# Axminster GSP

Network Development Report – South West

**May 2024**

Electricity Distribution

nationalgrid

# Contents

# Axminster GSP

## 1. Network Overview

Axminster Grid Supply Point (GSP) supplies 2 Bulk Supply Points (BSPs) which span the NGED and SSEN network through three 400/132 kV Grid Transformers (GTs) at Axminster GSP. Yeovil BSP is SSEN owned and Woodcote BSP is NGED owned; however, the two DNOs are interconnected as parts of the NGED network are also fed through Yeovil BSP, and an interconnection at Bridport primary substation into Chickerell BSP via Winterbourne Abbas primary substation (SSEN owned).

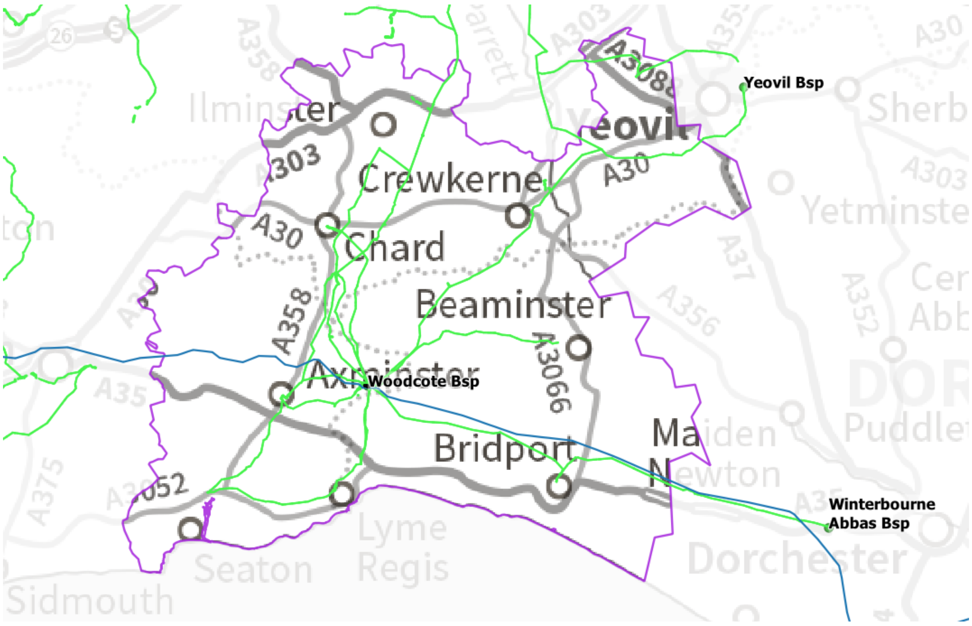


*Figure 1.1 Axminster GSP NGED geographic network coverage*

Yeovil BSP supplies four NGED primary substations which are mostly rural, with the bulk of the NGED demand centred in Martock and Montacute. The NGED Yeovil ring is fed via two 33 kV circuits from Yeovil BSP, and supplies approximately 12,000 NGED customers.

