



SSEN Distribution

DNOA OUTCOMES REPORT

March 2024



Scottish & Southern
Electricity Networks

DSO Powering Change



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Foreword

Our DSO functions are already creating the system capacity to enable customers' connections, while at the same time facilitating the decarbonisation of transport and heat. This is enabling the communities we service to undertake their journey to net zero, and unlock economic value at a local and national level.

We published our draft Distribution Networks Options Assessment (DNOA) methodology earlier this year. It was published as a consultation to invite your views so you could help shape its content. Through engagement at webinars and bilateral meetings, and responses to our consultation, you have provided us with valuable insights for our 2023 DNOA methodology and future developments in this area. We have now published our final DNOA methodology for 2023 and will use this as the basis for providing greater transparency in our decision-making process for system planning.

The DNOA methodology is part of our wider Net Zero Strategic Planning approach which aims to provide the network capacity needed to facilitate Net Zero by 2050 whilst retaining a clear focus on safety and reliability. This kind of proactive, rather than incremental, investment can avoid the costly disruption of repeated network upgrades to cope with growing requirements, as well as enabling connections ahead of need.

This is the first of our DNOA outcomes reports. It summarises the first areas that we have taken through our DNOA process. These areas have been chosen as areas of more immediate need and cover both our north of Scotland and central southern England licence areas. Whilst there is widespread coverage across our regions, there is a focus on West London reflecting the urgency of the need in this particular area.

Through the DNOA process we are adopting a "flexibility-first" approach. This ensures we're making appropriate use of flexibility services, to deliver efficient and cost-effective whole system solutions at the optimum time.

Our assessments have identified a significant proportion of needs can be met by flexibility services, particularly in the shorter term. The majority of cases where this is not possible relate to voltage or fault level needs where flexibility markets are less mature.

On the next few pages, we'll provide guidance on how to view these reports. We also provide an index to help you navigate the document and understand assessments of relevance to you.

Whilst we provide indications of future flexibility opportunities, please treat these as indicative. Further information will be provided through our subsequent flexibility procurement communications.

We intend that further DNOA outcomes will be published periodically through 2024, ensuring you are kept abreast of the latest decisions we make.

ANDREW WAINWRIGHT
Whole Systems Manager



We hope you find this document of use and welcome your feedback to inform future DNOA outcomes reports



How to view this report

The following guidance note can be used to help navigate each outcomes report

DNOA Area

Scheme description (1)

Proposed option (2)

System need requirement (3)

| J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |

DNOA History (4)

| 2023/24 | 2024/25 | 2025/26 | 2026/27 | 2027/28 |
|--------------------|---------|---------|---------|---------|
| Initial assessment | | | | |

Indicative flexibility price (if available): (5)

- Availability
- Utilisation

Reinforcement timeline (6)

Estimated peak MW outside firm capacity under each scenario (7)

Grey text relates to estimated peak MW without reinforcement delivery

| | 2023/24 | 2024/25 | 2025/26 | 2026/27 | 2027/28 | 2029/30 | 2030/31 |
|-----|---------|---------|---------|---------|---------|---------|---------|
| CT | - | - | 0.1 | 1.2 | -(2.3) | -(4) | -(5) |
| ST | - | - | - | - | -(1.1) | -(2.3) | -(3.3) |
| LTW | - | - | 0.5 | 2 | -(5.4) | -(6) | -(8) |
| FS | - | - | - | - | - | -(1.3) | -(2.3) |

Constraint management timeline (illustrative) (8)

Scheme map: (9)

1 Scheme description:

- This section describes the location where a system need has been identified. This is accompanied with indicative postcodes for the customer areas related to this scheme.
- Included is the type of constraint on the network and the estimated year the constraint will become active.

2 Proposed option:

- An outline of the proposed solution option aligned with the defined outcomes in the DNOA methodology. A description of any flexibility procurement and/or reinforcement works required is provided and justified.
- An estimated value for the capacity released by the delivery of any works required can be found here. It does not necessarily relate to available capacity.

3 System need requirement:

- This table highlights in yellow the months of the year where there is a potential system need due to the constraint arising.

4 DNOA history:

- A record of the outcome report status.

5 Indicative flexibility price:

- The indicative flexibility price used in the techno-economic assessment is given in this section where relevant and available.
- This is given as an availability and utilisation price in £/MWh.

6 Reinforcement timeline:

- Where reinforcement is proposed, an indicative delivery year for the completion of works is given.

7 Estimated peak MW outside firm capacity:

- Where reinforcement is proposed, an indicative delivery year for the completion of works is given.

8 Constraint management timeline:

- The timeline illustrates the stages needed to remove the constraint from the network.
- **For schemes proposing to procure flexibility:** The first stage (purple) is an indicative 2-year initial flexibility procurement window where any required services will be acquired. The second stage (yellow) indicates the years where the option uses flexibility services to release more capacity. The last stage (green) indicates the year when capacity will be increased on the network to relieve the constraint.
- **For schemes proposing an asset solution:** The timeline indicates when capacity will be increased on the network to relieve the constraint.

9 Scheme map:

- The map provided shows the approximate geographical area covered by the scheme.



Index of DNOA outcomes - SHEPD

1 Procure Flexibility Solutions - see below the DNOA Outcome Reports proposing flexibility opportunities

| DNOA outcome | Flexibility utilisation period | Indicative postcode Areas |
|----------------------------|--------------------------------------|----------------------------------|
| Abernethy, Kinross, Dollar | 2-year period from 2024/25 – 2025/26 | FK14, KY12 - KY14, KY4, PH1, PH2 |
| Culloden (Inverness) | 2-year period from 2025/26 – 2026/27 | IV1 IV2 |
| Inveralmond and Redgorton | 1-year period in 2025/26 | PH1, PH2, PH7, PH8, UM5 |

2 Asset Solutions - see below the DNOA Outcome Reports proposing asset solutions only

| DNOA outcome | Capacity increase from | Indicative postcode areas |
|----------------------------------|------------------------|---|
| Errochty – Tummel Bridge | 2026/27 | FK21, IV33, PH1, PH8, PH9, PH15 - PH18 |
| Aberdeenshire (North Coast) | 2025/26 | AB38, AB55, AB37, AB54 |
| Machrie/Whiting Bay 11kV Network | 2025/26 | KA27 |
| North-east Moray | 2028/29 | AB45, AB53 - AB56, IV30, IV32 |
| Tarland, Aboyne and Ballater | 2028/29 | AB31, AB33 - AB36, AB39, AB45, AB49, AB51, AB52 |



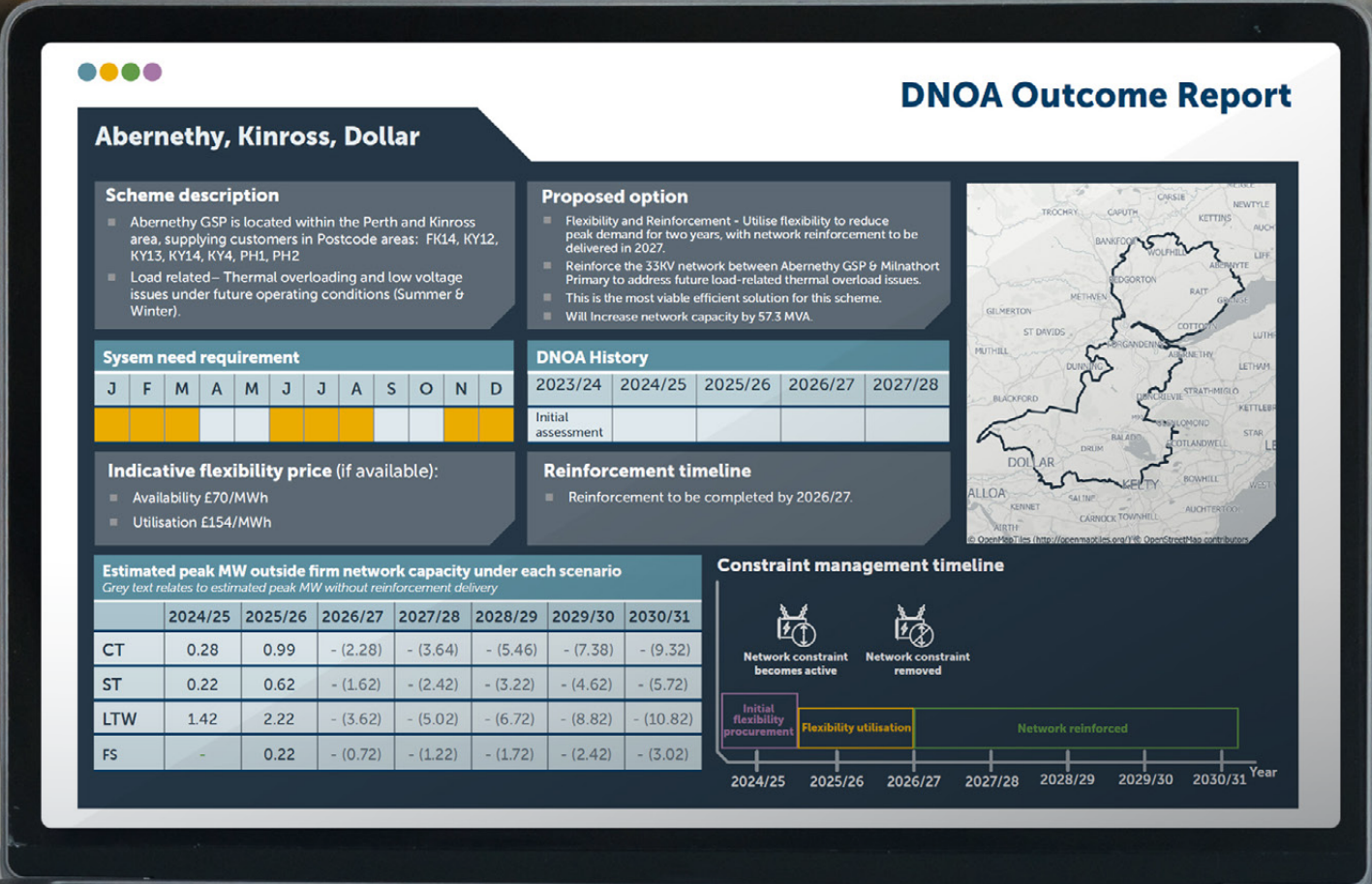
Index of DNOA outcomes - SEPD

1 Procure Flexibility Solutions - see below the DNOA Outcome Reports proposing flexibility opportunities

| DNOA outcome | Flexibility utilisation period | Indicative postcode areas |
|--------------|--------------------------------------|--|
| Beaconsfield | 2-year period from 2025/26 – 2026/27 | BH20, HP7, HP9, HP10, HP13, HP15, RG31, SL0, SL2, SL6, SL9 |
| Birdham | 3-year period from 2027/28 – 2029/30 | PO18 - PO22, DT1 |
| Chiswick | 3-year period from 2025/26 – 2027/28 | W4 |
| East Bedfont | 1-year period in 2029/30 | HP27, TW3 - TW7, TW12 - TW16, TW18, TW19 |
| Egham | 2-year period from 2027/28 - 2028/29 | GU25, SL3 - SL5, TW14, TW20 |
| Lytchett | 3-year period from 2024/25– 2026/27 | DT2, DT11, BH15 - BH18, BH20, BH21 |

2 Asset Solutions - see below the DNOA Outcome Reports proposing asset solutions only

| DNOA outcome | Capacity increase from | Indicative postcode areas |
|-----------------------------|------------------------|---|
| Chiswick and East Brentford | 2028/29 | W4, W5, W7, W13, TW7, TW8 |
| Ealing and Hounslow | 2028/29 | NW10, TW1, TW3, TW4, TW7, TW8, UB1, UB2, UB6, W3 - W7, W12, W13 |
| High Wycombe and Marlow | 2025/26 | HP7 - HP9, RG31, SL0 - SL9, UB8, UB9, WD3 |
| Hunston: Birdham & Selsey | 2027/28 | PO16, PO18 - PO22, DT1 |



