Coventry GSP

Network Development Report – East Midlands

May 2024

Electricity Distribution

nationalgrid

Contents

Coventry 132 kV

1. Network Overview

Coventry Grid Supply Point (GSP) feeds eight Bulk Supply Points (BSPs) in National Grid Electricity Distribution's (NGED's) East Midlands licence area in and around Warwickshire, Leicestershire and Northamptonshire. These eight BSPs are: Coventry North, Coventry South 132/11 kV, Daventry, Hinckley, Nuneaton, Rugby, Pailton, and Whitley.

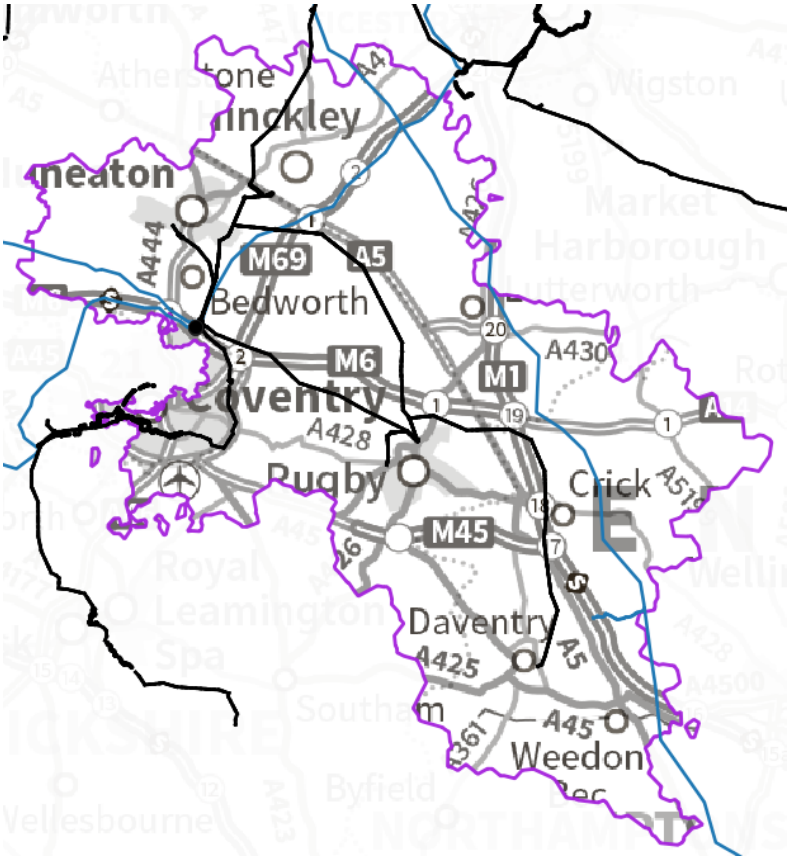

Figure 1.1 Coventry GSP geographic network coverage

This report discusses all existing and future network constraints over a 0-10 year horizon identified on the 132 kV network supplied from Coventry GSP. 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

Coventry GSP is a 275/132 kV substation comprising four 275/132 kV, 240 MVA Super Grid Transformers (SGTs). The 132 kV busbar configuration is a standard wrap-around, with four busbar sections. The entire 132 kV compound at Coventry GSP is being reinforced as part of a fault level project, which will uprate all the 132 kV bays and the busbars to 2500 A. As part of this project, the 132 kV bays will be re-arranged to balance the 132 kV feeders, and a new 132 kV bus section circuit breaker on the reserve busbar will be introduced, which will improve network operation. The new arrangement has been assessed in the analysis for all future years. Further analysis may be required at a later stage if the actual on site build has to vary from the current proposal.

In the new arrangement, Coventry GSP will run as a 2+2 site, with the 132 kV bus coupler circuit breakers open and bus section circuit breakers closed. During SGT outages, the site will run with 3 SGTs in parallel.

Coventry GSP has 132 kV interconnection with Berkswell GSP via Coventry South BSP, normally open on 132 kV circuit breakers at Coventry South BSP. Coventry South 132/33 kV is supplied from Berkswell, whist Coventry South 132/11 kV is supplied from Coventry GSP. Coventry GSP also has 132 kV interconnection with Enderby GSP via Hinckley BSP, normally open on 132 kV circuit breakers at Hinckley BSP. Hinckley 132/33 kV is supplied from Coventry GSP, whilst Hinckley 132/11 kV is supplied from Enderby GSP.

