Hinckley and Nuneaton BSPs

Network Development Report – East Midlands

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Electricity Distribution

nationalgrid

Contents

Hinckley / Nuneaton 33 kV

1. Network Overview

Hinckley and Nuneaton Bulk Supply Points (BSPs) are fed from Coventry Grid Supply Point (GSP) in National Grid Electricity Distribution's (NGED's) East Midlands licence area.

Nuneaton BSP is supplied directly from Coventry GSP via dedicated 132 kV dual circuits. Hinckley BSP is supplied via two 132 kV circuits from Coventry GSP. The circuits carry on to Pailton, Daventry and Rugby BSPs, and form the Coventry – Hinckley – Pailton – Daventry – Rugby 132 kV ring.

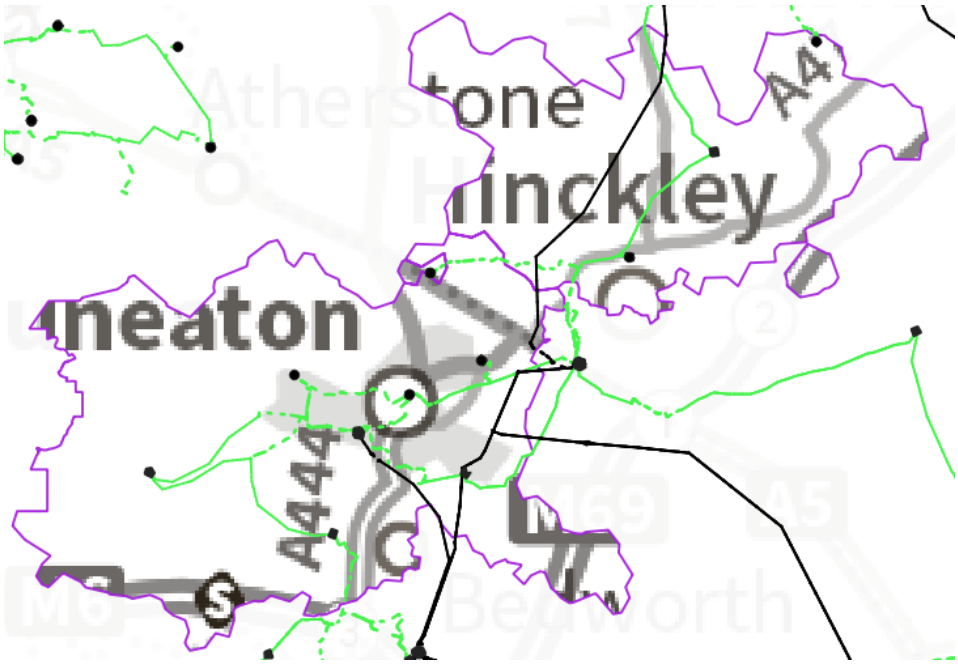

Figure 1.1 Hinckley and Nuneaton geographic network coverage

This report discusses all existing and future network constraints over a 0-10 year horizon identified on the Grid Transformers (GTs) at, and the 33 kV network supplied from Hinckley and Nuneaton BSPs. This uses the methodology outlined in the Network Development Plan Methodology Report with Network Operability Modelling applied as outlined below.

For the purposes of this analysis the NGED Best View Distribution Future Energy Scenario (DFES) has been used to study the years 2022 (baseline), 2028 and 2034, with consideration given to how proposals could change under the other scenarios. Five representative days have been studied across the four seasons: Winter Peak Demand, Intermediate Warm Peak Demand, Intermediate Cool Peak Demand, Summer Peak Demand and Summer Peak Generation.

1.1 Network Topology

Hinckley BSP is a two 90 MVA, 132/33 kV GT substation. The 33 kV busbar comprises two sections and is rated at 2000 A. Hinckley BSP supplies four primary substations: Barwell, Middlefield, Sapcote (T2), and Wood Lane.

Wood Lane primary is supplied from Hinckley BSP via a dedicated 33 kV double circuit, which connect to a pair of 33/11 kV transformers. Barwell and Middlefield primaries share a pair of 33 kV circuits from Hinckley BSP. Both primaries comprise of two 33/11 kV transformers.

Sapcote T2 is suppled from Hinckley BSP via a dedicated 33 kV circuit, whereas T1 is normally fed from Pailton BSP. A second 33 kV circuit from Hinckley BSP, normally open at Hinckley, can also supply Sapcote T1 as required.

Hinckley BSP is interconnected at 33 kV with Coalville BSP through Barwell primary, with Pailton BSP through Sapcote primary, and with Nuneaton BSP through Gypsy Lane and Langdale Drive primaries.