DNOA OUTCOMES



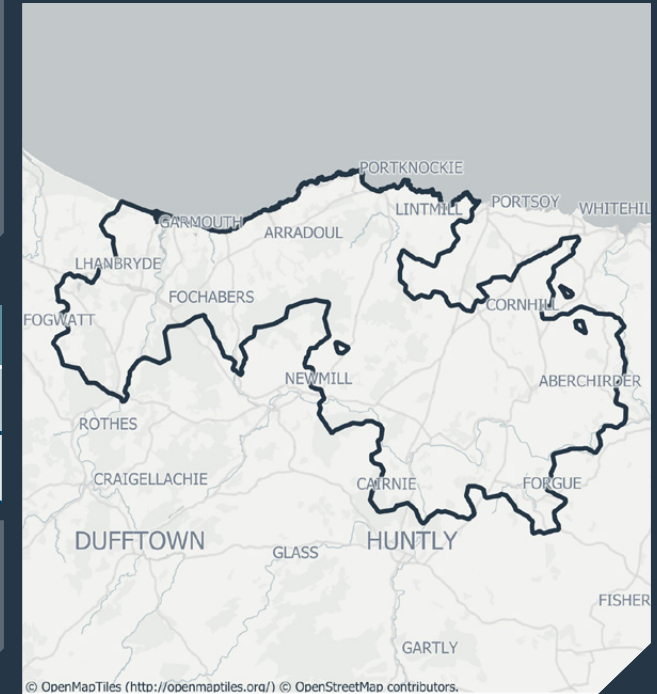
Aberdeenshire (North Coast) 33kV Network

Scheme description

- The affected 33kV circuits support the network in the Moray area of Scotland, covering postcodes AB38, AB55, AB37 & AB54.
- Load related - The circuits face challenges with voltage levels dropping below regulatory-accepted thresholds under normal operating conditions.

Proposed option

- Increase the size of the voltage compensation equipment at the new Glenrothes Distillery 33kV switchboard and loop the new switchboard into to the 33kV ring.
- Low additional cost to achieve compliant volts whilst meeting the requirements for predicted 2050 demands.



System need requirement

| J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |

DNOA History

| 2023/24 | 2024/25 | 2025/26 | 2026/27 | 2027/28 |
|--------------------|---------|---------|---------|---------|
| Initial assessment | | | | |

Indicative flexibility price (if available):

- Availability : N/A
- Utilisation : N/A

Reinforcement timeline

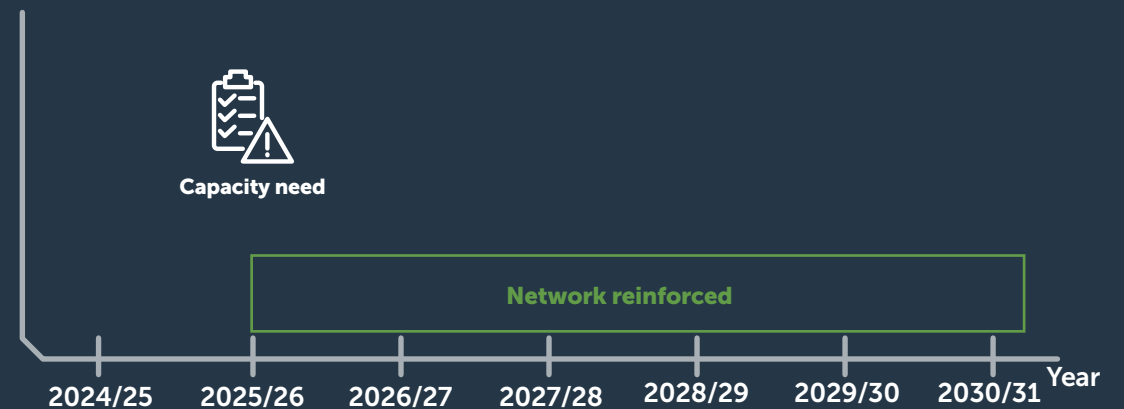
- Reinforcement delivered by 2025/26

Estimated peak MW outside firm network capacity under each scenario

Grey text relates to estimated peak MW without reinforcement delivery

| | 2024/25 | 2025/26 | 2026/27 | 2027/28 | 2028/29 | 2029/30 | 2030/31 |
|-----|---------|---------|---------|---------|---------|---------|---------|
| CT | - | - | - | - | - | - | - |
| ST | - | - | - | - | - | - | - |
| LTW | - | - | - | - | - | - | - |
| FS | - | - | - | - | - | - | - |

Constraint management timeline





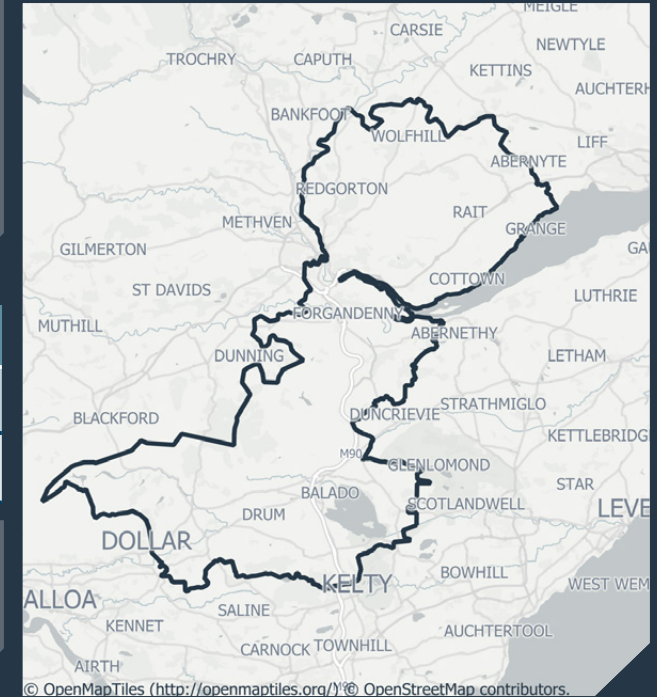
Abernethy, Kinross, Dollar

Scheme description

- Abernethy GSP is located within the Perth and Kinross area, supplying customers in Postcode areas: FK14, KY12, KY13, KY14, KY4, PH1, PH2
- Load related– Thermal overloading and low voltage issues under future operating conditions (Summer & Winter).

Proposed option

- Flexibility and Reinforcement - Utilise flexibility to reduce peak demand for two years, with network reinforcement to be delivered in 2027.
- Reinforce the 33KV network between Abernethy GSP & Milnathort Primary to address future load-related thermal overload issues.
- This is the most viable efficient solution for this scheme.
- Will Increase network capacity by 57.3 MVA.



System need requirement

| J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |

DNOA History

| | 2023/24 | 2024/25 | 2025/26 | 2026/27 | 2027/28 |
|--------------------|---------|---------|---------|---------|---------|
| Initial assessment | | | | | |

Indicative flexibility price (if available):

- Availability £70/MWh
- Utilisation £154/MWh

Reinforcement timeline

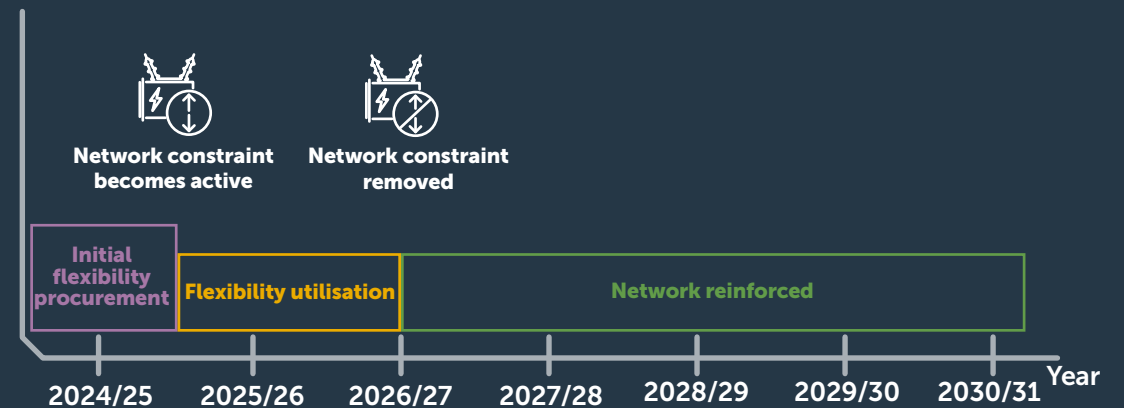
- Reinforcement to be completed by 2026/27.

Estimated peak MW outside firm network capacity under each scenario

Grey text relates to estimated peak MW without reinforcement delivery

| | 2024/25 | 2025/26 | 2026/27 | 2027/28 | 2028/29 | 2029/30 | 2030/31 |
|-----|---------|---------|----------|----------|----------|----------|-----------|
| CT | 0.28 | 0.99 | - (2.28) | - (3.64) | - (5.46) | - (7.38) | - (9.32) |
| ST | 0.22 | 0.62 | - (1.62) | - (2.42) | - (3.22) | - (4.62) | - (5.72) |
| LTW | 1.42 | 2.22 | - (3.62) | - (5.02) | - (6.72) | - (8.82) | - (10.82) |
| FS | - | 0.22 | - (0.72) | - (1.22) | - (1.72) | - (2.42) | - (3.02) |

Constraint management timeline





Beaconsfield

Scheme description

- Proposed reinforcements will increase capacity in Beaconsfield, Buckinghamshire. Postcode(s): BH20, HP7, HP9, HP10, HP13, HP15, RG31, SL0, SL2, SL6, SL9.
- Load related – substation thermal overload due to forecasted demand growth.

Proposed option

- Procure flexibility solutions for 2 years followed by asset solutions: installation of upgraded transformers and circuits.
- The option provides the economic benefit of reinforcement deferral, ensures P2 compliance until 2031, and sets up future works.
- Releases 22.9MVA of capacity at Beaconsfield.



System need requirement

| J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |

DNOA History

| 2023/24 | 2024/25 | 2025/26 | 2026/27 | 2027/28 |
|--------------------|---------|---------|---------|---------|
| Initial assessment | | | | |

Indicative flexibility price (if available):

- Availability £150/MWh
- Utilisation £200/MWh

Reinforcement timeline

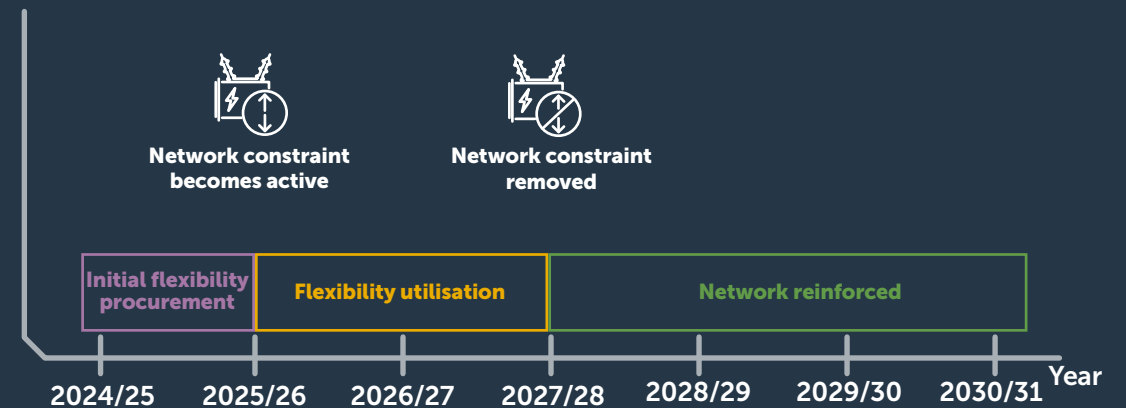
- Flexibility utilisation 2025/26 and 2026/27.
- Reinforcement delivery 2027/28.