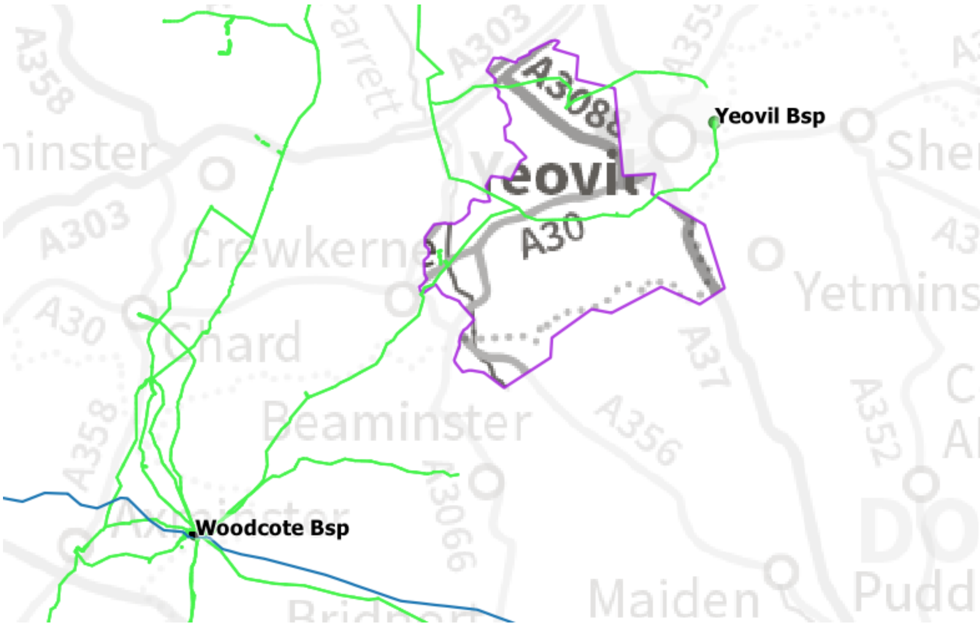


*Figure 1.2 Yeovil BSP NGED geographic network coverage*

Woodcote BSP is an NGED owned BSP that supplies 9 primary substations which are mostly rural, with the demand spread across the primary substations and highest centres of demand being

Bridport and Chard. It is fed via two 132 kV circuits and supplies approximately 47,000 customers in its current running arrangement.

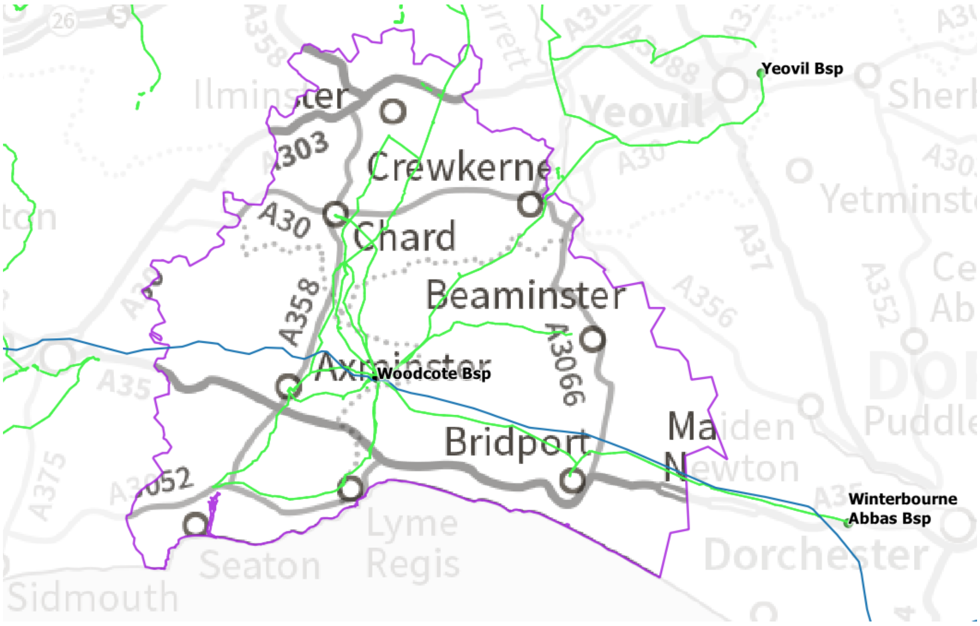


*Figure 1.3 Woodcote BSP NGED geographic network coverage*

Woodcote and Yeovil BSP are interconnected at Crewkerne primary substation, which can be run from either of the BSPs under different network conditions. Additional interconnections include the split running of Martock Primary between Street BSP and Yeovil BSP, and Bridport which can be fed from Chickerell BSP or Woodcote BSP.