Coventry North and Nuneaton BSPs are supplied from Coventry GSP via dedicated, radial 132 kV dual circuits which connect to a pair of transformers at each BSP. Whitley BSP and Coventry South 132/11 kV BSP share two 132 kV circuits from Coventry GSP (the HK route). 132 kV circuits are in place between Berkswell GSP and Coventry South, which normally supply Coventry South 132/33 kV, but can also enable 132 kV transfers between GSPs.

Four 132 kV circuits from Coventry GSP supply Rugby, Daventry, Hinckley, and Pailton BSPs. Two are between Coventry and Hinckley, and two between Coventry and Rugby. Pailton and Daventry are connected off the 132 kV circuits between Hinckley and Rugby BSP, forming a 132 kV ring with closed 132 kV circuit breakers at Pailton and on the 132 kV mesh at Rugby BSP. Two 132 kV circuit between Enderby GSP and Hinckley BSP normally supply Hinckley 132/11 kV BSP, but can also be used to facilitate 132 kV transfers between GSPs.

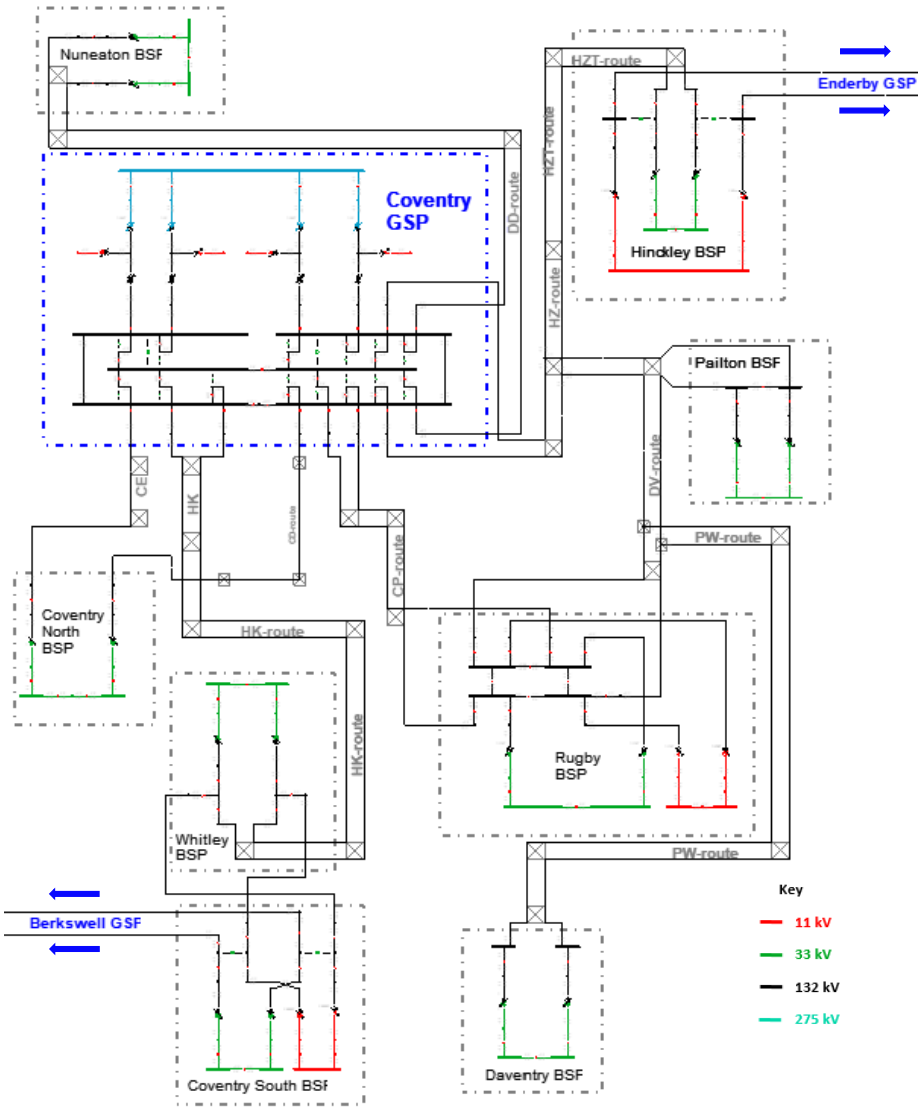

Figure 1.1.1 Coventry 132 kV network single line diagram

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 operated now and planned to be operated in the future.