Estimated peak MW outside firm network capacity under each scenario

Grey text relates to estimated peak MW without reinforcement delivery

| | 2024/25 | 2025/26 | 2026/27 | 2027/28 | 2028/29 | 2029/30 | 2030/31 |
|-----|---------|---------|---------|---------|---------|---------|---------|
| CT | - | 0.3 | 0.9 | - (2.6) | - (3.4) | - (4.3) | - (5.7) |
| ST | - | - | - | - (0.5) | - (0.9) | - (1.4) | - (1.8) |
| LTW | 0.2 | 0.9 | 1.8 | - (4) | - (5.2) | - (6.7) | - (8) |
| FS | - | - | - | - (0.2) | - (0.6) | - (1) | - (1.4) |

Constraint management timeline





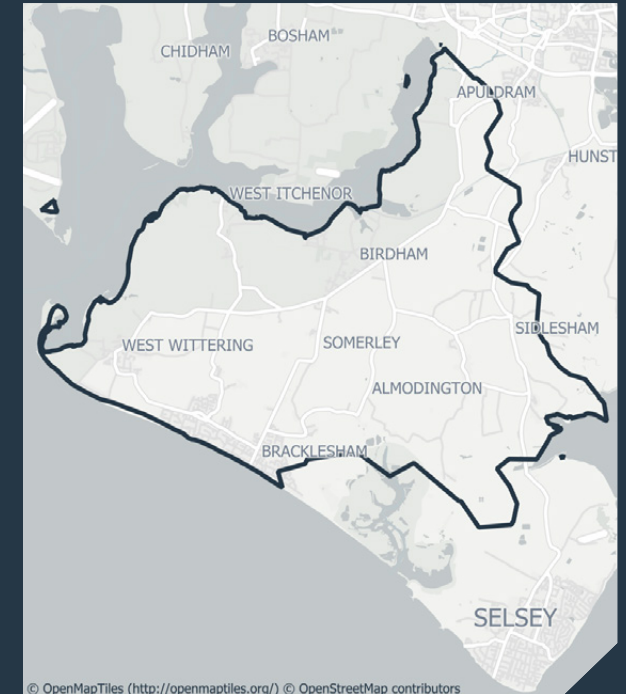
Birdham

Scheme description

- Birdham primary substation is located in the Chichester district of West Sussex. Postcode areas: PO18 - PO22, DT1
- Load related – Thermal overloading of the transformers beyond minimum standard for security of supply by 2027/28

Proposed option

- Procure Flexibility Solutions: Reinforcement works are required to upgrade both transformers at Birdham Primary.
- Flexibility is feasible and the economically optimal for three years.
- Capacity released: 27MVA



System need requirement

| J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |

DNOA History

| | 2023/24 | 2024/25 | 2025/26 | 2026/27 | 2027/28 |
|--------------------|---------|---------|---------|---------|---------|
| Initial assessment | | | | | |

Indicative flexibility price (if available):

- Availability: TBC
- Utilisation: TBC

Reinforcement timeline

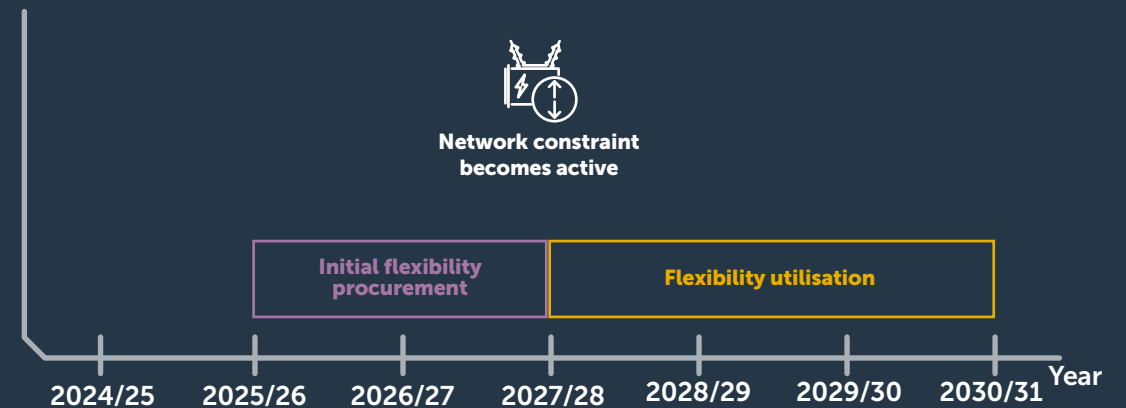
- Reinforcement delivery by the end of 2029/30.

Estimated peak MW outside firm network capacity under each scenario

Grey text relates to estimated peak MW without reinforcement delivery

| | 2024/25 | 2025/26 | 2026/27 | 2027/28 | 2028/29 | 2029/30 | 2030/31 |
|-----|---------|---------|---------|---------|---------|---------|----------|
| CT | - | - | - | 0.22 | 0.55 | 0.88 | - (1.38) |
| ST | - | - | - | - | - | - | - |
| LTW | - | 0.095 | 0.49 | 0.91 | 1.31 | 1.80 | - (2.41) |
| FS | - | - | - | - | - | - | - |

Constraint management timeline





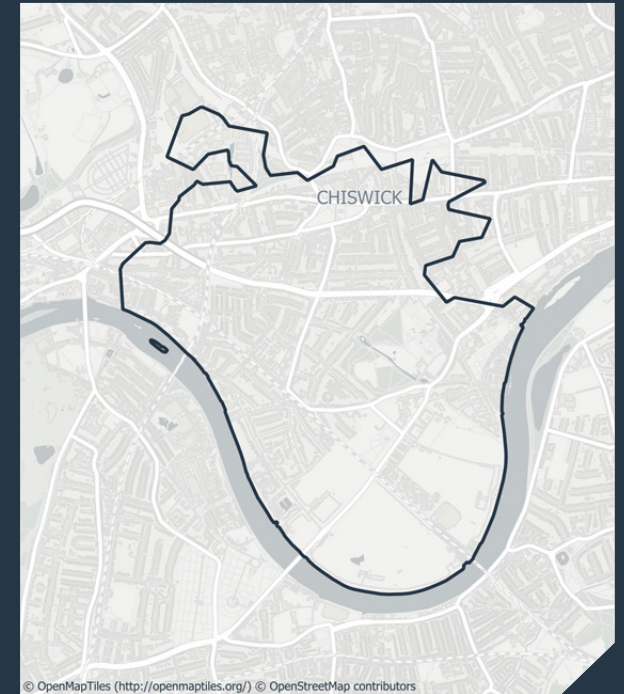
Chiswick

Scheme description

- Harvard Lane Primary Substation is in Chiswick, West London – SSEN’s SEPD licence area. Postcode(s): W4
- Load related – thermal overloading. First circuit outage security of supply issues projected under all 4 DFES scenarios ahead of 2050.

Proposed option

- Procure flexibility for 3 years followed by asset solutions: network rearrangement and installation of transformers with increased capacity.
- Option provides the economic benefit of reinforcement deferral. Provides long term compliance with P2 security of supply. Increases network capacity at Harvard Lane and the relevant bulk supply point.
- Releases 51MVA of capacity at Harvard Lane



System need requirement

| J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |

DNOA History

| 2023/24 | 2024/25 | 2025/26 | 2026/27 | 2027/28 |
|--------------------|---------|---------|---------|---------|
| Initial assessment | | | | |

Indicative flexibility price (if available):

- Availability £150/MWh
- Utilisation £200/MWh

Reinforcement timeline

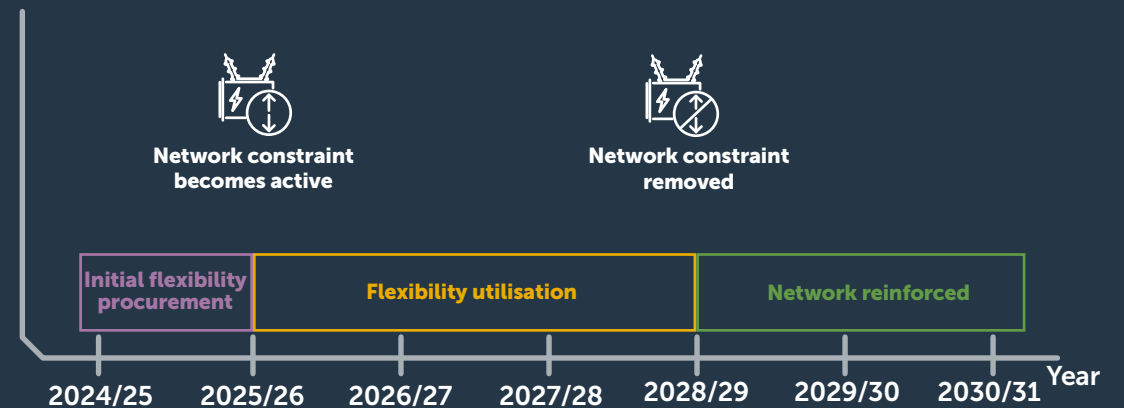
- 3 years of flexibility to defer reinforcement from 2025/26.
- Reinforcement delivery by the end of 2027/28.

Estimated peak MW outside firm network capacity under each scenario

Grey text relates to estimated peak MW without reinforcement delivery

| | 2024/25 | 2025/26 | 2026/27 | 2027/28 | 2028/29 | 2029/30 | 2030/31 |
|-----|---------|---------|---------|---------|---------|---------|---------|
| CT | - | 0.04 | 0.77 | 1.51 | -(2.30) | -(3.14) | -(4.40) |
| ST | - | - | - | - | - | -(0.08) | -(0.51) |
| LTW | - | 0.61 | 1.64 | 2.75 | -(3.95) | -(5.19) | -(6.48) |
| FS | - | - | - | - | - | - | -(0.01) |

Constraint management timeline





Chiswick and East Brentford

Scheme description

- Ealing 22kV Bulk Supply Point is in West London. Postcode(s): W4, W5, W7, W13, TW7, TW8.
- Fault level related – fault currents at Ealing 22kV busbars exceed the fault ratings of existing circuit breakers during RIIO-ED2.

Proposed option

- Asset solution: replacement of 17 circuit breakers with new circuit breakers with higher fault current ratings.
- Ensures fault level compliance in the long term. 33kV circuit breakers installed and operated at 22kV level.
- Additional current breaking rating of 11.9kA, additional current making rating of 29.1kA (per Circuit Breaker).



