Figure 18: Option D-7: Single Line Diagram C8
Figure 19: Option D-7: 400 kV cable route C9

## List of tables

Table 1: Summary of longlist options vi
Table 2: Estimated costs for pre-construction activities (£m 23/24 prices) 2
Table 3: Interactive projects 6
Table 4: Investment drivers 9
Table 5: Forecast curtailment costs annual average, for cases under chapter 2 N-1 busbar outage and N-1-D of chapter 5 SQSS 10
Table 6: Details of customers with contracted connections 10
Table 7: Details of customers the Walpole West 400 kV AIS Extension enables 11
Table 8: Strategic direction setting 14
Table 9: Assessment of longlist options 16
Table 10: Multifactorial analysis 28
Table 11: Cost estimate breakdown (upfront capital cost estimate) 31
Table 12: Lifetime CBA (2023/24 prices, central carbon pricing, discounted values) 34
Table 13: Summary of all additional Capex costs (2023/24 base prices) 35
Table 14: Summary of all benefits 36
[redacted]
Table 16: Summary of outputs and benefits 40
Table 17: Summary of risks and mitigations 43
Table 18: Submission summary 45
Table 19: Table of abbreviations and definitions A1
Table 20: System design table B1

# Reference and summary table

| Field | Description |
|---|---|
| **Project name** | Walpole West 400 kV Air Insulated Switchgear (AIS) Extension |
| **TO's preferred re-opener track** | Track 2 Eligibility Letter (EL) |
| **RRP references** | NGT200112_04, NGT200112_04_B, NGT500178, and NGT700188 |
| **BPDT / Scheme reference number** | NGT200112_04 |
| **Load Board reference** | August 2026, project name "Walpole"[1] |
| **Investment driver(s)** | Load:<br>• generation customer connections;<br>• connections reform study outputs. |
| **Project outputs** | • Extension of the existing Main and Reserve busbars 2 using rigid busbars, providing additional space for spare bays in future.<br>• Transpose the [redacted] circuit onto a new busbar section; increasing operability at the site. |
| **Short list of strategic options considered** | Three main options were shortlisted for detailed analysis:<br>• **Option D-5**: [redacted] extension of the existing Main and Reserve busbars 2 using rigid busbars with access from the south;<br>• **Option D-6**: [redacted] extension of the existing Main and Reserve busbars 2 using rigid busbars with the Super Grid Transformer (SGT) located on the north side of the busbar; and<br>• **Option D-7**: [redacted] extension of the existing Main and Reserve busbars 2 using rigid busbars, with the SGT located on the north side of the busbar.[2] |
| **Preferred solution and explanatory narrative on the rationale** | Our preferred solution is Option D-7: [redacted] extension of the existing Main and Reserve busbars 2 using rigid busbars. |

[1] In previous Load Boards, this investment was referred to as "Walpole" which included the scope of this investment and its companion Eligibility Letter submission: Walpole 400kV CEGB Mark 1 Uprating. These investments have since been split out into two separate Eligibility Letter submissions, in line with Ofgem's Load Re-opener guidance: https://www.ofgem.gov.uk/sites/default/files/2026-03/load-re-opener-guidance-and-submission-requirements-document.pdf.

[2] The SGT element of this option was later removed from scope. This is explained in more detail in Section Interactive projects.

| Field | Description |
|---|---|
| | This option meets the load-related drivers whilst preserving flexibility for future development at Walpole. |
| **PASE alignment** | This investment is a Pre-Approval of Solution Engineering (PASE) variant option for a substation extension (atypical extension to double busbar AIS substation). |
| **Cost (23/24 prices)** | [redacted] |
| **Delivery year** | October 2031 |
| **Extension cost (applicable only to substations)** | N/A |
| **Applicable reporting tables** | **BPDT:**<br>NGT200112_04 ([redacted]): This scheme is the [redacted] circuit diversion at the 400 kV site. <10.5 ET Pipeline Log>;<br>**RRP:**<br>NGT200112_04, and NGT200112_04_B: <Scheme_C&V_Calc_Load_Allow>;<br>NGT200112_04 and NGT700188: <Scheme_C&V_Calc_Load_Actuals>. |
| **Interactive projects** | A range of other projects at the Walpole site interact with this investment, including:<br>[redacted]<br>• Infrastructure Works for Walpole [redacted]<br>• WALP4 Diversion of [redacted]<br>• WALP4: Generator Extension [redacted]<br>• WALP4: Infra Works for [redacted]<br>• Walpole 400 kV Central Electricity Generating Board<br>• (CEGB) Mark 1 Uprating |
| **Historic funding interaction** | Received allowances of [redacted] which will be readjusted at the end of RIIO-T2 to ensure none of this is used. Allowances for T3 were not requested in the T3 Business Plan but will instead be requested in the Project Assessment submission through the Load Re-opener. |
| **Spend apportionment** | [redacted] |

# Executive summary

## Project summary

This submission supports the delivery of contracted clean generation connections by providing the 400 kV extension at Walpole required to connect [redacted] and undertaking asset circuit reconfiguration to accommodate the increased demand (extension of the existing main and reserve busbars). By increasing capacity and providing additional bays, the investment removes a critical constraint to industrial and commercial development and creates a flexible platform to support future growth. The additional capacity is expected to ensure windfarms in the region are subject to less curtailment, thus consumers will face lower constraint costs.[3]

In parallel, a separate Eligibility Letter (EL) submission (Walpole 400 kV CEGB Mark 1 Uprating) provides for the 400 kV fault level uprating at Walpole (CEGB Mark I section, 50 kA to 63 kA), strengthening a key transmission node that directly influences boundary flows across the B9 boundary. The uprating is therefore a critical enabler for new large generation connections across the region, including at Norwich, Necton, Walpole B, Walpole, (EGL3, EGL4 and GWNC) which directly contribute to increasing fault levels at this site.

## Submission purpose

We are seeking Ofgem's approval, under the Load Related Re Opener (Special Condition 3.18 of the RIIO ET3 licence), to progress the Walpole West 400 kV Air Insulated Switchgear (AIS) Extension project as a Track 2 EL investment and approve Pre Construction Funding (PCF).

## Project need

The Walpole West 400 kV AIS Extension investment is load driven, with the proposed investment required to support the following:

- **Generation customer connections:** the investment is required to meet the needs of the customer connection: [redacted] at 400 kV.
- **Connections reform:** study outputs have identified this investment as enabling works for c.9.5 GW of connections, including major Offshore wind projects that use the EC5 and B9 Boundaries.[4]

There are also benefits to operability at the site which are achieved by the investment.

## Optioneering to date

We have undertaken a robust multifactorial optioneering process to identify the most appropriate solution to meet the identified need. We conducted a high-level assessment of strategic options (do nothing, market-based, whole-system, extension of the existing 400 kV substation, and the construction of a new 400 kV substation) to develop a longlist of potential options, which considered 11 options.

[3] Indicative modelling on expected constraint cost savings is contained at Table 5 below.

[4] [redacted]

Of these, we shortlisted 3 options: D-5, D-6 and D-7.

Our preferred option is Option D-7 because it provides the most robust balance of operability, constructability and whole-life value, including a reserve busbar section circuit breaker for improved running arrangements, improved access, and enhanced futureproofing through additional spare bay space and the widened [redacted] (tertiary customer) Horizontal Directional Drill (HDD) cable easement.

This preferred option is supported by the optioneering assessment and the referenced layouts/Single Line Diagrams (SLDs) in Section 3 Optioneering.

Table 1: Summary of longlist options

| Option | Details | Drivers met? | New site? | AIS/ GIS? | Shortlist? | Preferred solution? |
|---|---|---|---|---|---|---|
| **Option A** | Do nothing counterfactual option | No | No | NA | No | No |
| **Option B** | Market-based solution | No | No | NA | No | No |
| **Option C** | Non-transmission, whole systems solutions | No | No | NA | No | No |
| **Option D-1** | [redacted] extension of the existing Main and Reserve busbars 2 using rigid busbars | Yes | No | AIS | No | No |
| **Option D-2** | [redacted] extension of the existing Main and Reserve busbars 2 using rigid busbars with an "S" shape (with a 90-degree change in direction) | Yes | No | AIS | No | No |
| **Option D-3** | [redacted] extension of the existing Main and Reserve busbars 2 using rigid busbars with an "S" shape with feeder bay back-to-back with new Bus Coupler 4 | Yes | No | AIS | No | No |
| **Option D-4** | [redacted] extension of the existing Main and Reserve busbars 2 using flexible and rigid busbars with feeder bay back-to-back with new Bus Coupler 4 | Yes | No | AIS | No | No |
| **Option D-5** | [redacted] extension of the existing Main and Reserve busbars 2 using rigid busbars with access from the south | Yes | No | AIS | Yes | No |

| Option | Details | Drivers met? | New site? | AIS/ GIS? | Shortlist? | Preferred solution? |
|---|---|---|---|---|---|---|
| **Option D-6** | [redacted] extension of the existing Main and Reserve busbars 2 using rigid busbars[5] | Yes | No | AIS | Yes | No |
| **Option D-7** | [redacted] extension of the existing Main and Reserve busbars 2 using rigid busbars[6] | Yes | No | AIS | Yes | Yes |
| **Option E** | Construction of a new 400 kV substation. | No | Yes | AIS | No | No |

## Cost estimates

Based on the latest Cost Book (2023/24 prices) and early project estimates, the preferred option, Option D-7, has an estimated total cost of [redacted] including risk and contingency. Pre Construction Funding of (8.2%) [redacted] is requested to progress surveys, planning and land activities, Front End Engineering Design (FEED), programme management and obtain third party services.

The alternative shortlisted options D-5 and D-6 have an estimated cost of [redacted] also including a [redacted]. Those costs are reflected in the Cost Benefit Analysis (CBA).

## Indicative delivery programme

Our programme has been designed to deliver the customer connection by its agreed energisation date. The current delivery date for this investment is October 2031.

Cost apportionment and final efficiencies will be confirmed through the Project Assessment stage.

[5] Following discussion with the Distribution Network Operator (DNO) in April 2025, the SGT was removed as it was no longer necessary across all options.

[6] Following discussion with the DNO in April 2025, the SGT was removed as it was no longer necessary across all options.

# 1. Introduction

## 1.1 Walpole West 400 kV AIS Extension

This submission, coupled with its Annexes and Cost Benefit Analysis (CBA), is made under the Load Re-Opener and Price Control Deliverable (Special Condition 3.18 of the RIIO ET3 Licence) for the Walpole West 400 kV Air Insulated Switchgear (AIS) Extension.

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)
- confirmed acceptance of the preferred solution (Option D-7)
- confirmation that the project should proceed via Track 2 Eligibility Letter (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).

The investment is load driven. Customer details are explained in Section 2.1 Customer.

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

### Eligibility, Project Track Statement and PASE

The project qualifies under Special Condition 3.18 as a load-driven investment scheduled for delivery within the RIIO-ET3 period. This investment received allowances of [redacted] which will be returned as part of T2 closeout to ensure any used portion of this allowance and that investments are not funded twice. Allowances for T3 were not requested in the T3 Business Plan as the project was not sufficiently mature to have cost confidence they were not awarded and instead will be requested in the Project Assessment submission through the Load Re-opener.[7]

This submission proposes the Track 2 EL Load Re-Opener process for assessment. Track 2 EL is appropriate as a single preferred option is set out and it is Pre-Approval of Solution Engineering (PASE) aligned. It is a variant option for a substation extension (atypical extension to double busbar AIS substation). Further detail is provided in PASE alignment in Section 3.4.

### Preconstruction 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-

[7] The only other allowance which could be applicable for a portion of this investment would be a volume driver for the customer, [redacted]. This would equate to [redacted], however as these customer works form part of this wider load-related investment which totals [redacted], this makes this atypical and suitable for load re-opener submission.

Opener Eligibility Letter submission). We are seeking pre-construction funding of [redacted] representing up to 8.2% of the total forecast cost (rounded down).

Based on our current forecast we have provided below a breakdown of costs amounting to [redacted] for pre-construction activities.

Table 2 below summarises the activities covered by the application of these PCF allowances based on our current progress of PCF and Early Enabling Works (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. Any funding used from the [redacted] awarded for this investment in T2 baseline will be returned through T2 closeout. This will ensure no double recovery of funds for this investment.

[redacted]

## 1.2 Background

### Chronology of investment

The chronology for this investment is provided in Figure 1.

Figure 1: Summary of chronology




### Regional and network context

The proposed investment site sits in Walpole in the East Anglia region of the network (see Figure 2 and Figure 3). National Grid Electricity Transmission's (NGET's) East Anglia Region is strategically important for the future transmission of renewable energy from the North to Southern England and Europe and is therefore subject to increasing operational and capacity pressures as the electricity system transitions to net zero. Significant increases in offshore windfarm energy are already consented, with new interconnectors and large-scale battery

storage for solar and wind farms planned. The flat landscape also supports a growing number of solar farms in the region.

Forecast changes to demand and generation in East Anglia are driven by a combination of decarbonisation objectives, industrial and economic growth, and committed customer pipelines. These drivers are expected to materially affect the role and loading of the transmission network over RIIO T3 and beyond. These are increasing the requirement for resilient, flexible and adequately rated transmission infrastructure to ensure timely connection, maintain security of supply and minimise wider system costs for consumers.

Until now, the existing high voltage electricity network has been sufficient to meet demand. However, as electricity needs grow, the capacity of the electricity transmission network will also need to increase.

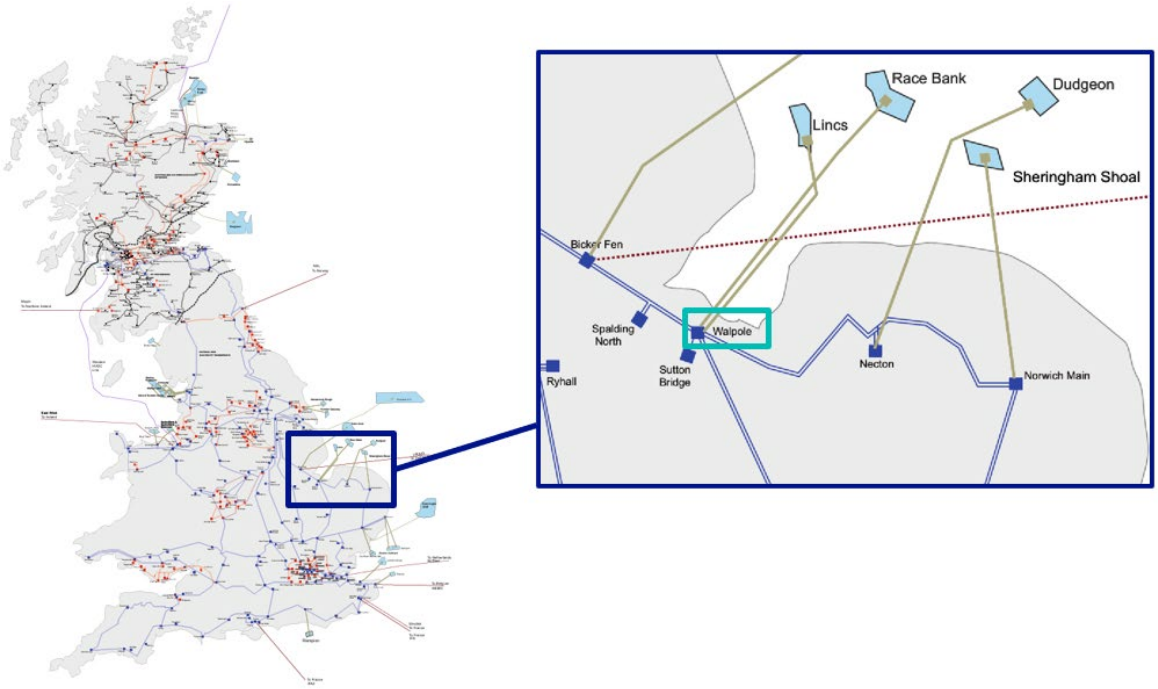
NGET's emerging transmission strategy for East Anglia combines network reinforcement, strategic new substations, and uprating of existing infrastructure. It is aligned to a broader transmission direction of travel in which key hubs are strengthened to accommodate offshore wind, nuclear and wider transfer growth toward London and the South East, while remaining consistent with future ASTI and wider network developments. This aims to accommodate forecast changes in system use while protecting long-term consumer value.