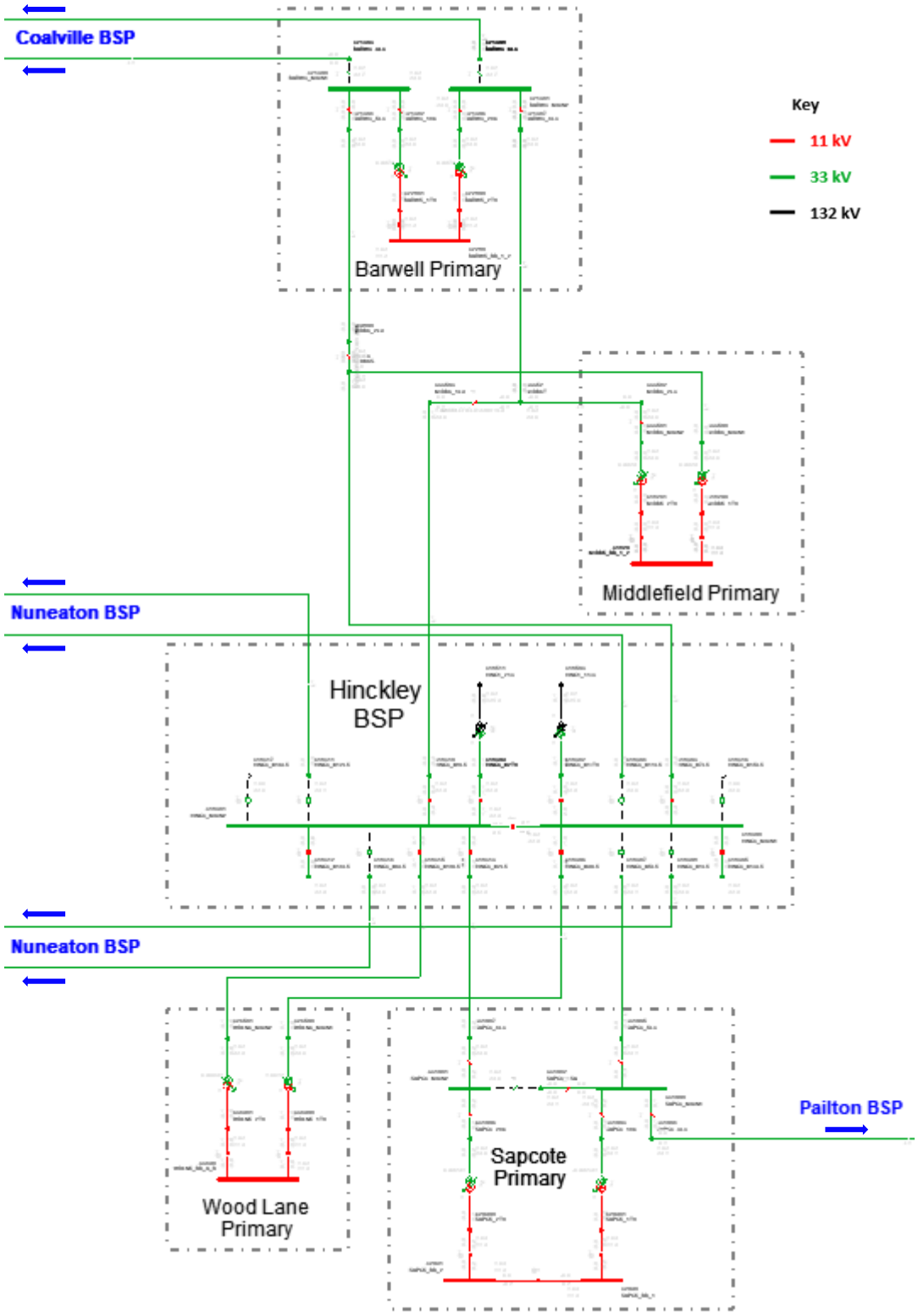

Figure 1.1.1 Hinckley 33 kV network single line diagram

Nuneaton BSP is a two 90 MVA, 132/33 kV GT substation. The 33 kV busbar comprises two sections and is rated at 2000 A. Nuneaton BSP supplies seven primary substations: Arley, Coton Road, Gypsy Lane, Langdale Drive, Newdigate T1, Nuneaton, and Whittleford. Nuneaton primary is located at the same site as the BSP.

Gypsy Lane is supplied from Nuneaton BSP via a dedicated 33 kV double circuit. Coton Road and Whittleford primaries both have a dedicated 33 kV circuit feeding one transformer, and share a second circuit with Langdale Drive primary. Gypsy Lane and Langdale Drive primaries both have a second 33 kV double circuit from Hinckley BSP, which is normally open at Hinckley.

Newdigate T1 is suppled from Nuneaton BSP via a dedicated 33 kV circuit, whereas T2 is normally fed from Coventry North BSP. The 33 kV circuit from Nuneaton to Newdigate T1 also provides supplies to Arley, a single transformer primary. A second 33 kV circuit is in place between Nuneaton and Arley, and the 33 kV side of the primary is normally run closed.

Nuneaton BSP is interconnected at 33 kV with Coventry North BSP through Newdigate primary, and with Hinckley BSP through Gypsy Lane and Langdale Drive primaries.

