Berkswell GSP

Network Development Report – East Midlands

May 2024

Electricity Distribution

nationalgrid

Contents

Berkswell 132 kV

1. Network Overview

Berkswell Grid Supply Point (GSP) supplies five Bulk Supply Points (BSPs) in National Grid Electricity Distribution's (NGED's) East Midlands licence area. These five BSPs are: Coventry Central, Coventry South (132/33 kV), Coventry West, Harbury, and Warwick.

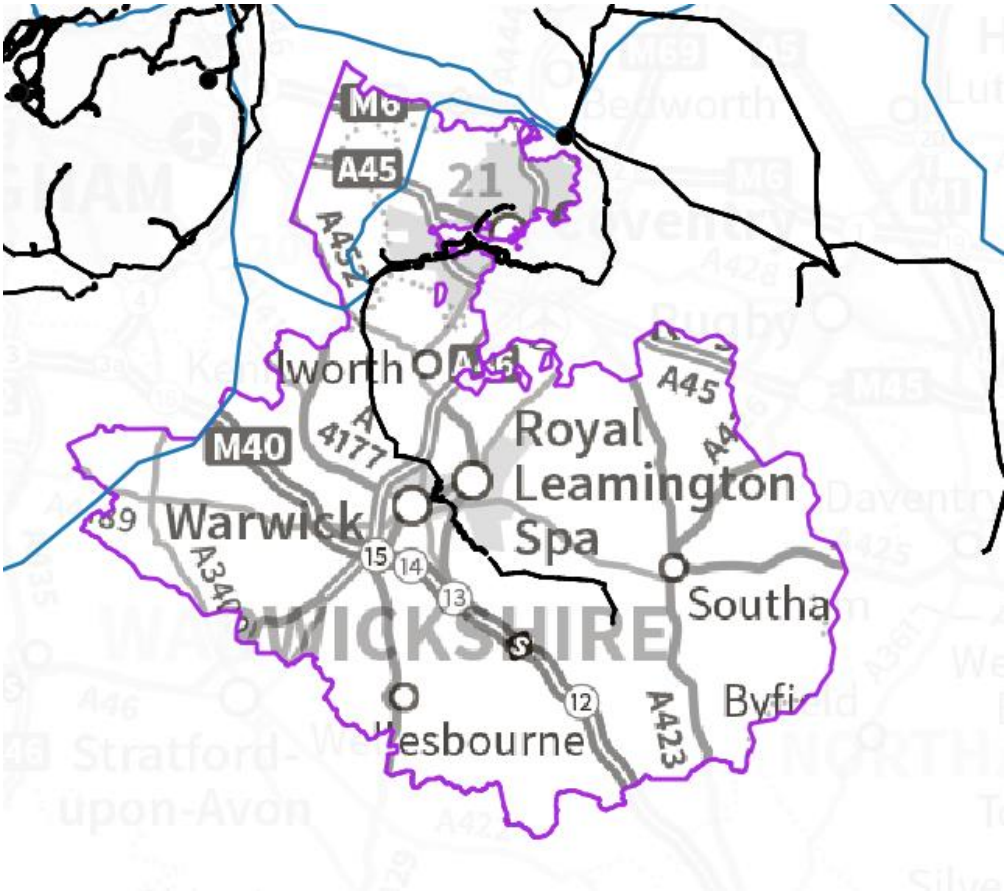

Figure 1.1 Berkswell GSP geographic network coverage

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

Berkswell GSP is a 275/132 kV substation comprising of four 275/132 kV 240 MVA Super Grid Transformers (SGTs). The site is normally run as a 2 + 2 arrangement, with bus-section circuit breakers closed and bus-coupler circuit breakers open. Running the site with more than two SGTs on a busbar is currently not possible due to fault level constraints.

Berkswell GSP has interconnection with Coventry GSP via normally open circuit breakers at Coventry South BSP.

