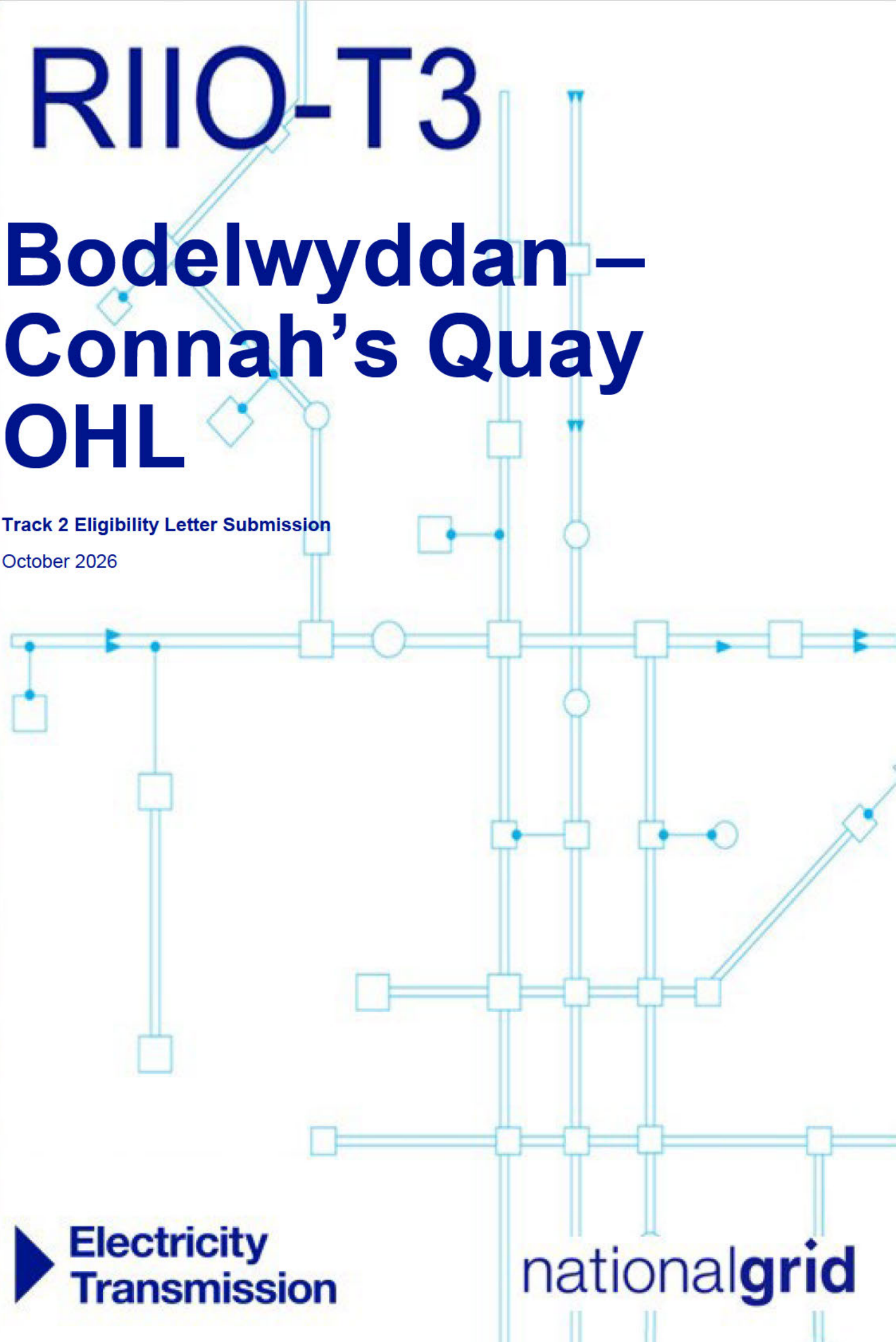
RIIO-T3

Bodelwyddan – Connah's Quay OHL

Track 2 Eligibility Letter Submission

October 2026



Electricity Transmission

nationalgrid

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Reference and summary table

Field	Description
Project name	Bodelwyddan – Connah's Quay OHL
TO's preferred re-opener track	Track 2 Eligibility Letter (EL)
RRP reference	NGT400057 (scheme name "Uprate the Bodelwyddan - Connah's Quay c" and project reference "BODELWYDDAN - DEESIDE - PENTIR REFURB")
BPDT / Scheme reference number	NGT400057 (project reference "BODELWYDDAN - DEESIDE - PENTIR REFURB")
Load Board reference	Referenced in the July 2026 RIIO-3 Re-opener Pipeline Update with project name "NGET 4ZB Bodelwyddan - Connah's Quay OHL".
Investment driver(s)	• **Customer:** There is a connections pipeline of [redacted] Gate 2 Phase 1 customers by 2030 and a further [redacted] Gate 2 Phase 2 customers by 2035 that are directly dependent upon the delivery of reinforcements on this circuit. Our power system assessments based on assumptions stemming from the then ESO's Transmission Works Review (TWR) indicate an uprating is required on the circuit to meet a pre-fault summer load of [redacted] in 2028. • [redacted]
Project outputs	[redacted]
Short list of strategic options considered	Two main options were shortlisted for detailed analysis: • **Option E-1:** Reconductoring to [redacted] • **Option E-4:** Reconductoring to [redacted]
Preferred solution and explanatory narrative on the rationale	Our preferred option is E-1 (reconductor to [redacted]) because it provides the greatest thermal capability and future headroom, aligns with PASE principles for L6 tower reconductoring, has lower electrical losses and lower whole-life costs, and benefits from established operational and maintenance experience across the NGET network. It also enables associated fitting renewal and tower strengthening to be delivered within the same coordinated

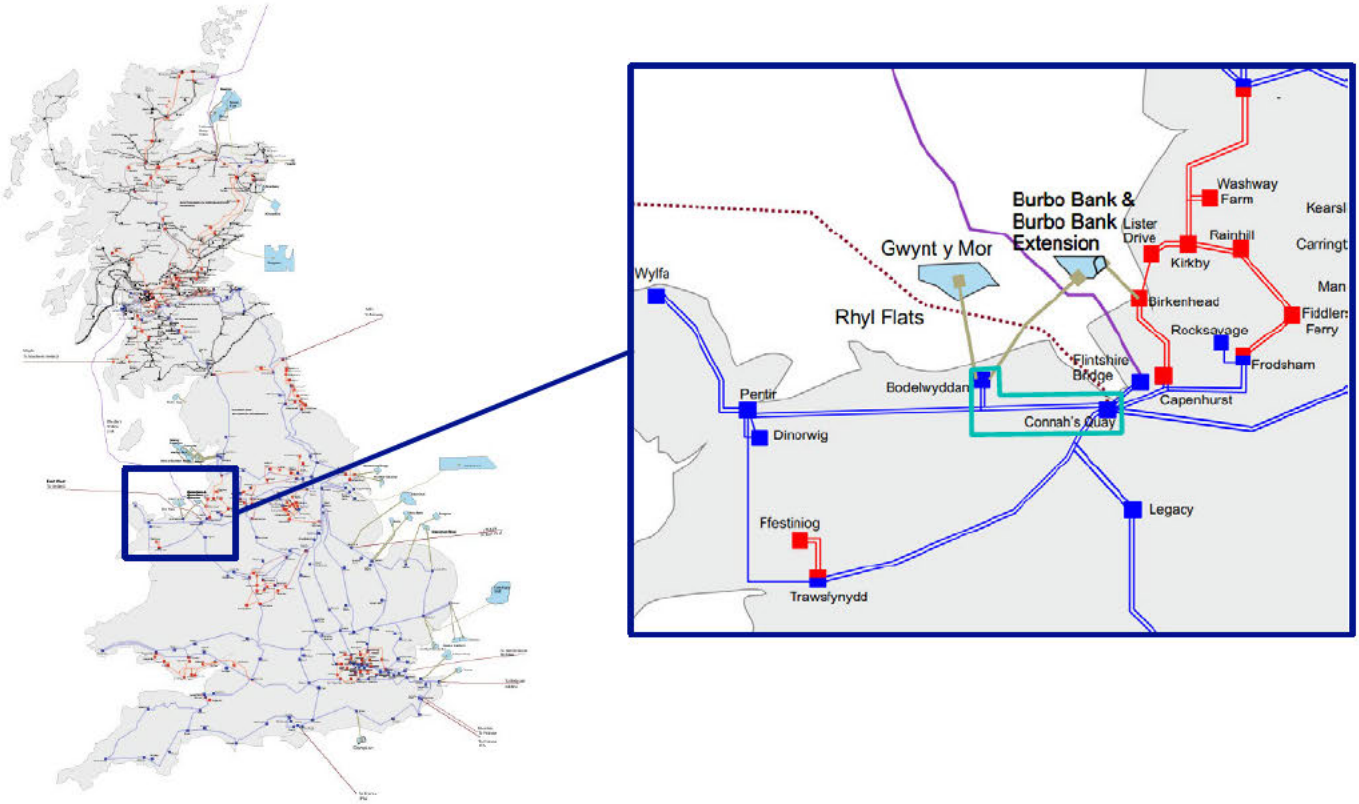
	programme, reducing future outages, mobilisation costs and duplicated stakeholder impacts. Taken together, these factors provide the strongest overall consumer outcome whilst preserving flexibility for future North Wales network developments.
PASE alignment	The preferred option (Reconductoring to [redacted]) is a primary option for reconductoring interventions in the PASE framework. This is because it uses the highest-rated conductor ([redacted] available to NGET for the tower type (L6) and the fittings are to the highest voltage permissible to the tower design (400kV).
Cost (23/24 prices)	At the time of submitting this Eligibility Letter for this mature project, we have a total cost forecast of [redacted] (23/24 prices), including [redacted] for risk and contingency. Please see Section 3.6 for how that percentage is calculated.
Delivery year	[redacted]
Applicable reporting tables	• In the T3 BPDT, the project is referenced in tables <1.9 Look Up Tables>, <6.1 Scheme C&V Load Actuals>, <6.5 T3 Baseline Load>, <9.4 CAI>, <10.2 Asset ID> and <11.10 Contractor Indirects> with OSR NGT400057. • In the 2025-26 RRP, the project is referenced in tables <Look Up Tables>, <D4.11_Asset_ID> and <E1.21 APM Expenditure> with OSR NGT400057.
Interactive projects	• **Bodelwyddan - Deeside - Pentir OHL (4ZB):** Reconductoring 49.9km of the 80km 4ZB Bodelwyddan – Deeside – Pentir route. • **Upper Wales North Connection (UWNC):** New North Wales to West Midlands double circuit to provide extra system capacity. • **Bodelwyddan 400kV extension:** SF_6-free GIS extension of the Bodelwyddan 400kV substation with 400 kV double turn in. • **Deeside - Legacy - Trawsfynydd - Ironbridge - Shrewsbury OHL:** Reconductoring of two circuits: Connah's Quay – Legacy – Trawsfynydd 1 and 2 400kV circuit, and Ironbridge – Shrewsbury – Legacy and Ironbridge – Legacy 400 kV circuits. • **Lower Frankton Quad Boosters:** Installation of two [redacted] Quad Boosters.
Historical funding interactions	[redacted]
Spend apportionment	**T2 (FY 2022-2026):** [redacted] **T3 (FY 2027-2031):** [redacted] **T4+ (FY 2032-2037+):** [redacted]

Executive summary

Project summary

The investment will uprate the Bodelwyddan – Connah's Quay 4ZB OHL circuit in North Wales (see location on network in the figure, below). This is required to address thermal power flow constraints on the 400kV network in North Wales that we have identified in our power-system assessments based on assumptions shared by NESO. This will need to be resolved by 2030 to enable the connection of a selection of Gate 2 Phase 1 customers that are directly dependent upon the delivery of reinforcements on this circuit.