System need requirement

| J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |

DNOA History

| 2023/24 | 2024/25 | 2025/26 | 2026/27 | 2027/28 |
|--------------------|---------|---------|---------|---------|
| Initial assessment | | | | |

Indicative flexibility price (if available):

- N/A

Reinforcement timeline

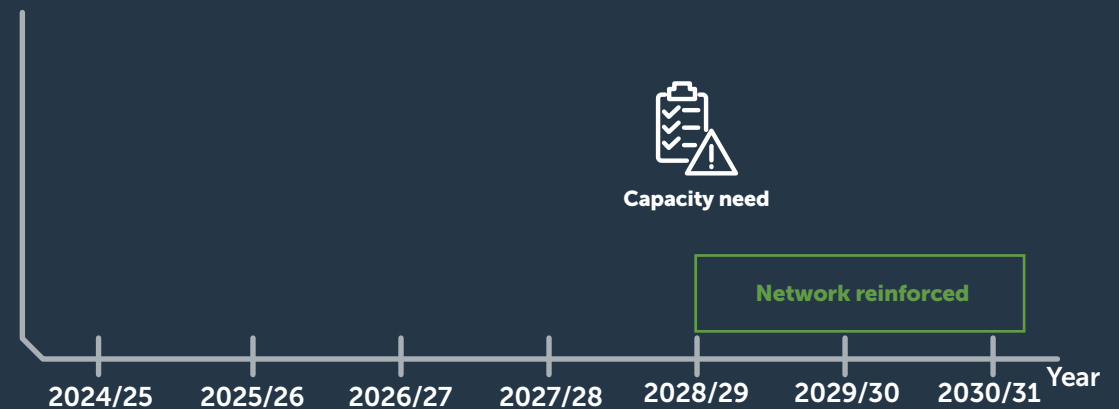
- Reinforcement delivery by the end of 2027/28

Estimated peak MW outside firm network capacity under each scenario

Grey text relates to estimated peak MW without reinforcement delivery

| | 2024/25 | 2025/26 | 2026/27 | 2027/28 | 2028/29 | 2029/30 | 2030/31 |
|-----|---------|---------|---------|---------|---------|---------|---------|
| CT | - | - | - | - | - | - | - |
| ST | - | - | - | - | - | - | - |
| LTW | - | - | - | - | - | - | - |
| FS | - | - | - | - | - | - | - |

Constraint management timeline





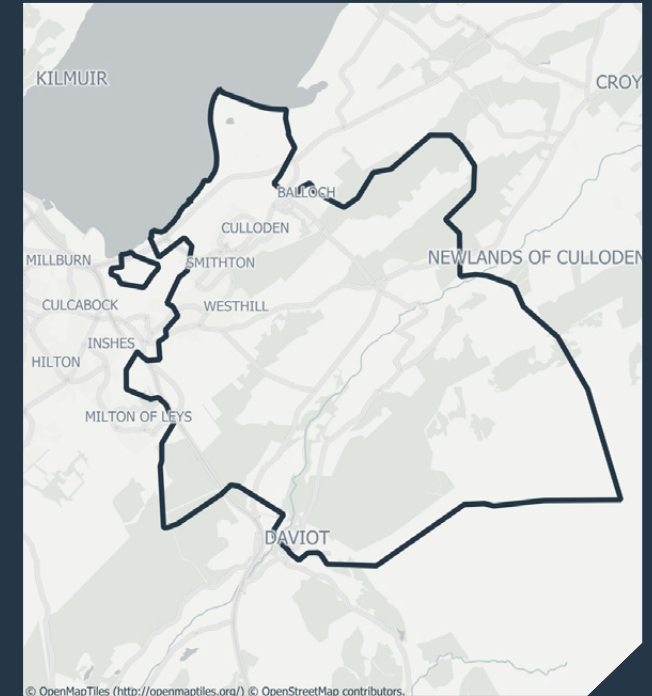
Culloden (Inverness)

Scheme description

- Culloden 33/11kv primary substation is located within the Inverness area. Postcodes – IV1 , IV2
- Load related – thermal overloading of primary substation & circuits beyond minimum standard for security of supply by 2026 (LTW) and 2027 (CT).

Proposed option

- Flexibility in 2025/26 and 2026/27 ahead of reinforcement works to build new 33/11kv primary substation and reconfigure existing circuits.
- This option provides the most economic & sustainable solution to preventing thermal overloading.



System need requirement

| J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |

DNOA History

| 2023/24 | 2024/25 | 2025/26 | 2026/27 | 2027/28 |
|--------------------|---------|---------|---------|---------|
| Initial assessment | | | | |

Indicative flexibility price (if available):

- Availability £150/MWh
- Utilisation £200/MWh

Reinforcement timeline

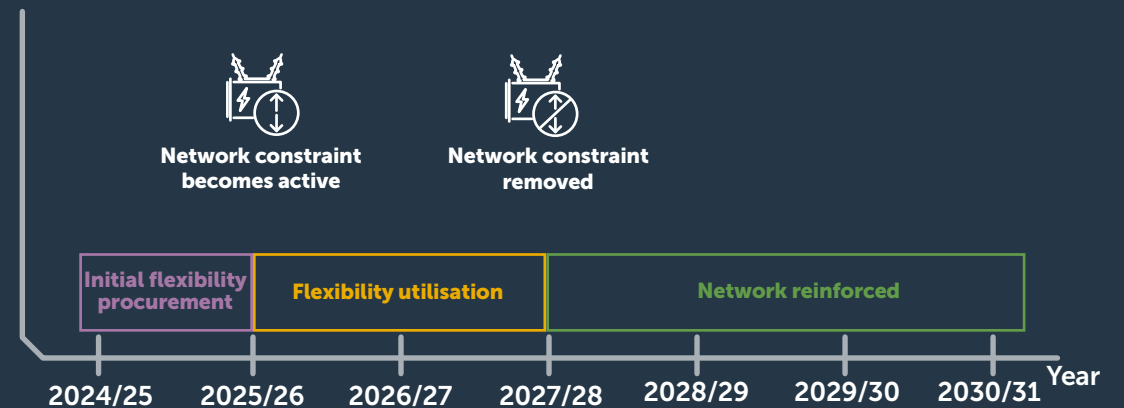
- Flexibility utilisation 2025/26 & 2026/27
- Reinforcement delivery by end 2027/28

Estimated peak MW outside firm network capacity under each scenario

Grey text relates to estimated peak MW without reinforcement delivery

| | 2024/25 | 2025/26 | 2026/27 | 2027/28 | 2028/29 | 2029/30 | 2030/31 |
|-----|---------|---------|---------|----------|----------|----------|----------|
| CT | - | - | 0.76 | - (1.96) | - (3.06) | - (4.16) | - (5.26) |
| ST | - | - | - | - (0.36) | - (0.86) | - (1.46) | - (1.86) |
| LTW | - | 0.46 | 1.66 | - (3.06) | - (4.26) | - (5.66) | - (7.06) |
| FS | - | - | - | - | - | - (0.46) | - (0.96) |

Constraint management timeline





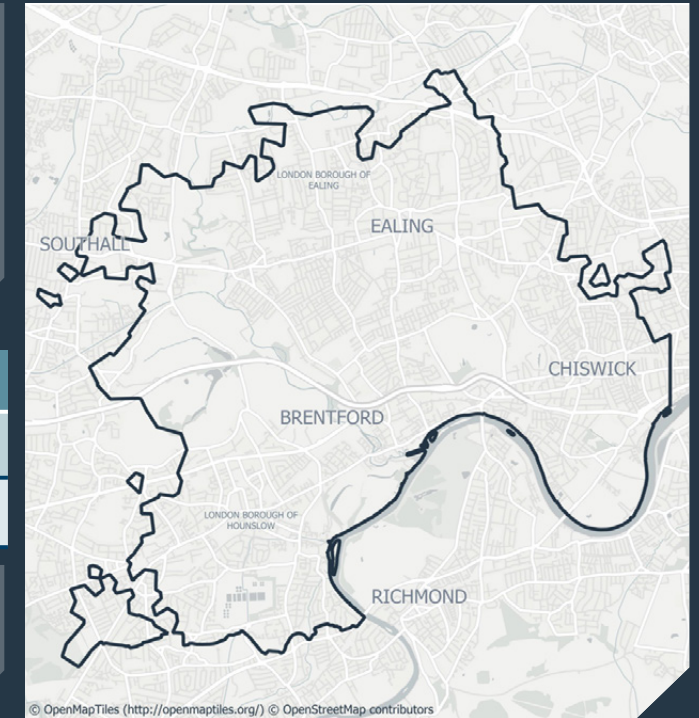
Ealing and Hounslow

Scheme description

- Ealing 66kV Bulk Supply Point is in West London –SSEN’s SEPD licence area. Postcode(s): NW10, TW1, TW3, TW4, TW7, TW8, UB1, UB2, UB6, W12, W13, W3, W4, W5, W6, W7.
- Fault level related – fault currents at Ealing 22kV busbars exceed the fault ratings of existing circuit breakers during RIIO-ED2.

Proposed option

- Asset Solution: Existing air insulated switchgear replaced with gas insulated switchgear. 21 New 132kV gas insulated circuit breakers replacing existing 66kV air insulated circuit breakers.
- Ensures fault level compliance in the long term. Low space requirements at a space constrained site. Switchboard can be operated at 132kV if site is updated.
- Additional current breaking rating of 18.1kA, additional current making rating of 44.2kA (per Circuit Breaker).



System need requirement

| J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |

DNOA History

| 2023/24 | 2024/25 | 2025/26 | 2026/27 | 2027/28 |
|--------------------|---------|---------|---------|---------|
| Initial assessment | | | | |

Indicative flexibility price (if available):

- Availability: N/A
- Utilisation: N/A

Reinforcement timeline

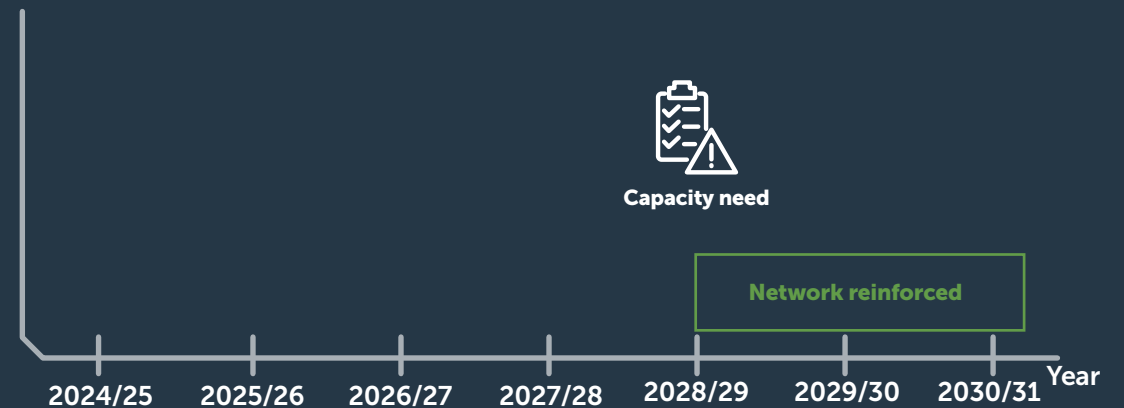
- Reinforcement delivery by the end of 2027/28

Estimated peak MW outside firm network capacity under each scenario

Grey text relates to estimated peak MW without reinforcement delivery

| | 2024/25 | 2025/26 | 2026/27 | 2027/28 | 2028/29 | 2029/30 | 2030/31 |
|-----|---------|---------|---------|---------|---------|---------|---------|
| CT | - | - | - | - | - | - | - |
| ST | - | - | - | - | - | - | - |
| LTW | - | - | - | - | - | - | - |
| FS | - | - | - | - | - | - | - |

Constraint management timeline





DNOA Outcome Report

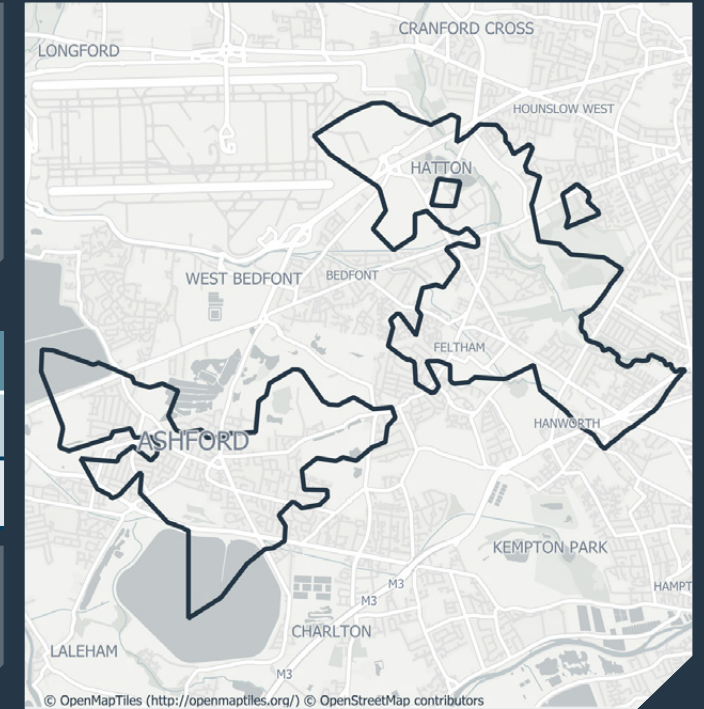
East Bedfont

Scheme description

- East Bedfont BSP Substation is located within Hounslow, London and supplies Hillingdon, Hounslow, Spelthorne & parts of Richmond upon Thames. Postcodes: HP27, TW12, TW13, TW14, TW15, TW16, TW18, TW19, TW3, TW4, TW5, TW6, TW7
- Load related– Thermal overloading of East Bedfont A Primary Transformers during First Circuit Outage conditions under all 4 DFES scenarios.