- Arranged outages on the 132 kV busbars at Coventry GSP are modelled such that circuits are secured onto available and useful busbars.
- For the future arrangement at Coventry 132 kV, under an arranged outage on any of the four SGTs, the associated bus coupler circuit breakers are closed to parallel the remaining three SGTs.
- For the future arrangement at Coventry 132 kV, under an arranged outage on any of the busbar sections, the associated bus sections are opened, and bus couplers are closed, to maintain a 2+2 running arrangement.
- The 33 kV and 11 kV (or 6.6 kV) networks downstream of the BSPs supplied from Coventry GSP are split for arranged outages on the 33 kV bus section circuit breakers (see relevant 33 kV network reports for more details).
- For the loss of an infeed to a transformer at any of the BSPs fed from Coventry GSP under arranged outages, the lower voltage side circuit breaker is opened to prevent back-energisation.

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 132 kV circuits from Coventry GSP to Hinckley / Pailton / Daventry / Rugby BSPs overload by 2028 for an N-2 event on the Coventry – Rugby 132 kV circuits. Various sections of the full 132 kV circuits overload under a combination of conditions.
- Both 132 kV circuits from Coventry GSP to Rugby BSP overload by 2028 for an N-2 event on the Coventry – Rugby 132 kV circuits. By 2034, overloads are expected for N-1 events as well, during or following an outage on the other 132 kV direct circuit from Coventry GSP.
- The Hinckley – Pailton – Daventry – Rugby demand group becomes non-compliant with Engineering Recommendation P2 by 2028 for second circuit outage security requirements.
- Both 132 kV circuits from Coventry GSP to Whitley 132/33 kV BSP and Coventry South 132/11 kV BSP overload by 2034 for the loss of the other.

2.2 Coventry – Hinckley – Pailton – Rugby 132 kV circuit 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
Coventry – Hinckley – Pailton 132 kV circuit overloads	Arranged outage on a 132 kV circuit between Coventry and Rugby BSP, or at Rugby or Coventry 132kV	Fault on the remaining 132 kV circuit between Coventry and Rugby, or at Coventry 132 kV	2028	2028	2028	2028
Coventry – Hinckley – Pailton 132 kV circuit overloads	Arranged or fault outage on the other 132 kV circuit	-	2034	2034	-	-
Pailton – Rugby 132 kV circuit section overloads	Arranged outage on a 132 kV circuit between Coventry and Hinckley BSP, or at Coventry or Rugby 132 kV	Fault on the remaining 132 kV circuit between Coventry and Hinckley	2028	2028	2028	2028

Uncertainty under other Distribution Future Energy Scenarios: This constraint is exacerbated most significantly under the Leading the Way and Consumer Transformation scenarios. Under Falling Short and System Transformation, the constraints is still present.

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	Reconductor the 132 kV double circuit from Coventry GSP to Hinckley / Pailton / Rugby BSPs	×	×	✓	Viable
2	Rebuild the 132 kV double circuit from Coventry GSP to Hinckley / Pailton / Rugby BSPs	✓	×	✓	Viable
3	Install two new 132 kV circuit from Coventry GSP to Pailton BSP and re-configure the network	✓	✓	✓	Viable
Operational Mitigation					
4	Transfer Hinckley 132/33 kV BSP into Enderby GSP during arranged outages	×	×	✓	Viable
5	Transfer Hinckley 132/33 kV BSP into Enderby GSP permanently	×	×	✓	Discounted
Flexibility services					
6	Procure flexibility under Hinckley, Pailton, Rugby and Daventry BSPs	✓	×	✓	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 – Reconductor the 132 kV double circuit from Coventry GSP to Hinckley / Pailton / Rugby BSPs

Viable

Capacity released for constraint(s) considered: Up to 60 MVA

New limiting factor for constraint(s) considered: The new 132 kV circuits

Detailed description: Reconductoring the existing 132 kV circuits between Coventry GSP and Hinckley / Pailton / Rugby BSPs will increase the capacity enough to accommodate the forecast 2028 demand of Hinckley, Pailton, Daventry and Rugby BSPs for the loss of both 132 kV infeeds via Rugby. It will also resolve the constraint between Pailton and Rugby, where the 132 kV circuit is required to support the demand of Hinckley, Pailton and Daventry BSPs. However, by 2034, the new capacity will be exceeded, and additional works will be required to further upgrade the circuits. This is discussed further in Option 2.