Figure 1: Proposed location of investment on our network



Key: **Red** = 275kV assets, **Blue** = 400kV assets. Investment location shown in **green** box.

Submission purpose

We are seeking Ofgem's approval, under the Load Re-opener (Special Condition 3.18 of the RIIO ET3 licence), to progress the project as a Track 2 EL investment and approval of Pre Construction Funding (PCF).

As part of our T3 Business Plan submission, we submitted an EJP for the uprating of the Bodelwyddan – Pentir leg of the 4ZB route. [redacted]

[redacted]

While these two legs of the OHL have been presented through two separate submissions to Ofgem, they have been assessed through equivalent principles. Both propose using the highest-rated conductor available at the time of optioneering for the tower type.

Project need

The uprating of this route is necessary for enabling customer connections. This includes a pipeline of Gate 2 Phase 1 offers of [redacted] by 2030 and further Gate 2 Phase 2 offers [redacted] by 2035 whose connection requirements are directly dependent upon the delivery of reinforcements on this circuit.

As customer connection projects progress, power transfers and circuit loading across the route are expected to increase, driving higher utilisation of the transmission network and increasing the capability requirements on the circuit. As part of its five-point plan to accelerate customer connection dates and address the large UK connections pipeline, the then-ESO conducted a Transmission Works Review (TWR) in 2023.

Our power system assessments based on the Construction Planning Assumptions (CPAs) that stemmed from the TWR indicated that an uprating is required on the Bodelwyddan – Connah's Quay circuit to meet a pre-fault summer load of [redacted] by 2028. This informed our optioneering, as we ensured that any solution would meet this capacity threshold as a minimum.

Revised CPAs from NESO that stem from Connections Reform uphold this driver, although they indicate that the uprating would now be required by 2030 at the latest.

Optioneering to date

We have undertaken a multi-factor optioneering process to identify the most efficient solution to meet the identified need. We conducted a high-level assessment of six strategic option categories, including do nothing (A), market-based (B), whole-system (C), use existing assets (D), reconductor (E), or build a new line (F). From this, we developed a longlist of 19 potential options (see Table 1).

From this longlist, we identified two shortlist options through the following process:

- **Discounting unfeasible strategic option categories, A-D and F:** Categories A-D were discounted given that they were unable to provide the uprating required.

[redacted]

Category F was discounted because a new OHL circuit would not be deliverable in the required timescales and due to the cost to consumers.

- **Discounting conductor types in category E:** We discounted conductor types based on various considerations, including:
  - **Rating:** We rejected the use of [redacted] conductors (options E-2, E-7, E-8 and E-10) because they fail to meet the rating threshold of [redacted].
  - **Type registration:** We rejected the use of [redacted] conductors (E-3, E-5, E-9 and E-11) because their type registrations were removed or unavailable at the time of committing to a conductor type following optioneering in 2023-24 (please note the project is in delivery).
  - **Cost confidence and supply chain capability:** We also rejected the use of [redacted] conductor (E-5) because there is insufficient cost confidence within this conductor family, with indicative cost estimates suggesting they would be significantly more expensive than the [redacted] conductor (E-1). We also assessed that conductor type to have low maturity from a manufacturing perspective, leading to supply chain capability risks. For these reasons, type registration has not been progressed.
  - **Operability and engineering:** We rejected the use of [redacted] conductor (E-6) on the basis that it is not a preferred conductor system for L6 tower types due to the additional complexities in installation compared to conventional L6 conductor types like [redacted] In addition, there is only limited deployment on the network.
- **Two shortlisted options:** Our two shortlisted options were to reconductor using [redacted] (E-1) or [redacted] (E-4).

Table 1: Summary of options

Option	Details	Drivers met?	Shortlist?	Preferred?
A	Do nothing counterfactual option	No	No	No
B	Market-based solution	No	No	No
C	Non-transmission, whole systems solutions	No	No	No
D-1	Hotwiring	No	No	No
D-2	Dynamic line rating	No	No	No
D-3	Quad booster	No	No	No
D-4	Series reactors	No	No	No
E-1	Reconductor to [redacted]	Yes	Yes	Yes
E-2	Reconductor to [redacted]	No	No	No
E-3	Reconductor to [redacted]	No	No	No
E-4	Reconductor to [redacted]	Yes	Yes	No
E-5	Reconductoring to [redacted]	No	No	No
E-6	Reconductoring to [redacted]	Yes	No	No

Option	Details	Drivers met?	Shortlist?	Preferred?
E-7	Reconductoring to [redacted]	No	No	No
E-8	Reconductoring to [redacted]	No	No	No
E-9	Reconductoring to [redacted]	No	No	No
E-10	Reconductoring to [redacted]	No	No	No
E-11	Reconductoring to [redacted]	No	No	No
F	New Overhead Line Circuit	No	No	No

Of our shortlisted options, Option E-1 is the preferred solution. This is supported by the optioneering assessment and the referenced diagrams in section 3. The rationale is that it provides the greatest thermal capability and future headroom, aligns with PASE principles for L6 tower reconductoring, has lower electrical losses and lower whole-life costs, and benefits from established operational and maintenance experience across the NGET network.

Although primarily driven by customer connection requirements, the option also delivers wider consumer value by integrating load-related reinforcement with [redacted]. Coordinated delivery avoids future standalone interventions, reducing repeat outages, mobilisation costs and stakeholder impacts.

Taken together, these factors provide the strongest overall consumer outcome whilst preserving flexibility for future North Wales network developments.

Cost estimates

Based on the latest cost estimates at the time of submitting this Eligibility Letter for this mature project, preferred option E-1 has a total cost forecast of [redacted] (23/24 prices), including [redacted] for risk and contingency that captures [redacted]

Given the maturity of the project, we request Pre Construction Funding (PCF) allowances that correspond to the estimated pre-construction expenditure incurred to date. Based on that estimate, we request PCF allowances of [redacted] (23/24 prices) as part of this submission under Special Condition 3.15 of the Electricity Transmission licence, which equates to [redacted] of the latest total forecast project costs. This is requested to cover the cost of surveys, planning and land activities, FEED, programme management, and obtaining third party services, which we undertook at risk to maintain pace in delivery while waiting for Ofgem's preferred funding route.

Delivery programme

The target completion date is in [redacted]. Key dependencies at the time of writing in the lead up to that date include:

- **Outages:** The possibility of other project outages and interfacing works slipping is mitigated through coordination meetings with interfacing projects.

[redacted]

- **Land access:** The possibility of disagreement with landowners on temporary access, routes and timing for OHL refurbishment is mitigated through engaging early with landowners to ascertain suitable access routes and timing.
- **Adverse weather:** Effects of adverse weather are mitigated through monitoring weather conditions and assigning additional resources where appropriate.
- **Vandalism and theft:** The risk of National Grid or contractor assets being stolen or vandalised on site is mitigated through a security plan tailored to each location.

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

1. Introduction

1.1 Bodelwyddan – Connah's Quay OHL

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 Bodelwyddan – Connah's Quay OHL investment.

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 E-1)
- confirmation that the project should proceed via Track 2 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 will uprate the circuit, which our power-system assessments based on the Construction Planning Assumptions (CPAs) shared by NESO indicate are necessary for advancing customer connections, including customer connections in North Wales.

Eligibility, Project Track and PASE

The project qualifies under Special Condition 3.18 as a load-driven investment scheduled for delivery within the RIIO-ET3 period. The investment has no allowances provided in the current or historical price control periods.

How our position has evolved

As part of our T3 Business Plan submission, we submitted an EJP for the uprating of the Bodelwyddan – Pentir leg of the 4ZB route. [redacted]

[redacted]

[redacted]



While these two legs of the OHL have been presented through two separate submissions to Ofgem, they have been assessed through equivalent principles. Both propose using the highest-rated conductor available at the time of optioneering for the tower type.

Re-opener track

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 that is PASE aligned. 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 PCF allowances. This is because, in alignment with paragraph 3.15.21 of the licence, the project "did not have funding approved on 1 April 2026".

Given the maturity of the project, we request PCF allowances that correspond to the estimated pre-construction expenditure incurred to date. Table 2 below summarises our estimated expenditure for each category of pre-construction works that is eligible to receive PCF allowances. Based on that estimate, we request PCF allowances of [redacted] (23/24 prices) as part of this submission. This equates to [redacted] of the latest total forecast project costs of [redacted] (23/24 prices).

This position will be updated and ultimately reconciled at Project Assessment stage of the re-opener. We confirm that no PCF activity included in this submission has been funded through baseline allowances, other re openers, or alternative licence mechanisms.

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

No	Description	Total forecast costs (£m)
1	Surveys	[redacted]
2	Planning consent approvals	
3	Optioneering and Feed development	
4	Project design activities	
5	Early enabling works	
6	Stakeholder engagement and consultation activities	
TOTAL		

1.2 Background

Chronology of investment

Between 2019-2022, we received [redacted] customer connection applications at substations in the vicinity of the Connah's Quay – Bodelwyddan – Pentir 4ZB route.[3] These connection applications were made against a backdrop of a growing connections pipeline on the GB transmission network.

In 2023, a Transmission Works Review (TWR) was conducted as part of the then ESO's Five Point Plan to advance customer connection dates. This was based on assumptions regarding the likelihood of customers progressing to a physical connection and the impact this would have on the network. Based on that review, updated Construction Planning Assumptions (CPAs) were provided by the then ESO. Our power-system assessments based on those CPAs identified thermal power flow constraints on key transmission system circuits, including a need to increase transmission capacity on the North Wales 400kV network to accommodate forecast power flows. We determined that this uprating would need to be provided by 2028 at the latest.

Between 2023-2024, we undertook optioneering for how to address the thermal power flow constraints on both legs of the 4ZB route that were identified by the CPAs: the Bodelwyddan – Pentir leg and the Bodelwyddan – Connah's Quay leg. We presented our preferred option to Ofgem on the Pentir leg in a T3 EJP in December 2024, which received baseline funding as part of the ET3 Final Determinations. [redacted]

Between 2025-26, revised CPAs were provided by NESO as part of Connections Reform. Our power system assessments based on those assumptions reconfirmed the need to uprate the 4ZB route and our selected preferred option. However, we determined this would now need to be undertaken by 2030, rather than 2028.

[3] Please refer to the T3 EJP submission for the Bodelwyddan – Pentir circuit for more information on those connection applications.

[redacted]

As part of the Connections Reform process, we have obtained an updated view of the customers whose connections are directly dependent on the uprating. This is an evolved picture from the [redacted] customer connection requests that initially triggered the works. Please refer to Section 2, below, for more information.

The target delivery date at the time of writing is [redacted] which meets the requirement to provide the uprating by 2030.

An overview of the project chronology is provided in Figure 2.

Figure 2: Summary of chronology

Following [redacted] customer connection applications at sites on the 4ZB route in North Wales, our analysis based on the then ESO's 2023 Transmission Work Review (TWR) assumptions identified thermal power flow constraints on the route.	**2019-22 (connection requests):** We received [redacted] connection requests at sites on the 4ZB route: **2023 (TWR):** Based on the TWR, updated Construction Planning Assumptions (CPAs) were provided by the then ESO. Our analysis based on those CPAs identified thermal power flow constraints on key transmission system circuits, including a need to increase transmission capacity on the North Wales 400kV network to accommodate forecast power flows.
We optioneered the uprating of the 4ZB route, including the Bodelwyddan – Pentir leg (presented to Ofgem in a T3 EJP) and the Bodelwyddan – Connah's Quay leg ([redacted]).	**2023-24 (optioneering):** Based on the CPAs, we undertook optioneering for a solution that would address the thermal power flow constraints on two legs of the 4ZB: the Bodelwyddan – Pentir leg and the Bodelwyddan – Connah's Quay leg. **2024 (T3 Business Plan):** In the T3 Business Plan in December 2024, we submitted an EJP for the Bodelwyddan – Pentir leg that received baseline allowances for our preferred option. For the Bodelwyddan – Connah's Quay leg, covered in the present document, [redacted]
[redacted]	**2025 (Connections Reform):** As part of Connections Reform, NESO shared revised CPAs with us. Based on those CPAs, the need to uprate the two legs of the 4ZB route remains. [redacted]

Regional and network context

The investment is located on the 400kV network in the north of Wales (please see Figure 1 in the Executive Summary).