This report discusses all existing and future network constraints over a 0-10 year horizon associated with the NGED network fed from Axminster 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

The Yeovil BSP NGED network is arranged as follows:

- Two 33 kV circuits run out of Yeovil BSP and supply the NGED primary substations of Coker, East Chinnock, Martock T1 and Montacute
- There is a normal open point at Martock, where Martock T2 is fed from the Street BSP network under normal running conditions, but under certain outages can be fed from Yeovil BSP. An auto-changeover is installed here to carry out these network rearrangements.
- There is a normal open point at East Chinnock to Crewkerne primary that is normally fed from Woodcote BSP, but can be fed from Yeovil BSP in the event of a fault or arranged outage. An auto-changeover is installed here to carry out these network rearrangements.

The Woodcote BSP network is arranged as follows:

- GT1, GT2 and GT3 are run in parallel.
- There is a normally open point at Bridport primary, requiring manual control room intervention to switch Bridport to be fed from the alternative feed of Chickerell BSP, instead of Woodcote Main1 busbar.
- Woodcote Main1 busbar feeds a number of solar farms on the ring which supplies Axminster primary and Colyford and Penn Cross primary substations. There is a tee off between Woodcote and Axminster primary substation which feeds half of Waterlake primary, which

is run split under normal running arrangements. The network has additional circuits from these primary substations to both Main2 busbar and Main3 busbar.

- The other half of Waterlake primary substation is fed from Woodcote Main2 busbar, on a circuit which continues on to feed a number of solar farms before continuing to the Bridgwater BSP network at North Street Langport primary substation, which is normally open.
- Off Main1 busbar, a circuit feeds Chard and Dowlish Ford primary substations, before connecting to the aforementioned circuit which supplies half of Waterlake and continues to Bridgwater BSP.
- Main3 busbar feeds Beaminster, a single transformer primary substation with a second 33 kV construction circuit currently being run at 11 kV to Crewkerne primary substation.
- Woodcote Main2 busbar has a circuit feeding Crewkerne primary substation, which is the normal feed into Crewkerne, but as mentioned above, there is an additional circuit from Crewkerne to the Yeovil ring that is used when an outage is affecting the normal feed.

## 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.

- Various winter/intermediate cool arranged outages not permitted due to SCO overloads.
- Martock auto-changeover to feed Martock primary substation entirely from Street BSP or Yeovil BSP for a fault/outage affecting either the Yeovil or Street infeeds.
- Waterlake auto-changeover
- For the loss of an infeed to a transformer at any of the primary substations fed from Yeovil BSP under arranged outages, the lower voltage side circuit breaker is opened to prevent back-energisation.
- Crewkerne transferred into Yeovil for a fault/outage affecting the infeed from Woodcote BSP.
- Splitting and rearranging of Woodcote circuits under arranged outages
- Splitting of some primary substations under normal running arrangements in Woodcote BSP.

# 2. Summary of Network Constraints

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

- Yeovil BSP infeed
- Yeovil BSP 33 kV ring circuit overloads
- Yeovil BSP group low volts
- Woodcote BSP group low volts
- Coker single transformer primary 11 kV backfeed
- Martock Transformers T1/T2 overloads
- Woodcote 33 kV Circuit Demand Overloads
- Woodcote group security of supply
- Bridport primary substation alternative feed
- Bridport primary transformer overloads
- Crewkerne primary transformer overloads

# 3. Network Constraint Details and Solution Options

## 3.1 Yeovil BSP infeed

### Constraint Overview

Generation | Demand

The table below outlines the nature of the network constraints identified in the network analysis, with the worst overloads seen at winter peak demand.