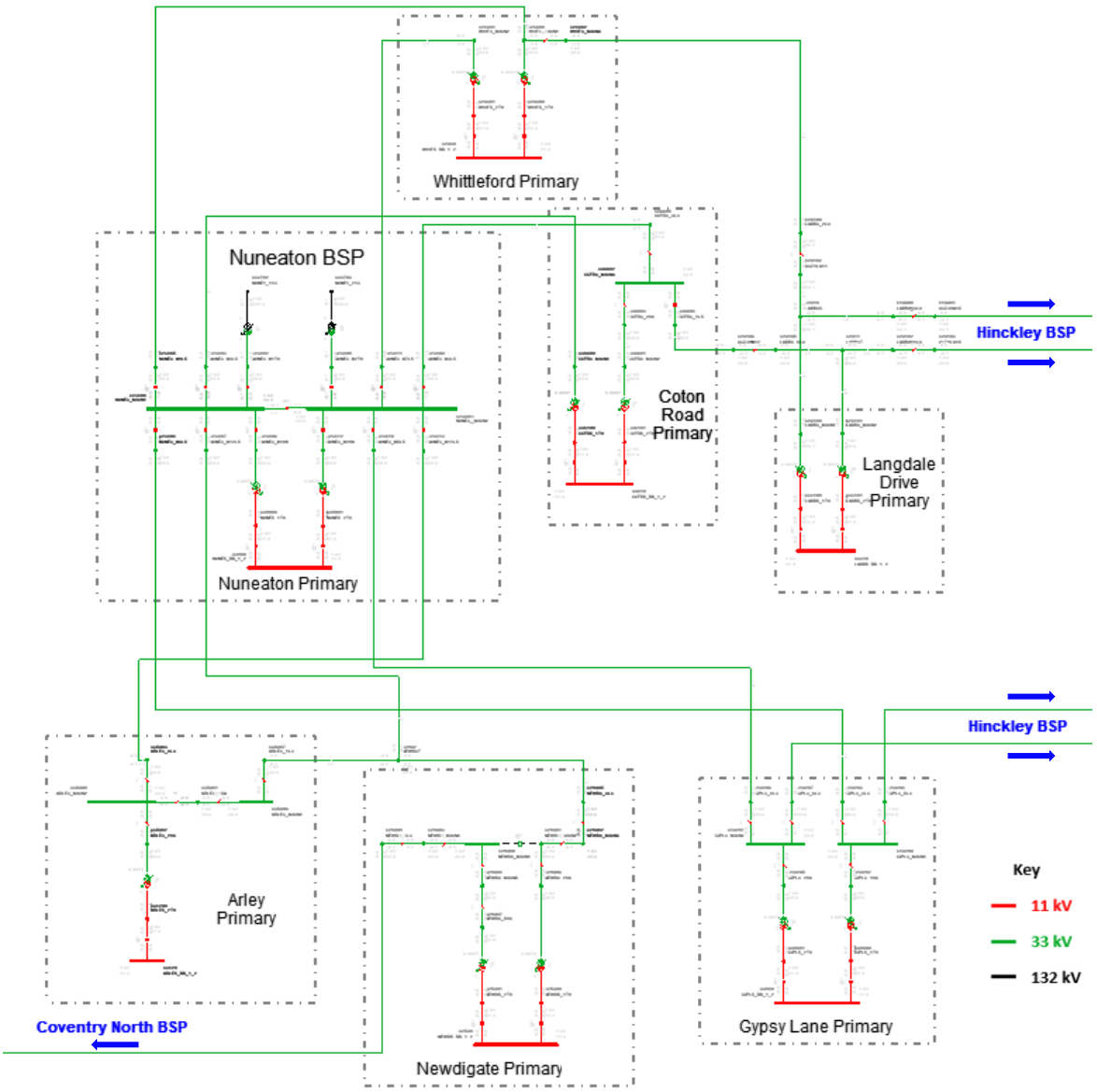

Figure 1.1.2 Nuneaton 33 kV network single line diagram

1.2 Network Operability Modelling

The following network automation and manual switching schemes have been modelled in the analysis of this area, aligning to how the network is currently operated.

- For arranged outages on any GT at Hinckley or Nuneaton BSPs, or their associated 132 kV infeeds, the lower voltage side circuit breaker is opened to prevent back-energisation.
- For arranged outages on any GT at Hinckley or Nuneaton BSPs, or their associated 132 kV infeeds, Newdigate and Sapcote primaries are split at 11 kV to prevent loose couples.
- For arranged outages on the 33 kV bus section circuit breaker at Hinckley and Nuneaton BSPs, the downstream network is split, where applicable, at 11 kV to prevent loose couples.
- For an arranged outage on an infeed to, or a transformer at any of the primaries, the lower voltage side circuit breaker is opened to prevent back-energisation.
- For an arranged outage on the infeed to, or the transformer at Arley primary, the demand at Arley is transferred to other primaries on the 11 kV network.
- For an arranged outage on the transformer at, or the 33 kV infeed to Sapcote primary, the third 33 kV circuit from Hinckley BSP is connected to secure the demand.