This option remains viable, but only when combined with an operational mitigation as described in Options 4 and 5.

Option 2 – Rebuild the 132 kV double circuit from Coventry GSP to Hinckley / Pailton / Rugby BSPs

Viable

Capacity released for constraint(s) considered: Up to 130 MVA

New limiting factor for constraint(s) considered: The new 132 kV circuits

Detailed description: To release additional capacity beyond Option 1, due to the limitation on the existing 132 kV towers, the 132 kV overhead line requires a full rebuild, which will include new towers. This option is generally significantly more expensive than a reconductoring option, and may require longer timescales due to the increased scope of works and potential for additional consents and land rights.

Option 3 – Install two new 132 kV circuit from Coventry GSP to Pailton BSP and re-configure the network

Viable

Capacity released for constraint(s) considered: The demand of Pailton, Daventry and Rugby BSPs

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

Detailed description: In order to bring the loading on the 132 kV circuits within capacity, one option would be to transfer sufficient demand out of this section of network, during the relevant outage conditions. By installing two 132 kV circuits between Coventry GSP and Pailton BSP, network re-configuration can be undertaken to split the current group into three separate groups.

At Pailton, the 132 kV arrangement would be changed to facilitate the supply of the GTs from each new 132 kV circuit, with normally open points towards Hinckley BSP. The existing 132 kV circuit would carry on to supply Daventry BSP, with new 132 kV normal open points at Rugby BSP. Pailton and Daventry would form a new 132 kV demand group. Hinckley and Rugby BSPs would each have dedicated 132 kV circuits from Coventry GSP, creating two separate demand groups on their own. The existing Hinckley – Pailton – Daventry – Rugby group would be split into three demand groups, interconnected at 132 kV for demand restoration and/or transfer purposes as required.

The distance between Coventry GSP and Pailton BSP is approximately 14 km. The new 132 kV circuits to Pailton BSP would be designed to accommodate large conductors, in order to support Rugby BSP restoration into the future, as demand in the area continues to grow, and also to provide additional transfer flexibility for Hinckley BSP.

Two new 132 kV bays are required at Coventry GSP for this option. There are known space constraints at the GSP; however, further site surveys and design will determine suitability.

Option 4 – Transfer Hinckley 132/33 kV BSP into Enderby GSP during arranged outages

Capacity released for constraint(s) considered: The demand of Hinckley 132/33 kV BSP

Viable

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

Detailed description: As the 132 kV circuits are expected to overload under N-2 conditions, it is possible to transfer Hinckley 132/33 kV BSP from Coventry GSP to Enderby GSP during planned outages on any of the four 132 kV circuits, as well as any outages on other items of plant and equipment that affects one of the four 132 kV infeeds. This could result in frequent transfers between GSPs, which would need to also be agreed at a planning level with the transmission system operator.

This option on its own does not resolve the constraint as forecasted by 2034, as by that point in time the demand of Pailton, Daventry and Rugby alone, without Hinckley, is high enough to cause the 132 kV circuits to overload. However, this can be used in conjunction with the reinforcement in Option 1 for constraint management during planned outages. A form of 132 kV circuit reinforcement is still required as well due to the N-1 constraint that occurs by 2034.

Option 5 – Transfer Hinckley 132/33 kV BSP into Enderby GSP permanently

Capacity released for constraint(s) considered: The demand of Hinckley 132/33 kV BSP

Discounted

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

Detailed description: The transfer option described in Option 4 can be explored as a permanent transfer rather than temporary one, especially given the potential high frequency of occurrence. However, this will decrease the capacity of the 132 kV circuits on a permanent basis on the Enderby GSP side, which will affect other BSPs in the area, and likely create additional constraints requiring 132 kV circuit works. Also, Enderby GSP itself relies on demand transfers during certain outages, which means that the existing Coventry GSP – Hinckley circuits will become a limiting factor for the Enderby GSP compliance and will likely require reinforcement as part of a separate constraint.

Due to all of the detrimental impact of this permanent transfer, this option has been discounted.