At the local level, the Walpole site strategy aims to facilitate new generation and demand connections, maintain system operability and network capability at the site, and increase system strength and fault level capability to support East Anglia network growth.

This investment, the Walpole West 400 kV AIS Extension, supports delivery of NGET's transmission strategy for East Anglia by enabling the connection of an [redacted] customer at Walpole 400 kV, facilitating wider network requirements identified through Connections Reform and avoiding constraint/curtailment costs caused by the current circuit arrangement at Walpole.

Taken together, the investment represents a proportionate and efficient response to evolving system needs in East Anglia. By enabling connections, supporting wider network requirements and addressing constraints at a strategically important node, this investment enables timely connection of low-carbon generation, supports whole system operability, reduces the risk of future network limitations and helps avoid more extensive or disruptive reinforcement at a later date, thereby protecting long term value for consumers.

Figure 2: NGET network map highlighting the location of the investment in the East Anglia region




[redacted]

### Interactive projects

This investment has been developed as part of a wider site strategy at the Walpole substation. Consequently, there are several projects that interact with this investment (see Table 3 below). During our optioneering and the design of the preferred solution for the investment set out in this document, we have worked closely with these project teams to ensure that the overall strategy for the site delivers value to consumers. Cumulatively, these projects aim to expand capacity, integrate new energy sources and ensure the substation's readiness for future demands.

Whilst these will be delivered as independent investments, these are being developed in a coordinated manner. We are exploring all opportunities for efficiency, including seeking appropriate outage coordination to ensure Security and Quality of Supply Standard (SQSS) compliance is maintained.

The following table sets out a summary of the Walpole site strategy for illustrative purposes. The projects which comprise this investment are highlighted in blue[8]:

Table 3: Interactive projects

| Project | Details | Status |
|---|---|---|
| [redacted] | Extending the bars to the eastern end by [redacted] to connect [redacted]. This project is currently in delivery | 2027 |
| [redacted] | Adding a [redacted] at Walpole 400 kV [redacted]. This project is currently in delivery | 2028 |
| **Infrastructure Works for Walpole** [redacted] | New generation connection ([redacted] to 132 kV substation with cables through the 400 kV compound | 2030 |
| **WALP4 Diversion of** [redacted] | Diverts the [redacted] circuit [redacted] to resolve Point on Bar issue | 2031 |
| **WALP4: Generator Extension** | Limited to a new main and reserve section and bus coupler necessary for the west extension. This scope was originally part of WALP4: Infra Works [redacted] but was split into a separate investment | 2031 |
| [redacted] | [redacted] | 2030 |
| **WALP4: Infra** [redacted] | [redacted] as not possible to carry out on existing busbar due to loss of power in-feed risk | [redacted] |
| **400 kV CEGB Mark 1 Uprating** | Uprating of the existing 400 kV CEGB Mark 1 infrastructure, rated for 50 kA to 63 kA to address forecast fault level increase due to renewable energy connections in the region | 2033 |

[8] A new SGT was part of this investment; however, this was subsequently removed from the site strategy.

[redacted]

## Site background

The Walpole site comprises a 400 kV AIS substation, an operational 132 kV GIS substation, and a decommissioned 132 kV AIS as shown in the high-level image in Figure 4. The combined 400 kV/132 kV installation operates as a critical Grid Supply Point (GSP), supplying both UK Power Networks (UKPN) and National Grid Electricity Distribution (NGED).

Land immediately adjacent to the National Grid substation boundary is occupied by a number of third-party generation developers and existing infrastructure, which constrains further expansion. In particular, no further extension of the substation is possible to the east as it is directly adjacent to a public road as well as to the north or south due to the presence of connecting customers developments. The current in construction Walpole East extension for [redacted] has sterilised the East of the site. The option to extend further was discounted due to the costs, land acquisition and disruption of moving the existing road Walpole Bank. That option would [redacted] have [redacted] given NGET [redacted] bay for a further Customer connection albeit we would have been limited by SQSS in-feed loss requirements, which would restrict the amount of capacity we could add to the system on this section.

[redacted]

The original Walpole 400 kV AIS substation was constructed in the 1960s and is of Mark I CEGB design, originally rated at 4,000A with a short circuit rating of 50 kA. An eastern extension was developed and commissioned in the 2010s, designed in accordance with more recent standards and rated to 63 kA, reflecting current technical requirements.[10]

The 400 kV double busbar substation currently consists of:

- [redacted]

[10] At the time this partial uprating occurred on the East end of the site, there was not a need to uprate the rest of the substation, hence the rest of this site stayed at 50 kA as this was sufficient for the needs at the time.

These fault level works to uprate rest of site to 63 kA are contained in the companion EL submission titled Walpole 400 kV CEGBB1 Mark 1 Uprating.

[redacted]

The proposed works for this investment comprise extending the existing Main and Reserve Busbars 2 using rigid busbars and a specific arrangement of bays (varying depending on option, as depicted below in Section 3.3 Shortlisted options). This includes:

- [redacted] Bus Section
- Relocation of the [redacted] circuit via a cable section
- [redacted] generation bay [redacted]
- [redacted] Bus coupler bay (Bus Coupler 4)
- [redacted] provision of space for additional future bay (allocated for the Mark I upgrade strategy or a future customer/SGT).

## Historical funding

The lead scheme for this investment (WALP4 Diversion of [redacted]) listed in Table 3, received allowances of [redacted] which will be readjusted as part of T2 closeout to ensure none of this is used, in effect returning any used portion of this allowance.[11] This will ensure no double recovery of funds for this investment. Allowances for T3 were not requested in the T3 Business Plan but will instead be requested in the Project Assessment submission through the Load Re-opener.

## Early Asset Write Offs (EAWO)

This investment proposes extension of the existing substation at Walpole. 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.[12]

[redacted]

[12] There are EAWO considerations on the companion EL submission titled: Walpole 400kV CEGB Mark 1 Uprating. This has also been submitted in the October 2026 load re-opener window.

# 2. Drivers and need case

The Walpole West 400 kV AIS Extension investment is triggered by load requirements in East Anglia.

The customer Available for Commercial Load (ACL) dates presented in this submission reflect the modelled delivery programme. The testing and setting of ACL dates for customer contracts within scope of connections reform is ongoing throughout 2026. Confirmation of agreed ACL dates will therefore be presented in the next stage of submission which is the Project Assessment.

Table 4: Investment drivers

| Summary of drivers | | ACL date |
|---|---|---|
| **Load: Generation customer connections** | At 400 kV, one generation customer connection [redacted] | 2031 |
| **Load: Connections reform** | Study outputs have identified this investment as enabling works for major Offshore wind that use the EC5 and B9 Boundary.[13] | 2031 |

This investment is required to meet the needs of the connecting customer application (see Table 6 below) and to facilitate the connection of major offshore wind projects in the region. The customer project will be provided with a connection bay at Walpole as part of this investment.

The offshore wind projects in East Anglia create point-on-bar loading which has triggered the need for the reconfiguration of the [redacted] circuits at Walpole – this is enabling works for these offshore wind projects. Reconfiguring the [redacted] circuit as part of this investment will remove point on bar loading by evenly distributing the circuits at Walpole across two busbar sections rather than their current configuration where both circuits are on the same busbar section. Failure to address this would prevent connection of [redacted] or any of the other customers this investment enables (identified in Table 7 below).

We carried out an indicative constraint cost analysis to determine the impact of the point-on-bar loading triggered by the offshore wind projects in East Anglia. Power system studies indicated this impacts the transmission network[14]. This analysis contained in Table 5 indicates the annual average benefit per day under specified conditions.

[redacted]

[14] For cases under chapter 2 N-1 busbar outage and N-1-D of chapter 5 SQSS.

Table 5: Forecast curtailment costs annual average, for cases under chapter 2 N-1 busbar outage and N-1-D of chapter 5 SQSS

| [redacted] | [redacted] |
|---|---|
| [redacted] | [redacted] |
| [redacted] | [redacted] |
| [redacted] | [redacted] |
| [redacted] | [redacted] |
| [redacted] | [redacted] |
| [redacted] | [redacted] |
| [redacted] | [redacted] |
| [redacted] | [redacted] |
| [redacted] | [redacted] |
| [redacted] | [redacted] |

## 2.1 Customer

Table 6 provides an overview of customer connections, relative to this investment and the impacts of Connections Reform. A map showing the customer location is provided in Figure 5.

Table 6: Details of customers with contracted connections

| Customer name | Project name | Technology type | Demand capacity | TEC | Voltage (kV) | ACL date | Connections Reform Gate / Phase |
|---|---|---|---|---|---|---|---|
| [redacted] | | | [redacted] | [redacted] | 400 kV | 2031 | Gate 2 Phase 2 |

This investment enables the delivery of the [redacted] customer connection through provision of a connection bay. The final ACL date for the connection will be dependent on outcome of power system studies which are being conducted under the Connections Reform programme as [redacted] has been identified as Gate 2 Phase 2. However, the physical works to construct the connection bay is due to be complete in 2031 which is aligned with [redacted] current connections contract. Any changes to their final firm connection date

will be driven by newly identified enabling works beyond the substation in the region which will be clarified following the completion of power system studies.

This investment is also needed to facilitate the connection of large renewable energy generation at Necton 400 kV substation ( ) and large offshore wind at Norwich Main substation ( ) by completing the transposition as enabling works for these connections. A summary of the connections this investment enables is provided in Table 7 below.

Additional considerations, including future fault level requirements, wider East Anglia generation growth and future customer connection opportunities, have informed development of the preferred option but are not required to justify the investment need itself. The project therefore remains efficient and justified based on currently identified drivers alone.

Table 7: Details of customers the Walpole West 400 kV AIS Extension enables

| Customer name | Project name | Technology type | Demand capacity | Transmission Entry Capacity | Site and voltage | ACL date[15] | Connections Reform Gate / Phase |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

| Customer name | Project name | Technology type | Demand capacity | Transmission Entry Capacity | Site and voltage | ACL date[15] | Connections Reform Gate / Phase |
|---|---|---|---|---|---|---|---|
| [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] |
| [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] |

As part of this submission, NGET has assessed whether Connections Reform has materially changed the customer drivers underpinning the proposed intervention. Connections Reform outcomes are not expected to affect the need, scope, cost, programme, preferred option or timing of this proposed network intervention.

Materially changing these drivers would require a significant volume of the connecting customers to drop out. Following connection reform study outputs, the transposition element of this investment is required to facilitate the connection of up to c.9.5 GW of generation (Table 7 above sets out a summary of the Gate 2 customers enabled by this investment), in addition to connecting [redacted]. The driver for this investment remains even if [redacted] withdraws, and would remain even if all other customers in Table 7 except for [redacted] withdraw, because the transposition is required to address the underlying point-on-bar loading limitation, which remains in either case. As [redacted] currently in commissioning for ACL stage 1, it is highly unlikely to withdraw as the transposition works are required to enable its subsequent ACL stages.[16]

Overall, given that all relevant customers are Gate 2 customers (per Table 6 and Table 7), and [redacted] Gate 2 offer date is consistent with their pre-connections reform offer date, it is highly unlikely that Connections Reform outcomes will impact the drivers for this investment.

[redacted]



## 2.2 Asset health

The Walpole West Extension has no direct asset health driver. While asset health risks exist elsewhere across the Walpole site, the scope of this investment does not replace or defer any asset health interventions. Any interaction between load-related investment and asset health outputs arises from the separate Walpole 400 kV CEGB Mark 1 Uprating investment, which is submitted as a companion scheme and is responsible for replacement of existing primary plant associated with the fault-level uprating works.

# 3. Optioneering

This section explains how we assessed the options for this investment.

### Optioneering overview

We have applied a staged, multi-factor optioneering process to identify the preferred option.

1. We start by determining the most suitable strategic option. Strategic optioneering determines the type of investment we should develop.
2. We then consider a longlist of technical options within each investment type, down selecting to a shortlist of options.
3. We then consider a shortlist of technical options, selecting a preferred option based on a qualitative balanced scorecard of considerations: Engineering, environmental, deliverability, economic/consumer value and consenting/stakeholder.
4. We then assess quantitatively all shortlisted options in a CBA to determine which technical option provides greater Net Present Value (NPV).
5. We then consider the outputs of both step 3 and 4 to provide a final preferred option.

This paper uses a linked "option" label: lettered design options (A–E) (with sub variants) to describe what could be built. The preferred solution is therefore the selected design option.

## 3.1 Strategic options

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

Table 8: Strategic direction setting

| Option | Description |
|---|---|
| **Option A: Do nothing** | This option involves making no changes and therefore doing nothing to facilitate the connection of customers. |
| **Option B: Market based solution** | This option involves accommodating increased customer demand through the procurement and use of ancillary services only. |
| **Option C: Non-transmission, whole systems solution** | This option involves addressing the identified need without constructing new transmission assets, instead relying on coordinated interventions across the wider electricity system (a DNO instead of NGET). |
| **Option D: Make use of existing substation** | This option involves extending the existing 400 kV AIS substation. |
| **Option E: Build a new substation** | This option involves construction of a new 400 kV substation. |

We discounted Options A, B and C due to the inability of these options to facilitate the connection requests and therefore fulfil our licence obligation, Transmission Licence (Licence Condition D4A).

Option E was ruled out due to its long lead-time (which would prevent timely project delivery), its high overall cost to consumers and that extension of the existing substation was a viable option. Option D was taken forward for further assessment at longlist as the key viable strategic option available.

A descriptive rationale for rejection or progression from the longlist is explained in Table 9.

## 3.2 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 options presented in the table below focus on alternative arrangements and layouts for the Walpole West 400 kV AIS Extension. The [redacted] circuit transposition is treated as common enabling scope across variants and is therefore not optioneered separately within each layout option. The circuit will be transferred via a new cable sealing end compound and associated cable section to connect into [redacted] bay on [redacted] with the west extension option selection determining the location and configuration of [redacted] bay and its interfaces.

[redacted]

[redacted]

Within each of the five option categories, set out in Section 3.1 Strategic options above, we designed options and assessed them based on the balanced scorecard categories. An overview of the assessment of our longlist options is provided in the table below.