2. Network Constraints and Solution Options

2.1 Summary of Network Constraints

The following constraints were identified for the Best View Scenario, for which mitigation options will be discussed:

- Both transformers at Coton Road primary overload by 2034, following a planned or unplanned outage on the other transformer or its associated 33 kV infeed.
- The 33 kV circuit between Nuneaton and Whittleford T1 overloads by 2028, under an N-1 busbar fault scenario. Under N-2 scenarios, when required to support the demand of both Whittleford and Langdale Drive primaries, the overload is seen from the baseline.
- The 33 kV circuit between Nuneaton and Coton Road T2 overloads by 2028, under N-2 scenarios when required to support the demand of both Coton Road and Langdale Drive primaries.
- Both transformers at Nuneaton BSP overload by 2028, following a planned or unplanned outage on the other transformer or its associated 132 kV infeed.

2.2 Coton Road primary transformer overloads

Constraint Overview

Generation Demand

The table below outlines the nature of the network constraints identified in the network analysis.

Table 2.2.1 constraint(s) and conditions under which constraint(s) occur

Constraint	N-1 Condition	Subsequent N-2 Condition	First studied year constraint is observed in each season under Best View			
			Winter	Int Cool	Int Warm	Summer
Coton Road primary transformer overloads	Arranged or fault outage on the other infeed or transformer	None	2034	2034	2034	2034

Uncertainty under other Distribution Future Energy Scenarios: The constraint is present under Leading the Way, Consumer Transformation and Best View by 2034. By 2050, all scenarios forecast an overload on the existing transformers.

Solution Options

A list of each of the options considered for this constraint is given below.

Table 2.2.2 solution options to solve constraint(s)

Solution Options	Description	Solves Constraint	Wider Benefit	Potential to be cost effective	Viable or Discounted
0	No Intervention	×	×	×	Discounted
Reinforcement					
1	Reinforce both transformers with 20/40 MVA units	✓	×	✓	Viable
2	Install third transformer on site	✓	×	×	Viable
Operational Mitigation					
3	Transfer demand to other primaries	✓	×	✓	Viable
Flexibility services					
4	Procure flexibility under Coton Road primary	✓	×	✓	Viable

Solution Development

These options have been assessed on their technical viability and their likely cost-effectiveness pending a full Cost Benefit Analysis (CBA). This CBA will be subsequently carried out by the DNO to determine the optimal reinforcement solution, which will then be tested against market provided flexibility by the DSO as part of the Distribution Network Options Assessment (DNOA) process.

Option 1 – Reinforce both transformers with 20/40 MVA units

Viable

Capacity released for constraint(s) considered: up to 11 MVA after 33 kV circuit works in Section 2.4; up to 15 MVA after additional 33 kV circuit works

New limiting factor for constraint(s) considered: the 33 kV circuits supplying Coton Road and Langdale Drive T2 primaries

Detailed description: Uprating both primary transformers at Coton Road to 20/40 MVA units will increase capacity on the transformers; however, the 11 kV switchboard will also require reinforcement to align with the new transformer ratings. The replacement of the transformers at Coton Road primary would also confer an asset condition benefit, as the existing units are over 55 years old.

The primary substation's winter firm capacity will still be limited by the 33 kV circuits, particularly by the one that is shared with Langdale Drive primary, which has also been identified as being constrained and is discussed further in Section 2.4. Following the completion of the reinforcement works proposed in Section 2.4, the 33 kV circuit feeding Coton Road T1 will remain the limiting factor. However, it is not anticipated that reinforcing this will be required by 2034. This circuit can be reinforced at a later stage, as required by additional demand growth in the area. Each 33 kV circuit between Nuneaton BSP and Coton Road primary is approximately 2.5 km in length.

Option 2 – Install a third transformer on site

Capacity released for constraint(s) considered: N/A

Viable

New limiting factor for constraint(s) considered: the 33/11 kV transformers for a busbar outage at Nuneaton BSP

Detailed description: Installing a third 33/11 kV transformer at Coton Road primary will not materially increase the site's capacity as there are only two 33 kV busbars at Nuneaton BSP, thus two transformers would need to be fed from a single busbar at Nuneaton BSP (which would both be lost for a busbar outage).

If a third GT were required at Nuneaton BSP, then this option could potentially become viable. Either another 33 kV circuit, or additional 33 kV switching equipment and re-configuration will be required at Coton Road.

The third transformer could, however, be supplied from Hinckley BSP, utilising the existing 33 kV circuit from Hinckley to Cotton Road via Langdale Drive primary. To enable this, either half of Langdale Drive primary, or the entire demand, would also be moved into Hinckley BSP. The 11 kV switchboard will also require extension to accommodate, as a minimum, a third section.

As with all solutions where an additional transformer is required, space may be the limiting factor for this site. A full survey and detailed design will be able to confirm this option's viability from a construction point of view.

Option 3 – Transfer demand to other primaries

Capacity released for constraint(s) considered: Depending on transfers

Viable

New limiting factor for constraint(s) considered: As before

Detailed description: Transferring demand out of Coton Road primary to adjacent primary substations through the 11 kV network will be assessed as part of a full 11 kV study. This may not be a viable long term solution for constraint management.