Coventry West, Coventry Central, Coventry South and Harbury BSPs all have two 132/33 kV GTs each, all rated to 90 MVA with the exception of the two at Coventry Central (which are both non-standard 120 MVA units). Coventry South also has two 132/11 kV GTs supplied from Coventry GSP. Warwick BSP has three 132/33 kV GTs (two 60 MVA and two 90 MVA) and three 132/11 kV GTs (all 15/30 MVA). All of the BSPs fed from Berkswell GSP are supplied directly from the GSP (with the exception of Harbury BSP which is supplied via Warwick BSP).

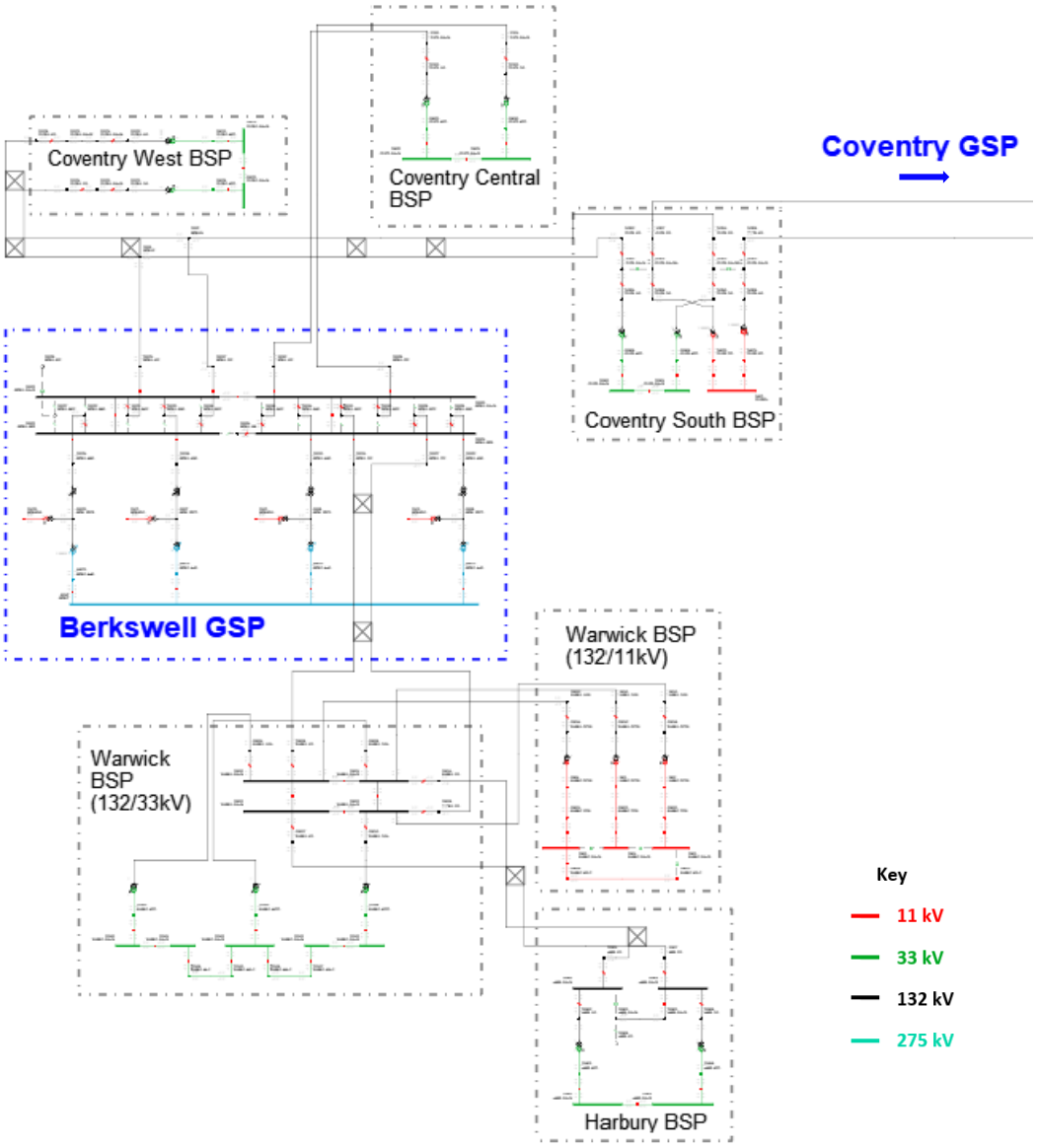

Figure 1.1.1 Berkswell GSP 132 kV network single line diagram

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 currently operated, as well as proposed actions, to manage some constraints identified operationally.