*Table 3.1.1 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 |
| Yeovil BSP NGED Agreed Supply Capacity | Intact | None | 2028 | 2028 | 2030 | 2032 |
| Yeovil BSP NGED Agreed Supply Capacity | Woodcote 1L5 to Crewkerne 2L3 circuit arranged outage or fault | - | Baseline | 2023 | 2025 | 2028 |
| Yeovil BSP NGED Agreed Supply Capacity | Any arranged outage or fault resulting in Martock T2 being fed from Yeovil | - | Baseline | Baseline | 2024 | 2026 |

**Uncertainty under other Distribution Future Energy Scenarios:** As some of these constraints occur under baseline, there is no uncertainty about future forecasts. There is a risk that demand reduces; however, this is not forecast under any scenario so mitigation against this constraint is definitely required. The date the constraint arises under intact network conditions varies by scenario, ranging from 2027 to 2031.

### Solution Options

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

*Table 3.1.2 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 | Secure additional infeed capacity from Yeovil BSP | × | × | ✓ | Viable |
| 2 | Create alternative normal running and backfeed solutions for Crewkerne and Martock | × | ✓ | ✓ | Viable |
| 3 | Build new BSP at Crewkerne to take load off Yeovil and Woodcote BSP | × | ✓ | × | Viable |
| **Operational Mitigation** | | | | | |
| 4 | Transfer demand to other BSPs | × | × | ✓ | Viable |
| 5 | Disable auto-changeover at Crewkerne | × | × | ✓ | Viable |
| **Load Management Schemes** | | | | | |
| 6 | Post-fault transfers | × | × | ✓ | Discounted |
| **Flexibility services** | | | | | |
| 7 | Procure flexibility at the primary substations fed from Yeovil | × | ✓ | ✓ | Discounted |

## 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 Distribution Network Operator (DNO) to determine the optimal reinforcement solution, which will then be tested against market provided flexibility by the Distribution System Operator (DSO) as part of the Distribution Network Options Assessment (DNOA) process.

### Option 0 – No Intervention

**Capacity Released for constraint(s) considered:** 0 MVA

Discounted

**Detailed description:** Doing nothing to mitigate the constraint would result in overloads for the conditions described above. This would lead to import exceeding the agreed supply capacity from Yeovil BSP.

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

### Option 1 – Secure additional infeed capacity from Yeovil BSP

**Capacity Released for constraint(s) considered:** 2-14 MVA

Viable

**Detailed description:** Through requesting additional infeed capacity from SSEN, load growth will be supported up to 34 MVA. Following this, additional works of reconductoring sections of the Yeovil ring will be required to enable the utilisation of the remaining 14 MVA of additional import capacity from SSEN.

As the load in the area is projected to continue increasing, this solution needs to be subject to a cost benefit assessment following discussions with SSEN. It is likely that a balance between requesting additional capacity and carrying out reinforcement or building new network needs to be struck.

Based on initial discussions with SSEN, the increased ASC is unlikely to be available until 2028, therefore an alternative solution would need to be found in the interim.

**New limiting factor for constraint(s) considered:** Yeovil 33 kV ring circuit overloads

### Option 2 – Create alternative backfeed solutions for Crewkerne and Martock under N-1 conditions

**Capacity Released for constraint(s) considered:** 10 MVA

Viable

**Detailed description:** This combination of solutions removes the requirement to backfeed Crewkerne and Martock T2 under N-1 outage conditions from the Yeovil ring by moving this demand onto Woodcote.

| Outage | Baseline | 2023 | 2024 | 2028 | 2030 | 2034 |
|---|---|---|---|---|---|---|
| **Normal running conditions** | 14.26 | 14.49 | 15.99 | 20.74 | 23.1 | 30.6 |
| **N-1 Martock T2 being fed from Yeovil** | 20.93 | 21.37 | 23.15 | 30.14 | 33.41 | 44.12 |
| **N-1 Crewkerne being fed from Yeovil** | 23.6 | 23.9 | 25.6 | 33.8 | 37.9 | 48.4 |
| **N-1 Crewkerne being fed from Yeovil, Martock T1 removed** | 20.03 | 20.4 | 21.79 | 27.27 | 30.9 | 39.66 |

**Crewkerne**:

Uprate the operating voltage of the existing Crewkerne – Beaminster circuit (33 kV construction currently being run at 11 kV) to 33 kV to remove N-1 dependency on Yeovil and feed East Chinnock from Woodcote. This would involve minimal construction works; however, would reduce the 11 kV circuit capacity in the area.