The transmission network in North Wales was designed for moving power from older generating plants to demand centres. The region houses Dinorwig, a hydroelectric pumped storage generator used by the system operator for strategic reserve and fast dispatch. [redacted]

The Northwest region is renowned for its diverse energy landscape with c.16 GW of connected generation capacity already in place comprising a variety of technology types including Combined Cycle Gas Turbines (CCGTs), offshore wind farms (such as Burbo Bank and the Walney Extension), pumped storage and interconnectors. From Connah's Quay substation, there is the East West interconnector with Ireland.

As part of Connections Reform, capacity allocations were agreed between the Government and NESO for each transmission network region for different technologies required for 2030 and 2035 to help protect the ability to connect strategically important demand.[4] For the region defined as "North Wales, the Mersey and the Humber", this was restricted to 1.2GW of capacity for solar, 300MW of capacity for onshore wind and 4.2GW of capacity for batteries for 2030.

The Welsh Government has set a target for Wales to meet 100% of its electricity needs from renewable sources by 2035 and achieve net zero carbon emissions by 2050, ambitions which signal a significant energy transition for the country. With abundant wind and marine resources, and scope for future nuclear development at Wylfa, North Wales could become a net exporter of low-carbon electricity.

Interactive projects

The Bodelwyddan–Connah's Quay reinforcement forms part of a broader North Wales transmission strategy that includes future reinforcements such as the tCSNP2 Upper Wales North Connection (UWNC) project and wider network developments identified through Connections Reform. The preferred option provides a lower-regret near-term intervention that maximises the capability of existing infrastructure while preserving flexibility for future strategic transmission developments.

Interactive projects are described in Table 3 and are presented on a map in Figure 3, below.

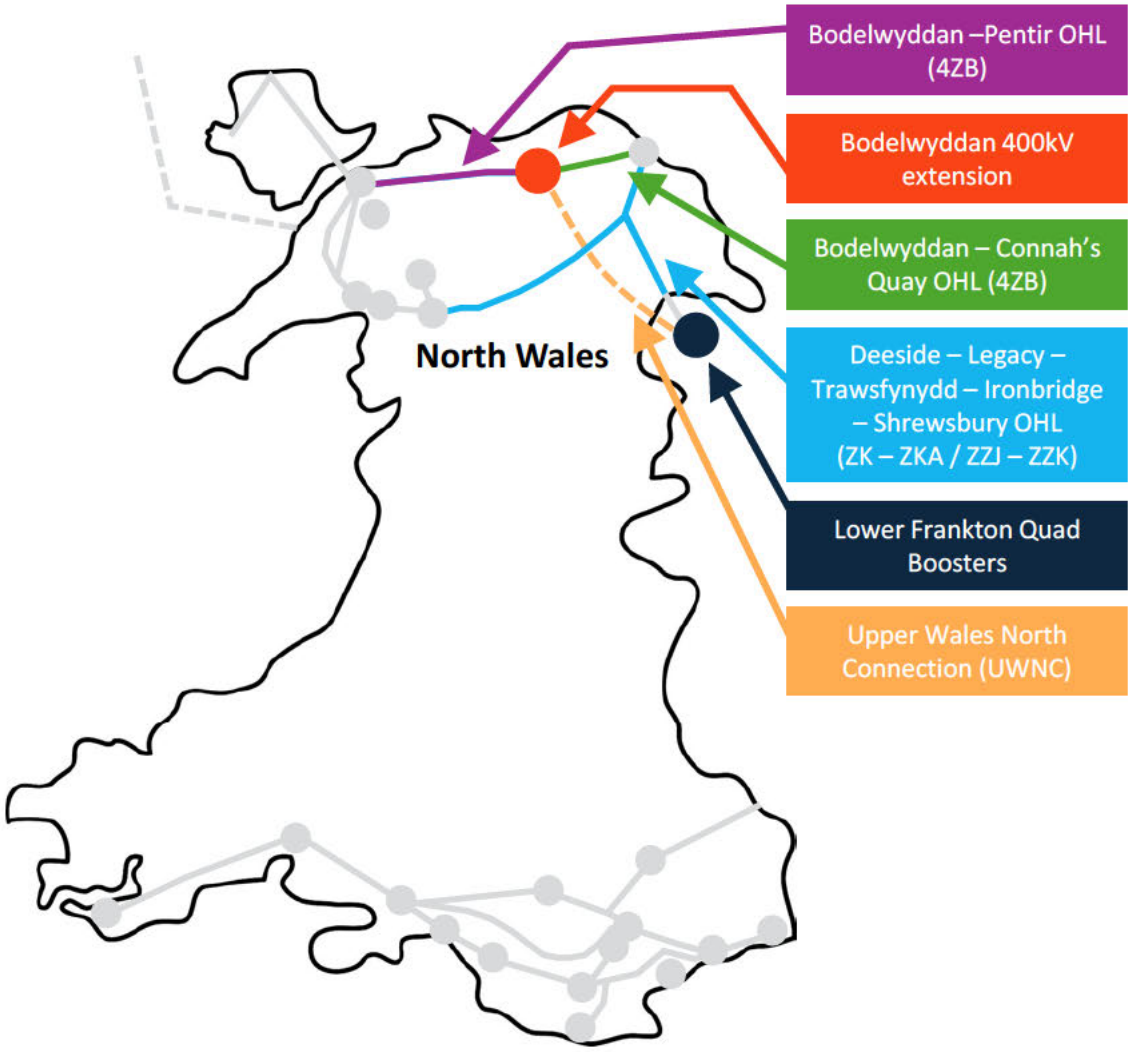
Table 3: Interactive projects

Key	Project	Details	Status
	Bodelwyddan - Deeside - Pentir OHL (4ZB)	Reconductoring of the first 49.9km of the 80km 4ZB Bodelwyddan – Deeside – Pentir route. This covers [redacted] from Pentir to the Bodelwyddan tee.	The EJP was submitted in the T3 Business Plan for delivery in [redacted]
	Upper Wales North Connection (UWNC)	New North Wales to West Midlands double circuit to provide additional system capacity. This is part of the larger PSNC project which will build a new circuit between North Wales and South Wales.	[redacted]

[4] UK Government, 2026. Clean Power 2030 Action Plan: connections reform annex (updated April 2025)

Key	Project	Details	Status
	Bodelwyddan 400kV extension	SF_6-free GIS extension of the existing Bodelwyddan 400kV substation with 400 kV double turn in. This is to connect [redacted] customers.	Eligibility Letter was submitted to Ofgem in May 2026. Construction is planned to commence in [redacted] and the first customer's contractual ACL is in [redacted]
	Deeside - Legacy - Trawsfynydd - Ironbridge - Shrewsbury OHL	Reconductoring of two circuits: Connah's Quay - Legacy - Trawsfynydd 1 and 2 400kV circuits, and Ironbridge - Shrewsbury - Legacy and Ironbridge - Legacy 400 kV circuits to address TWR study thermal constraint findings.	The project has also submitted a Track 2 Load Re-opener submission in October 2026. The project is scheduled for completion in [redacted]
	Lower Frankton Quad Boosters	Installation of two [redacted] Quad Boosters to provide operational control of power flows and support management of increasing transfers across the North Wales and Midlands transmission network.	Included within tCSNP2 Refresh; ongoing assessment to determine future scope and delivery requirements.

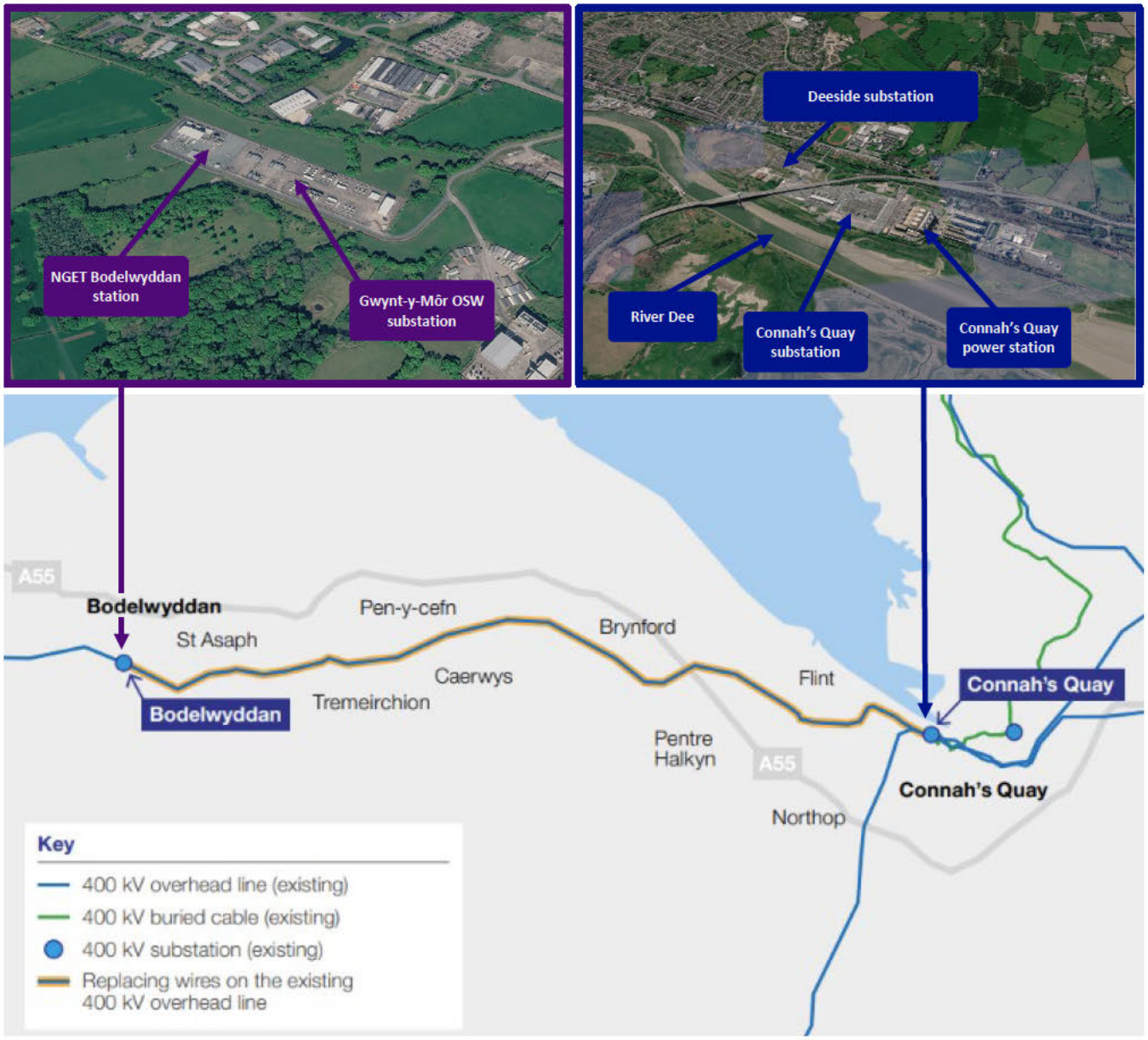
Figure 3: Location of interactive works relative to the investment



Site background

The 4ZB route consists of two circuits, circuits 1 and 2, which are divided into two sections: the Pentir to Bodelwyddan route and the Bodelwyddan to Connah's Quay route. Constructed in [redacted] the route has undergone major refurbishments in the past, with the most recent refurbishment taking place in [redacted] A visual representation of the substations and the 4ZB is route provided in Figure 4 below, with the Bodelwyddan - Connah's Quay section covering around 30km of the total 4ZB 80 km route.