Table 9: Assessment of longlist options

| Option name and status (progressed/not progressed) | Technical Description | Relevant diagrams, layout or SLD reference | Consenting risk and environmental constraints | Rationale for rejecting or taking forward the option |
|---|---|---|---|---|
| **Option A:** Do minimum[17] **Not progressed** | The network is kept in its current state, and no new connections are facilitated. | N/A | N/A | **Engineering:** Compliant customer connection not delivered. Therefore, this option was not taken forward. |
| **Option B:** Market-based solution **Not progressed** | Increased customer demand is accommodated through the procurement and use of ancillary services only. | N/A | N/A | **Engineering:** Whilst this option could have provided a solution for the circuit transposition element of this investment, it could not have delivered a Compliant customer connection as [redacted] physical bay for the customer would still have been required. Further, this would lead to increased constraint costs to end consumers. Therefore, this option was not taken forward as it was unable to deliver on all the drivers of this investment. |
| **Option C:** Non-transmission, whole systems solution **Not progressed** | The required customer connection is accommodated by a DNO instead of NGET. | N/A | N/A | **Engineering:** Compliant customer connection not delivered. Whole system solutions depend on a DNO's ability to accommodate further physical customer connections on their infrastructure. NGET discounted this option early in the optioneering process [redacted] Therefore, this option was not taken forward. |
| **Option D-1:** [redacted] extension of the existing Main and Reserve busbars 2 using rigid busbars **Not progressed** | This option involves extending the existing Main and Reserve Busbars 2 using rigid busbars, which requires the majority of the DNO's land and a strip of land owned by [redacted] to the west of the existing substation. There is also space allowance considered for [redacted] | Layout in Appendix C | This option requires land acquisition of third-party land owned by a [redacted] and a section of land from and [redacted] landowner. There | **Engineering:** Proximity of this design to the 132 kV OHL Sutton Bridge circuit add unnecessary risk and complexity, with respect to safety and operational challenges. **Land acquisition and deliverability:** [redacted] Therefore, this option was not taken forward. |

[17] In line with the Re-opener Guidance and Application Requirements Document, our do minimum option acts as "as a counterfactual to demonstrate the financial impact of no additional investment or programme expenditure taking place".

| Option name and status (progressed/not progressed) | Technical Description | Relevant diagrams, layout or SLD reference | Consenting risk and environmental constraints | Rationale for rejecting or taking forward the option |
|---|---|---|---|---|
| | [redacted] bay included as part of the strategy [redacted] | | is also a requirement for a planning application | |
| **Option D-2:** [redacted] extension of the existing Main and Reserve busbars 2 using rigid busbars with an "S" shape (with a 90-degree change in direction)<br>**Not progressed** | This option involves extending the existing Main and Reserve Busbars 2 using rigid busbars that follows an "S" shape (with a 90-degree change in direction), avoiding [redacted] land and requiring utilisation of the DNO's land only. As a result, the extension shifts southward leading to limited space between the proposed perimeter fence and the southern boundary of the land.<br>As in the previous option, there is also [redacted] space [redacted] bay | Layout in Appendix C | With this option, the extension is contained entirely within [redacted] land and avoids the need for additional land [redacted]. A Planning application is still required in order to complete the extension | **Consumer value / economic performance:** Compared to option D-1, this design requires greater volumes of infrastructure to build, thus the installation and maintenance is not within the interests' of either current or future consumers.<br>**Engineering challenges**: The southern shift of the extension results in limited space between the proposed perimeter fence for the west extension and the southern boundary line which would pose operational challenges. Additionally, the S shape and the 90-degree directional change in the busbar extension would introduce complexities during maintenance activities in line with the safety rules. The design also encroaches on the area limited by the Walpole-Bicker Fen circuit, posing additional operational and safety concerns.<br>Additionally, due to the close proximity to the southern boundary, adjacent to [redacted], customer cable routes to the site would be unfeasible. Therefore, this option was not taken forward. |
| **Option D-3:** [redacted] extension of the existing Main and Reserve busbars 2 using rigid busbars with an "S" shape with feeder bay back-to-back with new Bus Coupler 4<br>**Not progressed** | This option is similar to option 2 with an S shape busbar, but it moves [redacted] bay such that it is built back-to-back with the bus coupler 4. This option requires utilisation of the DNO's land only.<br>As in the previous option, there is also [redacted] space [redacted] bay | Layout in Appendix C | In this option as per Option D-2, the extension is contained entirely within [redacted] land and avoids the need for additional land [redacted]. A Planning application is still required in order to complete the extension. | **Consumer value / economic performance:** As with opt. D-2, compared to option D-1, this design requires far greater volumes of infrastructure to build, thus the installation and maintenance is not within the interests' of either current or future consumers.<br>**Engineering challenges**: As for the previous option, the southern shift of the extension results in limited space between the proposed perimeter fence for the west extension and the southern boundary line which would pose operational challenges. Additionally, the S shape and the 90-degree directional change in the busbar extension would introduce some complexities during the maintenance activities in line with the safety rules. The different arrangement of the bus coupler 4 avoids the area close to the Walpole-Bicker Fen OHL Circuit<br>Additionally, due to the close proximity to the southern boundary, adjacent to [redacted], customer cable routes to the site would be unfeasible. Therefore, this option was not taken forward. |

| Option name and status (progressed/not progressed) | Technical Description | Relevant diagrams, layout or SLD reference | Consenting risk and environmental constraints | Rationale for rejecting or taking forward the option |
|---|---|---|---|---|
| **Option D-4:** [redacted] extension of the existing Main and Reserve busbars 2 using flexible and rigid busbars with feeder bay back-to-back with new Bus Coupler 4<br>**Not progressed** | This option is the same as opt. 3 for the [redacted] bay positioning, but it utilises flexible and rigid busbars. This option requires utilisation of the DNO's land only. This option was explored as the flexible busbars allow for more space between the transition points of the existing and extended Man and Reserve busbars.<br>As in the previous option, there is [redacted] space [redacted] bay | Layout in Appendix C | In this option as per Option D-2 and D-3, the extension is contained entirely within [redacted] land and avoids the need for additional land [redacted]. A Planning application is still required in order to complete the extension. | **Consumer value / economic performance:** As with opt. D-2, compared to option D-1, this design requires far greater volumes of infrastructure to build. The flexible busbar rating is difficult to achieve for [redacted] may be required.<br>As the western extension extends further to the west, it is close to the Walpole-Bicker Fen overhead line circuit, which could pose additional operational and safety concerns.<br>Furthermore, the interface between rigid and flexible busbars is not a common feature of the NGET substations and thus will require specialised resource for both installation and maintenance. This option is thus not in the interests of current or future consumers.<br>Additionally, due to the close proximity to the southern boundary, adjacent to [redacted], customer cable routes to the site would be unfeasible. Therefore, this option was not taken forward. |
| **Option D-5:** [redacted] extension of the existing Main and Reserve busbars 2 using rigid busbars with access from the south<br>**Progressed to shortlist** | This option is the same as opt. 1 but the design requires utilisation of the DNO's land only. This option aligns the main and reserve busbar extension with the existing busbars providing a straightforward design. In this layout there is no allowance or a road around the perimeter of the busbar to the north of the site, with access only available from the south. The main and reserve busbar extension is aligned with the existing Main and Reserve Busbar 2.<br>As in the previous option, there is also [redacted] space [redacted] bay. | Layout in Appendix C | In this option as per Option D-2, D-3 and D-4, the extension is contained entirely within [redacted] land and avoids the need for additional land [redacted]. A Planning application is still required in order to complete the extension. | **Land acquisition and deliverability:** Without [redacted], access is limited to the south only, with the potential to impact maintenance. However, compared to option D-1, this option reduces total required land area, roads area, footpaths area, total number of structures and total earthworks.<br>**Engineering:** Due to the busbar arrangement as a result of the rigid busbar design, the SGT bay requires to be moved with a south facing bay. As a result, the [redacted] cable will cross the post-insulator foundations used to extend the Main and Reserve busbars, adding risk and complexity as it also follows the same route of a customer cable [redacted]<br>This option was therefore taken forward for shortlisting. |
| **Option D-6:** [redacted] extension of the existing Main and Reserve busbars 2 using rigid busbars with the SGT located | This option follows the same rigid busbar design as option 5 but the SGT is located on the north side of the busbar. The design includes an access road around the western extension and between the main and reserve busbar | Layout in Appendix C | This option requires land acquisition of third-party land owned by [redacted] and a section of land from and [redacted] | **Engineering:** The 240 MVA [redacted] cable route for this option has a more straightforward design as it does not require us to cable under the busbars alongside the [redacted]. The road around the west extension and on the easement for the [redacted] enhances access for construction and maintenance activities. |

| Option name and status (progressed/not progressed) | Technical Description | Relevant diagrams, layout or SLD reference | Consenting risk and environmental constraints | Rationale for rejecting or taking forward the option |
|---|---|---|---|---|
| on the north side of the busbar<br>**Progressed to shortlist** | extension, which provides more suitable access to site and maintenance.<br>As in the previous option, there is also [redacted] space [redacted] bay | | private landowner. There is also a requirement for a planning application | Furthermore, the number of post insulators required for this option is lower.<br>This option was therefore taken forward for shortlisting. |
| **Option D-7:** [redacted] extension of the existing Main and Reserve busbars 2 using rigid busbars, with the SGT located on the north side of the busbar[18]<br>**Progressed to shortlist** | This option was developed as an evolution of Option 6. Option D-7 has the same design of option 6 with the addition of a reserve Busbar section circuit breaker to enhance operational flexibility of the site, and [redacted] bay compared to the other options to maximise space allowance of the land parcel. Additional space was also allocated for the cable easement to allow the connection [redacted] increasing this from a 3m easement to an 8 m easement. | Layout in Appendix C | This option requires land acquisition of third-party land owned by [redacted] and a section of land from and [redacted] landowner. There is also a requirement for a planning application | **Engineering**; This option has the same key advantages and challenges as option 6, but in addition it has a reserve busbar section breaker which considerably improves operational flexibility of the site and facilitates different running arrangements. The substation layout was also optimised by creating an allowance for physical space for [redacted] bays which futureproof this substation extension and ensure good customer value.<br>This option was therefore taken forward for shortlisting. |
| **Option E:** Construction of a new 400 kV substation.<br>**Not progressed** | Construction of a new 400 kV substation | N/A – not explored | Consenting and land risk and timelines contribute to rendering this option unfeasible to meet the driver requirements and ensure good value for consumer. | **Deliverability and cost:** Although this option was originally considered, the timeline requirement does not allow for a new substation development. With consideration to the regional strategy and works in the pipeline, [redacted]<br>Furthermore, as the existing Walpole substation is a key node in the transmission network with a large influence on flows across the B9 boundary, there is a requirement to ensure these extension works are completed in a timely manner to avoid constraining large offshore wind generators connecting at Necton 400 kV substation and Norwich Main 400 kV. Therefore, this option was not taken forward. |

[18] Following discussion with the DNO in April 2025, the SGT was removed as it was no longer necessary across all options. More information is provided on this at Table 3 on interactive projects.

In summary, Options A-C were rejected due to their inability to deliver a compliant customer connection.

On option C, we considered whether the driver could be met through non-transmission interventions, including alternative DNO connection configurations, flexibility services and wider coordinated network solutions. Assessments confirmed that no credible whole-system alternative could simultaneously provide the required 400 kV customer connection and facilitate the necessary reconfiguration of the [redacted] circuit. The shortlisted options therefore represent the most appropriate whole-system options as they enable customer connections, improve operability and support wider East Anglia network development through a single coordinated intervention.

Options D-1—D-4 were rejected due to complex engineering challenges (including operational and safety) and inadequate consumer value. Options D-5, D-6 and D-7 were selected for shortlisting due to their favourable engineering characteristics (more conventional and commonly applied) which make them more feasible than the other options. Option E was rejected because it would be unable to be delivered in time to meet the investment's drivers.

## Stakeholder influence on shortlisting

### DNOs

As referenced above in Section 1.2 Background, this investment initially included within its scope a new 240 MVA SGT. However, through close collaboration with the DNOs through regular workshops, it became apparent this was no longer required. This evolved our site strategy to limit the investment in the interests of connection customers and end consumers. Our coordinated approach across programmes ensures that capability is delivered efficiently at a system level.

### Stakeholder views

No formal objections have been received to date. NGET has undertaken ongoing engagement with local communities, councils and other key stakeholders throughout the development of the project. This included a public consultation between May and June 2024 comprising both face-to-face and virtual events, alongside continued engagement through local authority briefings and community liaison groups. Local authorities were informed in early 2026 of the upcoming planning permission application, and briefing discussions were held with councillors.

Engagement has also continued through other projects in the area, including updates provided via the [redacted]. A resident letter drop is planned ahead of, or immediately following, submission of the planning application to keep local communities informed.

Feedback received through engagement activities has helped shape the project and planning submissions where appropriate. One of the key themes raised related to traffic management and the potential impact of construction traffic on local communities. This is being addressed through the development of a traffic management plan intended to minimise disruption during construction. [redacted]

[redacted]

## 3.3 Shortlisted options

As part of the optioneering process, we initially shortlisted two options (D-5 and D-6) in late 2024. Option D-5 had the key advantage of being deliverable wholly within land owned by a DNO, [redacted] However, this arrangement results in a constrained layout due to there being no road around the perimeter of the busbar system extension, limiting access to only the south; this creates challenges for routine maintenance access and cable routing/installation.

These constraints are avoided under Option D-6 which enables a more conventional layout with improved operational flexibility and access arrangements. Option D-6 does, however, require an additional strip of land from [redacted] landowner [redacted] therefore, Option D-5 was developed and assessed as a fallback that avoided third-party land acquisition.

Option D-7 was created as an evolution of Option D-6 to provide a wider space between the existing site and the new extension to allow for customer cables to traverse the site for an existing investment at the site. It was added to the shortlist.

The shortlisted options are listed below and described in the following subsections:

- **Option D-5**: [redacted] extension of the existing Main and Reserve busbars 2 using rigid busbars with access from the south;
- **Option D-6**: [redacted] extension of the existing Main and Reserve busbars 2 using rigid busbars with the SGT located on the north side of the busbar; and
- **Option D-7**: [redacted] extension of the existing Main and Reserve busbars 2 using rigid busbars, with the SGT located on the north side of the busbar.

[redacted] preference shifted to Option D-7 as it provides a standard design and best overall operability, access and constructability. By April 2025, we were notified by the DNO that the SGT element would no longer be required; this was consequently removed from the shortlisted design options: D-5, D-6 and D-7. The removal of the SGT did not materially impact the outcome of the optioneering assessment: Reconfiguring the [redacted] circuit remains necessary to address the load drivers, supporting new generation connections in the region. Retaining the position allocated for the SGT as safeguarded [redacted] preserves flexibility within the land and layout being developed and avoids the likelihood of a need for inefficient future re-work associated with substation extensions – securing cost efficiencies for consumers in the long-term. Therefore, our preferred solution remained the same.

Across all shortlisted options there is provision of space for [redacted] bay(s). [redacted] will be provided as physical space only (with civils works undertaken and no primary plant installed).