Option 4 – Procure flexibility under Coton primary

Flexibility service type: Generation turn up/demand turn down.

Viable

Detailed description: Flexibility services could be procured to alleviate the projected overloads on the 33/11 kV transformers at Coton primary. The viability of utilising flexibility will be further investigated as part of the DNOA process.

Solution Recommendation

The optimal, long term reinforcement solution recommendation for Coton Road primary is to install 20/40 MVA transformers and replace the 11 kV switchboard. The reinforcement solution proposed in Section 2.4, which is to move Langdale Drive into Hinckley BSP, also needs to take place in order to release capacity at Coton Road primary. Additional 33 kV circuit reinforcement can be undertaken at a later stage as required to release additional capacity, in line with forecasted demand growth in the area.

2.3 Nuneaton – Whittleford T1 33 kV circuit overloads

Constraint Overview

Generation **Demand**

The table below outlines the nature of the network constraints identified in the network analysis.

Table 2.3.1 constraint(s) and conditions under which constraint(s) occur

Constraint	N-1 Condition	Subsequent N-2 Condition	First studied year constraint is observed in each season under Best View			
			Winter	Int Cool	Int Warm	Summer
Nuneaton – Whittleford T1 33 kV circuit overloads	Arranged or fault outage on Nuneaton main 2	None	2028	2028	2028	2034
Nuneaton – Whittleford T1 33 kV circuit overloads	Arranged outage on Whittleford T2 or its 33 kV infeed	Fault on Langdale Drive T2 or its 33 kV infeed	2028	Baseline	2028	2028
Nuneaton – Whittleford T1 33 kV circuit overloads	Arranged outage on Langdale Drive T2 or its 33 kV infeed	Fault on Whittleford T2 or its 33 kV infeed	2028	Baseline	2028	2028

Uncertainty under other Distribution Future Energy Scenarios: Overloads are observed on the transformer under N-2 conditions, when required to support the entire demand of Whittleford and Langdale Drive, even in the baseline analysis. Overloads are expected under all scenarios by 2034.

Solution Options

A list of each of the options considered for this constraint is given below.

Table 2.3.2 solution options to solve constraint(s)

Solution Options	Description	Solves Constraint	Wider Benefit	Potential to be cost effective	Viable or Discounted
0	No Intervention	×	×	×	**Discounted**
Reinforcement					
1	Reinforce the existing 33 kV circuit	✓	✓	✓	**Viable**
2	Install a new 33 kV circuit to Whittleford primary	✓	✓	×	**Viable**
Operational Mitigation					
3	Transfer demand to other primaries	✓	×	✓	**Viable**
4	Transfer Langdale Drive primary into Hinckley BSP	✓	✓	✓	**Viable**
Flexibility services					
5	Procure flexibility under Whittleford and Langdale Drive primaries	✓	×	✓	**Viable**

Solution Development

These options have been assessed on their technical viability and their likely cost-effectiveness pending a full CBA. This CBA will be subsequently carried out by the DNO to determine the optimal reinforcement solution, which will then be tested against market provided flexibility by the DSO as part of the DNOA process.

Option 1 – Reinforce the existing 33 kV circuit

Capacity released for constraint(s) considered: up to 25 MVA

Viable

New limiting factor for constraint(s) considered: The reinforced 33 kV circuit

Detailed description: Reinforcing the existing 3.5 km 33 kV circuit between Nuneaton BSP and Whittleford T1 primary will release additional capacity which will resolve both N-1 and N-2 constraints. It is anticipated that the entire 33 kV circuit would require reinforcement.

Since this circuit will still be shared between two primaries, it may require further reinforcement beyond 2034 if there is significant growth across both.

Option 2 – Install a new 33 kV circuit to Whittleford primary

Capacity released for constraint(s) considered: The demand of Langdale Drive

Viable

New limiting factor for constraint(s) considered: As before

Detailed description: Installing a new 33 kV circuit from Nuneaton BSP to Whittleford primary will enable the un-stitching of primaries, releasing capacity by splitting the demand across separate circuits. The new 33 kV circuit would be used to supply Whittleford primary T1, as it is expected to have higher growth over time, and the remaining circuit would be straight jointed to supply Langdale Drive T1 alone. A new 33 kV circuit breaker will be required at Nuneaton BSP to connect the new circuit. The cost difference between Options 1 and 2 will mostly be due to the need for a new 33 kV circuit breaker, since the 33 kV cable installation would be similar.

Splitting the network into different sections has the added benefit of increased security of supply, and better network operability through reduced network complexity.

Option 3 – Transfer demand to other primaries

Capacity released for constraint(s) considered: Depending on transfers

Viable

New limiting factor for constraint(s) considered: As before

Detailed description: Transferring demand out of Whittleford and/or Langdale Drive primaries to adjacent primary substations through the 11 kV network will be assessed as part of a full 11 kV study. This may not be a viable long term solution for constraint management.