Figure 4: Images of Bodelwyddan and Connah's Quay substations on the 4ZB OHL route



Historical funding

[redacted]

Early Asset Write Offs (EAWO)

At the time of initiating the investment, the RAV balance was [redacted]

2. Drivers and need case

The investment is triggered by the need to uprate the Bodelwyddan – Connah's Quay circuit to accommodate the load of connecting customers on the route. This need is informed by our power system assessments based on assumptions shared by the then ESO.

Table 4: Investment drivers

Summary of drivers		ACL date
Customer	There is a connections pipeline of [redacted] Gate 2 Phase 1 customers by 2030 and a further [redacted] Gate 2 Phase 2 customers by 2035 that are directly dependent upon the delivery of reinforcements on this circuit. Our power system assessments based on assumptions stemming from the then ESO's 2023 Transmission Works Review (TWR) indicate that, to provide those connections, an uprating is required on the circuit to meet a pre-fault summer load of [redacted] in 2028. This informed our optioneering. Revised assumptions from NESO that stem from connections Reform Phase 1 confirm our optioneering choice.	2030, 2035
Asset health	[redacted]	-

2.1 Customer

Customer connections

The pipeline of Gate 2 customer connections that are dependent on the investment is summarised in Table 5. This is split into Phase 1 connections taking place before 2030 and Phase 2 connections taking place before 2035 as part of Connections Reform.[5] The customers identified within this pipeline represent those whose connection requirements are directly dependent upon the delivery of the proposed reinforcements. Without the additional capability delivered by the investment, these customer connections cannot be accommodated whilst maintaining secure operation of the transmission system.

[5] The customer connection pipeline has been refined through Connections Reform. As part of this process, projects that did not meet the required progression criteria were reassigned to Gate 1, removing less mature projects from the near-term connection background. The remaining projects (Gate 2, which is split into Phases 1 and 2) therefore represent the current view of the most credible and deliverable customer connections.

Table 5: Connections pipeline (by 2030/35) of customers who are dependent on the investment

Customer Category	Number of Connections	Capacity (MW)	Connection Assumptions
Generation*	[redacted]	[redacted]	Gate 2 Phase 1 (by 2030)
Demand			
DNO Demand			
DNO Embedded Generation			
Other			
Total			
Generation**			Gate 2 Phase 2 (by 2035)
Demand			
DNO Demand			
DNO Embedded Generation			
Other			
Total			

[redacted]

System requirements to connect the customers

As customer connection projects progress, power transfers and circuit loading across the affected routes are expected to increase, driving higher utilisation of the transmission network and increasing the capability requirements on the affected circuits. Reinforcement of the affected circuits is therefore required to address the identified capability shortfall and facilitate forecast growth in customer connections.

To address this challenge, as discussed in our chronology to the investment in Section 1.2, the then ESO undertook a Transmission Works Review (TWR) in 2023. Based on the TWR, updated Construction Planning Assumptions (CPAs) were provided by the then ESO. These identified thermal power flow constraints on key transmission system circuits, including a need to increase transmission capacity on the North Wales 400kV network by 2028 to accommodate forecast power flows. Using those CPAs, NGET conducted power-system assessments to identify the specific network reinforcements needed to meet those assumptions. Based on our assessments stemming from the TWR CPAs, we forecast a predicted pre-fault summer load of [redacted] in 2028, which provided the threshold on which we based our optioneering (set out in Section 3).

As part of Connections Reform Phase 1, revised CPAs were provided by NESO. Using those CPAs, we conducted new power system assessments to understand the latest network reinforcements needed to meet those assumptions. Based on our assessments stemming from the Connections Reform Phase 1 CPAs, we forecast a pre-fault summer loading of approximately [redacted] by 2030 on the circuit and a post-fault winter requirement of [redacted] by 2030. [redacted]

[redacted] Although this information came to us after our optioneering, this confirmed that we used the correct approach of adopting the conductor with the highest rating.

The Transmission Works Report, which lists the transmission reinforcement schemes being carried out across TOs to facilitate customer connections and is accessible from NESO's website, includes the uprating of the Bodelwyddan – Connah's Quay OHL.[6]

More information on this driver is set out in Appendix D.

Robustness of need under customer uncertainty

NGET has considered the risk of changes to the current customer portfolio. While the precise composition and timing of individual projects may continue to evolve, the reinforcement is driven by broader forecast increases in power transfers across the North Wales corridor rather than any single customer.

The CPAs that have informed this need have attrition factored into them, meaning the need is robust to a proportion of Gate 2 projects failing to materialise. Furthermore, Connections Reform and the Connections Network Design Methodology (CNDM) require all projects that have secured Gate 2 status to be included in the assessment background, irrespective of potential future delays. The reinforcement requirement has therefore been determined against the agreed Gate 2 portfolio to ensure a fair, consistent and queue-compliant outcome.

The proposed reinforcement therefore represents a low-regret intervention which remains justified under a range of plausible customer development scenarios. If individual projects do not progress, significant reinforcement requirements remain due to the remaining background of generation, demand and wider regional transfer requirements. The results are also robust to the potential for oversubscription of batteries because, when NESO assigns Gate 2 status, NESO has already made this consideration.

[redacted]

[redacted]

[6] NESO, 2026. TWR Report (26 June 2026)





3. Optioneering

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.
5. We then consider the outputs of both step 3 and 4 to provide a final preferred option.

This paper uses lettered design options (A–F) (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 7: Strategic direction setting

Option	Description
Option A: Do nothing	This option involves making no changes and therefore doing nothing to meet the drivers.
Option B: Market based solution	This option involves meeting the drivers 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.
Option D: Make use of existing assets	This option involves making use of existing OHL infrastructure.
Option E: Reconductoring	This option involves reconductoring the existing OHL but making use of the existing towers.
Option F: New line	This option involves construction of a new OHL.

We discounted Options A, B and C due to the inability of these options to meet the investment drivers and therefore fulfil our licence obligation, Transmission Licence (Licence Condition C8). The use of existing OHL infrastructure (Option D) was discounted because these options were

unable to meet the investment driver, while the construction of a new line (Option F) was ruled out on deliverability grounds and the cost to consumers.

For Option C, NGET considered whether the identified capability requirement could be met through non-transmission interventions including DNO flexibility services, active network management, generation curtailment and coordinated transmission-distribution solutions. Such measures may provide operational benefits but would not provide the enduring scale of increase in transmission capability required by NESO's Construction Planning Assumptions nor support wider network transfer requirements across North Wales. Consequently, a transmission reinforcement remained necessary.

The preferred strategic direction is therefore to reconductor (Option E).

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.

A descriptive rationale for rejection or progression from the longlist is explained in Table 8, below.

Table 8: Assessment of longlist options

Option name and status (progressed/not progressed)	Technical Description	Relevant diagrams	Consenting risk and environmental constraints	Rationale for rejecting or taking forward the option
Option A: Do minimum **Not progressed**	Maintaining the network its current state and not addressing the investment drivers.	N/A	N/A	**Engineering:** Rejected as this option does not meet the investment drivers for the project, the wider consequences of which result in a highly constrained transmission network in North Wales.
Option B: Market-based solution **Not progressed**	The investment drivers are met through the procurement and use of ancillary services only.	N/A	N/A	**Engineering:** Market-based approaches are not able to provide the necessary increase in capacity. It is therefore not possible to address the investment driver through this means.
Option C: Non-transmission, whole-systems solution **Not progressed**	The investment drivers are met through DNO flexibility rather than through NGET infrastructure investment.	N/A	N/A	**Engineering:** There are limitations with DNO flexibility. Active network management (ANM) or curtailment is not sufficient to meet the need of managing substantial power demands. Distribution-level flexibility and connection management measures are insufficient substitutes for infrastructure intervention. Therefore, this approach is unable to meet the driver.
Option D-1: Hotwiring **Not progressed**	Hotwiring the existing Bodelwyddan – Connah's Quay circuit.	N/A	N/A	**Engineering:** Rejected primarily as hotwiring will only achieve a pre-fault summer rating of [redacted] which is insufficient to meet the [redacted] uprating requirement indicated by our power system studies based on the TWR CPAs.
Option D-2: Dynamic line rating **Not progressed**	Real time calculation of safe transmission capacity by measuring and modelling actual conductor and environmental conditions.	N/A	No major environmental impact but consenting challenges may arise as it does not fully meet planning and compliance standards (SQSS).	**Engineering:** Does not provide the [redacted] uprating reinforcement requirement indicated by our power system studies based on the TWR CPAs.

Option name and status (progressed/not progressed)	Technical Description	Relevant diagrams	Consenting risk and environmental constraints	Rationale for rejecting or taking forward the option
Option D-3: Quad booster **Not progressed**	Redirection of real power flow between parallel paths, relieving overloads and improving utilisation of existing network capacity.	N/A	Minimal environmental impact but may introduce constraints on other circuits, leading to additional works and environmental risks elsewhere.	**Engineering:** Rejected as Quad Boosters redistribute power flows rather than increase circuit thermal capability. Whilst capable of influencing flow patterns, they would not address the underlying capability requirement identified by the studies and could increase loading on adjacent circuits. The introduction of series impedance would also adversely affect voltage stability, particularly under certain fault conditions.
Option D-4: Series reactors **Not progressed**	Increase transmission line impedance to limit currents and influence power flow	N/A	Minimal environmental impact but may introduce constraints on other circuits, leading to additional works and environmental risks elsewhere.	**Engineering and economic/consumer value:** Does not add capacity and could create system instability and overloads, leading to further interventions.
Option E-1: Reconductoring to [redacted] **Progressed to shortlist**	Uprate the existing OHL conductor between Bodelwyddan and Connah's Quay by reconductoring the circuit with [redacted]conductor.	Circuit diagram provided in Section 3.3, and route layout provided in Section 1.2.	The project will involve conducting standard project development surveys. Additionally, minor additional surveys will be carried out to account for the increased clearance provided by the new conductor system compared to the old system. Though the environmental risks are low compared to constructing a new OHL, the reconductoring works still carry potential risks including: • habitat disturbance • soil erosion • noise and air pollution • waste generation during the reconductoring works On top of these risks, there are indirect carbon emissions due to the supply	**Engineering:** This option was assessed as credible as it meets all the investment drivers of the project. With respect to the primary investment driver (i.e., TWR thermal capacity requirements), reconductoring the OHL with [redacted] is a significant upgrade that enables the circuits to achieve a summer pre-fault rating of [redacted]

Option name and status (progressed/not progressed)	Technical Description	Relevant diagrams	Consenting risk and environmental constraints	Rationale for rejecting or taking forward the option
			chain management (SCM) activities of the materials required and subsequent works carried out.	
Option E-2: Reconductoring to [redacted] **Not progressed**	Uprate the existing OHL conductor between Bodelwyddan and Connah's Quay by reconductoring the circuit with [redacted] conductor.	As with Option E-1.	As with Option E-1.	**Engineering:** Reconductoring the OHL with [redacted] conductors would only achieve a summer pre-fault rating of [redacted], which is insufficient to meet the [redacted] uprating requirement indicated by our power system studies based on the TWR CPAs.
Option E-3: Reconductoring to [redacted] **Not progressed**	Uprate the existing OHL conductor between Bodelwyddan and Connah's Quay by reconductoring the circuit with [redacted] conductor.	As with Option E-1.	As with Option E-1.	**Compliance:** This conductor has had its type registration removed, therefore, this is no longer a compliant solution. [redacted]
Option E-4: Reconductoring to [redacted] **Progressed to shortlist**	Uprate the existing OHL conductor between Bodelwyddan and Connah's Quay by reconductoring the circuit with [redacted] conductor.	As with Option E-1.	As with Option E-1.	**Engineering:** The option of reconductoring the OHL with [redacted] conductors is a significant upgrade that would extend asset life by around [redacted] and achieve a summer pre-fault thermal rating of [redacted]
Option E-5: Reconductoring to [redacted] **Not progressed**	Uprate the existing OHL conductor between Bodelwyddan and Connah's Quay by reconductoring the circuit with [redacted] conductor.	As with Option E-1.	As with Option E-1.	**Economic/consumer value:** Although [redacted] can meet the driver and achieve a summer pre-fault rating of [redacted], the conductor was not type registered at the time of optioneering.