- Arranged outages on the 132 kV busbars at Berkswell GSP are modelled such that circuits are secured onto available and useful busbars.
- There are a number of loose couples between Coventry West BSP and Warwick BSP, and Coventry North BSP and Nuneaton BSP. For any arranged outage affecting infeed in to any grid transformer, loose couples are split by opening the 11 kV bus section circuit breaker at Kenilworth and Newdigate primaries.

2. Network Constraint Details 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:

- The group demand of Warwick 132/33 kV BSP, Warwick 132/11 kV BSP and Harbury BSP is forecast to exceed 200 MW by 2034, meaning significant N-2 restoration capacity will be required.
- Demand constraints are projected on some of the GTs at Warwick BSP for N-1 outages by 2034, as well as on the circuits between Berkswell GSP and Warwick BSP.
- Demand constraints are projected on of the GTs at Harbury BSP for N-1 outages by 2034, as well as on the 132 kV circuits between Warwick and Harbury BSPs.

2.2 Warwick and Harbury N-2

Constraint Overview

Generation **Demand**

The table below shows the projected growth in group load between now and 2034 under the Best View scenario. The group currently has interconnection to Coventry West (approximately 40 MVA) which is used for demand restoration purposes following a second circuit outage.

Table 2.2.1 constraint(s) and condition under which constraint occurs

Constraint	N-1 Condition	Subsequent N-2 Condition	Group load			
			Baseline	2025	2028	2034
N-2 restoration requirements	Arranged outage on either 132 kV circuit to Warwick and Harbury BSPs	Fault on the remaining 132 kV circuit to Warwick and Harbury BSPs	115 MW	137 MW	166 MW	217 MW

Uncertainty under other Distribution Future Energy Scenarios: The group load is set to grow faster for the higher growth scenarios (Leading the Way and Consumer Transformation) and slower under the lower growth scenarios (System Transformation and Falling Short). The group load exceeds 150 MW by 2030 under every scenario, but the N-2 restoration requirements vary in magnitude.

Solution Options

A list of each of the options considered for this constraint is given in the table 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	Install new 132 kV circuit from Harbury to Banbury	✓	×	✓	**Viable**
2	Install a new 132 kV circuit from Berkswell to Warwick	✓	✓	✓	**Viable**
Operational Mitigation					
3	Transfer demand to other BSPs	×	×	×	**Discounted**
Flexibility services					
4	Procure flexibility under Warwick and Harbury 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 – Install new 132 kV circuit from Harbury to Banbury

Capacity Released for constraint(s) considered: Up to 266 MVA across Warwick and Harbury BSPs

Viable

New limiting factor for constraint(s) considered: 132 kV circuit ratings

Detailed description: Establishing a new 132 kV circuit from Harbury BSP to Banbury BSP (fed from East Claydon GSP) would alleviate the projected constraint and provide ample N-2 restoration for the group. The circuit would be approximately 20 km in length, and would be predominantly overhead line with a rating to support 266 MVA of transfer capacity. The circuit would normally run open, and would only be switched into service following the second circuit outage loss of both circuits from Berkswell into the group.

This solution also provides N-2 restoration capacity to the Banbury and Brackley group in East Claydon. However; given the steep load growth in the Warwick and Harbury group, there is the potential for the group demand to exceed 300 MW at a point in the future. At this point the requirements of Engineering Recommendation P2 are for all consumers at 2/3 group demand to be restored, for which an interconnector to Banbury would not be sufficient. As a result, option 2 may be required in the longer term to provide demand security to the group.