Option 4 – Transfer Langdale Drive primary into Hinckley BSP

Capacity released for constraint(s) considered: The demand of Langdale Drive

Viable

New limiting factor for constraint(s) considered: As before

Detailed description: In order to off-load the 33 kV circuit between Nuneaton BSP and Whittleford primary T1, the demand at Langdale Drive could be transferred into Hinckley, either during N-1 planned outages, or as a permanent transfer. Since the constraint occurs under N-1 events as well by 2028, it is proposed to make this transfer permanent under intact network conditions.

This solution also resolves the Nuneaton – Coton Road T2 constraint described in Section 2.4, supports the release of capacity for Coton Road primary, as described in Section 2.2, and resolves the constraint on the GTs at Nuneaton BSP, detailed in Section 2.5.

Hinckley BSP has been recently upgraded with new, higher rated 132/33 kV GTs and is expected to accommodate the demand of Langdale Drive primary without additional works. However, the 132 kV circuits supplying Hinckley BSP have been highlighted as being constrained (detailed in the Coventry 132 kV report), meaning this solution will exacerbate the constraint further. However, should the proposed reinforcement works on the 132 kV network take place, particularly the proposal to reconfigure the 132 kV network, will mean the 132 kV circuits supplying Hinckley 33 kV will sufficient for this demand transfer.

Option 5 – Procure flexibility under Whittleford and Langdale Drive primaries

Viable

Flexibility service type: Generation turn up/demand turn down.

Detailed description: Flexibility services could be procured to alleviate the projected overloads on the 33 kV circuit supplying Whittleford T1 and Langdale Drive T1. The viability of utilising flexibility will be further investigated as part of the DNOA process.

Solution Recommendation

In the short term, it is recommended that the N-2 constraint is managed operationally by moving Langdale Drive primary into Hinckley BSP during planned outages at Whittleford and Langdale Drive, or their associated 33 kV infeeds. Making this a permanent transfer is the long term solution recommendation, which resolves two 33 kV circuit constraints (Section 2.3 and Section 2.4), enables the required release of capacity at Coton Road (Section 2.2), and off-loads the GTs at Nuneaton BSP (Section 2.5).

To facilitate this as a long term solution, the 132 kV reinforcement works need to also be completed, as described in the Coventry 132 kV report. In the interim, in order to manage the 132 kV constraint, the demand of Hinckley 33 kV, including Langdale Drive, would need to be transferred outside of the Coventry GSP group during certain outage scenarios.

2.4 Nuneaton – Coton Road T2 33 kV circuit overloads

Constraint Overview

Generation **Demand**

The table below outlines the nature of the network constraints identified in the network analysis.

Table 2.4.1 constraint(s) and conditions under which constraint(s) occur

Constraint	N-1 Condition	Subsequent N-2 Condition	First studied year constraint is observed in each season under Best View			
			Winter	Int Cool	Int Warm	Summer
Nuneaton – Coton Road T2 33 kV circuit overloads	Arranged or fault outage on Nuneaton main 1	None	2034	2028	2028	2034
Nuneaton – Coton Road T2 33 kV circuit overloads	Arranged outage on Coton Road T1 or its 33 kV infeed	Fault on Langdale Drive T1 or its 33 kV infeed	2034	2028	2028	2034
Nuneaton – Coton Road T2 33 kV circuit overloads	Arranged outage on Langdale Drive T1 or its 33 kV infeed	Fault on Coton Road T1 or its 33 kV infeed	2034	2028	2028	2034

Uncertainty under other Distribution Future Energy Scenarios: Overloads are observed on the transformer under N-2 conditions, when required to support the entire demand of Whittleford and Langdale Drive, from 2028 onwards. Overloads are expected under all scenarios by 2034.

Solution Options

A list of each of the options considered for this constraint is given below.

Table 2.4.2 solution options to solve constraint(s)

Solution Options	Description	Solves Constraint	Wider Benefit	Potential to be cost effective	Viable or Discounted
0	No Intervention	×	×	×	**Discounted**
Reinforcement					
1	Reinforce the existing 33 kV circuit	✓	✓	✓	**Viable**
2	Install a new 33 kV circuit to Coton Road primary	✓	✓	×	**Viable**
Operational Mitigation					
3	Transfer demand to other primaries	✓	×	✓	**Viable**
4	Transfer Langdale Drive primary into Hinckley BSP	✓	✓	✓	**Viable**
Flexibility services					
5	Procure flexibility under Coton Road and Langdale Drive primaries	✓	×	✓	**Viable**

Solution Development

These options have been assessed on their technical viability and their likely cost-effectiveness pending a full CBA. This CBA will be subsequently carried out by the DNO to determine the optimal reinforcement solution, which will then be tested against market provided flexibility by the DSO as part of the DNOA process.

Option 1 – Reinforce the existing 33 kV circuit

Capacity released for constraint(s) considered: up to 17 MVA

Viable

New limiting factor for constraint(s) considered: The reinforced 33 kV circuit

Detailed description: Reinforcing the existing 2.5 km 33 kV circuit between Nuneaton BSP and Coton Road primary T2 will release additional capacity which will resolve both N-1 and N-2 constraints. It is anticipated that the entire 33 kV circuit would require reinforcement.