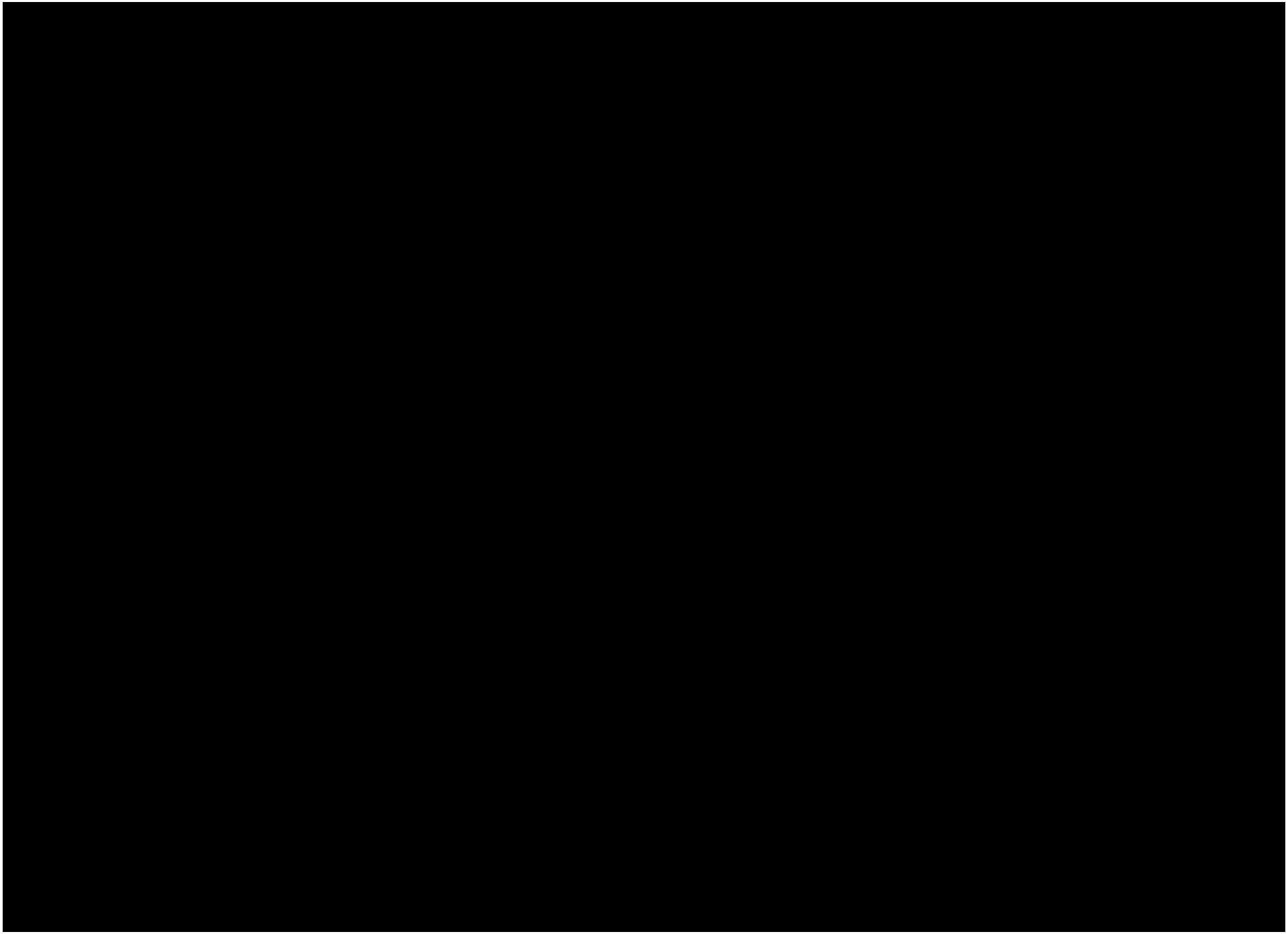
There is an ongoing review into optioneering to determine how to best connect [redacted] customers at the site ([redacted]). These customers do not form part of this investment but are part of overall Walpole site strategy, as indicated in Table 3 above in the interacting projects. Depending on the outcome of these ongoing discussions with NESO and the DNOs, this could necessitate [redacted] bays from this investment being used to connect these customers.[19]

Further, across all shortlisted options there is a need to build a new perimeter fence for the West Extension. [redacted]

In addition, the appropriate cabling route was also assessed, attributable to all shortlisted options. This was evaluated separately from the main substation layout optioneering because it is driven by fixed site constraints rather than by the bay layout alone, i.e. it is the same in all options.[20] The selected route provides a practicable connection between the existing overhead line infrastructure and the new western extension while managing these constraints, as is depicted in Figure 7.

[19] This could occur through a [redacted] which would provide enough capacity for both customers to connect.

[20] Including: the position of the existing terminal towers, the location of [redacted] bay, existing 400 kV infrastructure, third-party assets, existing cable routes, drainage interfaces and the need to maintain safe construction and operational clearances within a congested live substation environment.



The selected layout also incorporates the civil and land allowances required to support delivery. This includes the permanent compound footprint, perimeter fencing, internal and perimeter access routes, drainage provisions, flood defence interfaces, construction access and any required temporary working areas. These elements have been developed alongside the electrical layout because they directly influence the extent of land required, the planning boundary and the future ability to extend the site.

Planning and environmental requirements will be progressed as part of the western extension consenting strategy. The layout will support the planning application for the new compound, access, drainage and associated infrastructure, together with any conditions relating to ecology, landscaping, construction management and environmental mitigation. Biodiversity Net Gain (BNG) requirements were also incorporated into the delivery scope, including any habitat creation, enhancement, monitoring and maintenance obligations required through planning.

## Description of shortlisted options considered

### Option D-5: [redacted] extension of the existing Main and Reserve busbars 2 using rigid busbars with access from the south

**Proposed works:**

Option D-5 involves extending the existing Main and Reserve Busbars 2 using rigid busbars. The extension includes a specific arrangement of [redacted] as outlined in Appendix C and listed below.

- [redacted] Bus Section
- Relocation of the [redacted] circuit via a cable section
- [redacted] generation bay [redacted]
- [redacted] Bus coupler bay (Bus Coupler 4)
- [redacted] provision of space for additional future bay (allocated for the Mark I upgrade strategy or a future customer/SGT)[21]

In this option, there is no perimeter access road around the busbar extension and access is therefore only available from the south. While the busbar extension remains aligned with the existing Main and Reserve Busbar 2, the absence of a northern access road constrains operational and maintenance access and influences the arrangement of plant and cable routes. The layout does, however, maximise the separation between the proposed perimeter fence and the northern site boundary (including the Walpole–Bicker Fen overhead line corridor).

The works are contained wholly within DNO-owned land, avoiding the requirement to acquire any additional land from the [redacted] landowner [redacted]

**How it meets the driver:**

- This option meets the load-related driver by enabling connection of [redacted] and enabling connection of other customers. Achieves this while preserving some flexibility for future development at Walpole.

[21] The original design of Option D-5 had [redacted] for the SGT and [redacted] provision of space for [redacted] bay. Following discussion with the DNO in April 2025, the SGT was removed as it was no longer necessary. At this stage, the design of Option D-5 evolved to remove the [redacted] SGT bay, in turn increasing the provision of space [redacted]

**Drawings:**

- Please see Appendix C for the relevant layout drawing.

### Option D-6: [redacted] extension of the existing Main and Reserve busbars 2 using rigid busbars[22]

**Proposed works:**

Option D-6 involves extending the existing Main and Reserve Busbars 2 using rigid busbars. The extension includes a specific arrangement of [redacted] as outlined in Appendix C and listed below.

- [redacted] Bus Section
- Relocation of the [redacted] circuit via a cable section
- [redacted] generation bay [redacted]
- [redacted] Bus coupler bay (Bus Coupler 4)
- [redacted] provision of space for additional future bay (allocated for the Mark I upgrade strategy or a future customer/SGT)

Option D-6 uses the same overall rigid-busbar arrangement and bay configuration as Option D-5, but relocates [redacted] bays to the north side of the busbar extension. The layout incorporates a perimeter access road around the western extension and an internal access route between the Main and Reserve busbar extensions (aligned with the existing Main and Reserve Busbars 2) which requires the additional strip of land [redacted]. These access provisions improve construction, operational and maintenance access compared to Option D-5. The northern road alignment results in the northern perimeter fence being in closer proximity to the Sutton Bridge overhead line, which introduces additional interface considerations that are addressed through design development and construction controls.

This arrangement allows [redacted] bay to be extended [redacted]

The layout drawing for Option D-6 showing the bay arrangement is provided in Appendix C.

Option D-6 requires land outside the existing NGET site boundary, including land owned by [redacted] and an additional strip of land from the [redacted] landowner [redacted]. These third-party land requirements were a key consideration during optioneering [redacted]

**How it meets the driver:**

- This option meets the load-related driver by enabling connection [redacted] and enabling connection of other customers. Achieves this while preserving some flexibility for future development at Walpole.

**Drawings:**

- Please see Appendix C for the relevant layout drawing.

[22] The original design of Option D-6 had [redacted] for the SGT and [redacted] provision of space for [redacted] bay. Following discussion with the DNO in April 2025, the SGT was removed as it was no longer necessary. At this stage, the design of Option D-6 evolved to remove the [redacted] bay, in turn increasing the provision of space [redacted]

### Option D-7: [redacted] extension of the existing Main and Reserve busbars 2 using rigid busbars[23]

**Proposed works:**

Option D-7 was developed as an evolution of Option D-6, in response to evolving site needs.

The extension includes a specific arrangement of [redacted] as outlined in Appendix C and listed below.

- [redacted] Bus Section
- Relocation of the [redacted] circuit via a cable section
- [redacted] generation bay [redacted]
- [redacted] Bus coupler bay (Bus Coupler 4)
- [redacted] provision of space for additional future bays (allocated for the Mark I upgrade strategy or future customers/SGTs)

Figure 8 shows the required land to complete the west extension design proposed under this option (in red). During subsequent design development it was identified that additional space was required to accommodate the Horizontal Directional Drill (HDD) cable easement and therefore the [redacted] cable easement allowance was increased from 3m to 8m. This was not possible within the existing design of Options D-5 or D-6 – accommodating the revised cable easement allowance is therefore a feature exclusive to Option D-7.

In addition, the Option D-7 design goes further than Option D-6 by adding a reserve busbar section circuit breaker and the layout is extended to include [redacted] bay (which options D-5 and D-6 do not offer) to maximise the value of the land being acquired and to improve future optionality of the substation. The [redacted] bay provision reflects ongoing consideration of future connection requirements at Walpole, including potential outcomes of discussions with [redacted] We have also received early stage indications from prospective customers of additional interest to connect at Walpole 400 kV.

In total, [redacted] spare bays are retained within the Option D-7 arrangement as part of the overall optioneering strategy to provide a wider space between the existing site and the new extension to allow for customer cables to traverse the site and to future-proof the site. This arrangement allows for [redacted] bays to be extended either to the north or south of the 400 kV main and reserve busbars.

[23] The original design of Option D-7 had [redacted] for the SGT and [redacted] provision of space [redacted] future bay. Following discussion with the DNO in April 2025, the SGT was removed as it was no longer necessary. At this stage, the design of Option D-7 evolved to remove the [redacted] SGT bay, in turn increasing the provision of space [redacted]



**How it meets the driver:**

- This option meets the load-related driver by enabling connection [redacted] and enabling connection of other customers. Achieves this while preserving maximum flexibility for future development at Walpole.

**Drawings:**

- Please see Appendix C for the relevant layout drawings.

The System Design Table (SDT) for each option is provided within Appendix B.

In appraising these three options, we undertook a proportionate, multi factor qualitative assessment to determine which option delivers the best overall outcome for consumers, while meeting the investment drivers. The results are summarised in Table 10.

## 3.4 Qualitative assessment of shortlist

Table 10: Multifactorial analysis

| Option | Optioneering categories | | | | |
|---|---|---|---|---|---|
| | **Engineering** | **Environmental** | **Deliverability** | **Economic / consumer value** | **Consenting / stakeholder** |
| **All shortlisted options** | See individual option entries | • All shortlisted options are on greenfield build next to an existing substation location. Environmental effects are primarily local (construction impacts, noise/dust, materials) and manageable through standard mitigation; biodiversity allowance is included in the cost estimates.<br>• Carbon costs associated with construction are broadly equivalent across options (see quantitative analysis Section 3.5 Quantitative analysis of shortlist options). | • All shortlisted options are technically feasible and can be delivered within the required program, subject to securing the necessary land/consenting and managing construction interfaces with existing assets and circuits.<br>• All shortlisted options require the diversion (undergrounding) of [redacted] circuit | • All options account for an element of futureproofing optimising space in the available land parcels mitigating risk due to avoiding the need for future rework and the potential requirement to extend the substation fence line at a later date. | [redacted] All shortlisted options require engagement with stakeholders and require a planning application [redacted] |
| **Option D-5:** [redacted] extension of the existing Main and Reserve busbars 2 using rigid busbars with access from the south | • Delivers the required bay arrangement but results in a constrained layout with access only from the south (no northern perimeter road), reducing construction access and routine maintenance access. | • Confined to [redacted]-owned land, limiting overall land take; however, constrained internal arrangement reduces flexibility to optimise compound/access layout during detailed design (potential knock-on impacts during construction).<br>• Carbon impacts are broadly comparable across shortlisted options; any footprint reduction is marginal at this stage. | • The constrained access arrangement increases delivery sensitivity to construction sequencing and interfaces with live assets/circuits. Access from the southside for delivery of equipment and material is complex. | • Operational and maintenance inefficiencies caused by the constrained layout. | • Avoids the need for acquisition of the [redacted] land strip (reducing stakeholder dependency compared to Option D-6/D-7), while still requiring planning consent consistent with all options. |
| | Detractor | Neutral | Detractor | Neutral | Benefit |

| Option | Optioneering categories | | | | |
|---|---|---|---|---|---|
| | Engineering | Environmental | Deliverability | Economic / consumer value | Consenting / stakeholder |
| **Option D-6:** [redacted] extension of the existing Main and Reserve busbars 2 using rigid busbars[24] | • More standard/conventional layout than D-5, with improved construction, operational and maintenance access due to perimeter and internal access routes. | • Similar construction impacts compared to the other shortlisted options; key environmental effects remain local and mitigable<br>• Carbon impacts slightly higher than D-5 for this option as substation footprint increases. Extension is centered and requires [redacted] land. | • Proximity of northern access road/perimeter fence to the Sutton Bridge OHL requires enhanced design/controls and safe working arrangements, but this can be managed.<br>• Easier construction access from north and easier commissioning / sequencing due to perimeter access roads. | • A more standard layout reduces construction interface risk and can reduce operational / maintenance complexity versus D-5, supporting better value over the asset life.<br>• | • Additional stakeholder dependency due to the need to acquire more land (DNO land as well as a strip of land [redacted] increasing risk of delay to overall programme [redacted] so requires planning consent. |
| | Neutral | Neutral | Neutral | Benefit | Detractor |
| **Option D-7:** [redacted] extension of the existing Main and Reserve busbars 2 using rigid busbars[25] | • Builds on D-6 and improves operability by adding a reserve busbar section circuit breaker, improving running-arrangement flexibility.<br>• Adds [redacted] bay and optimises layout; supports enhanced future optionality at the site (greater flexibility for any future customers) while minimising the likelihood of need for later rework – reducing cost, construction impacts and network disruption. Can also reduce delivery times for future customers | • Similar construction impacts and carbon-equivalent impacts as other options; any additional footprint is balanced by improved futureproofing (avoiding future rework). | • Delivers a more coherent and buildable arrangement and provides improved access/constructability compared to D-5.<br>• Increased [redacted] cable easement (3m to 8m) addresses constructability constraints identified during design development. | • Maximises future optionality at the site ([redacted] bay and optimised layout) reduces the likelihood of costly future rework and fence-line changes, avoiding outage, consenting and construction costs, and better supporting better whole-life value.<br>• Operability improvement (reserve busbar section breaker) supports more resilient operations and reduces constraints. | • As above with Option D-6, requires planning consent and additional third-party land acquisition, so stakeholder dependency remains a delay risk to overall programme.<br>• The enhanced layout/futureproofing strengthens the justification for the land being acquired by maximising its use. |
| | Benefit | Neutral | Benefit | Benefit | Detractor |

[24] Following discussion with the DNO in April 2025, the SGT was removed as it was no longer necessary across all options. More information is provided on this at Table 3 on interactive projects.