Proposed option

- Reinforcement delivery to upgrade both 132/22kv Primary Transformers at East Bedfont A .
- This Project will release an additional 30 MVA capacity to the East Bedfont A distribution network.
- There will then be a requirement for further capacity from 2030 onwards. Initially this will be delivered through flexibility for one year followed by further network upgrades



System need requirement

| J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |

DNOA History

| 2023/24 | 2024/25 | 2025/26 | 2026/27 | 2027/28 |
|--------------------|---------|---------|---------|---------|
| Initial assessment | | | | |

Indicative flexibility price (if available):

- Availability £150/MWh
- Utilisation £200/MWh

Reinforcement timeline

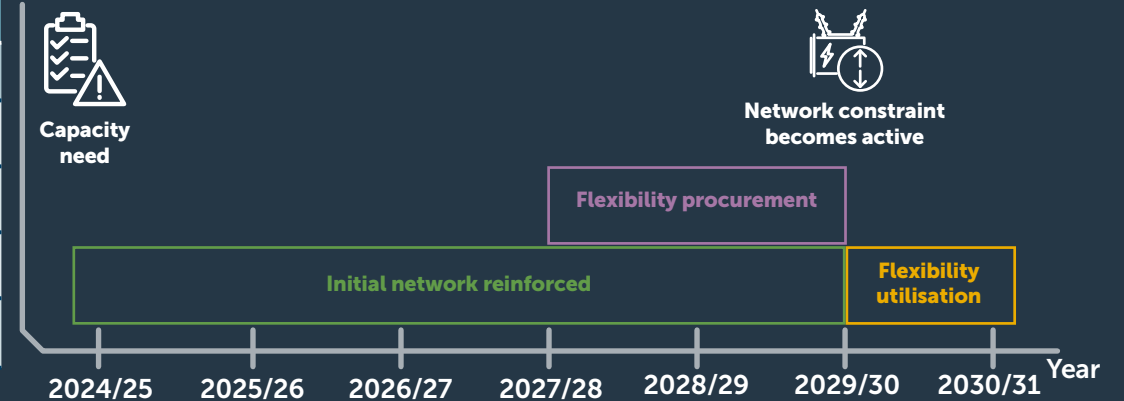
- Reinforcement delivered for 2024/25.
- Flexibility utilisation from 2029/30.

Estimated peak MW outside firm network capacity under each scenario

Grey text relates to estimated peak MW without reinforcement delivery

| | 2024/25 | 2025/26 | 2026/27 | 2027/28 | 2028/29 | 2029/30 | 2030/31 |
|-----|-----------|-----------|-----------|-----------|-----------|--------------|---------------|
| CT | - (18.70) | - (19.90) | - (21.10) | - (22.60) | - (26.40) | 1.85 (30.80) | 7.75 (36.70) |
| ST | - (18.00) | - (18.80) | - (19.70) | - (20.50) | - (21.60) | - (23.00) | - (24.10) |
| LTW | - (19.20) | - (20.50) | - (22.00) | - (25.10) | - (28.70) | 4.95 (33.90) | 10.95 (39.90) |
| FS | - (17.80) | - (18.60) | - (19.50) | - (20.50) | - (21.60) | - (23.10) | - (24.80) |

Constraint management timeline





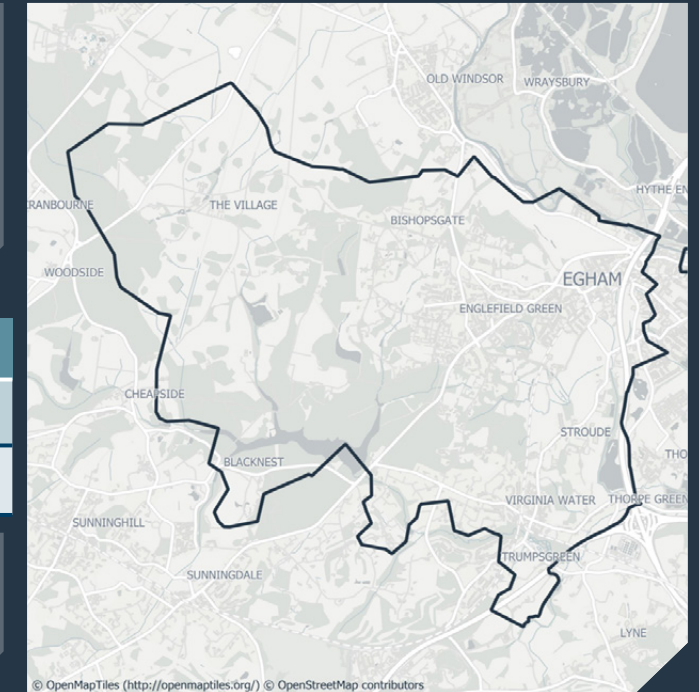
Egham

Scheme description

- Egham Primary Substation supplies the area to the West of Egham town – SSEN’s SEPD licence area. Postcode(s): GU25, SL3, SL4, SL5, TW14, TW20.
- Demand load related – thermal overloading. Thermal overloading of substation and circuit under first circuit outage.

Proposed option

- Procure flexibility solutions for two years followed by asset solution: installation of additional transformer and supply circuit.
- Option provides the economic benefit of reinforcement deferral. Provides long term compliance with P2 security of supply.
- Releases 30MVA of firm capacity at Egham primary substation.



System need requirement

| J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |

DNOA History

| 2023/24 | 2024/25 | 2025/26 | 2026/27 | 2027/28 |
|--------------------|---------|---------|---------|---------|
| Initial assessment | | | | |

Indicative flexibility price (if available):

- Availability £150/MW/h
- Utilisation £200/MWh

Reinforcement timeline

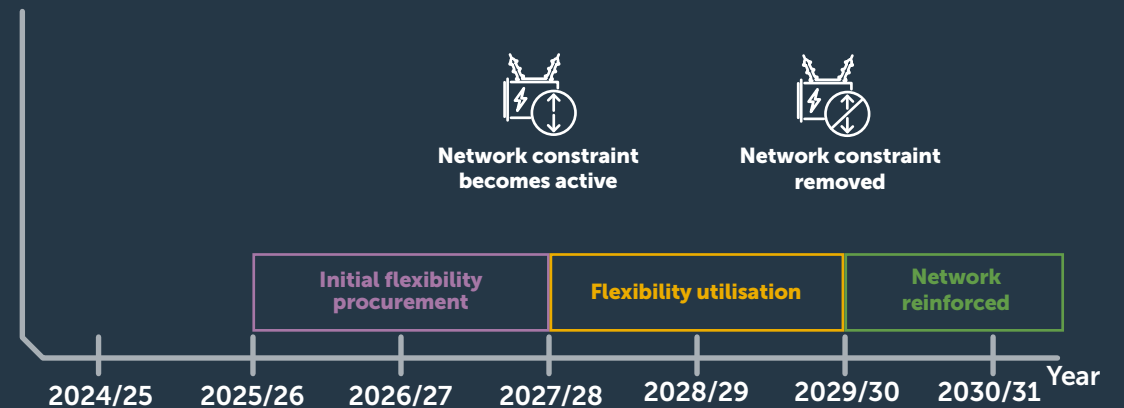
- Reinforcement delivery in 2029/30.

Estimated peak MW outside firm network capacity under each scenario

Grey text relates to estimated peak MW without reinforcement delivery

| | 2024/25 | 2025/26 | 2026/27 | 2027/28 | 2028/29 | 2029/30 | 2030/31 |
|-----|---------|---------|---------|---------|---------|---------|---------|
| CT | - | - | - | 0.34 | 1.68 | -(2.78) | -(4.26) |
| ST | - | - | - | - | - | - | -(0.38) |
| LTW | - | - | 0.31 | 1.62 | 2.99 | -(4.30) | -(5.83) |
| FS | - | - | - | - | - | -(0.11) | -(0.86) |

Constraint management timeline





Errochty / Tummel Bridge

Scheme description

- Rationalisation of 33kV network within Perth and Kinross, and Stirling. Postcodes – FK21, IV33, PH1, PH15, PH16, PH17, PH18, PH8, PH9
- Original driver is thermal export concerns at Tummel Bridge Grid Supply Point (GSP). Transmission works are ongoing to release capacity. This DNOA covers the associated distribution works

System need requirement

| J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |

Indicative flexibility price (if available):

- N/A -Flexibility cannot replace the need to reconfigure the network to unlock the additional capacity from the new Grid transformers at Errochty GSP.

Proposed option

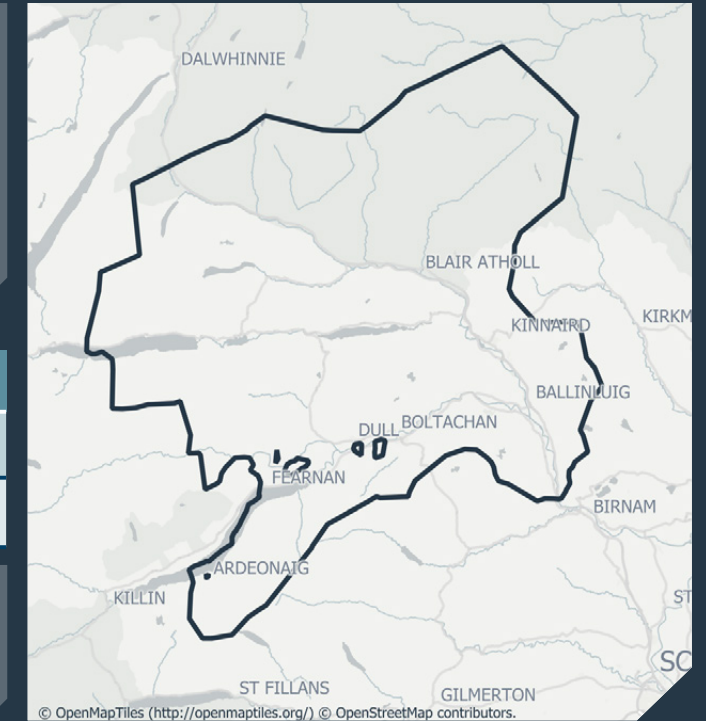
- Full integration of Tummel Bridge circuits to the new Errochty Grid Supply Point following transmission works to upgrade 2 x Errochty Grid Transformers to 90MVA units.
- Transfer of 5 x 33kv circuits from Tummel Bridge 33kv switchboard to the New Errochty 33kv switchboard. Build additional 33kv circuit to serve Tummel Primary, which currently feeds Tummel Power Station.
- Deemed to be the most efficient and enduring solution, allowing utilisation of the full capacity of the new GSP and future load growth to 2050.
- Releases 69MVA to the distribution network.