Option 6 – Procure flexibility under Hinckley, Pailton, Daventry, and Rugby BSPs

Viable

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

Detailed description: Flexibility services could be procured to alleviate the projected overloads on the Coventry – Hinckley – Pailton 132 kV circuits. 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 the 132 kV circuit overloads is Option 3, to install two additional 132 kV circuits to Pailton and separate the network into three different groups, leaving existing 132 kV circuits as interconnectors for support, particularly under N-2 conditions. Additional operational mitigations are limited on this group, because by 2028 the total group demand exceeds 300 MW, classifying it as a Class E group with a requirement to restore the entire demand under N-2 conditions (during maintenance periods).

This solution also resolves the circuit constraint described in Section 2.3 on the Coventry – Rugby 132 kV circuits. Should the space at Coventry GSP prove insufficient, additional options can be explored, including, in addition to the options above, the construction of a 132 kV switching station interconnected with the existing 132 kV compound, and even a new GSP if suitable.

2.3 Coventry – Rugby 132 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
Coventry – Rugby 132 kV circuit overloads	Arranged outage on a 132 kV circuit between Coventry and Hinckley BSP, or at Rugby BSP or Coventry GSP 132kV	Fault on the remaining 132 kV circuit between Coventry and Hinckley BSP	2028	2034	2034	-
Coventry – Rugby 132 kV circuit overloads	Arranged or fault outage on the other 132 kV circuit	-	2034	2028	2034	2034
Coventry – Rugby 132 kV circuit overloads	Arranged outage on a 132 kV circuit supplying Rugby BSP, or at Rugby or Coventry 132 kV	Fault between Coventry GSP and Hinckley BSP	2028	2028	2028	2028

Uncertainty under other Distribution Future Energy Scenarios: This constraint is exacerbated most significantly under the Leading the Way and Consumer Transformation scenarios. Under Falling Short and System Transformation, the constraints is still present.

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	Reconductor the 132 kV double circuit from Coventry GSP to Rugby BSP	×	×	✓	**Discounted**
2	Rebuild the 132 kV double circuit from Coventry GSP to Rugby BSP	✓	×	✓	**Viable**
3	Install two new 132 kV circuit from Coventry GSP to Pailton BSP and re-configure the network	✓	✓	✓	**Viable**
Operational Mitigation					
4	Transfer Hinckley 132/33 kV BSP into Enderby GSP during arranged outages	×	×	✓	**Viable**
5	Transfer Hinckley 132/33 kV BSP into Enderby GSP permanently	×	×	✓	**Discounted**
Flexibility services					
6	Procure flexibility under Hinckley, Pailton, Rugby and Daventry BSPs	✓	×	✓	**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 – Reconductor the 132 kV double circuit from Coventry GSP to Rugby BSP

Capacity released for constraint(s) considered: None

Discounted

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

Detailed description: Reconductoring the existing 132 kV circuits between Coventry GSP and Rugby BSP will not increase the capacity, as the existing conductors are already the largest possible on the existing 132 kV towers.

Option 2 – Rebuild the 132 kV double circuit from Coventry GSP to Rugby BSP

Capacity released for constraint(s) considered: Up to 70 MVA

Viable

New limiting factor for constraint(s) considered: The new 132 kV circuits

Detailed description: As mentioned in Option 1, in order to release capacity on the existing circuits, due to the limitation on the existing 132 kV towers, the 132 kV overhead line requires a full rebuild, which will include new towers. This option is generally significantly more expensive than a reconductoring option, and will likely require longer timescales due to the increased scope of works and potential for additional consents and land rights.

Option 3 – Install two new 132 kV circuit from Coventry GSP to Pailton BSP and re-configure the network

Capacity released for constraint(s) considered: The demand of Pailton, Daventry and Hinckley BSPs

Viable

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

Detailed description: In order to bring the loading on the 132 kV circuits within capacity, one option would be to transfer sufficient demand out of this section of network, during the relevant outage conditions. By installing two 132 kV circuits between Coventry GSP and Pailton BSP, network re-configuration can be undertaken to split the current group into three separate groups.

At Pailton, the 132 kV arrangement would be changed to facilitate the supply of the GTs from each new 132 kV circuit, with normally open points towards Hinckley BSP. The existing 132 kV circuit would carry on to supply Daventry BSP, with new 132 kV normally open points at Rugby BSP. Pailton and Daventry would form a new 132 kV demand group. Hinckley and Rugby BSPs would each have dedicated 132 kV circuits from Coventry GSP, creating two separate demand groups on their own. The existing Hinckley – Pailton – Daventry – Rugby group would be split into three demand groups, interconnected at 132 kV for demand restoration and/or transfer purposes as required.