Option name and status (progressed/not progressed)	Technical Description	Relevant diagrams	Consenting risk and environmental constraints	Rationale for rejecting or taking forward the option
				In addition, while there is limited cost confidence with this conductor family, the indications are that it is materially more expensive than the [redacted] option [redacted] **Deliverability:** This conductor type has low maturity from a manufacturing perspective, leading to supply chain capability risks.
Option E-6: Reconductoring to [redacted] **Not progressed**	Uprate the existing OHL conductor between Bodelwyddan and Connah's Quay by reconductoring the circuit with [redacted] conductor.	As with Option E-1.	As with Option E-1.	**Engineering:** [redacted] is not a preferred conductor system for L6 towers due to the additional complexities in installation compared to conventional L6 conductor types like [redacted] **Operability:** Only [redacted] is deployed on the network so there are limited strategic spares, operational and maintenance data – leading to more reliability risk. **Economic/consumer value:** [redacted] conductor is materially more expensive to purchase and install than the conductors we have shortlisted. Per circuit km, [redacted] is approximately 2x that of [redacted] (option E-1) and 1.8x that of [redacted] (option E-4).
Option E-7: Reconductoring to [redacted]	Uprate the existing OHL conductor between Bodelwyddan and Connah's Quay by reconductoring the circuit with [redacted] conductor.	As with Option E-1.	As with Option E-1.	**Engineering:** Rejected as reconductoring the OHL with [redacted] conductors would only achieve a summer pre-fault rating of [redacted] which fails to meet the primary investment driver of this project.

Option name and status (progressed/not progressed)	Technical Description	Relevant diagrams	Consenting risk and environmental constraints	Rationale for rejecting or taking forward the option
Not progressed				
Option E-8: Reconductoring to [redacted] **Not progressed**	Uprate the existing OHL conductor between Bodelwyddan and Connah's Quay by reconductoring the circuit with [redacted] conductor.	As with Option E-1.	As with Option E-1.	**Engineering:** Rejected as reconductoring the OHL with [redacted] conductors would only achieve a summer pre-fault rating of [redacted], which fails to meet the primary investment driver of this project.
Option E-9: Reconductoring to [redacted] **Not progressed**	Uprate the existing OHL conductor between Bodelwyddan and Connah's Quay by reconductoring the circuit with [redacted] conductor.	As with Option E-1.	As with Option E-1.	**Compliance:** Rejected as Type Registration of [redacted] conductor has been withdrawn; therefore, this is no longer a compliant solution.
Option E-10: Reconductoring to [redacted] **Not progressed**	Uprate the existing OHL conductor between Bodelwyddan and Connah's Quay by reconductoring the circuit with [redacted] conductor.	As with Option E-1.	As with Option E-1.	**Engineering:** Rejected as reconductoring the OHL with [redacted] conductors would only achieve a summer pre-fault rating of [redacted] which fails to meet the primary investment driver of this project.
Option E-11: Reconductoring to [redacted] **Not progressed**	Uprate the existing OHL conductor between Bodelwyddan and Connah's Quay by reconductoring the circuit with [redacted] conductor.	As with Option E-1.	As with Option E-1.	**Compliance:** [redacted] conductor was not type registered during the optioneering phase so was not a valid option at the time. This is also a lower-rated conductor type than others available (e.g., it has a lower rating than [redacted]
Option F: New Overhead Line Circuit **Not progressed**	Construct a new OHL route between Bodelwyddan and Connah's Quay substations.	Not explored.	High environmental impact due to land use and visual intrusion. Significant consenting risks due to new OHL construction in potentially protected or sensitive areas (although the precise route is not determined at the long list stage).	**Deliverability, economic/consumer value and consenting/stakeholder:** This option was rejected as it cannot address the immediate investment needs within the required timescale of 2028 and comes with higher costs, higher environmental impacts and greater consenting risks relative to the shortlisted options.

In summary, Options A-D were rejected because they were unable to meet the investment drivers for the project, the wider consequences of which result in a highly constrained transmission network in North Wales. Option F was rejected on the grounds that a new OHL circuit would not be deliverable in the required timescales and due to the costs to consumers.

Within our preferred strategic approach of reconductoring (Option E), we rejected various conductor types on the following grounds:

- **Rating:** We rejected the use of [redacted] conductors (options E-2, E-7, E-8 and E-10) because they fail to meet the [redacted] uprating requirement indicated by our power system studies based on the TWR CPAs.
- **Type registration:** We rejected the use of [redacted] conductors (options E-3, E-5, E-9 and E-11) because their type registrations were removed or unavailable at the time of committing to a conductor type following optioneering in 2023-24. The project is now in delivery.
- **Cost confidence and supply chain capability:** We also rejected the use of [redacted] conductor (option E-5) because there is insufficient cost confidence with this conductor family, with indicative cost estimates suggesting they would be more expensive than [redacted] conductor (option E-1). We also assessed that conductor type to have low maturity from a manufacturing perspective, leading to supply chain capability risks. For these reasons, type registration has also not been progressed.
- **Operability and engineering:** We rejected the use of [redacted] conductor (option E-6) on the basis that it is not a preferred conductor system for L6 tower types and has additional installation complexities. [redacted] conductor is significantly more expensive to purchase and install.

Our two shortlisted options were to reconductor using [redacted] (option E-1) or [redacted] (option E-4).

Stakeholder influence on shortlisting

Reconductoring the existing OHL route has a much lower impact on stakeholders and has a significantly lower consenting risk than the construction of a new OHL circuit. The construction of the new OHL did not address the immediate investment needs within the required timescale of 2028 and comes with higher costs, higher environmental impacts and greater consenting risks relative to the shortlisted options. Among other factors, this has influenced our decision to shortlist only the reconductoring options.

3.3 Shortlisted options

We shortlisted two options, which are described in the subsections below.:

- **Option E-1:** Reconductoring to [redacted]
- **Option E-4:** Reconductoring to [redacted]

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

Option E-1: Reconductoring to [redacted]

Description of works:

[redacted]

Circuit diagram: A circuit diagram is provided in Figure 5, below. A layout of the OHL route is provided in Section 1.2, above.

[redacted]

Option E-4: Reconductoring to [redacted]

Description of works:

[redacted]

Circuit diagram: The circuit diagram is equivalent to option E-1, which is provided above. A layout of the OHL route is provided in Section 1.2, above.

3.4 Qualitative assessment of shortlist

In appraising these two 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 9.

Some key considerations that are applicable to all options and that therefore do not act as differentiators include the following:

- **Planning and consenting:** Work will be completed under permitted development rights.
- **Future asset replacement:** Asset life of OHL circuit will be increased, meaning no secondary asset replacement project needed in the long term.
- **System access:** Adequate system access available to carry the work.
- **Access works and ecological consents:** Significant access works needed, including scaffold protection over third party assets.

Table 9: Multifactorial analysis

Option	Optioneering categories				
	Engineering	**Environmental**	**Deliverability**	**Economic / consumer value**	**Consenting / stakeholder**
Option E-1: Reconductoring t [redacted]	✓ **Rating:** Meets current and future demand by providing the highest rated conductor for the tower type (summer pre-fault rating of [redacted] compared to TWR requirements (pre-fault summer load of [redacted]). ✓ **Operation and maintenance:** Less complex maintenance procedures and availability of spares.	✓ **Losses:** [redacted] provides lower losses than both the existing conductor and Option E-4.	• **Installation method and programme and outage duration:** The installation method is relatively simple and does not have the same challenges associated with [redacted]	✓ **Conductor material costs:** More economical than other option due to [redacted] Well known and utilised conductors globally. ✓ **Asset lifespan:** A longer lifespan ([redacted] than Option E-4. ✓ **Thermal capacity and futureproofing:** Larger thermal capacity when compared to TWR requirements means route is future-proofed from any further growth.	• No significant difference between each option
	Benefit	Benefit	Neutral	Benefit	Neutral
Option E-4: Reconductoring to [redacted]	× **Rating**: Lowest rating out of the two shortlisted options (summer pre-fault thermal rating of [redacted] × **Futureproofing and efficiency:** Lack of future proofing and lower efficiency may lead to early asset write offs for future requirements. × **Operation and maintenance:** More complex maintenance procedures compared to traditional conductor types.	× **Losses:** Greater losses due to higher operating temperature and [redacted].	× **Installation method and programme and outage duration:** [redacted]) can increase programme requirements leading to increased outage durations. Not the case for the conductor types used in the other shortlisted options.	× **Conductor material costs:** Initially higher capital cost option. × **Asset lifespan:** A shorter lifespan [redacted] requires additional capex in shorter timeframes. × **Thermal capacity and futureproofing:** Higher cost to the consumer if load related revisits are required due to lower thermal rating than the alternative option.	• No significant difference between each option
	Detractor	Detractor	Strong Detractor	Detractor	Neutral

Qualitative assessment output

Based on the qualitative assessment, the preferred option is Option E-1 (Reconductoring to [redacted]), because:

- **Future proofing:** By uprating to the highest-rated conductor (summer pre-fault rating of [redacted], compared with a summer pre-fault thermal rating of [redacted]), it provides the most headroom for future developments relative to the TWR uprating requirements (pre-fault summer load of [redacted] by 2028).
- **Consumer value:** The conductor type typically has lower losses, a lower upfront capital cost, and a longer asset life than the conductor types for the other shortlisted options.

PASE alignment

The preferred option E-1 (Reconductoring to [redacted]) is a primary option for reconductoring interventions in the PASE framework. This is because it uses the highest-rated conductor ([redacted]) available to NGET for the tower type (L6) and because the fittings are to the highest voltage permissible to the tower design (400kV).

3.5 Quantitative analysis of shortlist options

Cost estimates of shortlist options

To assess the shortlisted options, cost estimates were created for quantitative economic comparison at the optioneering stage. These are the costs we present in the CBA to reflect our perspective at the time of optioneering and to ensure like-for-like comparison across shortlisted options. The cost estimates in our CBA differ from our present view of cost forecasts for this mature project, which is currently in delivery. We present our current cost forecast for our preferred option in Section 3.6.

All capex costs in the CBA are derived from NGET's latest Cost Book (23/24 prices). Estimating Units Lines (EULs) have been used to generate cost estimates based on the scope of work and the new assets to be acquired for each option. For each EUL, we have applied a [redacted] contingency, based on historical project analysis, to account for unforeseen circumstances and to mitigate risks during implementation.