[25] Following discussion with the DNO in April 2025, the SGT was removed as it was no longer necessary across all options.

## Qualitative assessment output

As set out in our multifactorial qualitative analysis (Table 10 above), option D-7 tests most positively against the assessment criteria.

On engineering, similarly to option D-6, this provides a more conventional layout than option D-5, with improved construction (due to its more standard design), operational and maintenance access due to perimeter and internal access routes. Option D-7 exceeds option D-6 by adding a reserve busbar section circuit breaker to improve running-arrangement flexibility, and adding space for [redacted] bay to better support future expansion optionality of the substation. This is especially valuable given: [redacted] there is a possibility [redacted] may be needed to connect the [redacted] and we have received early stage indications from prospective customers of additional interest to connect at Walpole 400 kV – these collectively increase the importance of maintaining future flexibility at Walpole. Option D-7 is best aligned to "build it once" principles, reducing the likelihood of future substation expansion.

On environmental, all options test equally against this assessment criterion.

On deliverability, similarly to option D-6, this is more deliverable than option D-5 due to its improved layout – there are no site access constraints with this option, unlike with option D-5. Option D-7 builds on D-6 by increasing the [redacted] cable easement (from 3m to 8m) to address constructability constraints, making this the best option against this assessment criterion.

On economic/consumer value, option D-7 exceeds against the other options by securing improved operability improvement by the reserve busbar section breaker, reducing constraints. It also offers the maximum future site optionality through the provision of [redacted] bay, avoiding likelihood of costly network reinforcement in future. This supports whole-life value better than the other options [redacted] provided as physical space only (with civils works undertaken and no primary plant installed), making this a low regret option now. Consequently, Option D-7 best supports consumer value in the long term since the marginally higher cost is offset by avoiding the need for extensive and costly future site expansion that may otherwise be incurred.

On consenting/stakeholder, all shortlisted options require planning consent, with Options D-6 and D-7 also requiring acquisition of [redacted] land. Option D-5 therefore tests most positively against this criterion.

## PASE alignment

In the PASE framework, this investment is PASE aligned as a variant option for a substation extension (atypical extension to Double Bus AIS substation). Consequently, option D-7 is PASE aligned.

## 3.5 Quantitative analysis of shortlist options

### Cost estimates of shortlist options

To assess the shortlisted options, cost estimates have been determined using a parametric cost estimating methodology suitable for the stage of development and option selection based on the scope of work and the new assets to be acquired for each option.

At each stage of project development, there are uncertainties associated with construction, commercial, stakeholder and supply chain activities, as well as external events, which may impact cost and schedule outcomes. Consistent with the level of project maturity at EL stage, the current estimate includes [redacted] to reflect the risk and contingency. This has been informed by National Grid's experience of previously delivered projects and the risk events encountered during delivery, providing a proportionate representation of project uncertainty at this stage. Detailed Quantitative Schedule Risk Analysis (QSRA) and Quantitative Cost Risk Analysis(QCRA) assessments will be completed as part of Project Assessment to further quantify project-specific risks and update the allowance where appropriate.

[redacted]

All three shortlisted options are similar in total cost as the core design scope is similar across all options. Option D-5 is lower cost because it is contained within the [redacted] land area [redacted] and the substation footprint is smaller than the other options which leads to reduced construction costs.

Option D-6 is slightly higher cost than D-5 due to the increased land requirement [redacted] and wider compound arrangement, which requires a longer perimeter fence.

Option D-7 is marginally more expensive than D-6 due to the additional reserve busbar circuit breaker and the inclusion of additional space provision for [redacted] bay.

### Cost Drivers

The project's cost estimates are based on current market conditions and costbook assumptions, with ongoing work to refine design, scope, quantities and risk allowances. The main cost drivers include:

- Land acquisition and access rights: costs associated with securing required land .
- Construction and asset costs, including the new main and reserve busbar sections, bus section / bus coupler infrastructure, [redacted] feeder bay, associated plant, support structures, foundations, earthing, lighting, protection and control interfaces, and commissioning.
- Cable and circuit transposition works: including the new 400 kV Cable Sealing End Compound, reconfigured OHL downleads from [redacted] cable terminations, ventilated trough route, bonding and earthing, induced voltage management, short-circuit withstand and associated commissioning.
- Civil engineering works: including earthworks, cut and fill, surfacing, piled foundations, internal roads, perimeter access routes, footpaths, laydown areas, drainage modifications, flood wall / fence integration and tie-ins to existing substation infrastructure.
- Enabling works: surveys, ecological assessments, vegetation clearance, site investigations, underground services surveys, geotechnical works, construction laydown, temporary access, temporary security, welfare/site establishment and preparatory works.
- Planning, environmental and BNG requirements: planning submission support, environmental mitigation, landscaping, ecological commitments.
- Drainage and watercourse interfaces: costs associated with diverting or modifying existing drainage.
- Increased footprint costs: longer perimeter fence and spare bay space provision.

## Cost Benefit Analysis

### Purpose and approach

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 Whole-Life Cost Analysis (WLCA) that captures capital expenditure, 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 three shortlisted connection and substation delivery options using Ofgem's RIIO-ET3 CBA template. The assessment is completed relative to a counterfactual and on a discounted basis over a 50-year appraisal period (2027–2076), consistent with the CBA methodology.

For each option considered, we have quantified:

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

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 three shortlisted options.

- Option D-5: [redacted] extension of the existing Main and Reserve busbars 2 using rigid busbars with access from the south;
- Option D-6: [redacted] extension of the existing Main and Reserve busbars 2 using rigid busbars; and
- Option D-7: [redacted] extension of the existing Main and Reserve busbars 2 using rigid busbars.

### CBA outcome

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



On the basis of the discounted lifetime CBA results (Table 12), Option D-5 delivers the highest NPV and therefore represents the preferred option on a quantitative assessment alone.

Options D-6 and D-7 delivers a lower NPV than D-5 This recommendation analysis is subject to confirmation through deliverability, consents/land, outage and risk considerations, and any CBA sensitivities (e.g. carbon price trajectories) set out in the assumptions below.

### Assumptions of the CBA analysis

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.
- Price base: 2023/24 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

[redacted]

### Benefits

The following benefits have been included within the CBA:

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

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



## 3.6 Preferred solution

Based on the outputs of our multifactorial analysis and CBA, our preferred option is to deliver Option D-7: [redacted] extension of the existing Main and Reserve busbars 2 using rigid busbars. Option D-7 is preferred because:

- **Whole-life value**: We acknowledge this option has the lowest NPV of all shortlisted options. NPV was an important component of the assessment, but it was not the sole decision criterion. Option D-7 was selected through the wider multi-factor assessment because it provides the strongest overall balance of operability, constructability, whole-life value and deliverability for only a marginally higher cost than the next best Option (D-6, [redacted] Option D-7 provides space for [redacted] spare [redacted] – this is expected to provide the best consumer value in the long term by maximising future flexibility at the Walpole substation. This is important as the additional [redacted] prepare for the possible eventuality that [redacted] bay may need to be used to connect the [redacted] customers [redacted] Retaining flexibility for future extensions within the Walpole substation therefore remains important to accommodate future customer or network requirements – especially as we have recently received early stage indications from prospective customers of additional interest to connect at Walpole 400 kV. Option D-7 achieves this most effectively: it avoids the likelihood of costly network reinforcement, construction impacts or network disruption in future. These long-term benefits offset the marginally higher upfront cost associated with Option D-7.
- **Operability and constructability**: Options D-6 and D-7 provide a more standard arrangement and improved access over Option D-5. Option D-7 additionally incorporates the widened [redacted] HDD cable corridor and a reserve busbar section circuit

breaker, addressing constructability and interface constraints and improving operational flexibility of the extension – these features are unique to Option D-7 and could not be accommodated within the existing design of Option D-6.

- **Land**: Whilst this option does require acquisition of land, which has risk attributed, [redacted] The preferred solution therefore reflects a proportionate judgement: D-7 carries greater land dependency than Option D-5, but avoids the enduring layout, construction and access disadvantages inherent with the south-access-only arrangement in Option D-5. These benefits outweigh the risk on land acquisition.
- **Future optionality and consumer value**: The removal of the SGT did not impact this preferred solution. When the SGT requirement was removed late in project development, its position was already integrated within the wider busbar arrangement; amending that position would have required redesign of the extension and risked programme delay. Retaining the position as safeguarded space [redacted] is a low regret feature that preserves future flexibility within the land and layout being developed and avoids inefficient future re-work – securing cost efficiencies for consumers. [redacted] additional future [redacted] delivered as civils-only to avoid later fence-line changes and rework, by minimising disruption to existing operational arrangements and maintaining optionality as the wider East Anglia transmission strategy continues to develop; due to its position in the substation design layout, the [redacted] space that had been allocated for the SGT bay will include a main and reserve busbar extension. The spare [redacted] may be allocated for the Mark I upgrade strategy[26] or future customer(s)/SGT(s). By embedding [redacted] now, we are striking the right balance between future optionality of the Walpole site – securing efficiency gains in the long term – and consumer value.

[redacted]

Option D-7 therefore accommodates the load drivers whilst preserving the flexibility for future development at the Walpole site. It presents the best option in our multifactorial analysis; the additional upfront cost to this option is offset by the whole-life value it offers, as explained above. This solution forms part of a wider integrated site strategy that has been continuously refined as customer requirements and system needs have evolved. The selected layout has

[26] Contained in companion EL submission, Walpole 400kV CEGB Mark I Uprating.

been deliberately developed to coordinate customer connections, operability improvements, future fault level mitigation and future development flexibility within a single coherent site strategy. This approach maximises the value of the land acquired, reduces the likelihood of future rework and minimises disruption associated with repeated site interventions.

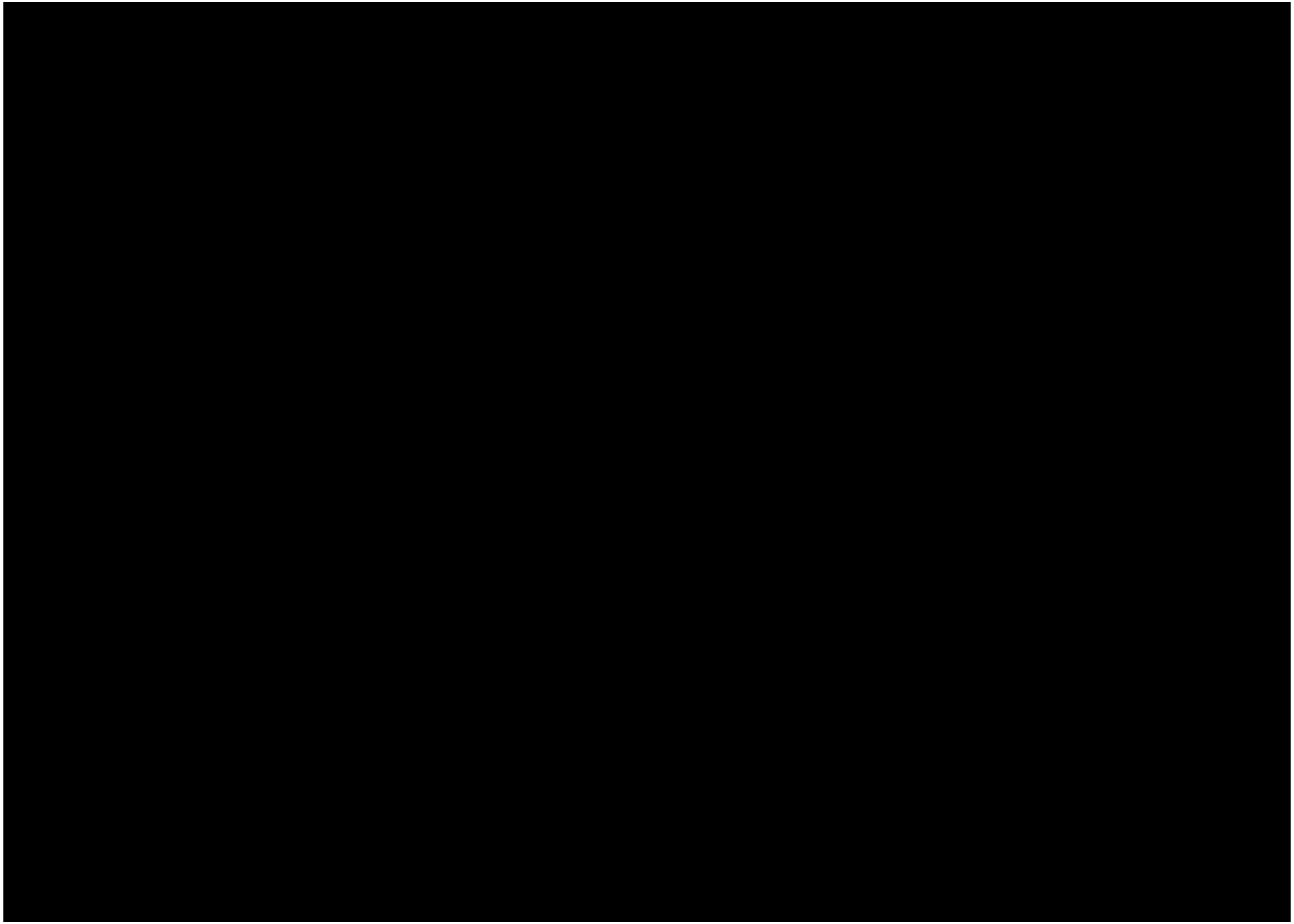
Although asset health is not a driver for the Walpole West extension, the preferred solution has been developed in the context of an ageing 1960s-era substation and wider asset health investment requirements at the site. The selected layout has been designed to coordinate effectively with future asset renewal and fault level uprating activities (those referenced in companion EL submission, titled Walpole 400 kV CEGB Mark I Uprating), reducing the risk of inefficient redesign or rework. This integrated planning approach of the Walpole site has ensured that future asset health interventions can be delivered more efficiently and with lower disruption to consumers and customers.

### Refinements to preferred solution since optioneering

The arrangement shown in Figure 9 below reflects the updated layout for this investment's preferred solution, Option D-7. The current scope includes [redacted] feeder bay for the transferred [redacted] circuit, associated busbar connections, support structures, foundations, earthing, protection and control interfaces and cable trough. This layout now reflects the latest changes, including the SGT no longer being in scope.

[redacted]

As shown in Figure 7 above, the cable route is approximately [redacted] and is based on [redacted] installed in at-surface ventilated troughs.



# Project benefits and outputs

Table 16: Summary of outputs and benefits

| Output: | Description |
|---|---|
| **Outputs and benefits** | Extension of the existing Main and Reserve busbars 2 using rigid busbars, providing additional space for spare bays in future.<br>Transpose [redacted] circuit onto a new busbar section; increasing operability at the site, reducing curtailment and operational flow restrictions, lowering constraint costs.<br>By increasing capacity and providing additional [redacted] investment removes a critical constraint to industrial and commercial development.<br>Delivers a solution that meets the project drivers: enables connection of generation customer and enables connection of wider large offshore wind connections by 2031.<br>Additional capacity can secure less curtailment for windfarms in the region across the EC5 and B9 boundaries due to increased flow capabilities; providing consumers with lower constraint costs. |

# 4. Delivery

## 4.1 Delivery year and indicative timeline

Our programme has been designed to deliver the customer connection by their agreed energisation date (see Figure 10). The current delivery date for this investment is October 2031. There is a key dependency on acquiring the necessary land in time to enable delivery of this investment by this delivery date.