This solution removes N-1 dependency of Crewkerne on Yeovil, as well as allowing the normal running arrangement of East Chinnock to be changed to be normally fed from Woodcote.

**Martock T2:**

Martock Option 1: Build circa 11 km of new overhead circuit between Martock and the Woodcote BSP network to take Martock load off Yeovil BSP under N-1 outage conditions. This would follow the route of one of the existing 11 kV circuits, extending to an appropriate P18-compliant area of network (circa 2 km from Dowlish Ford primary substation), and would mean that under N-1 outage conditions, Martock T2 would not be fed from Yeovil.

Martock Option 2: Build circa 6 km of new overhead circuit between Martock and the Bridgwater network at Curry Mallet to take Martock load off Yeovil under N-1 outage conditions. This would follow the route of one of the existing 11 kV circuits, and mean that under N-1 outage conditions, Martock T2 would not be fed from Yeovil BSP. This option would also require a 5.7 km stretch of circuit between the Wick tee and the West Point tee to be uprated.

The preferred option for Martock would depend upon the outcome of detailed network design to compare the cost and benefits associated with reinforcing existing circuits, in comparison to building a new stretch of circuit.

The combination of both a Martock T2 and Crewkerne alternative feed would solve the constraint until 2028 under Best View, at which point the demand would begin to exceed the ASC again, and the circuits feeding Martock T2 under N-1 from Woodcote would begin to overload.

**New limiting factor for constraint(s) considered:** Circuit capacity supporting new points of connection for Martock option 2

## Option 3 – Build new BSP at Crewkerne to take load off Yeovil and Woodcote BSP

**Capacity released for constraint(s) considered:** 100 MVA  **Viable**

**Detailed description:** To deload the 33 kV bars at Woodcote and the agreed infeed from Yeovil BSP, a third BSP fed from Axminster GSP could be built, close to the areas of Chard and Crewkerne, where much of the projected demand growth is planned to be located.

A new 14.5 km wood pole 132 kV double circuit would be required from Axminster to Crewkerne, where there would be two 60/90 MVA grid transformers.

Chard, Crewkerne and Dowlish Ford primary substations (which form the northern half of the Woodcote ESA) and some of the NGED demand as fed currently from Yeovil could transferred onto Crewkerne BSP along with the proportion of growth in both ESAs.

**New limiting factor for constraint(s) considered:** Additional 33 kV circuits would need to be constructed or reinforced in order to maximise the benefits of this solution, upstream spatial connection constraints at Axminster GSP.

## Option 4 – Transfer demand to other primary substations

**Capacity Released for constraint(s) considered:**  **Viable**

The capacity released is dependent on 11 kV circuit capacity

**Detailed description:** Martock is remote and it is likely that it is unsuitable for transferring demand to alterative primary substations, requiring further analysis by the Secondary System Planning team to determine the feasibility.

**New limiting factor for constraint(s) considered:** 11 kV circuit capacity.

## Option 5 – Disable auto-changeover at Crewkerne

**Capacity Released for constraint(s) considered:** 3.6 MVA  **Viable**

**Detailed description:** The auto-changeover at Crewkerne could be disabled to ensure there is no condition where Martock T1 and Crewkerne are simultaneously fed from the Yeovil ring. In the instance where Crewkerne loses its feed from Woodcote, Martock T1 can be switched out of the Yeovil ring prior to Crewkerne being picked up. This reduces group demand by 3.6 MVA and brings the baseline N-1 back to the ASC.