Option 2 – Install a new 132 kV circuit from Berkswell to Warwick

Capacity released for constraint(s) considered: Up to 160 MVA

Viable

New limiting factor for constraint(s) considered: 132 kV circuit ratings

Detailed description: Installing a new 132 kV circuit from Berkswell GSP to Warwick BSP. The circuit would be approximately 16.5 km long (predominantly overhead) and connected to the existing mesh corner arrangement at Warwick BSP.

This option has the benefit of providing sufficient resilience for the group even if the group demand were to exceed 300 MW, as providing a third circuit normally in service is sufficiently rated to supply the entire group during maintenance periods. However; this option does not provide additional N-2 restoration capacity to the Banbury and Brackley group.

Option 3 – Transfer demand to other BSPs

Capacity Released for constraint(s) considered: Up to 25 MVA

Discounted

New limiting factor for constraint(s) considered: 33 kV transfer capacity

Detailed description: To release additional capacity in the Warwick and Harbury group, additional 33 kV circuits could be installed or demand transferred to other BSPs using existing interconnection. This option has been discounted as all of the transfers considered would require a prohibitively expensive amount of 33 kV circuit to be built (or security of supply to be compromised). Some of the limiting factors for potential transfers include:

- Transferring Kenilworth primary entirely into Coventry West BSP is not a viable option, as this would reduce security of supply at Kenilworth, putting it at single circuit risk.
- Whitley BSP is projected to be constrained as detailed in the Coventry 132 kV report, making the transfer of Princethorpe less viable (even if it could be transferred there is relatively low demand at Princethorpe).
- Due to the low load density on the predominantly rural network between Harbury and Banbury BSPs, new 33 kV circuits would need to be very long to create new interconnection.

Given the level of demand growth projected for the group, this is not considered a long term solution. Transfers at 11 kV could also be explored to manage the constraint in the short term (but this is even less likely to be sufficient in the long term due to the magnitude of demand being considered).

Option 4 – Procure flexibility under Warwick and Harbury BSPs

Flexibility service type: Generation turn up/demand turn down

Viable

Detailed description: Flexibility is not suitable to manage this constraint directly as it is a security of supply requirement. Flexibility cannot be used to reduce the class of supply of a group, and the level of flexibility required would not be economical regardless. Flexibility could however be used to facilitate transfers at 33 kV which are used to restore demand for N-2 outages.

Solution Recommendation

It is recommended to install a 132 kV circuit between Harbury BSP and Banbury BSP as described in option 1. This option provides ample capacity beyond that which the existing 33 kV interconnection can provide. Given the uncertainty of future load growth beyond the assessment period (which may not necessitate a third circuit from Berkswell GSP) and the wider benefits that would be conferred for the Banbury and Brackley demand group, this is likely the optimal reinforcement solution for this constraint.

2.3 Berkswell to Warwick 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 condition under which constraint occurs

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
Berkswell to Warwick 132 kV circuit overloads	Arranged or fault outage of the other 132 kV circuit	None	2034	2034	2034	2034

Uncertainty under other Distribution Future Energy Scenarios: Similar overloads are projected under the Leading the Way and Consumer Transformation scenarios as under Best View. While lower growth is observed under Falling Short and System Transformation, overloads are still observed across multiple seasons by 2040 in these lower growth scenarios.

Solution Options

A list of each of the options considered for this constraint is given in the table 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 132 kV circuits between Berkswell and Warwick	✓	✓	✓	**Viable**
2	Install new 132 kV circuit from Berkswell to Warwick	✓	✓	✓	**Viable**
Operational Mitigation					
3	Post-fault inter-trips	×	✓	×	**Discounted**
Flexibility services					
4	Procure flexibility under Warwick and Harbury BSPs	✓	✓	✓	**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 132 kV circuits between Berkswell and Warwick

Capacity released for constraint(s) considered: Up to 260 MVA — **Viable**

New limiting factor for constraint(s) considered: 132 kV circuit ratings

Detailed description: The existing 132 kV circuits between Berkswell GSP and Warwick BSP are around 14 km long, which is predominantly overhead section on L7 double circuit towers. The limiting factor of both circuits is the overhead conductor (twin 175 mm^2 ACSR designed to at 50°C with a rating restriction on the joints). If the existing circuit were to be uprated (either through reprofiling or reconductoring with a suitable conductor such as 500 mm^2 AAAC), it could achieve a rating of up to approximately 265 MVA (subject to an overhead line survey). This would be sufficient to alleviate the projected constraint, but further intervention may be required beyond the assessment period.