Since this circuit will still be shared between two primaries, it may require further reinforcement beyond 2034 if there is significant growth across both.

Option 2 – Install a new 33 kV circuit to Whittleford primary

Capacity released for constraint(s) considered: The demand of Langdale Drive

Viable

New limiting factor for constraint(s) considered: As before

Detailed description: Installing a new 33 kV circuit from Nuneaton BSP to Coton Road primary will enable the un-stitching of primaries, releasing capacity by splitting the demand across separate circuits. The new 33 kV circuit would be used to supply Coton Road primary T2, as it is expected to have higher growth over time, and the remaining circuit would be straight jointed to supply Langdale Drive T2 alone. A new 33 kV circuit breaker will be required at Nuneaton BSP to connect the new circuit. The cost difference between Options 1 and 2 will mostly be due to the need for a new 33 kV circuit breaker, since the 33 kV cable installation would be similar.

Splitting the network into different sections has the added benefit of increased security of supply, and better network operability through reduced network complexity.

Option 3 – Transfer demand to other primaries

Capacity released for constraint(s) considered: Depending on transfers

Viable

New limiting factor for constraint(s) considered: As before

Detailed description: Transferring demand out of Coton Road and/or Langdale Drive primaries to adjacent primary substations through the 11 kV network will be assessed as part of a full 11 kV study. This may not be a viable long term solution for constraint management.

Option 4 – Transfer Langdale Drive primary into Hinckley BSP

Capacity released for constraint(s) considered: The demand of Langdale Drive

Viable

New limiting factor for constraint(s) considered: As before

Detailed description: In order to off-load the 33 kV circuit between Nuneaton BSP and Coton Road primary T2, Langdale Drive primary could be transferred into Hinckley, either during N-1 planned outages, or as a permanent transfer. Since the constraint occurs under N-1 events as well by 2028, it is proposed to make this transfer permanent under intact network conditions.

This solution will also resolves the Nuneaton – Whittleford T1 constraint described in Section 2.3, supports the release of capacity for Coton Road primary, as described in Section 2.2, and resolves the constraint on the GTs at Nuneaton BSP, detailed in Section 2.5.

Hinckley BSP has been recently upgraded with new, higher rated 132/33 kV GTs and is expected to accommodate the demand of Langdale Drive primary without additional works. However, the 132 kV circuits supplying Hinckley BSP have been highlighted as being constrained (detailed in the Coventry 132 kV report), meaning this solution will exacerbate the constraint further. However, should the proposed reinforcement works on the 132 kV network take place, particularly the proposal to reconfigure the 132 kV network, will mean the 132 kV circuits supplying Hinckley 33 kV will sufficient for this demand transfer.

Option 5 – Procure flexibility under Whittleford and Langdale Drive primaries

Viable

Flexibility service type: Generation turn up/demand turn down.

Detailed description: Flexibility services could be procured to alleviate the projected overloads on the 33 kV circuit supplying Coton Road T2 and Langdale Drive T2. The viability of utilising flexibility will be further investigated as part of the DNOA process.

Solution Recommendation

In the short term, it is recommended that the N-2 constraint is managed operationally by moving Langdale Drive primary into Hinckley BSP during planned outages at Coton Road and Langdale Drive, or their associated 33 kV infeeds. Making this a permanent transfer is the long term solution recommendation, which resolves two 33 kV circuit constraints (Section 2.3 and Section 2.4), enables the required release of capacity at Coton Road (Section 2.2), and off-loads the GTs at Nuneaton BSP (Section 2.5).

To facilitate this as a long term solution, the 132 kV reinforcement works need to also be completed, as described in the Coventry 132 kV report. In the interim, in order to manage the 132 kV constraint, the demand of Hinckley 33 kV, including Langdale Drive, would need to be transferred outside of the Coventry GSP group during certain outage scenarios.

2.5 Nuneaton BSP transformer overloads

Constraint Overview

Generation Demand

The table below outlines the nature of the network constraints identified in the network analysis.

Table 2.5.1 constraint(s) and conditions under which constraint(s) occur

Constraint	N-1 Condition	Subsequent N-2 Condition	First studied year constraint is observed in each season under Best View			
			Winter	Int Cool	Int Warm	Summer
Nuneaton BSP GT overloads	Arranged or fault outage on the other infeed or transformer	None	2034	2034	2034	2034
Nuneaton BSP GT overloads	Arranged outage on Newdigate T2 or its infeeds	Fault on a GT at Nuneaton BSP or its infeed	2034	2028	2028	2034
Nuneaton BSP GT overloads	Arranged outage on a GT at Nuneaton BSP or its infeed	Fault on Newdigate T2 or its infeeds	2034	2028	2028	2034

Uncertainty under other Distribution Future Energy Scenarios: The N-2 constraint is present in from 2028, when Nuneaton BSP is supplying the entire demand of Newdigate primary, followed by a fault on either GT. By 2034, the constraint is present under N-1 scenarios as well. This is anticipated to be worse under higher growth scenarios.