The [redacted] risk and contingency factor represents our view at the time of early optioneering and development and is a proportionate representation of remaining project uncertainty at that time. A project-specific Quantitative Schedule Risk Assessment (QSRA) and Quantitative Cost Risk Assessment (QCRA) will be completed as part of Project Assessment and the allowance requested will be updated accordingly.

Because the project has already progressed into delivery, residual uncertainty has reduced. Our present view of the risk and contingency factor is [redacted] which is discussed in Section 3.6.

Table 10: Cost estimate breakdown

Shortlist Options	OHL (£m)	Cables (£m)	Substation (£m)	Total (exc. risk (£m))	Biodiversity (%)	Total (incl. % risk (£m))
Option E-1: Reconductor with						
Option E-4: Reconductor with						

Option E-1 is lower cost than Option E-4 because conductor is more economical than conductor.

Cost Drivers

The project's cost estimates presented in the CBA are based on market conditions. This funding request is supported by high-cost confidence and robust EUL (Estimating Units Lines) assessments.

The only factor driving the difference between options is the cost and installation of the conductors.

Cost Benefit Analysis (CBA)

Purpose and approach

Our Cost Benefit Analysis (CBA) evaluates the economic efficiency and consumer value of the proposed transmission investments. This analysis aligns with Ofgem's Load Re-Opener Guidance and Submission Requirements.

The CBA process integrates monetised benefits such as constraint cost savings, system efficiency improvements, and consumer bill impacts, alongside a comprehensive Whole-Life Cost Analysis (WLCA) that captures capital expenditure, operational and maintenance costs, replacement cycles, carbon impacts, and future extendibility. This dual approach ensures a balanced assessment of both short-term economic benefits and long-term cost efficiency, avoiding the risk of asset stranding or future inefficiencies.

Our CBA considers:

- Robust optioneering and sensitivity testing: We have evaluated credible alternatives, including 'do nothing' and 'do minimum' scenarios, to confirm that the preferred solution delivers the optimal balance of technical performance, environmental impact, and economic benefit.
- Quantification of constraint cost reductions: Using system operator modelling outputs and historical data, we quantify expected savings from reduced system constraints, which translate into direct consumer bill benefits.

- Assessment of delay impacts: The financial consequences of potential project delays on constraint costs and consumer bills are modelled through risk-adjusted scenarios, providing a clear understanding of the value of timely delivery.
- Inclusion of socio-economic benefits: Where quantification is challenging, qualitative evidence supported by stakeholder engagement and regional development plans highlights the wider economic benefits, including job creation and inward investment.
- Consideration of non-monetised benefits: We explicitly identify benefits that are qualitative or not readily monetisable, such as enhanced system operability, resilience, and environmental improvements, ensuring full transparency of the value proposition.
- Alignment with policy and government targets including Net Zero and AI Growth Zones: The CBA reflects the influence of national and local policies, including Clean Power 2030, net zero commitments, and economic growth plans demonstrating how the investment supports the broader energy transition.

We have assessed consumer value by comparing the whole-life costs and benefits of two 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 two shortlisted options.

- **Option E-1:** the reconductoring of both circuits through a full asset refurbishment of both fittings and the new conductors with [redacted] and
- **Option E-4:** the reconductoring of both circuits through a full asset refurbishment of both fittings and the new conductors with [redacted].

CBA outcome

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

Table 11: Lifetime CBA (2023/24 prices, central carbon pricing, discounted values)

Option	Initial investment (£m)	PV of lifetime costs (£m)	PV of monetised benefits (£m)	NPV (£m)
Option E-1: Reconductor with [redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

On the basis of the discounted lifetime CBA results (Table 11), Option E-1 delivers the highest NPV ([redacted], 2023/24 base prices) and therefore represents the preferred option on consumer value grounds. Options E-4 delivers a lower NPV than E-1 ([redacted], 2023/24 base prices). 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

The costs of initial works and future replacement are set out in the table below. The CBA has a 50-year appraisal period. [redacted]

[redacted]

Table 12: Summary of all additional Capex costs (2023/24 base prices)

Option	Initial works (£m)	Future replacement (£m)	Total costs (£m)
Option E-1: Reconductor with [redacted]	[redacted]	[redacted]	[redacted]
Option E-4: Reconductor with [redacted]	[redacted]	[redacted]	[redacted]

Benefits

The following benefits have been included within the CBA:

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

Table 13 presents the summary of all (undiscounted) benefits, including environmental and non-environmental benefits, considering the central base case carbon price.

Table 13: Summary of all benefits

Option	Environmental benefits		Total benefits (£m)
	Carbon costs of construction (£m)	Transmission Losses (£m)	
Option E-1: Reconductor with [redacted]	[redacted]	[redacted]	[redacted]
Option E-4: Reconductor with [redacted]	[redacted]	[redacted]	[redacted]

3.6 Preferred solution

Based on the outputs of our multifactorial analysis and CBA, our preferred option is to deliver Option E-1 (Reconductoring to [redacted]) as it has been determined to represent the best overall outcome for consumers.

This option is preferred because it provides the greatest thermal capability and future headroom, aligns with PASE principles for L6 tower reconductoring, has lower electrical losses and lower whole-life costs, and benefits from established operational and maintenance experience across the NGET network. It also enables associated fitting renewal and tower strengthening to be delivered within the same coordinated programme, reducing future outages, mobilisation costs and duplicated stakeholder impacts.

Taken together, these factors provide the strongest overall consumer outcome whilst preserving flexibility for future North Wales network developments.

Although the investment is primarily driven by customer connection requirements, the preferred option also captures additional consumer value by combining load-related reinforcement with [redacted] Delivering these activities through a single outage and construction programme avoids future [redacted] interventions, reduces mobilisation costs and minimises repeat impacts on customers, landowners and stakeholders.

Although revised Connections Reform assumptions reduced forecast loadings relative to the original TWR assessments, the updated studies continued to demonstrate a requirement for substantial capability increases on the route. The [redacted] option therefore remains the most efficient long-term solution and avoids the risk of future reinforcement requirements arising from subsequent customer growth. This is summarised in Table 14.

This project is mature and in development. Our current cost forecast at the time of submitting this Eligibility Letter is [redacted] (23/24 prices). This includes [redacted] for risk and contingency for [redacted]

Table 14: Preferred option is the same under TWR and Phase 1 Connection Reform CPAs

	Scenario 1: TWR CPAs	Scenario 2: Phase 1 Connections Reform CPAs	Outcome
Predicted pre-fault summer loading	[redacted] by 2028	[redacted] by 2030	Need remains
Preferred solution	[redacted]	[redacted]	Unchanged

Project benefits and outputs

Table 15: Summary of outputs and benefits

Output and proposed PCD:	Description
Outputs and benefits	[redacted]

[redacted]

4. Delivery

4.1 Delivery year and indicative timeline

The target date of completion for the project is [redacted]. Figure 6 details the high-level program for Option E-1, which was created in May 2026 and remains accurate.

[redacted]

To achieve these planned outages, the requirements for the project were developed through National Grid's established outage planning and governance processes. Outage needs are identified during project development and captured within the OHL Workbook. These requirements are subsequently reviewed through the portfolio governance process and coordinated with Outage Planning, Power System Engineers (PSE) and System Planning teams to assess feasibility and delivery confidence, before ultimately submitting the request to NESO.

[redacted]

[redacted]

Our outage position in the lead-up to the submission of this Eligibility Letter is presented below in Table 16. As long as there are no unforeseen issues on this section of the network during the remaining outage, there are no risks to the completion of these works. If for any reason the final outage is cancelled by NESO last-minute, the outstanding works will be replanned later in the T3 period using the standard planning process described above.

Table 16: Outage position and maturity

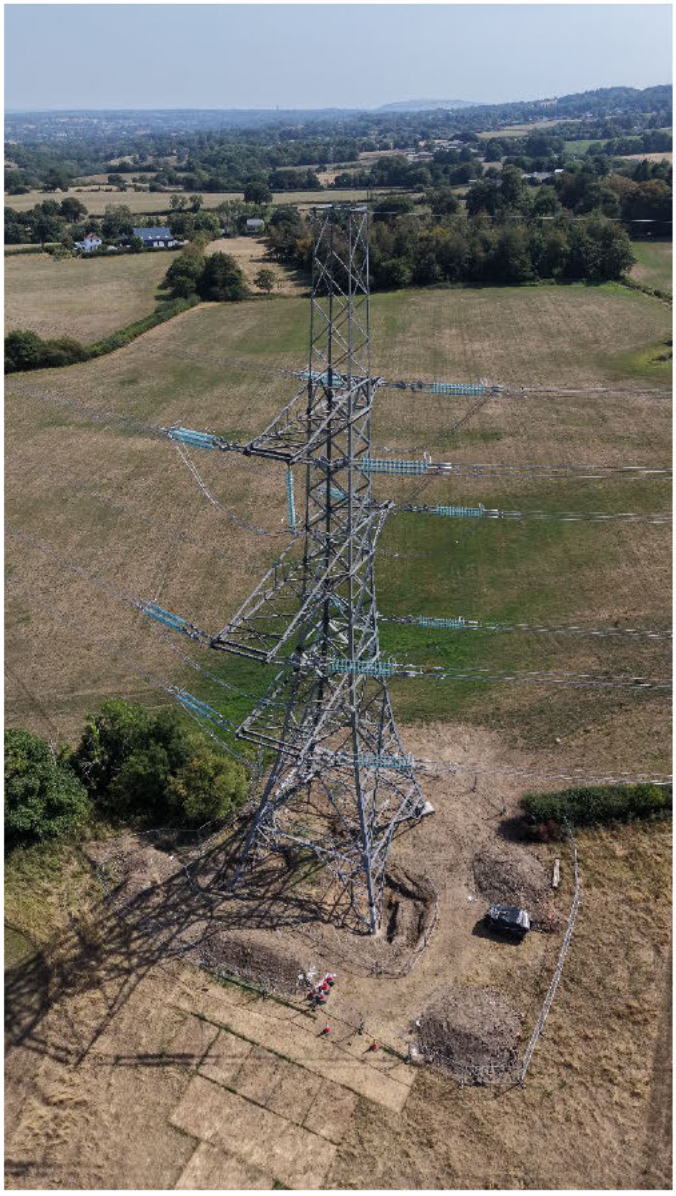
Circuit	Outage Dates	Current Position	Status
[redacted]			
[redacted]			
[redacted]			
[redacted]			

Given that the project is in delivery, we are able to provide images of the investment in Figure 7 and Figure 8, below.

Figure 7: Photograph 1 of the project in delivery



Figure 8: Photograph 2 of the project in delivery



4.2 Procurement and contracting strategy

[redacted]



[redacted]

4.3 Risks and risk management

An overview of delivery risks in the lead up to the delivery date is listed below in Table 17 along with mitigations. As discussed in Section 3.6 our current cost estimate includes [redacted] for risk and contingency for [redacted]. Please see that section for more detail on that figure.