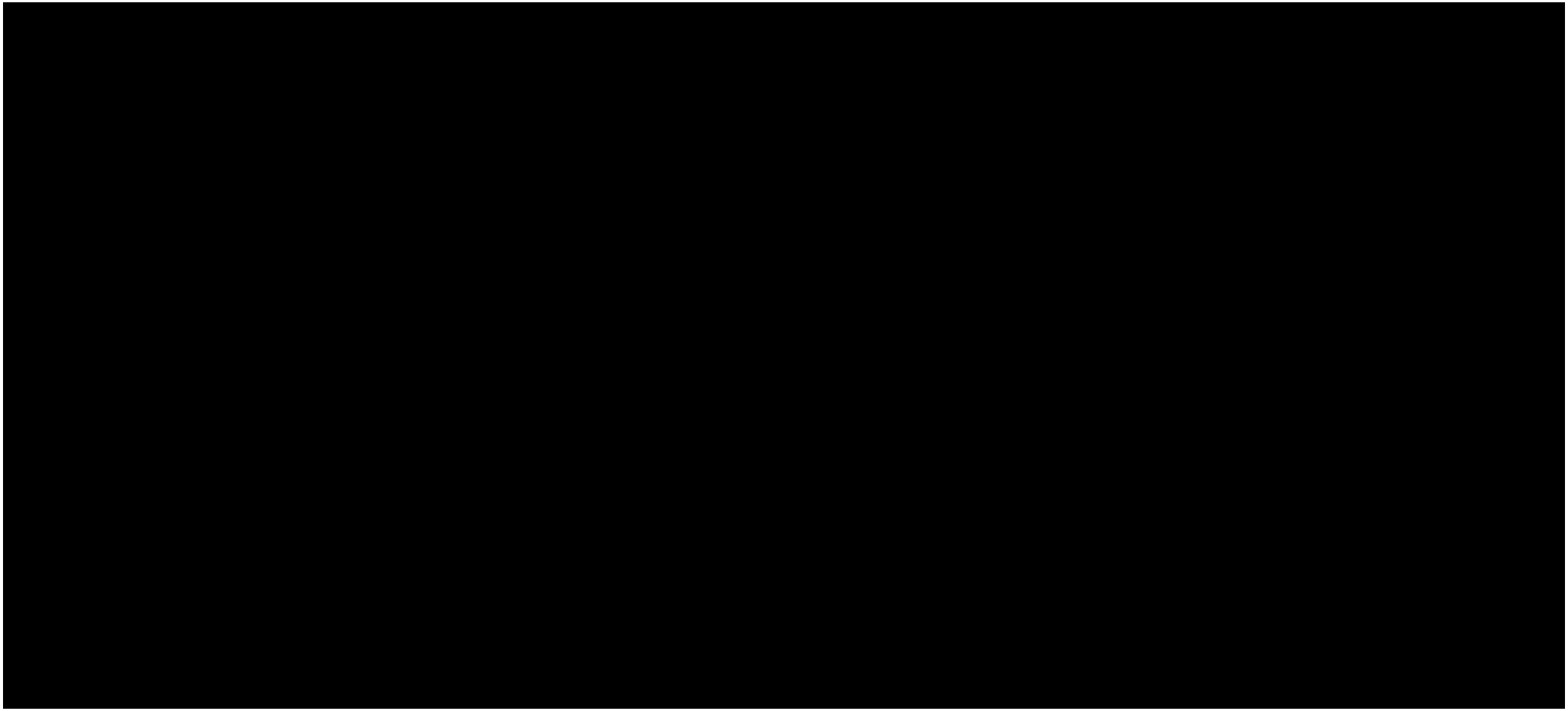
[redacted]

Following our latest stakeholder engagement, we do not anticipate any delays to delivery date at this [redacted]

Figure 10 details the high-level program for Option D-7. Key assumptions with this program are:

- [redacted] This assumes acquisition of the required [redacted] land [redacted]
- [redacted] enabling works to be completed prior to first site access.

[redacted]



## 4.2 Procurement and contracting strategy

To ensure robust contract management and cost control, the works at Walpole have been separated into distinct work packages.

- Package 1 – Walpole West 400kV AIS Extension
- Package 2 – Walpole 400kV CEGB Mark 1 uprating (contained in a separate EL submission)

[redacted]

Front End Engineering Design (FEED) work is already being undertaken for this investment (Package 1) with the intent that the delivery of this be completed using [redacted]

As noted above, this investment forms part of the overall Walpole Site Strategy, which comprises a companion EL submission: Walpole 400kV CEGB Mark I Uprating. Whilst these are being delivered as independent investments, these are being developed in a coordinated manner. We are exploring all opportunities to maximise efficiencies, including outage coordination to ensure SQSS compliance is maintained. Additional information regarding our procurement strategy and supplier selection will be presented in the Project Assessment.

## 4.3 Risks and risk management

An overview of current delivery risks is listed below along with mitigations. As risks continue to evolve, an updated detailed view of risk and mitigations will be supplied within the Project Assessment submission.

Table 17: Summary of risks and mitigations

| Risk | Mitigation |
|---|---|
| Land access, easements or wayleaves not secured in time, including access routes, temporary construction access, or third-party land required for haulage, storage or enabling works, leading to delay to construction activities and increased cost. | • Early identification of all permanent and temporary land requirements, including access routes and construction compounds.<br>• Early engagement with landowners, occupiers and agents to agree heads of terms.<br>• Where appropriate, develop alternative access or construction methodologies to reduce reliance on third-party land. |
| Delay in obtaining planning permission, preventing commencement of works or restricting working methods or hours. | • Early engagement with the Local Planning Authority to confirm requirements and expectations.<br>• Early preparation and submission of planning information<br>• Sequencing of non-planning-dependent works to protect the critical path. |

| Risk | Mitigation |
|---|---|
| Long lead items not secured in line with programme due to supply chain constraints, leading to delays and additional cost. | • Early identification of long-lead equipment and procurement risk.<br>• Early engagement with suppliers and use of framework or bulk purchase arrangements where available.<br>• Alignment of procurement strategy with delivery programme. |
| Interface risk with adjacent projects, enabling works or customer works, or parallel National Grid schemes, leading to clashes, sequencing issues or inefficient site access. | [redacted]<br>• Closely manage relevant stakeholder programmes with dependencies on this investment (UKPN).<br>• Regular interface and coordination meetings with all relevant stakeholders.<br>• Integrated programme reviews to identify and manage conflicts early. |
| Construction activities introduce safety risks, restrict access to live assets, or disrupt ongoing operations, potentially causing delays or incidents. | • Clear demarcation of work zones and exclusion areas.<br>• Development of construction management plan upon completion of FEED.<br>• Regular safety assurance, audits and reviews throughout delivery. |
| Community objections, complaints or stakeholder challenge arising from noise, traffic, working hours or visual impact, potentially leading to restrictions or delay. | • Development and implementation of a stakeholder and community engagement plan.[27]<br>• Early communication of construction impacts and mitigation measures.<br>• Traffic, noise and environmental management plans agreed in advance.<br>• Responsive handling of complaints and feedback with clear escalation routes. |
| Unforeseen ground conditions, contamination, archaeology or environmental constraints encountered during construction, leading to re-design, delays and additional cost. | • Early and comprehensive site investigations and surveys.<br>• Allowances and contingencies within programme and cost estimates.<br>• Agreed procedures for managing discoveries (e.g. contamination, archaeology).<br>• Early engagement with environmental specialists and regulators as required. |

[27] This plan is already being implemented: consultation took place May-June 2024; we wrote to local authorities in early 2026 informing stakeholders of our upcoming planning applications; and a resident letter-drop will occur in due course on the same subject. No formal objections have been received to date. Views of local residents will, where possible, be reflected within our planning submissions.

# 5. Conclusion

This submission outlines a preferred solution to satisfy the investment drivers. It seeks confirmation of eligibility under Special Condition 3.18, confirmation of eligibility of PCF under Special Condition 3.15, confirmation of re-opener Track 2 EL and formal Ofgem approval of the Needs Case and preferred solution. We will request allowances at the Project Assessment.

The preferred option D-7 consists of an [redacted] extension of the existing Main and Reserve busbars 2 using rigid busbars.

Table 18: Submission summary

| Submission summary | |
|---|---|
| **Main drivers** | Load:<br>• Generation customer connections: [redacted] at 400 kV.<br>• Connections reform: this investment is enabling works for c.9.5 GW of connections, including major Offshore wind across the EC5 and B9 Boundaries. |
| **Preferred option** | D-7: [redacted] extension of the existing Main and Reserve busbars 2 using rigid busbars. |
| **Estimated cost and timing** | [redacted] estimated delivery year of 2031. |
| **Outputs** | • Extension of the existing Main and Reserve busbars 2 using rigid busbars, providing additional space for spare bays in future.<br>• Transpose [redacted] circuit onto a new busbar section; increasing operability at the site. |
| **Proposed PCD** | A Mechanistic Price Control Deliverable (PCD) for extension of the existing main and reserve busbars and transposition [redacted] circuit onto a new busbar section by 2031. |

# Appendix A
# Glossary

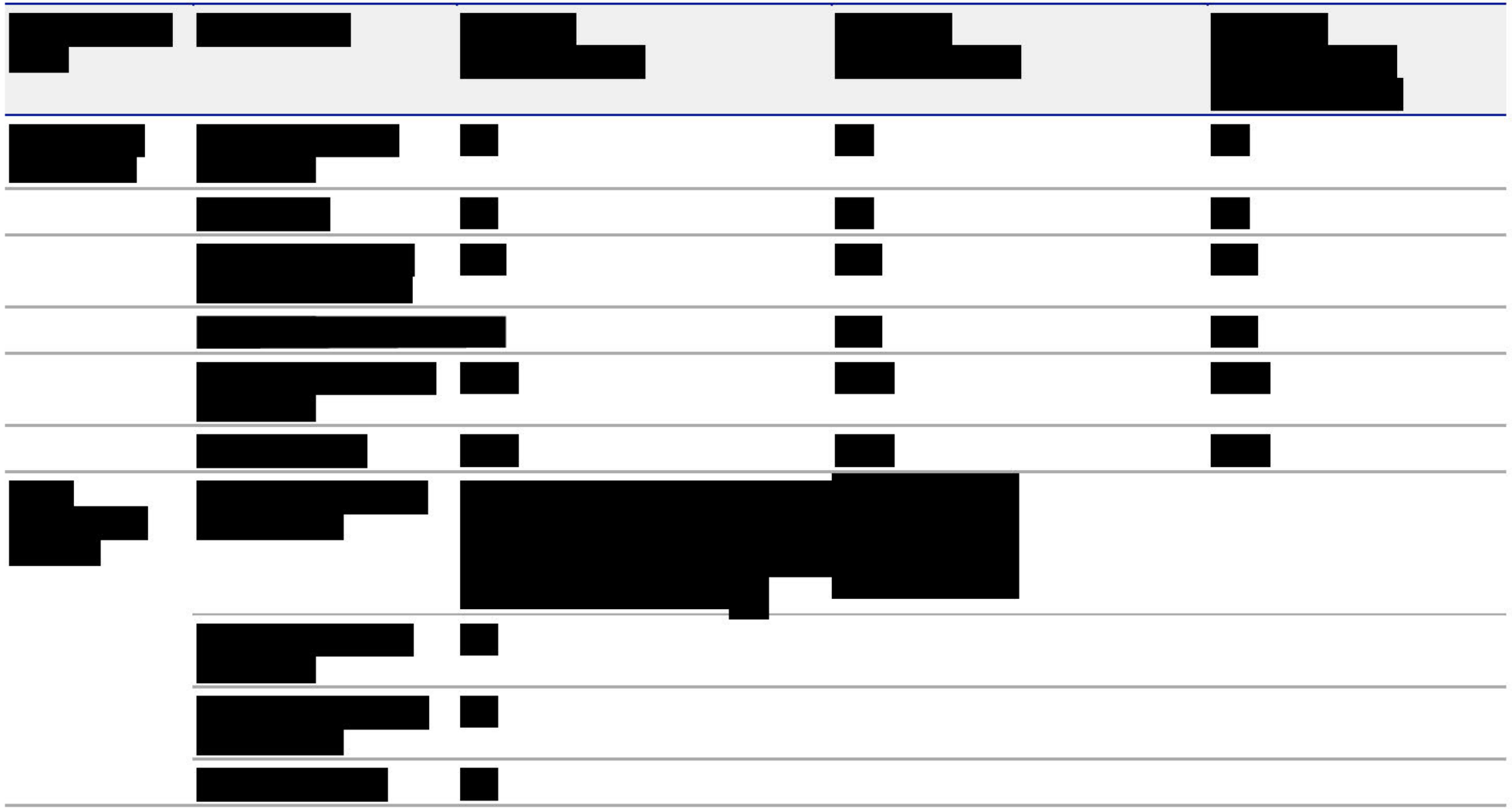
Table 19: Table of abbreviations and definitions

| Abbreviation | Description |
|---|---|
| ACL | Available For Commercial Load |
| AIS | Air Insulated Switchgear |
| BESS | Battery Energy Storage System |
| BNG | Biodiversity Net Gain |
| BPDT | Business Plan Data Template |
| CAPEX | Capital Expenditure |
| CBA | Cost Benefit Analysis |
| CEGB | Central Electricity Generating Board |
| CPO | Compulsory Purchase Order |
| DCO | Development Consent Order |
| DNO | Distribution Network Operator |
| EAWO | Early Asset Write Offs |
| ECC | Estimated Cost of Construction |
| EEW | Early Enabling Works |
| EL | Eligibility Letter |
| EPC | Engineering, Procurement and Construction |
| ETP | Electricity Transmission Partnership |
| FEED | Front End Engineering Design |
| FY | Financial Year |
| GIS | Gas Insulated Switchgear |
| GSP | Grid Supply Point |
| GW | Giga Watt |
| HDD | Horizontal Directional Drill |
| HV | High Voltage |
| HVDC | High Voltage Direct Current |

| Abbreviation | Description |
|---|---|
| IDB | Internal Drainage Board |
| iDNO | Independent Distribution Network Operator |
| ISS | Integrated Security Solution |
| kW | Kilo Watt |
| MVA | Megavolt-Amperes |
| MW | Mega Watt |
| NESO | National Energy System Operator |
| NG | National Grid |
| NGED | National Grid Electricity Distribution |
| NGET | National Grid Electricity Transmission |
| NOA | Network Options Assessment |
| NPV | Net Present Value |
| OHL | Overhead Line |
| PASE | Pre-Approval of Solution Engineering |
| PCD | Price Control Deliverables |
| PCF | Pre Construction Funding |
| QCRA | Quantitative Cost Risk Analysis |
| QSRA | Quantitative Schedule Risk Analysis |
| RAV | Regulated Asset Value |
| SDT | System Design Table |
| SF6 | Sulfur Hexafluoride |
| SGT | Super Grid Transformer |
| SLD | Single Line Diagram |
| SQSS | Security and Quality of Supply Standard |
| TCSNP | Transitional Centralised Strategic Network Plan |
| UIOLI | Use-it or Lose-it |
| UKPN | UK Power Networks |
| WLCA | Whole-Life Cost Analysis |