The distance between Coventry GSP and Pailton BSP is approximately 14 km. The new 132 kV circuits to Pailton BSP would be designed to accommodate large conductors, in order to support Rugby BSP restoration into the future, as the demand carries on to grow further, and also to provide additional transfer flexibility for Hinckley BSP. Two new 132 kV bays are required at Coventry GSP for this option. There are known space constraints at the GSP; however, further site surveys and design will determine suitability.

Option 4 – Transfer Hinckley 132/33 kV BSP into Enderby GSP during arranged outages

Capacity released for constraint(s) considered: The demand of Hinckley 132/33 kV BSP

Viable

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

Detailed description: As the 132 kV circuits are expected to overload under N-2 conditions, it is possible to transfer Hinckley 132/33 kV BSP from Coventry GSP to Enderby GSP during planned outages on any of the four 132 kV circuits, as well as any outages on other items of plant and equipment that affects one of the four 132 kV infeeds. This could result in frequent transfers between GSPs, which would need to also be agreed at a planning level with the transmission system operator.

This option on its own does not resolve the constraint as forecasted by 2034, as by that point in time the demand of Pailton, Daventry and Rugby alone, without Hinckley, is high enough to cause the 132 kV circuits to overload. It also does not resolve the N-1 constraint, unless the transfer is permanent.

Option 5 – Transfer Hinckley 132/33 kV BSP into Enderby GSP permanently

Capacity released for constraint(s) considered: The demand of Hinckley 132/33 kV BSP

Discounted

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

Detailed description: The transfer option described in Option 4 can be explored as a permanent transfer rather than temporary one, especially given the potential high frequency of occurrence. However, this will decrease the capacity of the 132 kV circuits on a permanent basis on the Enderby GSP side, which will affect other BSPs in the area, and likely cause additional constraint requiring 132 kV circuit works. Also, Enderby GSP itself relies on demand transfers during certain outages, which means that the existing Coventry GSP – Hinckley circuits will become a limiting factor for the Enderby GSP compliance and will likely require reinforcement as part of a separate constraint.

Due to all of the detrimental impact of this permanent transfer, this option has been discounted.

Option 6 – Procure flexibility under Hinckley, Pailton, Daventry, and Rugby BSPs

Viable

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

Detailed description: Flexibility services could be procured to alleviate the projected overloads on the Coventry – Rugby 132 kV circuits. 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 the 132 kV circuit overloads is Option 3, to install two additional 132 kV circuits to Pailton and separate the network into three different sections, leaving existing 132 kV circuits as interconnectors for support, particularly under N-2 conditions. Additional operational mitigations are limited on this group, because by 2028 the total group demand exceeds 300 MW, classifying it as a Class E group with a requirement to restore the entire demand under N-2 conditions (during maintenance periods).

This solution also resolves the circuit constraint described in Section 2.2 on the Coventry – Hinckley – Pailton – Rugby 132 kV circuits. Should the space at Coventry GSP prove insufficient, additional options can be explored, including, in addition to the options above, the construction of a 132 kV switching station interconnected with the existing 132 kV compound, and even a new GSP if suitable. It is possible that the demand at Rugby BSP alone, across the 132/33 kV and 132/11 kV substations, will exceed the rating of the current 132 kV circuits. Should this happen, the rebuild option will be considered, alongside additional transfer as applicable.

2.4 Coventry – Whitley 132 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
Coventry to Whitley 132 kV circuit overloads	Arranged or fault outage on the other circuit	-	2034	-	-	-

Uncertainty under other Distribution Future Energy Scenarios: This constraint is exacerbated most significantly under the Leading the Way and Consumer Transformation scenarios. Under Falling Short and System Transformation, the constraints is still present. Overloads are expected across additional seasons between 2034 and 2050.

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	Reconductor the 132 kV double circuit from Coventry GSP to Whitley BSP	✓	×	✓	Viable
2	Rebuild the 132 kV double circuit from Coventry GSP to Rugby BSP	✓	×	✓	Viable
3	Install a new 132 kV circuit from Coventry GSP to Whitley BSP	✓	×	×	Viable
Operational Mitigation					
4	Transfer Coventry South 132/11 kV BSP into Berkswell GSP	✓	×	✓	Viable
5	Transfer demand out of Whitley BSP	✓	×	✓	Viable
Flexibility services					
6	Procure flexibility under Whitley BSP and Coventry South 132/11 kV BSP	✓	×	✓	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 – Reconductor the 132 kV double circuit from Coventry GSP to Whitley BSP

Capacity released for constraint(s) considered: Up to 60 MVA

Viable

New limiting factor for constraint(s) considered: The new 132 kV circuits

Detailed description: Reconductoring the existing 132 kV circuits between Coventry GSP and Whitley BSP will increase the capacity enough to accommodate the current 2034 forecasted demand. It will also support the release of capacity as a result of reinforcement works at Whitley BSP (see the Whitley 33 kV report). Due to the tower types on the route, there is a limitation around the biggest conductor that can be installed.