**New limiting factor for constraint(s) considered:** Yeovil ring group demand

## Option 6 – Post-fault transfers

**Capacity Released for constraint(s) considered:** 0 MVA  **Discounted**

**Detailed description:** Post fault transfers cannot be utilised as the ASC is not variable depending upon the network condition.

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

**Option 7 – Procure flexibility in the Yeovil Ring**

**Estimated Flexibility Required (MVA):** 4 MVA+ **Viable**

**Detailed description:** Flexibility services could be procured to alleviate the projected overloads seen on the Yeovil ring. The viability of utilising flexibility will be further investigated as part of the DNOA process.

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

### Solution Recommendation

It is recommended that the Crewkerne auto-changeover be disabled to prevent baseline exceedances of the Yeovil ASC.

To solve the constraints beyond that, it is recommended that discussions continue with SSEN to identify the timescales for increasing NGED's ASC at Yeovil. Based on early discussions, this is likely to take a long time due to existing SSEN constraints at Yeovil BSP, requiring upstream reinforcement works.

Long lead times on increasing the ASC with SSEN necessitates the creation of alternative N-1 running arrangements in the near term for Crewkerne and Martock T2. This involves:

- uprating the 33 kV construction circuit between Beaminster and Crewkerne to remove N-1 contingency of Crewkerne from the Yeovil ring; and
- building a 7 km stretch of circuit between the Woodcote network and Martock primary, allowing for the abnormal running of Martock T2 from Woodcote instead of Yeovil.

In the longer term, depending on the timeframes for the upstream SSEN reinforcement to enable increasing the ASC, it may be necessary to move Martock T1 to be permanently fed from Woodcote using the newly constructed line. Other solutions could be to move East Chinnock onto Woodcote under normal running conditions using the newly uprated Crewkerne-Beaminster circuit.

## 3.2 Yeovil BSP 33 kV ring circuit overloads

### Constraint Overview

Generation | **Demand**

The table below outlines the nature of the network constraints identified in the network analysis, with the worst overloads seen at winter peak demand.

*Table 3.2.1 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 |
| COKE3T to 25PL3_ZEB44 L1 circuit overload | Yeovil 13L5 to Montacute 2L3 33 kV circuit fault or arranged outage | - | 2034 | 2034 | 2034 | - |
| ECHI3_1L5 to 25PL3_ZEC53M L1 | Yeovil 13L5 to Montacute 2L3 33 kV circuit fault or arranged outage | - | 2034 | > 2034 | > 2034 | - |
| Yeovil 2L5 to Coker 2L3 circuit overload | Yeovil 13L5 to Montacute 2L3 33 kV circuit fault or arranged outage | - | 2034 | 2034 | 2034 | - |
| Yeovil 13L5 to Montacute 2L3 33 kV circuit overload | Yeovil 2L5 to Coker 2L3 circuit | - | 2034 | 2034 | 2034 | - |

| | | | | | | |
|---|---|---|---|---|---|---|
| | fault or arranged outage | | | | | |
| COKE3T to 25PL3_ZEB44 L1 circuit overload | Yeovil 13L5 to Montacute 2L3 33 kV circuit fault or arranged outage | Fault on circuit feeding Martock T2 | Baseline | Baseline | Baseline | 2028 |
| COKE3T to 25PL3_ZEB39 L1 circuit overload | Yeovil 13L5 to Montacute 2L3 33 kV circuit arranged outage | Fault on circuit feeding Martock T2 | Baseline | Baseline | 2028 | 2028 |
| ECHI3_1L5 to 25PL3_ZEC53M L1 | Yeovil 13L5 to Montacute 2L3 33 kV circuit arranged outage | Fault on circuit feeding Martock T2 | Baseline | Baseline | Baseline | 2028 |
| Yeovil 2L5 to Coker 2L3 circuit overload | Yeovil 13L5 to Montacute 2L3 33 kV circuit arranged outage | Fault on circuit feeding Martock T2 | Baseline | Baseline | 2028 | 2028 |
| Yeovil 13L5 to Montacute 2L3 33 kV circuit overload | Yeovil 2L5 to Coker 2L3 circuit arranged outage | Fault on the Woodcote circuit feeding Crewkerne | Baseline | Baseline | Baseline | 2028 |
| East Chinnock 4L5 to Coker 3L3 | Yeovil 13L5 to Montacute 2L3 33 kV circuit arranged outage | Fault on Street circuit feeding Martock T2 | Baseline | Baseline | 2028 | 2028 |