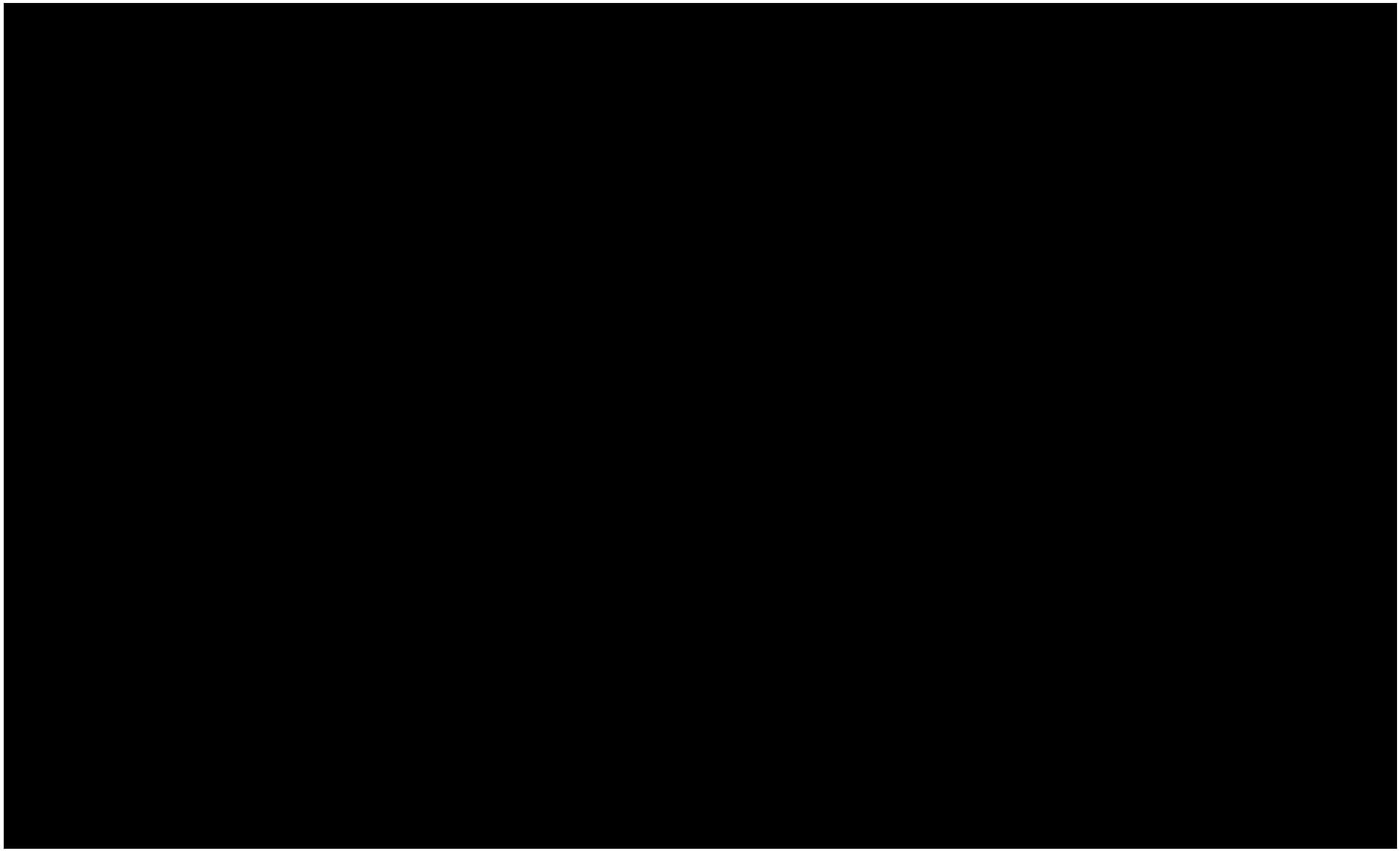
[redacted]

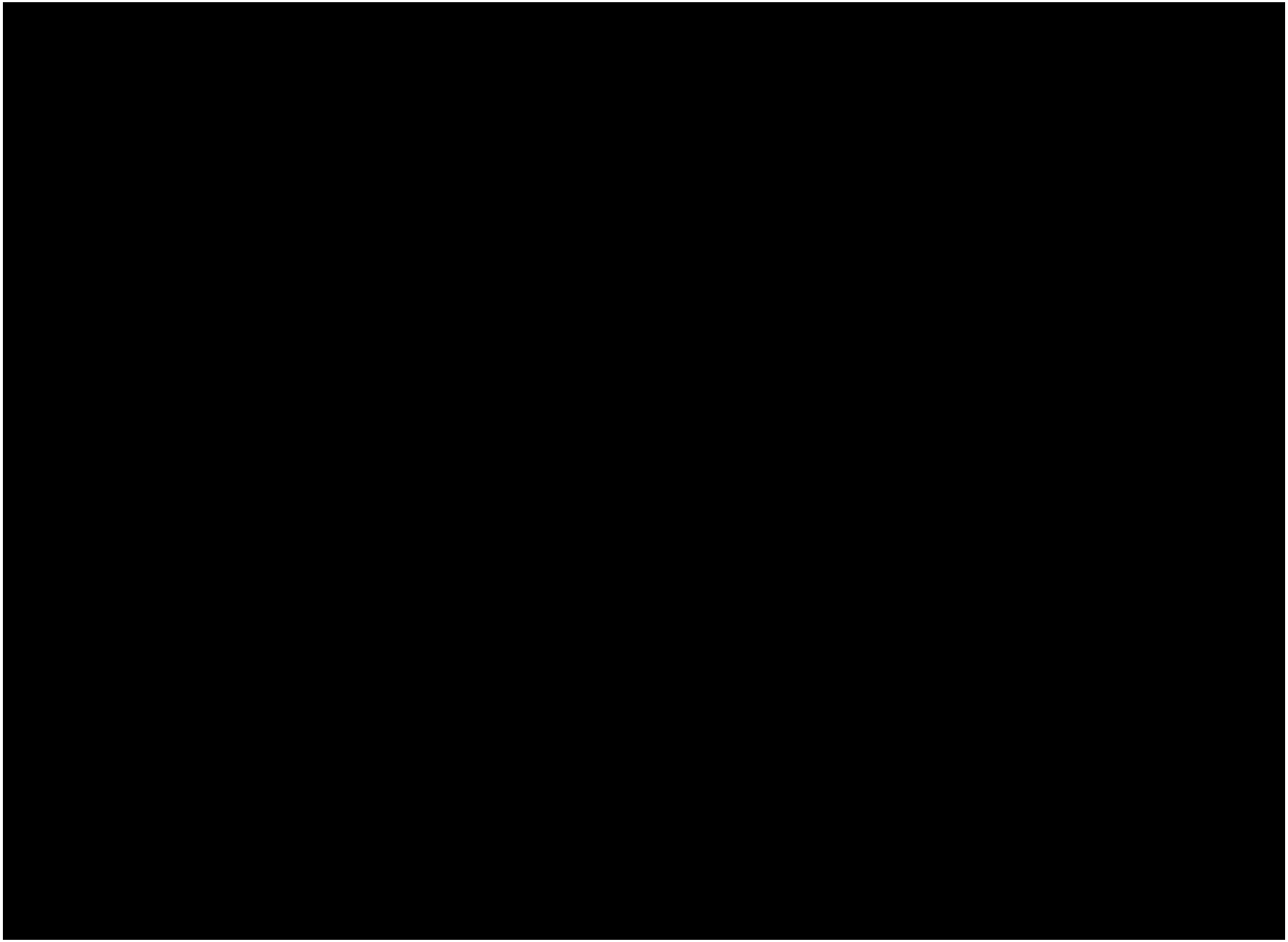
[redacted]



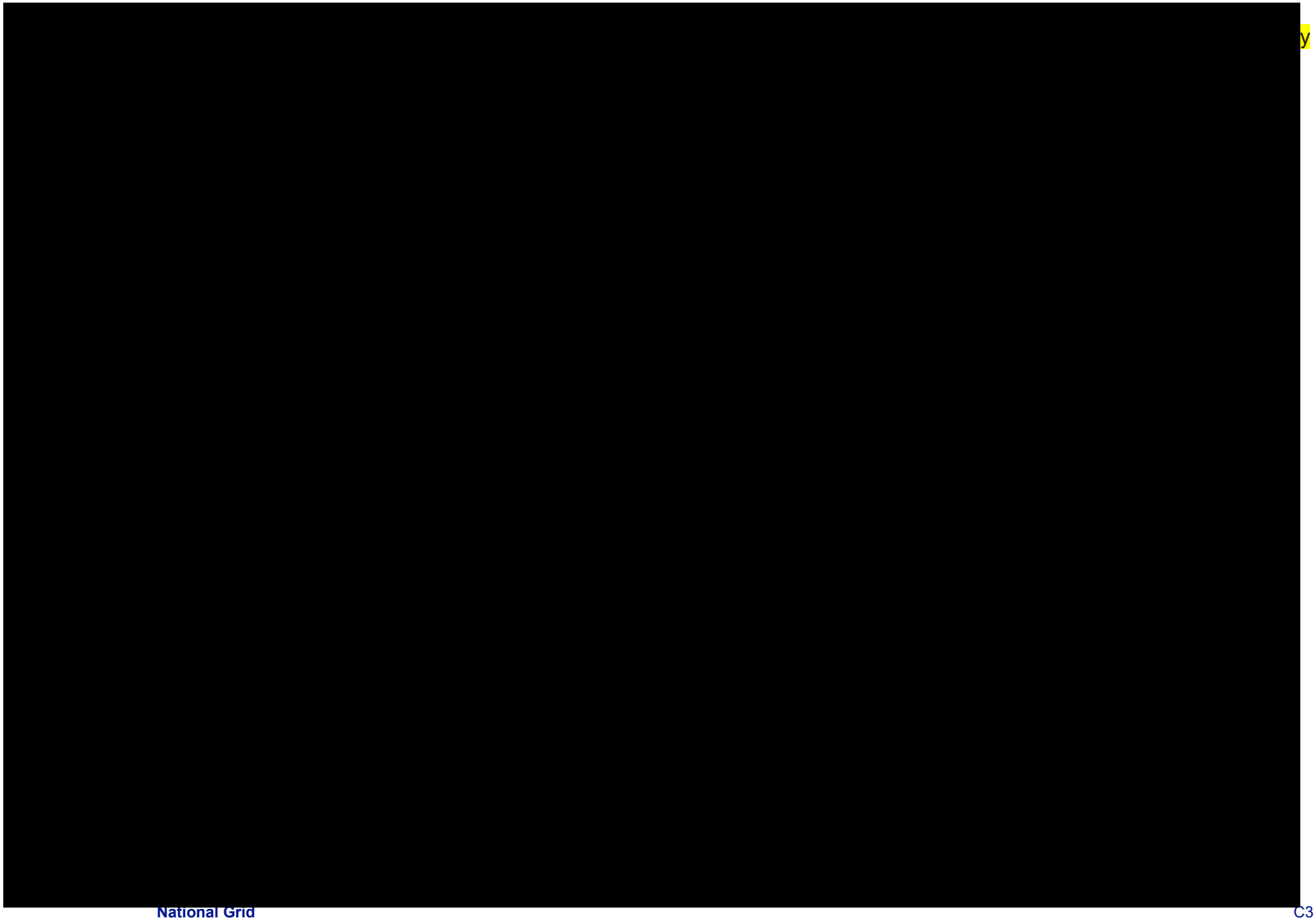


[redacted]