DNOA History

| 2023/24 | 2024/25 | 2025/26 | 2026/27 | 2027/28 |
|--------------------|---------|---------|---------|---------|
| Initial assessment | | | | |

Reinforcement timeline

- Reinforcement between 2024 – 2026

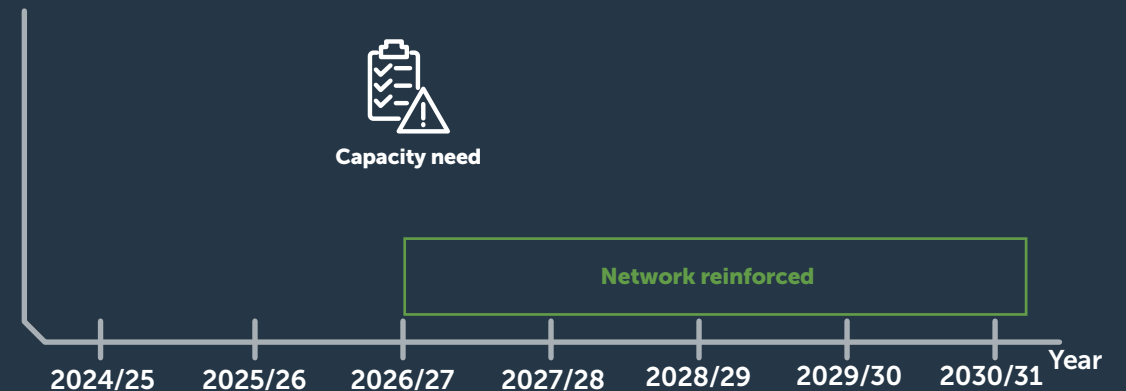


Estimated peak MW outside firm network capacity under each scenario

Grey text relates to estimated peak MW without reinforcement delivery

| | 2024/25 | 2025/26 | 2026/27 | 2027/28 | 2028/29 | 2029/30 | 2030/31 |
|-----|---------|---------|---------|---------|---------|---------|---------|
| CT | - | - | - | - | - | - | - |
| ST | - | - | - | - | - | - | - |
| LTW | - | - | - | - | - | - | - |
| FS | - | - | - | - | - | - | - |

Constraint management timeline





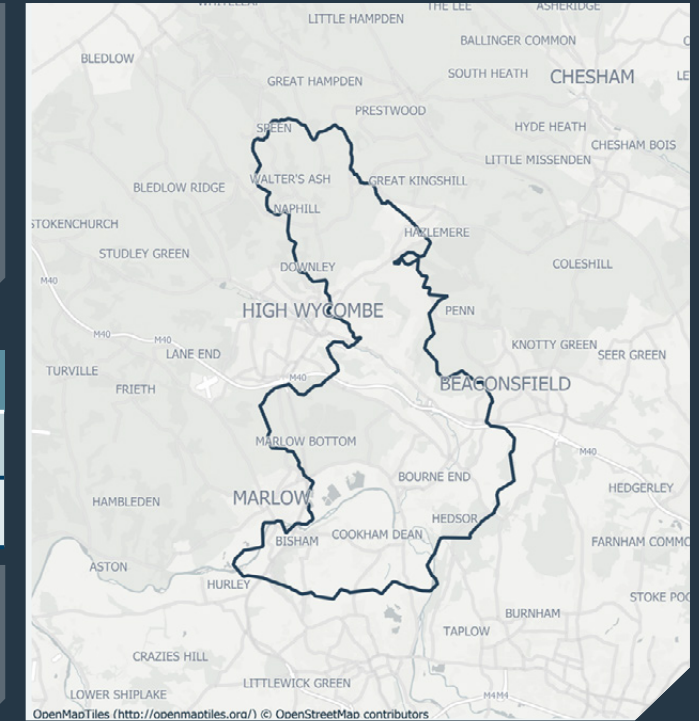
High Wycombe and Marlow

Scheme description

- This reinforcement will increase capacity in the Amersham area. Postcode(s): HP(7-9), RG31, SL(0-9), UB8, UB9, WD3.
- Load related – Thermal overloading of the 132kV circuit between Iver and Denham in second circuit outage conditions (N-2).

Proposed option

- Asset solution: Reinforce 270m of circuit with a cable of a higher thermal rating between Denham and Iver substations.
- Cost effective way to increase capacity and maintain compliance. Due to the large jump in demand in 2026, flexibility is not feasible.
- Up to 62 MVA of capacity released in the winter season.



System need requirement

| J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |

DNOA History

| 2023/24 | 2024/25 | 2025/26 | 2026/27 | 2027/28 |
|--------------------|---------|---------|---------|---------|
| Initial assessment | | | | |

Indicative flexibility price (if available):

- Availability: N/A
- Utilisation: N/A

Reinforcement timeline

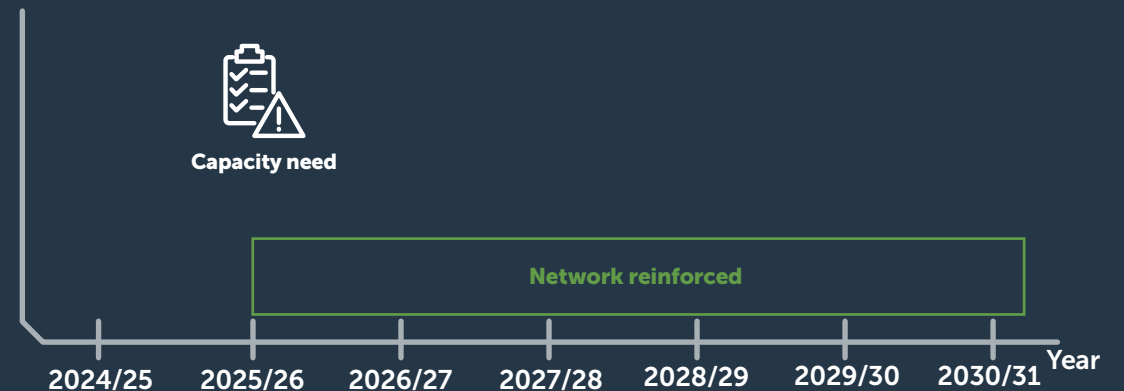
- Delivery by 2025/26.

Estimated peak MW outside firm network capacity under each scenario

Grey text relates to estimated peak MW without reinforcement delivery

| | 2024/25 | 2025/26 | 2026/27 | 2027/28 | 2028/29 | 2029/30 | 2030/31 |
|-----|---------|----------|----------|----------|----------|----------|----------|
| CT | - | - (44.3) | - (45.5) | - (46.7) | - (49.1) | - (51.6) | - (54) |
| ST | - | - (42.4) | - (42.9) | - (43.4) | - (44.7) | - (45.8) | - (47.1) |
| LTW | - | - (45.5) | - (47.4) | - (49.9) | - (52.1) | - (55.5) | - (59.2) |
| FS | - | - (42.4) | - (42.9) | - (43.4) | - (44) | - (45.3) | - (46.8) |

Constraint management timeline





Hunston: Birdham & Selsey

Scheme description

- Hunston substation and circuits are located in the Chichester district of West Sussex. Postcode areas: PO16, PO18 - PO22, and DT1.
- Work in this area has been triggered due to a current operational need and a long-term thermal overloading issue arising by 2042 is also taken into account.

Proposed option

- Asset Solution: Works include new underground 33kV circuits between Hunston, Birdham, and Selsey, and new assets at Selsey and Hunston. Currently, both overhead circuits must be taken out of service for any operational activities on either circuit, this solution will remove this issue.
- Due to operational issues, flexibility could not be used to delay investment.



System need requirement

| J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |

DNOA History

| 2023/24 | 2024/25 | 2025/26 | 2026/27 | 2027/28 |
|--------------------|---------|---------|---------|---------|
| Initial assessment | | | | |

Indicative flexibility price (if available):

- N/A

Reinforcement timeline

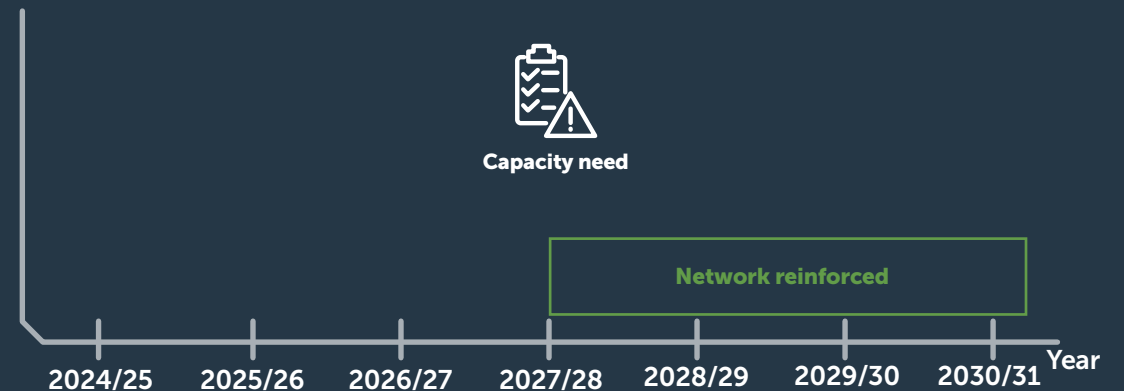
- Reinforcement delivery by the end of 2026/27

Estimated peak MW outside firm network capacity under each scenario

Grey text relates to estimated peak MW without reinforcement delivery

| | 2024/25 | 2025/26 | 2026/27 | 2027/28 | 2028/29 | 2029/30 | 2030/31 |
|-----|---------|---------|---------|---------|---------|---------|---------|
| CT | - | - | - | - | - | - | - |
| ST | - | - | - | - | - | - | - |
| LTW | - | - | - | - | - | - | - |
| FS | - | - | - | - | - | - | - |

Constraint management timeline





Inveralmond and Redgorton

Scheme description

- These reinforcements will increase capacity at Inveralmond, Redgorton and parts of rural Perthshire. Postcode(s): PH1, PH2, PH7, PH8, UM5.
- Load related - Thermal overload of Burghmuir feeders (301) and (302) under the CT DFES scenario in 2026.

Proposed option

- Procure flexibility solutions for one year followed by asset solutions: installation and reinforcement with 33kV cable, busbars, poles, and line conductor.
- The option provides the economic benefit of reinforcement deferral. Ensures P2 compliance and designed for effective 2050 operation.
- Releases 23.6MVA of capacity.

System need requirement

| J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |

DNOA History

| 2023/24 | 2024/25 | 2025/26 | 2026/27 | 2027/28 |
|--------------------|---------|---------|---------|---------|
| Initial assessment | | | | |

Indicative flexibility price (if available):

- Availability £122/MW
- Utilisation £167/MWh

Reinforcement timeline

- Flexibility utilisation in 2025/26.
- Reinforcement delivery by 2026/27.