**Uncertainty under other Distribution Future Energy Scenarios:** The date the constraint arises under intact network conditions varies by scenario, ranging from 2032 to past 2034.

## Solution Options

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

*Table 3.2.2 solution options to solve constraint(s)*

| Solution Options | Description | Solves Constraint | Wider Area Benefit | Potential to be cost effective | Viable or Discounted |
|---|---|---|---|---|---|
| 0 | No Intervention | × | × | × | Discounted |
| **Reinforcement** | | | | | |
| 1 | Reinforce existing 33 kV circuits | ✓ | × | ✓ | Viable |
| 2 | Create alternative normal running and backfeed solutions for Crewkerne and Martock | × | ✓ | ✓ | Viable |
| 3 | Reinforce 11 kV circuits to transfer demand at East Chinnock to Woodcote BSP under normal running conditions | ✓ | ✓ | ✓ | Viable |
| 4 | Build new primary substation to the West of Yeovil with direct feed from Yeovil BSP to deload the Yeovil ring | ✓ | ✓ | ✓ | Viable |
| 4 | Build new BSP at Crewkerne to take load off Yeovil and Woodcote BSP | × | ✓ | × | Viable |
| **Operational Mitigation** | | | | | |
| 5 | Transfer demand to other BSPs | × | × | ✓ | Discounted |
| 6 | Disable auto-changeover at Crewkerne/Martock | × | × | ✓ | Viable |
| **Load Management Schemes** | | | | | |
| 7 | Post-fault transfers | × | × | ✓ | Viable |

| | | | | | |
|---|---|---|---|---|---|
| **Flexibility services** | | | | | |
| 8 | Procure flexibility within the Yeovil ring | × | × | ✓ | **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 0 – No Intervention

**Capacity Released for constraint(s) considered:** 0 MVA **Discounted**

**Detailed description:** Doing nothing to mitigate the constraint would result in overloads for the conditions described above. This would lead to an inability to meet the Security of Supply requirements of Engineering Recommendation P2 for the primary substations fed by Yeovil.

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

### Option 1 – Reinforce existing 33 kV circuits

**Capacity Released for constraint(s) considered:** 8 MVA **Viable**

**Detailed description:** Several sections of the existing circuits on the Yeovil ring would have to be upgraded to facilitate load growth. This would involve replacing several sections of overhead line, potential line rebuild, as well as any CT and protection upgrades required. The sections to be replaced include:

For Yeovil 2L5 to Coker 2L3:

- 6.8 km Overhead line hard drawn copper (HDC)
- 423 m 0.3 Copper (Cu) Cable

For Coker 2L3 to 25PL3_ZEB44:

- 329 m Overhead line HDC

For Yeovil 13L5 to Montacute:

- 6.7 km Overhead line HDC

For the section of circuit between East Chinnock and Martock:

- 5.8 km Overhead line HDC

**New limiting factor for constraint(s) considered:** ASC from Yeovil BSP, voltage issues under N-1

### Option 2 – Create alternative normal running and backfeed solutions for Crewkerne and Martock

**Capacity released for constraint(s) considered:** 10 - 18 MVA **Viable**

**Detailed description:** This solution is discussed in more detail in as discussed in the solution options for the Yeovil BSP infeed constraint in this report, but would also serve as a solution to this constraint as it would be reducing load on the Yeovil ring.