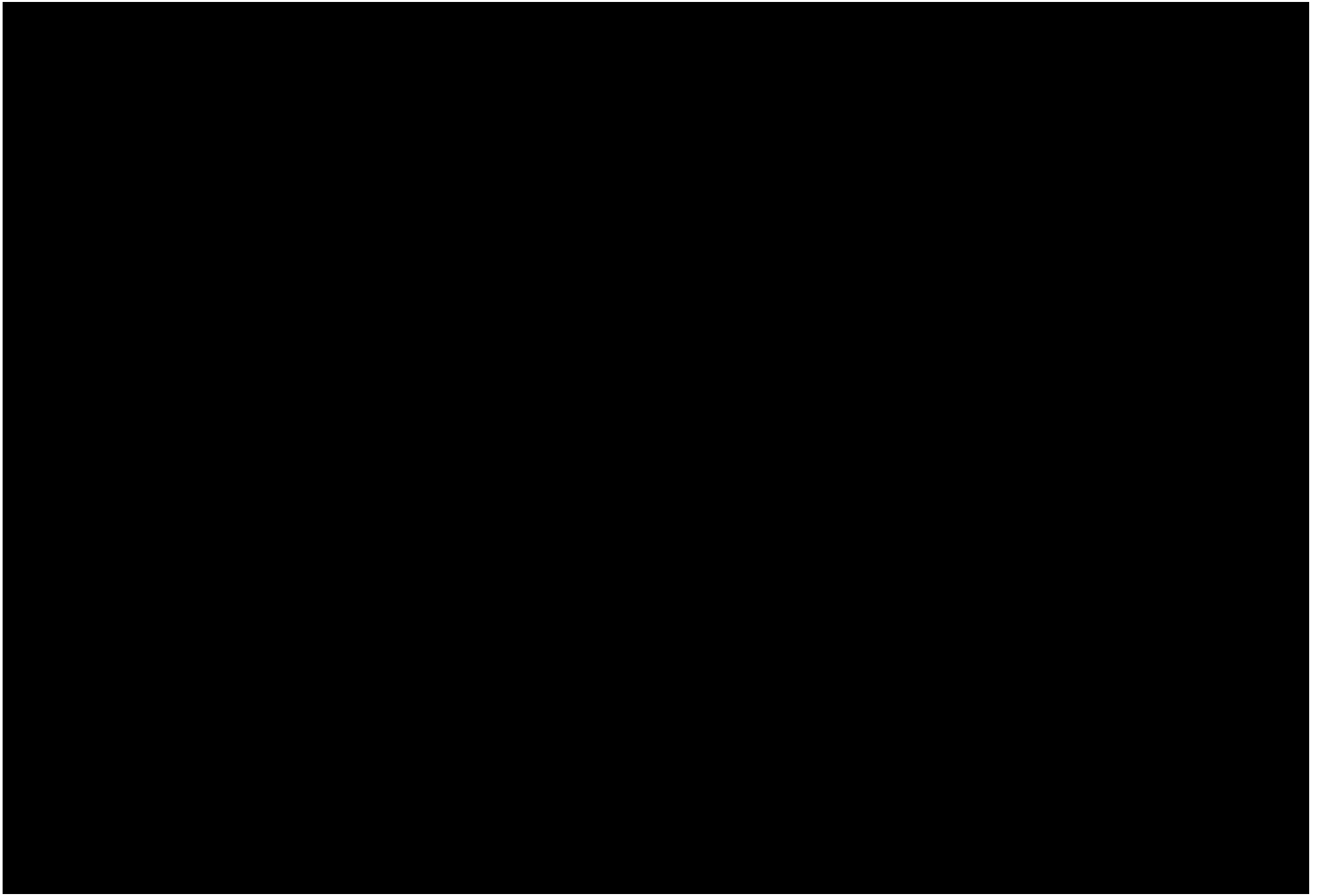


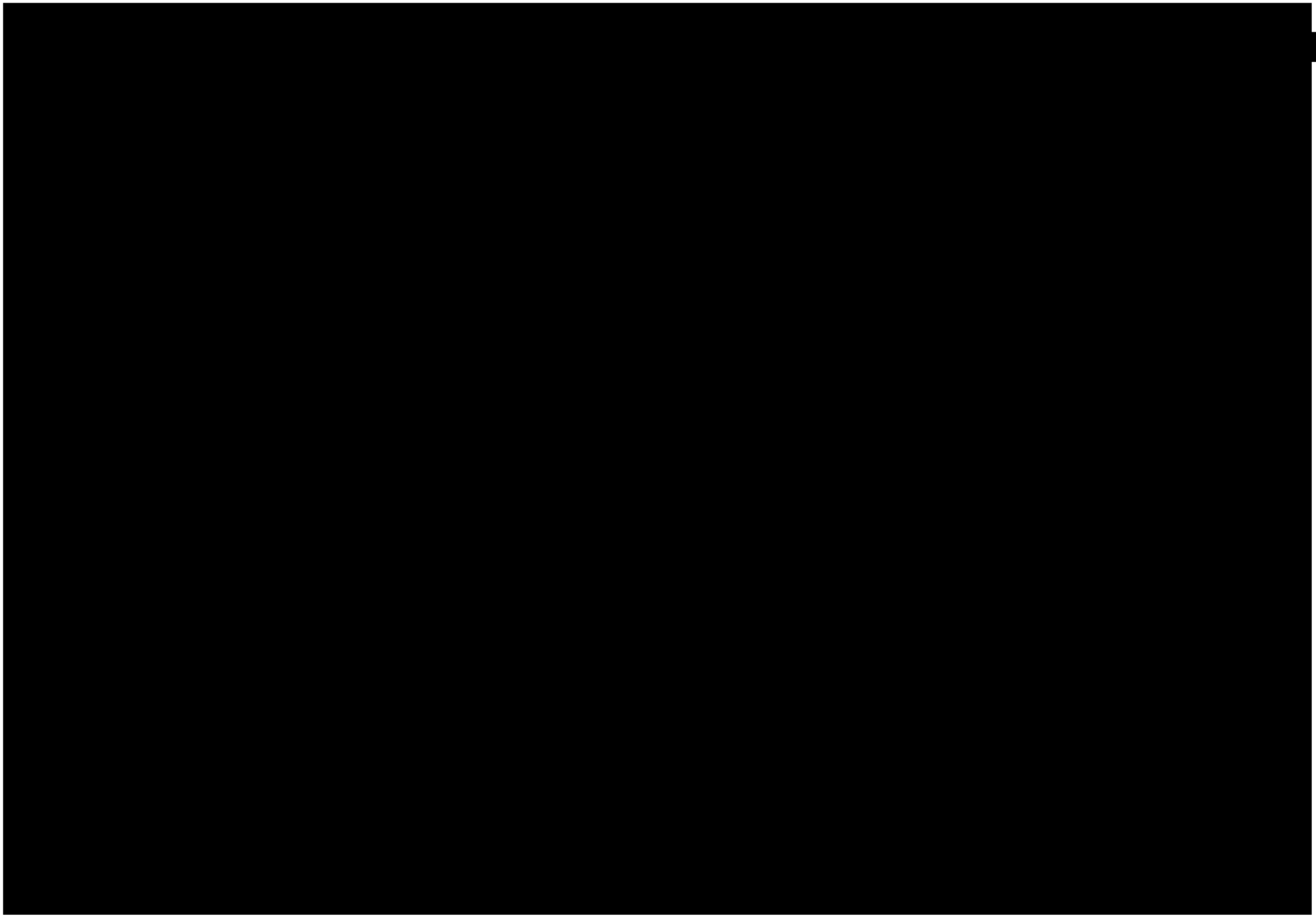


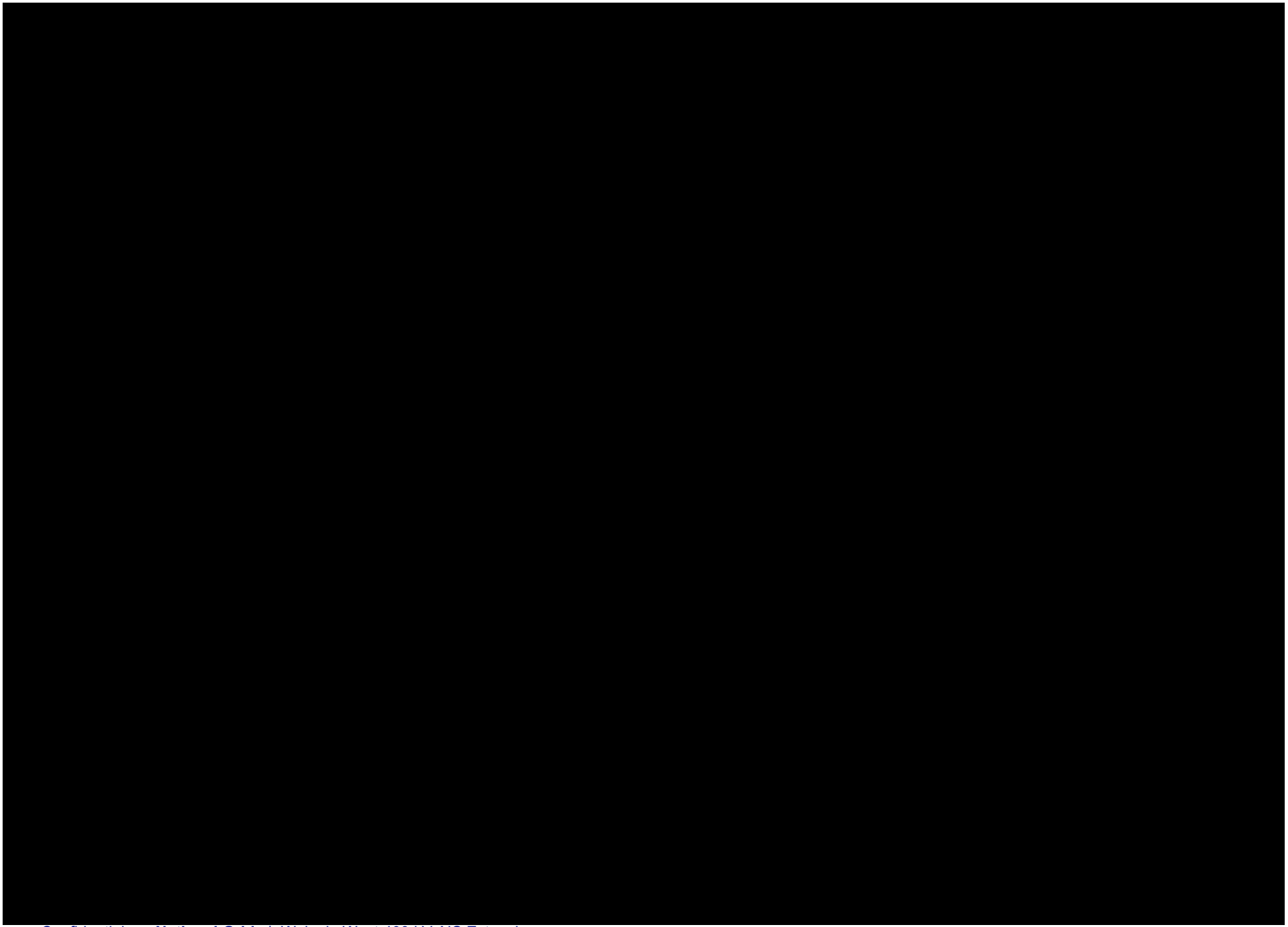
[28] The SGT is still featured in the option diagrams to demonstrate this build remains physically possible; as the SGT has fallen away, it will not be built at this time.

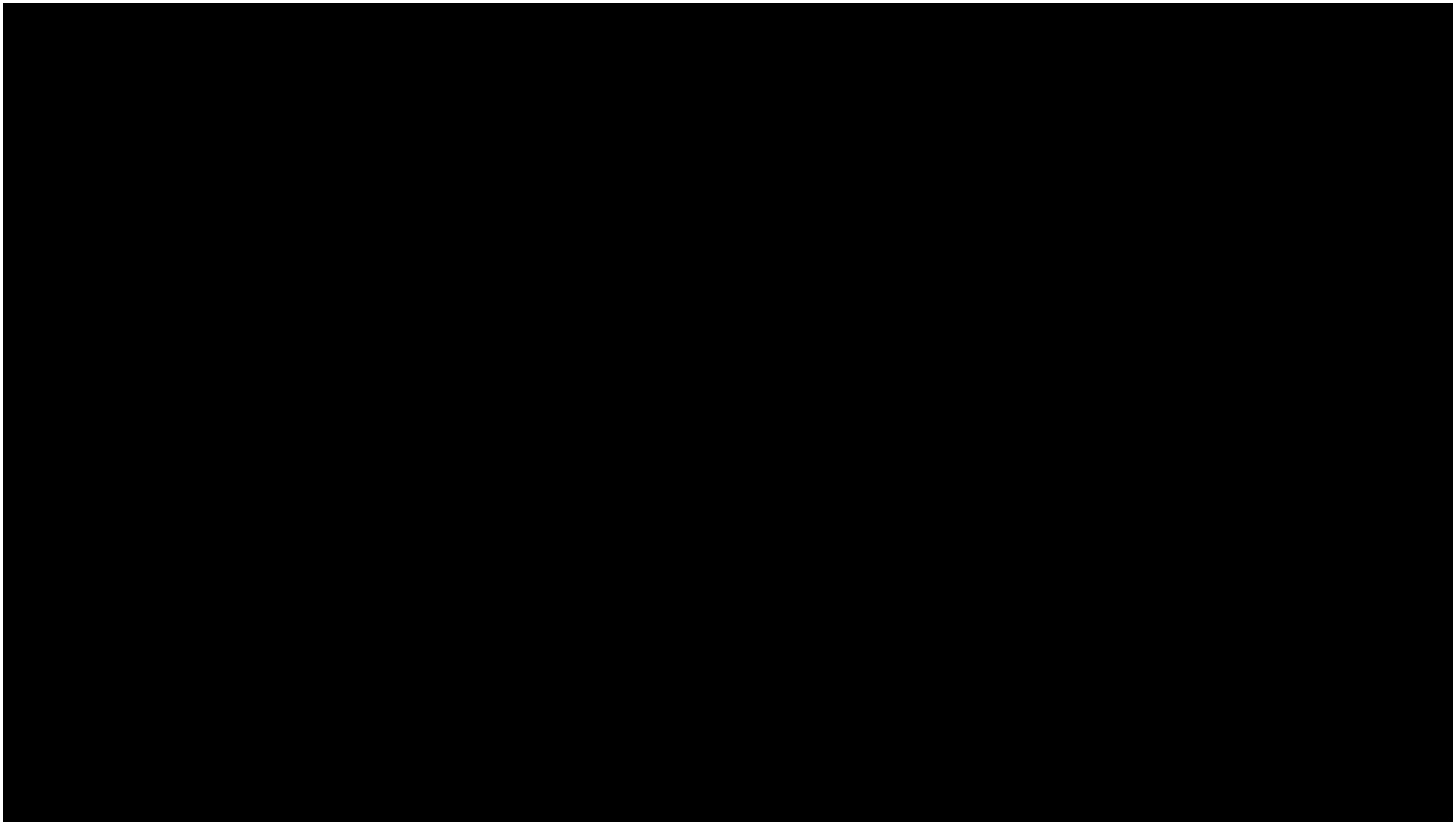


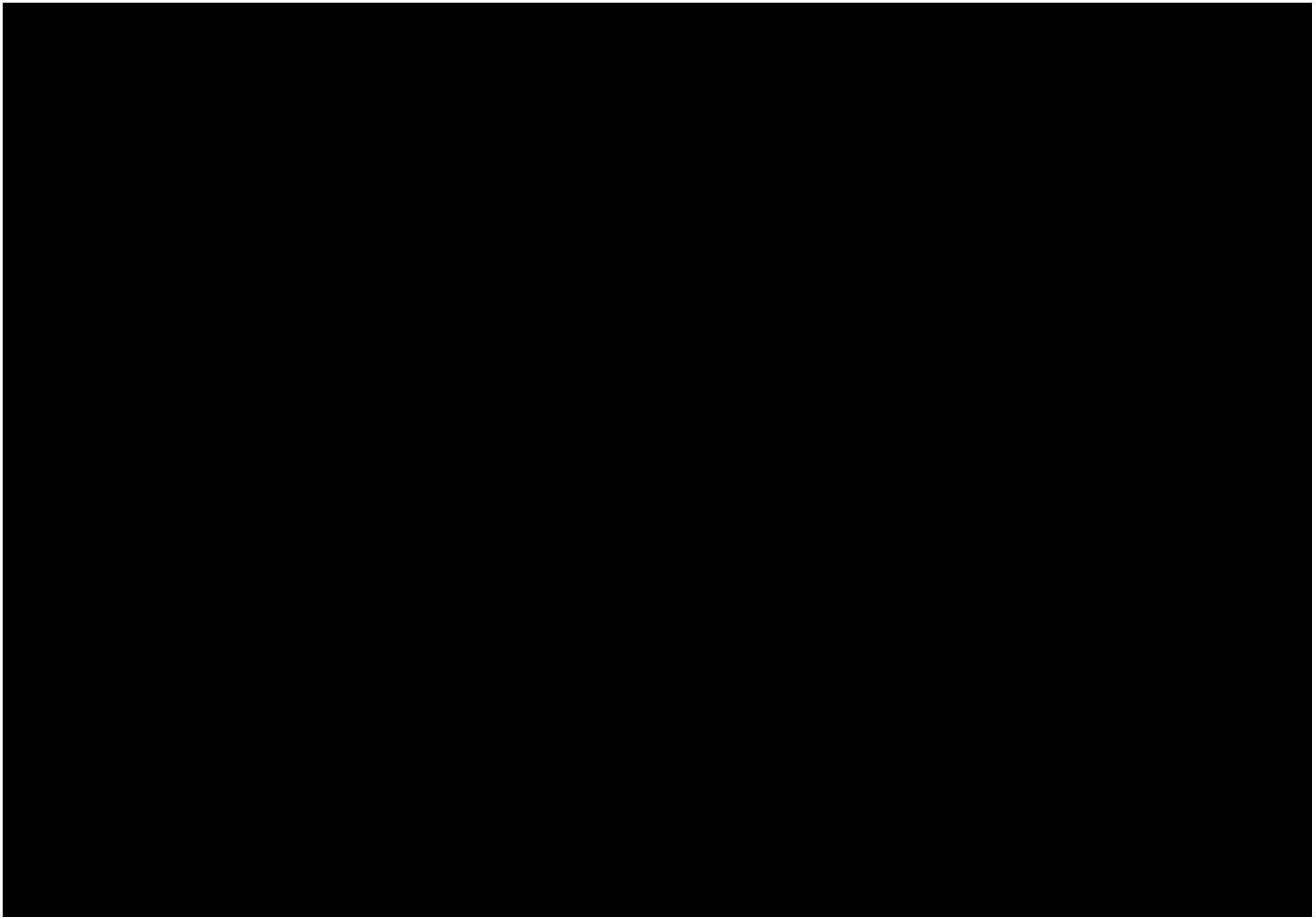












National Grid plc
National Grid House,
Warwick Technology Park,
Gallows Hill, Warwick.
CV34 6DA United Kingdom

Registered in England and Wales
No. 4031152
nationalgrid.com