Option 2 – Install new 132 kV circuit from Berkswell to Warwick

Capacity released for constraint(s) considered: Up to 240 MVA

Viable

New limiting factor for constraint(s) considered: 132 kV circuit ratings

Detailed description: Installing a new 132 kV circuit from Berkswell GSP to Warwick BSP would also resolve this constraint. The circuit would be approximately 16.5 km long (predominantly overhead) and connected to the existing mesh corner arrangement at Warwick BSP. The final length is subject to a full route investigation and land rights.

In order to provide enough resilience for the entire group to remain connected following a second circuit outage, the rating of the circuit would need to be approximately 250 MVA by 2050 (during access windows). This would also necessitate the uprating of the existing circuits (as in option 1), unless operational schemes were implemented to split the group under arranged outages such that not all of the group would be restored immediately.

A detailed survey and design of the site will determine the viability of this option, taking into account available space within the relevant substations. This reinforcement would also resolve the security of supply constraint outlined in Section 2.2 of this report.

Option 3 –Post-fault inter-trips

Estimated capacity released: 0 MVA

Discounted

New limiting factor: Rating of existing circuits and P2 compliance

Detailed description: The Warwick and Harbury BSP group is Class D under Engineering Recommendation P2 which would require the immediate restoration of the group demand minus 20 MW following a first circuit outage, with restoration of the full demand within 3 hours; therefore demand disconnection schemes (or similar) would make the site non-compliant.

Option 4 – Procure flexibility under Warwick and Harbury BSPs

Flexibility service type: Generation turn up/demand turn down

Viable

Detailed description: Flexibility services could be procured to alleviate the projected overloads seen on the 132 kV circuits, which would be required for extended periods during multiple seasons as the constraint occurs under first circuit fault conditions. The viability of utilising flexibility will be further investigated as part of the DNOA process.

Solution Recommendation

The solution must be considered alongside any recommended solution for the Warwick and Harbury group as outlined in Section 2.2 of this report. Uprating the existing circuits between Berkswell GSP and Warwick BSP is a coordinated option with building a new 132 kV circuit between Harbury and Banbury. Further intervention may be required after the assessment period, and in the short term flexibility services could be used to reduce network risk during times of high network utilisation.

2.4 Warwick 132/33 kV BSP GT 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 condition under which constraint occurs

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
Warwick GT1A overload	Arranged outage of T2 at Kenilworth or its associated infeed	Fault of GT3A transformer at Warwick	-	2034	2034	-
Warwick GT3A overload	Arranged outage of T2 at Kenilworth or its associated infeed	Fault of GT1A transformer at Warwick	-	2034	2034	-

Uncertainty under other Distribution Future Energy Scenarios: Similar overloads are projected under the Leading the Way and Consumer Transformation scenarios as under Best View. While lower growth is observed under Falling Short and System Transformation, overloads are still observed across multiple seasons by 2040 in these lower growth scenarios.

Solution Options

A list of each of the options considered for this constraint is given in the table 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 GT1A and GT3A at Warwick	✓	×	✓	Viable
Operational Mitigation					
2	Transfer demand to other BSPs	×	×	✓	Viable
3	Review seasonal ratings and restrict outage seasons	✓	✓	✓	Viable
Flexibility services					
4	Procure flexibility under Warwick 132/33 kV 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 – Reinforce GT1A and GT3A at Warwick

Capacity Released for constraint(s) considered: 12 MVA

Viable

New limiting factor for constraint(s) considered: New transformer ratings

Detailed description: Uprating the GT1A and GT3A grid transformers at Warwick BSP to 60/90 MVA units (to match the GT2A unit) would alleviate the projected constraint.