Solution Options

A list of each of the options considered for this constraint is given below.

Table 2.5.2 solution options to solve constraint(s)

Solution Options	Description	Solves Constraint	Wider Benefit	Potential to be cost effective	Viable or Discounted
0	No Intervention	×	×	×	Discounted
Reinforcement					
1	Uprate the 132/33 kV grid transformers	×	×	×	Discounted
2	Install a third 132/33 kV grid transformer	✓	×	✓	Viable
3	Install two 132/11 kV grid transformers	✓	✓	✓	Viable
Operational Mitigation					
3	Transfer demand out of the BSP	✓	✓	✓	Viable
Flexibility services					
4	Procure flexibility under Nuneaton BSP	✓	×	✓	Viable

Solution Development

These options have been assessed on their technical viability and their likely cost-effectiveness pending a full CBA. This CBA will be subsequently carried out by the DNO to determine the optimal reinforcement solution, which will then be tested against market provided flexibility by the DSO as part of the DNOA process.

Option 1 – Uprate the GTs at Nuneaton BSP

Capacity released for constraint(s) considered: N/A

Discounted

New limiting factor for constraint(s) considered: As before

Detailed description: Uprating the 132/33 kV GTs at Nuneaton BSP would alleviate this constraint. This option is not viable as the GTs are already the highest rating NGED uses on the network as standard. Utilising non-standard equipment creates a number of issues, such as finding replacements if serious faults occur.

Option 2 – Install a third 132/33 kV grid transformer

Capacity released for constraint(s) considered: up to 114 MVA

Viable

New limiting factor for constraint(s) considered: The 132 kV circuits supplying Nuneaton BSP

Detailed description: Installing a third GT at Nuneaton BSP rated to match the existing two GTs would create significant additional capacity and resolve this constraint. This would require installing a third 33 kV busbar, which would also create additional 33 kV feeder capacity. This third GT could either be fed by a third 132 kV circuit from Coventry GSP or using a cross-bay setup.

A third 132 kV circuit from Coventry GSP would necessitate approximately 8 km of circuit works (subject to detailed route investigation and land rights), making it the much more expensive option. There are also space constraints at Coventry GSP for new 132 kV bays. However, it may be more required if space constraints within Nuneaton BSP doesn't allow for a full 132 kV cross-bay arrangement with sufficient clearances.

Option 3 – Install two 132/11 kV grid transformers

Capacity released for constraint(s) considered: The 11 kV demand at Nuneaton primary

Viable

New limiting factor for constraint(s) considered: As before

Detailed description: In this option two 132/11 kV GTs would be installed at Nuneaton BSP, replacing the existing primary transformers. This would remove the 11 kV load at Nuneaton from the 132/33 kV GTs and alleviate this constraint at least up to 2034. Additionally, given the proximity of other primary substations fed from Nuneaton BSP, more demand could be transferred into the new 132/11 kV transformer as the need occurs over time, which will also support with off-loading these primary substations.

One of the potential challenges for this option is space within Nuneaton BSP compound; however, a detailed survey and design will be able to determine its suitability.

Option 4 – Transfer Langdale Drive primary into Hinckley BSP

Capacity released for constraint(s) considered: The demand of Langdale Drive

Viable

New limiting factor for constraint(s) considered: As before

Detailed description: In order to off-load the 132/33 kV GTs at Nuneaton BSP, Langdale Drive primary could be transferred into Hinckley BSP, either during N-1 planned outages, or as a permanent transfer. Since the constraint occurs under N-1 events as well by 2034, it is proposed to make this transfer permanent under intact network conditions.

This solution will also resolves the Nuneaton – Whittleford T1 33 kV circuit constraint (Section 2.3), the Nuneaton – Coton Road T2 33kV circuit constraint (Section 2.4), and supports the release of capacity for Coton Road primary (Section 2.2).

Hinckley BSP has been recently upgraded with new, higher rated 132/33 kV GTs and is expected to accommodate the demand of Langdale Drive primary without additional works.

Option 5 – Procure flexibility under Nuneaton BSP

Viable

Flexibility service type: Generation turn up/demand turn down.

Detailed description: Flexibility services could be procured to alleviate the projected overloads on the 132/33 kV transformers at Nuneaton BSP. The viability of utilising flexibility will be further investigated as part of the DNOA process.

Solution Recommendation

In the short term, it is recommended that the N-2 constraint is managed operationally by moving Langdale Drive primary into Hinckley BSP during planned outages at Newdigate primary. Making this a permanent transfer is the long term solution recommendation, which resolves two 33 kV circuit constraints (Section 2.3 and Section 2.4), enables the required release of capacity at Coton Road (Section 2.2), and off-loads the GTs at Nuneaton BSP (Section 2.5).

To facilitate this as a long term solution, the 132 kV reinforcement works need to also be completed, as described in the Coventry 132 kV report. In the interim, in order to manage the 132 kV constraint, the demand of Hinckley 33 kV, including Langdale Drive, would need to be transferred outside of the Coventry GSP group during certain outage scenarios.

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