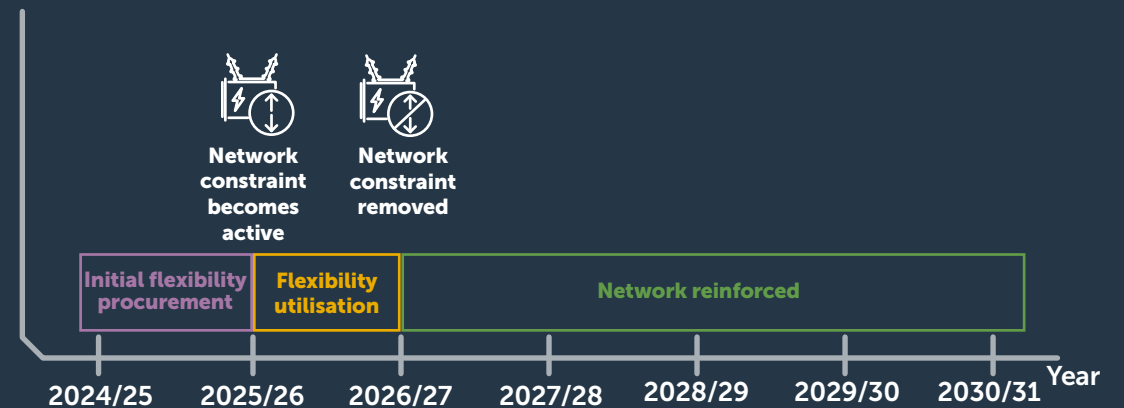


Estimated peak MW outside firm network capacity under each scenario

Grey text relates to estimated peak MW without reinforcement delivery

| | 2024/25 | 2025/26 | 2026/27 | 2027/28 | 2028/29 | 2029/30 | 2030/31 |
|-----|---------|---------|----------|----------|----------|----------|----------|
| CT | - | 1.08 | - (2.42) | - (4.27) | - (5.82) | - (6.97) | - (8.18) |
| ST | - | 0.68 | - (1.62) | - (3.07) | - (4.12) | - (4.87) | - (5.68) |
| LTW | 0.38 | 1.68 | - (2.92) | - (4.77) | - (6.22) | - (7.47) | - (9.08) |
| FS | - | - | - (0.52) | - (1.77) | - (2.72) | - (3.37) | - (4.08) |

Constraint management timeline





Lytchett

Scheme description

- Lytchett Bulk Supply Point is in the Dorset local authority area – SSEN’s SEPD licence area. Postcode(s): DT2, DT11, BH15, BH16, BH17, BH18, BH20, BH21.
- Demand load related and fault level related – thermal overloading of the 132/33kV transformers and fault level non-compliance for the 33kV circuit breakers.

System need requirement

| J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |

Indicative flexibility price (if available):

- Availability: TBC
- Utilisation: TBC

Estimated peak MW outside firm network capacity under each scenario

Grey text relates to estimated peak MW without reinforcement delivery

| | 2024/25 | 2025/26 | 2026/27 | 2027/28 | 2028/29 | 2029/30 | 2030/31 |
|-----|---------|---------|---------|----------|----------|----------|----------|
| CT | 5.43 | 5.87 | 6.71 | -(9.85) | -(11.69) | -(14.20) | -(17.94) |
| ST | 5.16 | 5.47 | 6.38 | -(7.36) | -(8.00) | -(9.42) | -(11.02) |
| LTW | 5.63 | 6.71 | 10.04 | -(14.04) | -(15.12) | -(18.81) | -(23.05) |
| FS | 4.87 | 5.20 | 5.68 | -(6.30) | -(6.73) | -(7.74) | -(8.89) |

Proposed option

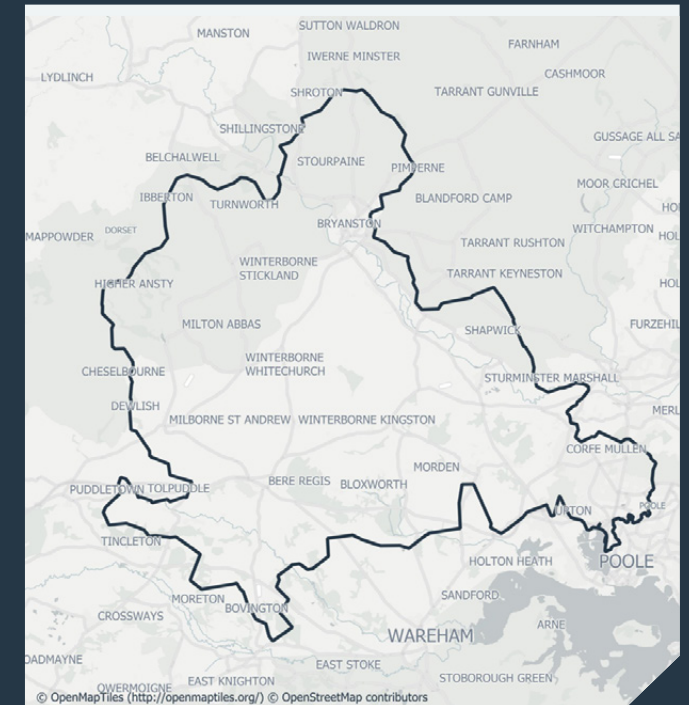
- Procure flexibility solutions. This is followed by asset solution(s): 132/33kV transformer replacement, new gas insulated 33kV busbar and circuit breakers.
- Option uses flexibility to maintain network security. Asset solutions solve all first circuit outage long term compliance issues.
- Releases 30MVA of firm capacity at Lytchett Bulk Supply Point.

DNOA History

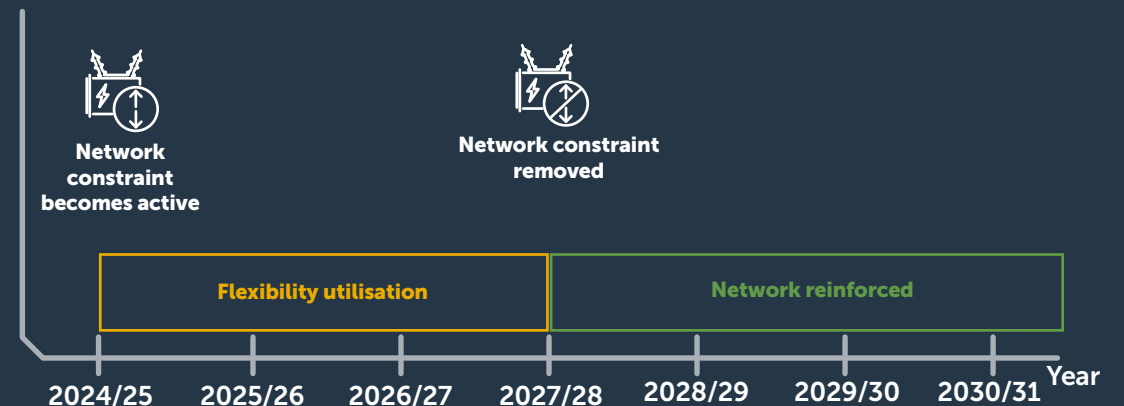
| 2023/24 | 2024/25 | 2025/26 | 2026/27 | 2027/28 |
|--------------------|---------|---------|---------|---------|
| Initial assessment | | | | |

Reinforcement timeline

- Reinforcement delivery for thermal constraint by the end of 2026/27 and for fault level constraint by the end of 2027/28.



Constraint management timeline





Machrie/Whiting Bay 11kV Network

Scheme description

- Machrie and Whiting Bay Primary sub stations are located on the Isle of Arran, which falls within the South Caledonia region of the SHEPD licence area.
- Load Related - Low volts during operational scenarios between Machrie and Whiting Bay Primary Substation

Proposed option

- Proposal to reinforce the 11kV Network between Machrie and Whiting Bay Primary sub stations by installing voltage regulating equipment.
- This is the most efficient and economical solution. Flexibility solution is not viable for solving the voltage issue
- Capacity released: 1.09MVA



System need requirement

| J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |

DNOA History

| 2023/24 | 2024/25 | 2025/26 | 2026/27 | 2027/28 |
|--------------------|---------|---------|---------|---------|
| Initial assessment | | | | |

Indicative flexibility price (if available):

- N/A

Reinforcement timeline

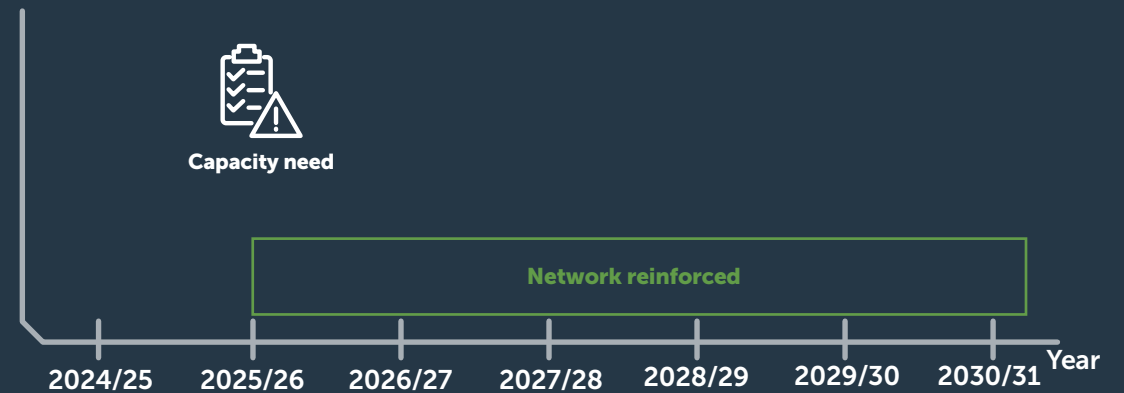
- Reinforcement delivered by 2025/26

Estimated peak MW outside firm network capacity under each scenario

Grey text relates to estimated peak MW without reinforcement delivery

| | 2024/25 | 2025/26 | 2026/27 | 2027/28 | 2028/29 | 2029/30 | 2030/31 |
|-----|---------|---------|---------|---------|---------|---------|---------|
| CT | - | - | - | - | - | - | - |
| ST | - | - | - | - | - | - | - |
| LTW | - | - | - | - | - | - | - |
| FS | - | - | - | - | - | - | - |

Constraint management timeline





DNOA Outcome Report

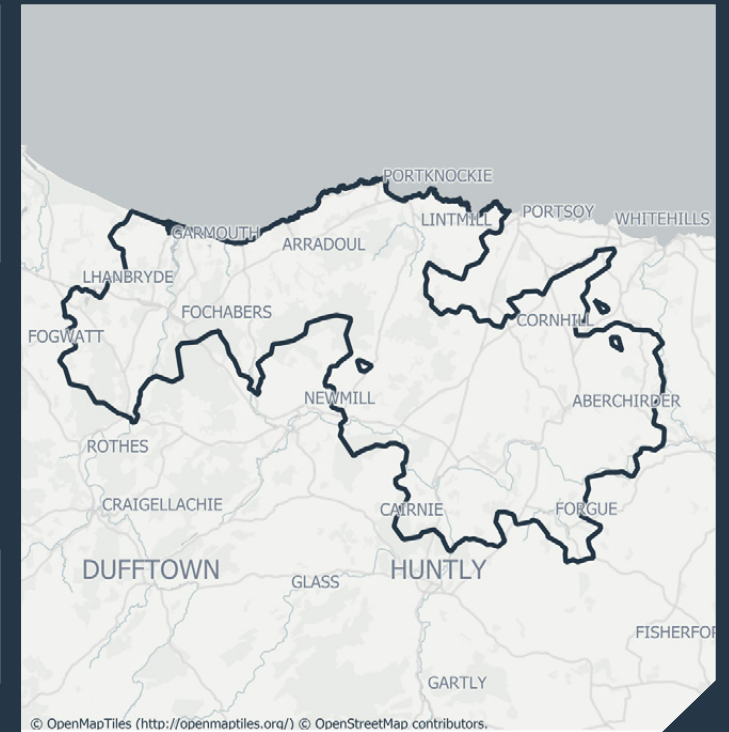
North-east Moray

Scheme description

- Keith Grid Supply Point is located within the Moray area in north-east Scotland. Postcode areas: AB45, AB53 - AB56, IV30, and IV32.
- Load related – voltage levels will not be within the acceptable range for maintaining a minimum standard of supply by 2027/28.