These works may also provide additional benefit to transfer load from Warwick 132/11 kV BSP, which by 2034 is approaching the limits of the 132/11 kV transformers.

Option 2 – Transfer demand to other BSPs

Capacity released for constraint(s) considered: 15 MVA

Viable

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

Detailed description: As outlined in the Warwick and Harbury 33 kV report, two recommended solutions are to install a new primary in Kenilworth (utilising the existing 33 kV interconnector between Coventry West and Warwick) and to establish a second primary transformer at Princethorpe. Both of these reinforcement schemes would involve transferring load away from Warwick 132/33 kV BSP, onto Whitley (in the case of Princethorpe) and Coventry West (in the case of Kenilworth).

The combination of these two reinforcements would alleviate the projected constraint in 2034. These works also provide additional benefit by addressing the load balance between GT1A and GT3A at Warwick, which by 2034 is not balanced due to the distribution of load across the primaries fed from each of the 33 kV busbars.

Option 3 – Review seasonal ratings and restrict outage seasons

Capacity Released for constraint(s) considered: Dependent on review

Viable

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

Detailed description: Overloads are only seen in 2034 for intermediate cool. It is therefore possible that this constraint could be delayed slightly by reviewing NGED's internal policy regarding transformer ratings, which does not currently distinguish between summer and intermediate cool ratings (which may be overly pessimistic). This solution is dependent on an internal review and would not be a long term solution.

In addition, as this constraint is only present under second circuit outages in 2034 for intermediate cool and warm, restricting outage seasons could be used to alleviate this constraint. This solution is viable in 2034 and could be used in conjunction with options 2 and 4, but would likely not be an enduring solution far beyond 2034. One disadvantage of this solution is that it reduces network operability.

Option 4 – Procure flexibility under Warwick 132/33 kV BSP

Flexibility service type: Generation turn up/demand turn down

Viable

Detailed description: Flexibility services could be procured to alleviate the projected overloads seen on the GTs at Warwick 132/33 kV BSP. The viability of utilising flexibility will be further investigated as part of the DNOA process. Flexibility will likely not be economical in 2034 due to the viability of utilising some of the low cost operational mitigations discussed in options 3 and 4 (but could be used in conjunction with these options if demand growth is higher than expected).

GT1A and GT3A at Warwick BSP are around 60 years old. If the replacement of the GTs is triggered by their condition by 2034 or soon after then flexibility would not be viable for deferring expenditure for this constraint. NGED periodically assesses the condition of the assets on the distribution network, including the GTs at Warwick BSP. Future NDP and DNOA reports will consider the most up-to-date data collected on the condition of the GTs to inform whether flexibility will be viable or not.

Solution Recommendation

A number of viable short term strategies have been identified to manage this constraint in 2034 (restricting outage seasons, reviewing the transformer ratings and procuring flexibility services). Over the long term the optimal solution identified is to uprate the existing GTs at Warwick BSP, with the size of the new units subject to further review as forecasts evolve.

2.5 Harbury BSP GT and 132 kV circuit overloads

Constraint Overview

Generation **Demand**

As outlined in the Warwick and Harbury 33 kV report, the demand growth at Harbury BSP is dominated by large developments in the Lighthorne Heath area supplied by Gaydon primary. The table below outlines the constraint identified for Best View, the conditions it occurs under, and the triggering year per season (although this would be heavily dependent on the new developments in the area).

Table 2.5.1 constraint(s) and condition under which constraint occurs

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
Harbury GT1 or GT2 overload	Fault or arranged outage on either GT at Harbury	None	2034	2034	-	-
Warwick to Harbury 132 kV circuit overload	Fault of the other Warwick to Harbury circuit	None	2034	2034	-	-

Uncertainty under other Distribution Future Energy Scenarios: Similar overloads are projected under the Leading the Way and Consumer Transformation scenarios as under Best View. Shortly after 2034, overloads are expected across all seasons. While lower growth is observed under Falling Short and System Transformation, overloads are still observed across multiple seasons by 2040 in these lower growth scenarios.