Option 2 – Rebuild the 132 kV double circuit from Coventry GSP to Whitley BSP

Capacity released for constraint(s) considered: Up to 130 MVA

Viable

New limiting factor for constraint(s) considered: The new 132 kV circuits

Detailed description: As there is a possibility that by 2050, the new capacity of the 132 kV re-strung circuits (Option 1) will be exceeded given the forecasted demand growth, bigger conductors could be used. However, due to the tower type limitation, a complete rebuild would be required to accommodate larger conductors. This option is generally significantly more expensive than a reconductoring option, and will likely require longer timescales due to the increased scope of works and potential for additional consents and land rights.

Option 3 – Install a new 132 kV circuit from Coventry GSP to Whitley BSP

Capacity released for constraint(s) considered: Up to 130 MVA

Viable

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

Detailed description: Installing a new, third circuit between Coventry North and Whitley, and additional 132 kV switching equipment at both ends of the circuit, would resolve this constraint. Building a new 132 kV circuit will require consents and land right, which is expected to have long timescales and high costs. In addition, this solution also requires a new 132 kV bay at Coventry GSP, which may already be constrained with regards to space. If there is sufficient space at the GSP for the 132 kV bays required to resolve the other 132 kV circuit constraints in the area (see Section 2.2 and Section 2.3), as well as this new circuit, then this option could be viable. If space is limited, the 132 kV bays for the new circuit to Pailton add more value to the network.

Option 4 – Transfer Coventry South 132/11 kV BSP into Berkswell GSP

Capacity released for constraint(s) considered: The demand of Coventry South 132/11 kV BSP

Viable

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

Detailed description: Transferring Coventry South 132/11 kV from Coventry GSP to Berkswell GSP would reduce the loading on the 132 kV circuits and resolve this constraint. However, moving this demand onto the Coventry – Coventry South – Coventry West 132 kV circuits would result in a reduction in capacity across the BSPs, and will likely, over time, result in a similar 132 kV circuit constraint on the Berkswell – Coventry South – Coventry West circuits as demand continues to grow across all BSPs. This option required additional assessment and discussions, both internally and with the transmission operator, to determine the full implications of such a transfer.

Option 5 – Transfer demand out of Whitley BSP

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

Viable

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

Detailed description: Whitley BSP is interconnected with Coventry South, Central and Warwick BSPs. Given that Warwick BSP is over 13 km away, and most primary substations supplied from Whitley BSP are in the Coventry central geographical area, transfers into Warwick have been discounted as they would require very long circuits.

Whitley, Coventry Central and Coventry South cover the network in and around Coventry centre, and interconnect in close proximity on 33 kV and 11 kV. Further analysis will be undertaken to determine if primary substations can be moved around these three BSPs whist maintaining all sites within capacity and minimising the installation of new 33 kV circuits. Currently, any 33 kV transfer would require 33 kV circuit works, in order to have two 33 kV circuits from a different BSP. The cost of these transfers, alongside any reinforcement works that may be required at the relevant Coventry BSP, will be used in the CBA across all sites. Further details on the constraints in the Coventry BSPs can be found in the Coventry Group 33 kV report.

Option 6 – Procure flexibility under Whitley BSP and Coventry South 132/11 kV BSP

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

Viable

Detailed description: Flexibility services could be procured to alleviate the projected overloads on the Coventry – Whitley 132 kV circuits. The viability of utilising flexibility will be further investigated as part of the DNOA process.

Solution Recommendation

The recommended long term solution for the constraint on the 132 kV circuit between Coventry GSP and Whitley BSP is to reconductor the circuits with the largest conductor possible on the existing 132 kV towers. Should this capacity be exceeded at a later stage, beyond 2034, additional options can be explored, including transferring of demand, as described in Options 4 and 5, in order to avoid the high cost of rebuilding the 132 kV circuit.

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