Core to our risk mitigation is maintaining stakeholder engagement, which began in March 2024. Some key points from this engagement include:

[redacted]

Table 17: Summary of risks and mitigations

Risk	Mitigation
Outages: Other projects outages and/or interfacing works may slip, resulting in insufficient time or delays to the booked outages.	We have coordination meetings with interfacing projects to coordinate works within outages and reduce risk.
[redacted]	[redacted]
Third-party asset protection: Due to the nature of a full overhead line (OHL) refurbishment and the more intrusive work involved, there is a risk to the protection of third-party assets.	NGET has proactively communicated with third parties to determine the best protection or closure measures for each asset. We have coordinated with [redacted] OHL wiring work have been carried out under single circuit outage conditions, and an experienced OHL contractor has been selected in line with NGET safety rules.
Land access: Difficulty in agreement with landowners regarding temporary access work, routes, and timings for OHL refurbishment work may result in program delays, safety concerns, and strained relationships with landowners.	NGET lands teams has engaged early with landowners to ascertain the most suitable access routes and timings to access lands. The programme will ensure that sufficient time has been given to allow this engagement.
Third-party impact: Third-party asset owners such as [redacted] may be affected by the work (e.g., scaffold structures, outages or closures).	NGET has engaged early with third parties to ascertain they are aligned with the project and its timings. Our external affairs team has proactively supported with this engagement.
Adverse weather: Construction works are affected by adverse weather, including wind and poor visibility.	We monitor weather conditions and ensure programme delay is mitigated with additional resources where appropriate.
Vandalism and theft: Risk of NG / Contractor assets being stolen / vandalised on site.	We have put in place a security plan with appropriate mitigations at each location.
[redacted]	[redacted]

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 approval of the Needs Case and preferred solution.

The preferred option E-1 consists of a reconductoring the existing Bodelwyddan – Connah's Quay OHL circuit to [redacted]. This represents a lower-regret near-term reinforcement within the wider North Wales transmission strategy, maximising the capability of existing infrastructure whilst preserving flexibility for future reinforcements identified through Connections Reform and wider regional network development plans.

Table 18: Submission summary

Submission summary	
Main drivers	• **Customer:** There is a connections pipeline of [redacted] Gate 2 Phase 1 customers by 2030 and a further [redacted] Gate 2 Phase 2 customers by 2035 that are directly dependent upon the delivery of reinforcements on this circuit. Our power system assessments based on assumptions stemming from the then ESO's Transmission Works Review (TWR) imply an uprating is required on the circuit to meet a pre-fault summer load of [redacted] in 2028, which informed our optioneering. • [redacted]
Preferred option	Our preferred option is E-1 (reconductor to [redacted]) because it provides the greatest thermal capability and future headroom, aligns with PASE principles for L6 tower reconductoring, has lower electrical losses and lower whole-life costs, and benefits from established operational and maintenance experience across the NGET network. It also enables associated fitting renewal and tower strengthening to be delivered within the same coordinated programme, reducing future outages, mobilisation costs and duplicated stakeholder impacts. Taken together, these factors provide the strongest overall consumer outcome whilst preserving flexibility for future North Wales network developments.
Estimated cost and timing	At the time of submitting this Eligibility Letter for this mature project, we have a total cost forecast of [redacted] (23/24 prices), including [redacted] for risk and contingency. The target delivery date is [redacted]
Outputs	[redacted]
Proposed PCD	Delivery of the above outputs by [redacted].

Appendix A
Glossary

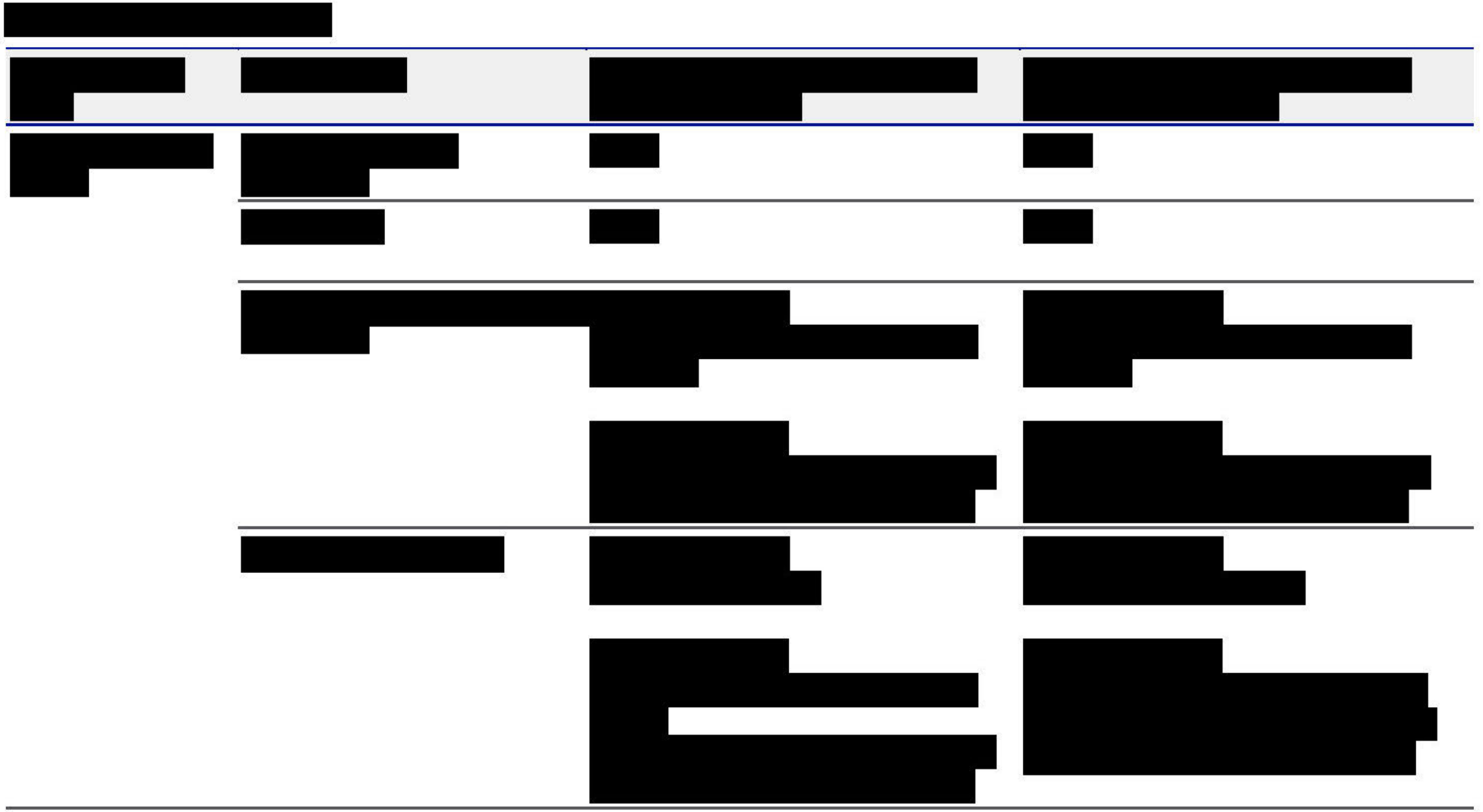
Table 19: Table of abbreviations and definitions

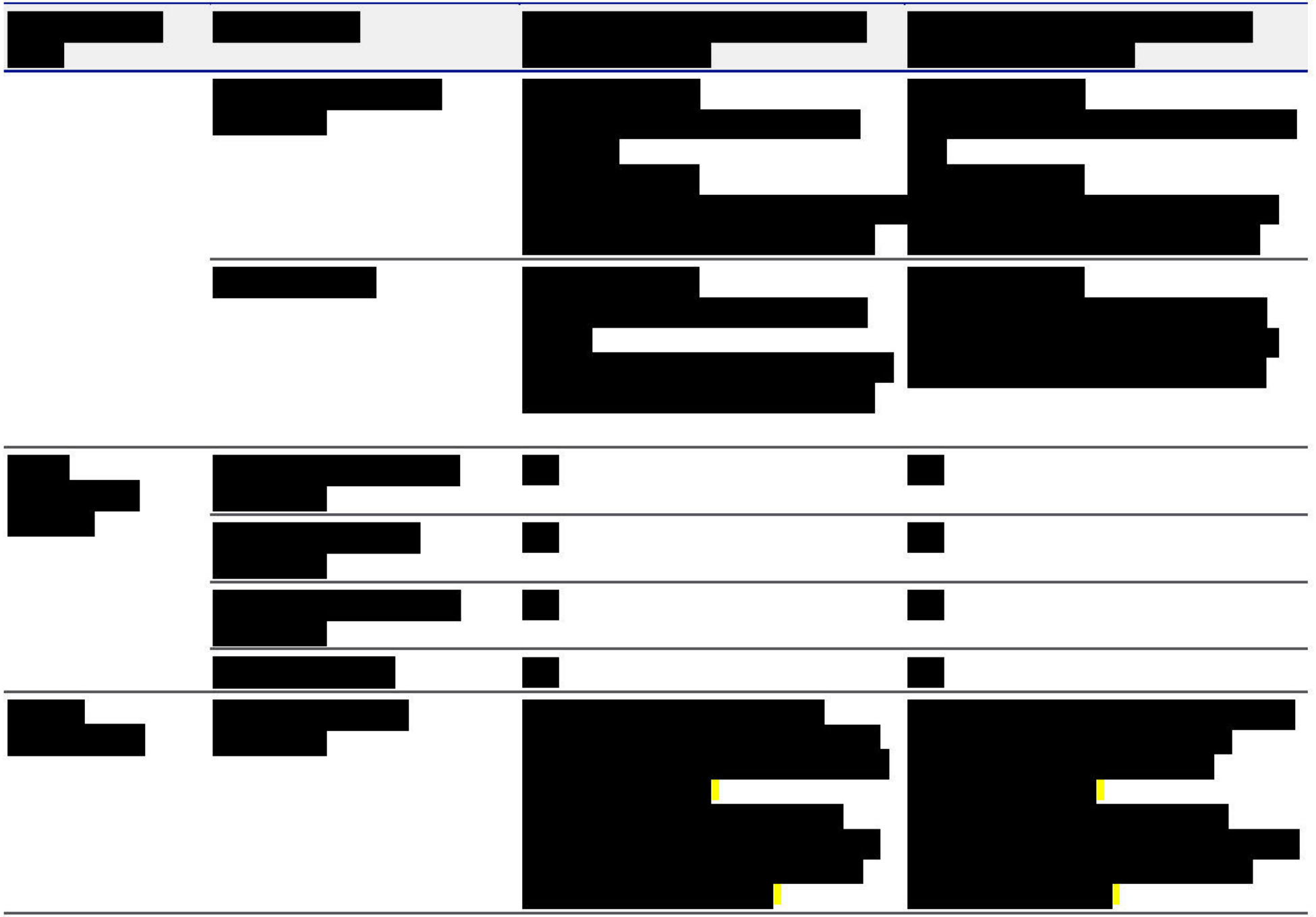
Abbreviation	Description
AAAC	All Aluminium Alloy Conductor
ACL	Available for Commercial Load
ANM	Active Network Management
AO	Asset Operations
APM	Advanced Procurement Mechanism
BESS	Battery Energy Storage System
BNG	Biodiversity Net Gain
BPDT	Business Plan Data Template
CBA	Cost Benefit Analysis
CCGT	Combined Cycle Gas Turbine
CNDM	Connections Network Design Methodology
CPA	Construction Planning Assumption
CPO	Compulsory Purchase Order
DNO	Distribution Network Operator
EAWO	Early Asset Write Off
ECI	Early Contractor Involvement
EEW	Early Enabling Works
EJP	Engineering Justification Paper
EL	Eligibility Letter
[redacted]	[redacted]
EoL	End of Life
EPC	Engineering, Procurement and Construction
ESO	Electricity System Operator
ET	Electricity Transmission
EUL	Estimating Unit Line