Solution Options

A list of each of the options considered for this constraint is given in the table 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 existing GTs at Harbury	✓	×	✓	Discounted
2	Install a third 132/33 kV GT at Harbury BSP	✓	✓	✓	Viable
3	Build a new 132/11 kV BSP	✓	×	×	Viable
Operational Mitigation					
4	Transfer demand to other BSPs	✓	×	✓	Discounted
5	Post-fault transfers	×	×	×	Discounted
Flexibility services					
6	Procure flexibility under Harbury 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 Harbury 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 Harbury 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. This option would also not alleviate the 132 kV circuit overloads.

Option 2 – Install a third 132/33 kV GT at Harbury BSP

Capacity released for constraint(s) considered: Up to 45 MVA

Viable

New limiting factor for constraint(s) considered: Berkswell to Warwick and Warwick to Harbury 132 kV circuit capacity

Detailed description: Installing a third 60/90 MVA grid transformer at Harbury could alleviate the projected constraints. However, to facilitate the level of demand growth projected this option would also require:

- Installation of a third section of 33 kV board to connect the third transformer and outgoing 33 kV circuits, and 132 kV works to facilitate the connection of the GT (and potentially a third 132 kV circuit to Banbury as outlined in Section 2.2 of this report).
- Reconductoring the overhead sections of the existing 132 kV circuits between Warwick and Harbury with a suitable conductor (300 mm^2 AAAC). This entails around 20 km of circuit works.

Option 3 – Build a new 132/11 kV BSP

Capacity Released for constraint(s) considered: Up to 78 MVA

Viable

New limiting factor for constraint(s) considered: Berkswell to Warwick and Warwick to Harbury 132 kV circuit capacity

Detailed description: As the demand growth at Harbury is dominated by a large development around Gaydon primary, another option is to establish a 132/11 kV Bulk Supply Point at or near Gaydon. This option would include:

- Reconductoring the 132 kV circuits between Warwick BSP and Harbury BSP as outlined in option 2.
- Procuring a new BSP site around the area fed from Gaydon primary, fed via a 5 km 132 kV circuit from Harbury BSP, with each transformer banked onto one of GT1 and GT2. If the new BSP is suitably close to the area of demand growth, installation of two 132/11 kV 15/30 MVA transformers should be sufficient for the projected growth.

The level of circuit works (and modifications at existing substations) will depend on the location of the new BSP, which is subject to planning and consents. This option may reduce the requirement to reinforce existing transformers and circuits at Gaydon primary.

Option 4 – Transfer demand to other BSPs

Capacity Released for constraint(s) considered: Minimal

Discounted

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

Detailed description: The only BSP which Harbury BSP is interconnected with at 33 kV is Warwick BSP. Warwick BSP is also projected to be constrained as discussed in Section 2.4 of this report, and this interconnection is only via a single 33 kV circuit (so no demand could be transferred under normal running arrangements without compromising security of supply).

Option 5 – Post-fault transfers

Capacity Released for constraint(s) considered: None

Discounted

New limiting factor for constraint(s) considered: N/A

Detailed description: Post fault transfers cannot be utilised as the overload is beyond post-fault ratings, meaning there is no window to reduce the load on the 132 kV circuits through load management.

Option 6 – Procure flexibility under Harbury BSP

Flexibility service type: Generation turn up/demand turn down

Viable

Detailed description: Flexibility services could be procured to alleviate projected overloads. This could defer reinforcement but due to the large quantity of flexibility required this may not be a viable long term solution.

Solution Recommendation

The significant load growth observed within the BSP is related to these observed for Gaydon primary substation and can be traced to a few large developments; as a result, the timing and trigger of any works would be heavily reliant on these new developments materialising, and in some cases, contributing to the works.

If the demand growth projected is concentrated in a small geographic area, it is recommended to establish a new BSP as this will remove the need to undertake reinforcement on 33 kV circuits and transformers in the Harbury network. Alternatively, a third GT is a viable option if the demand growth is more geographically dispersed.

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