Proposed option

- Asset solution: A combination of reconfiguration, network extension and reinforcing of existing assets has been assessed to be the ideal option. For this particular circuit configuration, no flexibility market options are available/viable due to the lack of available assets.
- Capacity released: 7.68 MVA



System need requirement

| J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |

DNOA History

| 2023/24 | 2024/25 | 2025/26 | 2026/27 | 2027/28 |
|--------------------|---------|---------|---------|---------|
| Initial assessment | | | | |

Indicative flexibility price (if available):

- Availability: N/A
- Utilisation: N/A

Reinforcement timeline

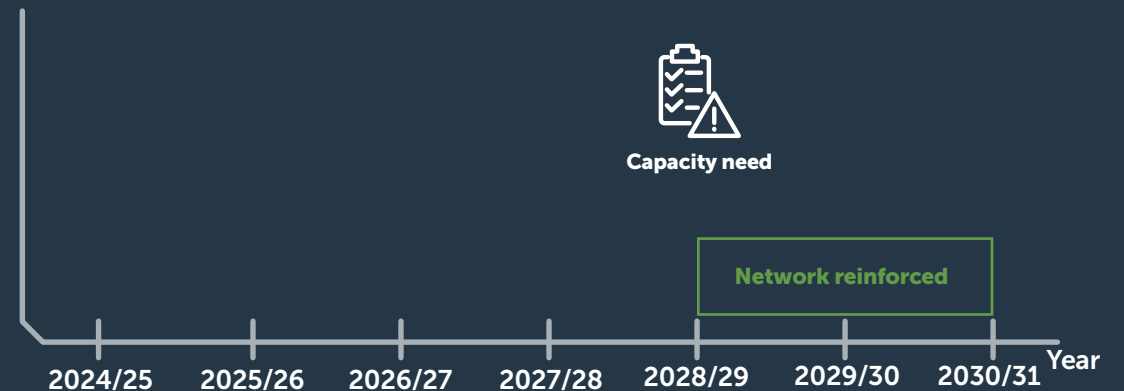
- Reinforcement delivery by the end of 2027/28.

Estimated peak MW outside firm network capacity under each scenario

Grey text relates to estimated peak MW without reinforcement delivery

| | 2024/25 | 2025/26 | 2026/27 | 2027/28 | 2028/29 | 2029/30 | 2030/31 |
|-----|---------|---------|---------|---------|---------|---------|---------|
| CT | - | - | - | - | - | - | - |
| ST | - | - | - | - | - | - | - |
| LTW | - | - | - | - | - | - | - |
| FS | - | - | - | - | - | - | - |

Constraint management timeline





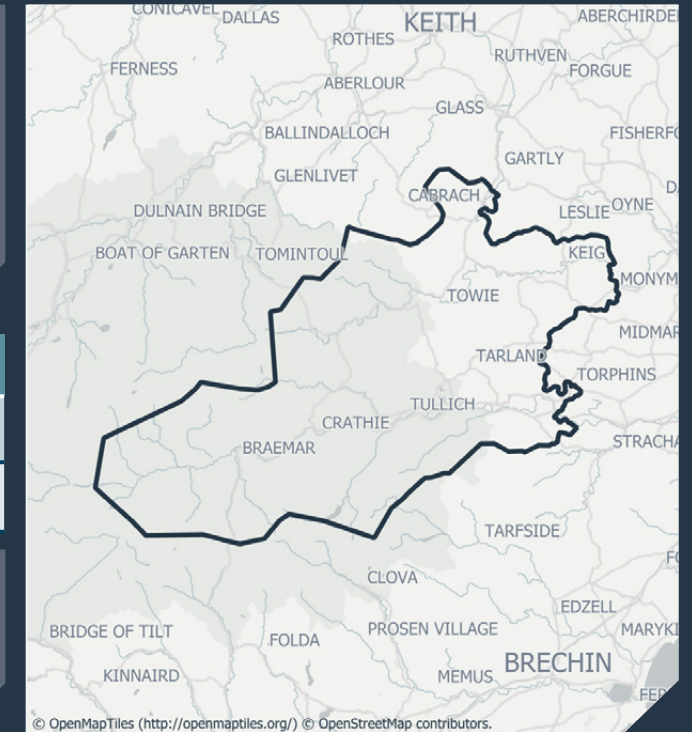
Tarland, Aboyne and Ballater

Scheme description

- Tarland Grid Supply Point is located within Aberdeenshire, Scotland. Postcode areas: AB31, AB33-AB36, AB39, AB45, AB49, AB51, AB52
- Load related constraint – Work required due to short term voltage issues and longer-term thermal issues.

Proposed option

- Asset solution: Reinforcement of existing assets and the addition of new assets. The option to use flexibility was assessed as not possible due to the nature of the customer base and the particular network configuration.
- Capacity released: 15.6 MVA.



System need requirement

| J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |

DNOA History

| 2023/24 | 2024/25 | 2025/26 | 2026/27 | 2027/28 |
|--------------------|---------|---------|---------|---------|
| Initial assessment | | | | |

Indicative flexibility price (if available):

- Availability: N/A
- Utilisation: N/A

Reinforcement timeline

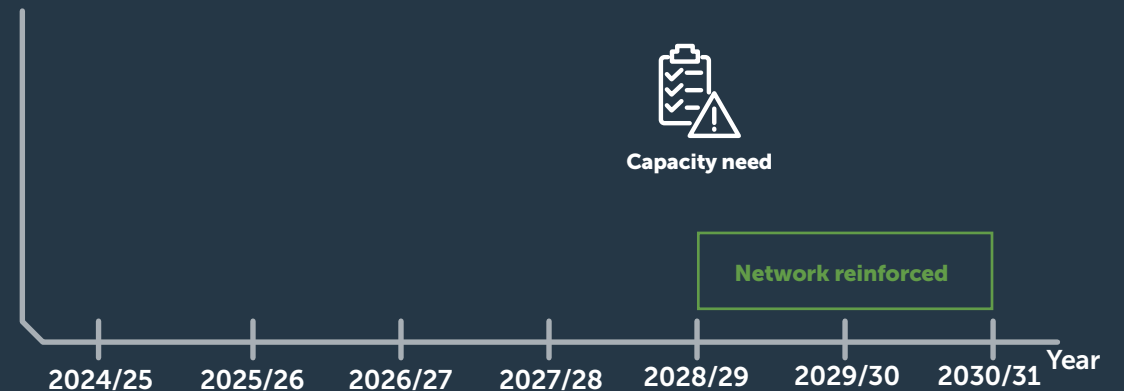
- Reinforcement delivery by the end of 2027/28.

Estimated peak MW outside firm network capacity under each scenario

Grey text relates to estimated peak MW without reinforcement delivery

| | 2024/25 | 2025/26 | 2026/27 | 2027/28 | 2028/29 | 2029/30 | 2030/31 |
|-----|---------|---------|---------|---------|---------|----------|----------|
| CT | - | - | - | - | - | - (0.10) | - (0.31) |
| ST | - | - | - | - | - | - (0.01) | - (0.21) |
| LTW | - | - | - | - | - | - | - |
| FS | - | - | - | - | - | - | - |

Constraint management timeline





Engaging with our stakeholders

✓ Listening to our stakeholders

We have engaged with a range of stakeholders throughout the process of refreshing our DSO strategy in October 2023. Ranging from flexibility providers to the ESO and Local Authorities, we have captured the voices of relevant stakeholders on our future plans and defined our priorities based on their preferences.

The key activities and insights that have fed into our DNOA methodology include:

- Engaging with stakeholders on transparency and assurance and gaining their insights on managing uncertainty in our decision-making and how stakeholders want to be involved in our processes.
- We outlined our ambition to embed strategic investment in our strategy and the benefits of it as part of the DSO strategy and heard from our stakeholders about focusing on delivering network visibility, identifying system needs, transparent options assessment and whole system planning.

✓ What are we planning to do in the future?

SSEN is focused on delivering for the communities we serve and doing our part to ensure a just energy transition.

We understand that any evolution of electricity market governance arrangements must serve the needs of all stakeholders and customers, including the most vulnerable.

At every stage of development, we are taking time and care to consider how any changes to the way we manage the electricity distribution system may impact the most vulnerable in our society. We encourage community stakeholders to engage with us in this process, which has the potential to deliver savings for all customers, including vulnerable customers and communities, while also driving the journey towards net zero.

We will annually refresh our DNOA methodology document and publish the outcomes of the DNOA process at least twice a year. We look to get stakeholders' input on our overall DNOA process as well as the level of detail and the granularity we provide in the DNOA outcome reports.



Want to know more?

| Topic | Last update |
|--|--|
| Forecasting the future of our network. Link to our DFES report | Updated annually |
| Network capacity information and constraints Link | NDR Updated bi-annually NHR and LTDs Updated annually |
| Local area energy planning support. Sign-up to LENZA | Onboarding of Local Authorities is ongoing |
| Flexibility tenders and documents. Link | Updated periodically |
| Outcomes of our DNOA process | Published periodically' |



Glossary

| Term | Description |
|---|--|
| Aggregators | A new type of energy service provider which can increase or moderate the electricity consumption of a group of consumers according to total electricity demand on the grid. |
| BAU | Business As Usual |
| CMZ | Constraint Managed Zones . These zones make use of technologies providing flexibility to alleviate network constraints, deploying them as an alternative to traditional network reinforcement in the management of peak demand. |
| Data triage | Systematically find issues which should inhibit open data, identify the 'least impact' mitigation technique(s) and make the process transparent. |
| Decarbonisation | Reducing the carbon intensity in terms of emissions per unit of electricity generated. |
| DER | Distributed Energy Resources. Any resource on the distribution system that produces or stores electricity. This can include distributed generation, storage, heat pumps and electric vehicles as well as other technologies. |
| Digital System Map/ Digital Twin | A digital representation of a real-world entity or system. |
| DNO | Distribution Network Operator |
| DNOA | Distribution Network Options Assessment |
| DSO | Distribution Systems Operator. The directorate within SSEN that supports a more flexible network operation. Uniquely placed to ensure simple and consistent access to new markets for our active customers through maximising the utilisation of our existing electrical and communication networks. |
| DSOAB | DSO Advisory Board |
| DSAP | Digital Strategy and Action Plan |
| ESO | Electricity System Operator. The electricity system operator for Great Britain, making sure that Great Britain has the essential energy it needs by ensuring supply meets demand. |
| EV | Electric Vehicle |
| FSO | Future System Operator. Ofgem intend to set up an expert, independent FSO with responsibilities across both the electricity and gas systems and the ability to expand its remit to additional energy vectors when needed. The FSO will be in the public sector, with operational independence from government. |
| GDN | Gas Distribution Network |
| GIS | Geographic Information System |
| GW | Gigawatt |
| HV | High Voltage |
| IDNO | Independent Distribution Network Operator |
| kWh | Kilowatt hour |

| Term | Description |
|------------------|--|
| LAEP | Local Area Energy Plan. A data-driven and whole energy system, evidence-based approach that sets out to identify the most effective route for the local area to contribute towards meeting the national net zero target, as well as meeting its local net zero target. |
| LCT | Low Carbon Technologies |
| LENZA | Local Energy net zero Accelerator. SSEN's tool for supporting local authority LAEPs. |
| LEO(N) | Local Energy Oxfordshire (Neighbourhood) |
| LTDS | Long Term Development Statements. Designed to help to identify and evaluate opportunities for entering into arrangements with us relating to use of system or connection. |
| LV | Low Voltage |
| MW | Megawatt |
| NDP | Network Development Plan |
| NeRDA | Near Real-Time Data Access |
| NIA | Network Innovation Allowance |
| NMF | Neutral Market Facilitator will provide a market for trading use of Distributed Energy Resources (DERs). |
| Open Data | Data in a machine-readable format that can be freely used, shared and built on by anyone, anywhere, for any purpose. |
| PSR | Priority Services Register. Our register of vulnerable customers. |
| RIIO-ED2 | Price control for Electricity Distribution (2023-2028) |
| RSP | Regional System Planner. Ofgem proposal for regional energy system planning bodies. |
| SDG | Sustainability Development Goals |
| SEPD | Southern Electric Power Distribution |
| SHEPD | Scottish Hydro Electric Power Distribution |
| SIF | Strategic Innovation Fund |
| SME | Small Medium Size Enterprise |
| SSE | Scottish and Southern Electricity |
| TO | Transmission Owner |
| TOM | Target Operating Model |
| VFES | Vulnerability Future Energy Scenarios |
| VIVID | Vulnerability Identification Via Informative Data |

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For any queries or to request further information, please contact us on:

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