Abbreviation	Description
FEED	Front-End Engineering Design
FY	Financial Year
[redacted]	[redacted]
GB	Great Britain
GIS	Gas Insulated Switchgear
GSP	Grid Supply Point
GW	Gigawatt
GVA.s	Gigavolt Ampere seconds
kA	Kiloampere
kV	Kilovolt
LRR	Load Related Re-opener
[redacted]	[redacted]
MW	Megawatt
MVA	Megavolt Ampere
MVAR	Megavolt Ampere Reactive
N/A	Not Applicable
[redacted]	[redacted]
NESO	National Energy System Operator
NG	National Grid
NGET	National Grid Electricity Transmission
NGT	National Grid Transmission
NMWTRA	North and Mid Wales Trunk Road Agent
NPV	Net Present Value
Ofgem	Office of Gas and Electricity Markets
OHL	Overhead Line
OSR	Ofgem Scheme Reference
PA	Project Assessment
PASE	Pre-Approval of Solutions by Engineering
PCF	Pre-Construction Funding
PCD	Price Control Deliverable

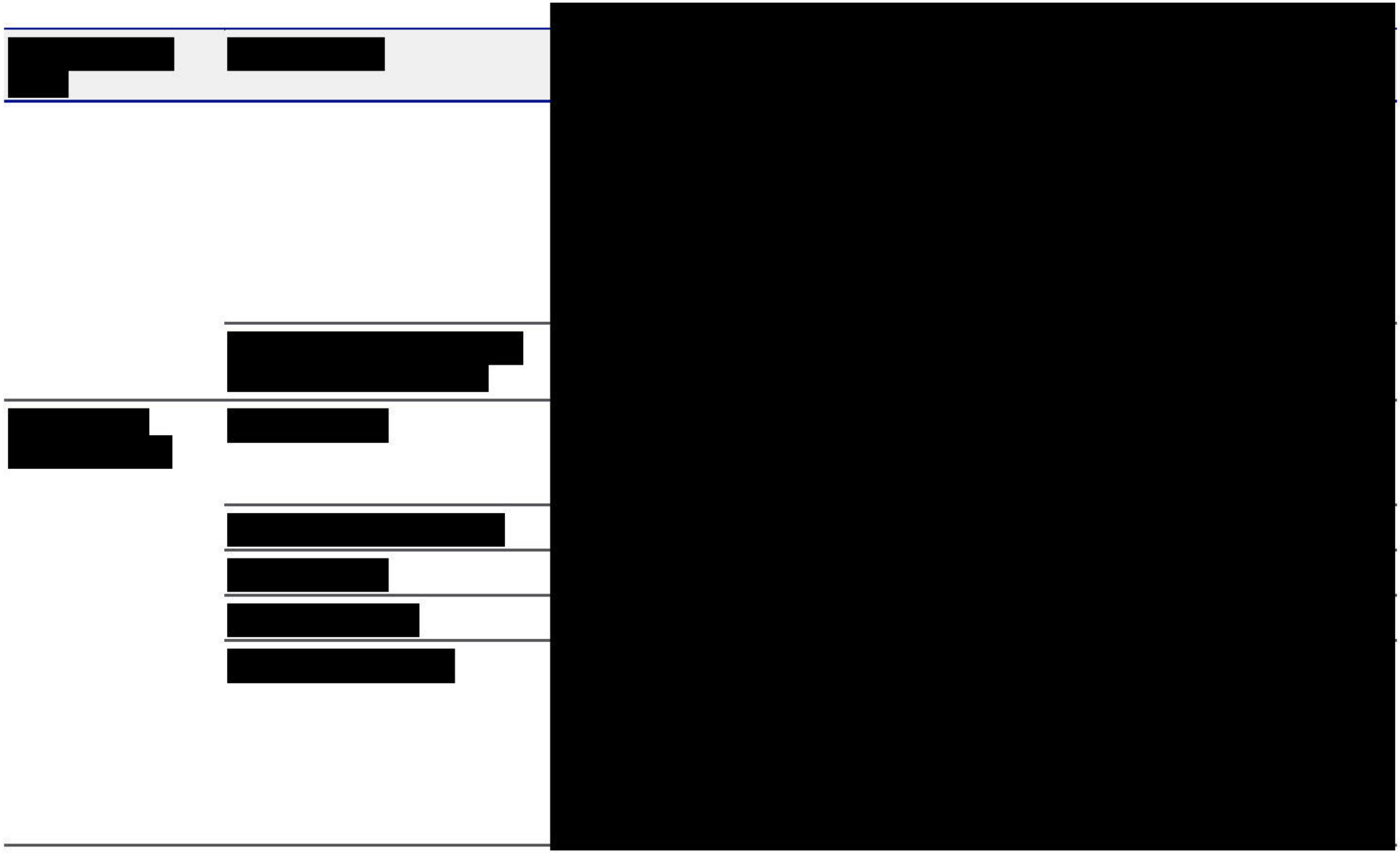
Abbreviation	Description
PSNC	Pentir Swansea New Circuit
PSE	Power Systems Engineer
PV	Photovoltaic / Present Value
RAG	Red, Amber, Green
RAV	Regulatory Asset Value
RIIO-T2	Second Electricity Transmission price control under the RIIO framework
RIIO-T3	Third Transmission price control under the RIIO framework
RRP	Regulatory Reporting Pack
SCM	Supply Chain Management
SDT	System Design Table
SF_6	Sulphur Hexafluoride
[redacted]	[redacted]
SQSS	Security and Quality of Supply Standard
T1	RIIO-T1 price control period
T2	RIIO-T2 price control period
T3	RIIO-T3 price control period
TO	Transmission Owner
TOCA	Transmission Owner Construction Agreement
TOCO	Transmission Owner Connection Offer
TWR	Transmission Works Review
VD	Volume Driver
WLCA	Whole-Life Cost Analysis
[redacted]	[redacted]

Appendix B
System design table

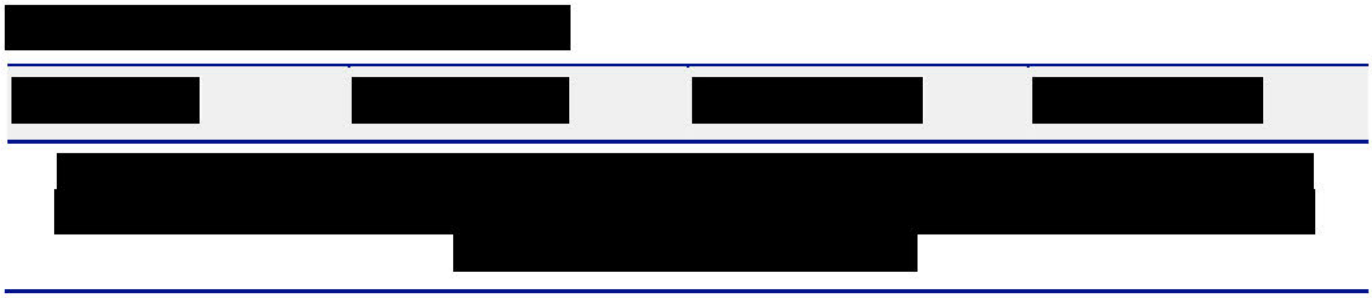




[redacted]

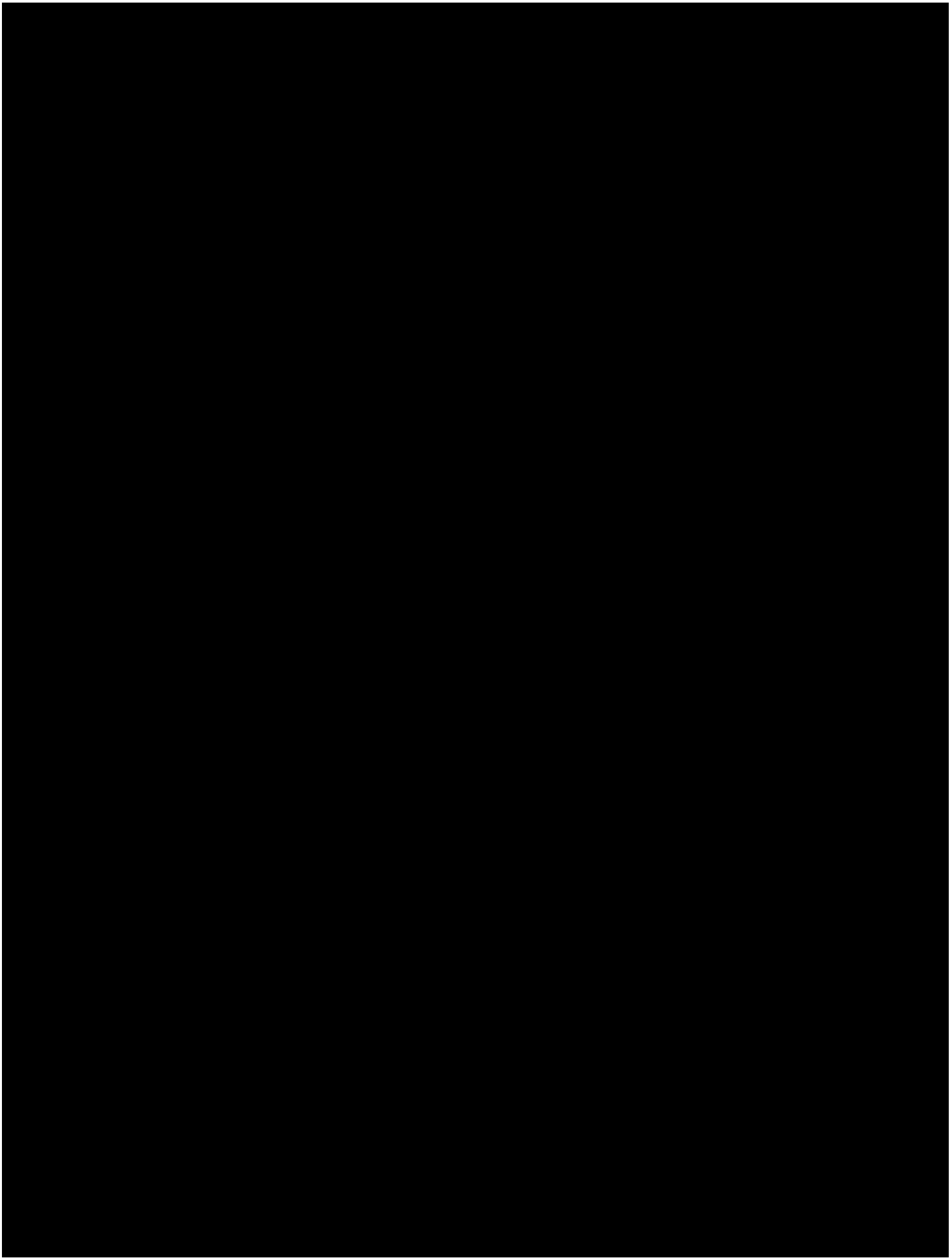


Appendix C
T1 and T2 asset interventions



Appendix D
Detailed customer driver information

[redacted]



[redacted]

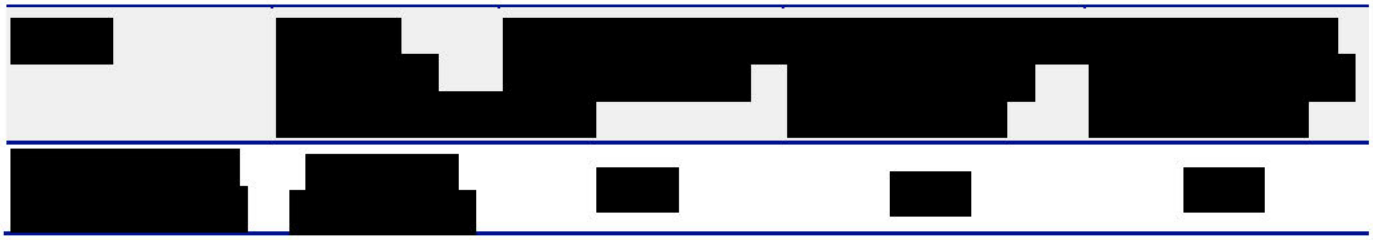
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

[redacted]

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