**New limiting factor for constraint(s) considered:** Intact group demand

### Option 3 – Reinforce 11 kV circuits to transfer demand to other BSPs

**Capacity Released for constraint(s) considered:** Up to 1 MVA **Viable**

**Detailed description:** Where there are customers fed from Yeovil within reasonable distance of alternative primary substations fed from different BSPs, the headroom of these primary substations are often already reaching capacity towards the end of the study period.

This solution could work for the demand on East Chinnock and Martock primary substations, through moving demand to be under Crewkerne primary substation. This would need to be combined with other solutions such as option 2 in order to remove Yeovil BSP group demand under N-1 running conditions.

Where a solution has been proposed to install larger transformers (e.g. Crewkerne), it may be possible to transfer load to these sites; however, this could require extensive lengths of 11 kV circuit to be reinforced, rendering the solution unfeasible. Further analysis by the Secondary System Planning Team is required to determine the feasibility of this solution.

**New limiting factor for constraint(s) considered:** Crewkerne primary transformer capacity

### Option 4 – Build new primary substation with direct feed from Yeovil BSP

**Capacity Released for constraint(s) considered:** Up to 14 MVA Viable

**Detailed description:** As the Yeovil ring in 2034 begins to have both voltage issues and thermal constraints under N-1 conditions, building a new primary substation with a direct infeed from Yeovil BSP would help to deload the Yeovil ring, reducing the need for long lengths of overhead reinforcement.

A suitable site for the new primary substation has not yet been determined, but could be sited to the West of Yeovil to support the connection of new developments and be proximal to existing load at Montacute and Coker. This primary substation could therefore permanently de-load Montacute and Coker, as well as supporting the new demand.

The likely date for the primary substation needing to be completed is around 2029-2030, as this is when overloads start on the Yeovil to Coker circuit.

**New limiting factor for constraint(s) considered:** ASC from Yeovil BSP

### Option 4 – Build new BSP at Crewkerne to take load off Yeovil and Woodcote BSP

**Capacity released for constraint(s) considered:** 100 MVA Viable

**Detailed description:** This solution is discussed in more detail in the solution options for the Yeovil BSP infeed constraint in this report, but would also serve as a solution to this constraint as it would be reducing load on the Yeovil BSP ring and constituent circuits.

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

### Option 5 – Transfer demand to other BSPs

**Capacity Released for constraint(s) considered:** 0 MVA Discounted

**Detailed description:** There are not alternative solutions for the running of the Yeovil BSP ring at present without further reinforcement on the network to enable transfers to other BSPs.

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

### Option 6 – Post-fault transfers

**Capacity Released for constraint(s) considered:** 0 MVA Viable

**Detailed description:** Post fault transfers cannot be utilised with the current Yeovil BSP ASC as the overload is beyond the ASC with SSEN, so load cannot be reduced retrospectively. Should the solution in section 3.1 be taken forward, the post-fault rating of 24.9 MVA would allow for Martock T1 to then be moved out of the Yeovil ring onto the Bridgwater-Street network if there were an auto-changeover scheme installed, delaying the need for further intervention until 2031.

**New limiting factor for constraint(s) considered:** Post-fault ratings

### Option 7 – Disable auto-changeover at Crewkerne/Martock

**Capacity Released for constraint(s) considered:** 3.6 MVA Viable

**Detailed description:** The auto-changeover at Crewkerne should be disabled to ensure there is no condition where Martock T1 and Crewkerne are simultaneously fed from the Yeovil ring. In the instance where Crewkerne loses its feed from Woodcote, Martock T1 can be switched out of the Yeovil ring prior to Crewkerne being picked up. This reduces group demand by 3.6 MVA and brings the baseline N-1 back to the ASC.

The same should be done at Martock, particularly at times of arranged outage of the Woodcote to Crewkerne circuit, where Crewkerne will be being fed from Yeovil.

**New limiting factor for constraint(s) considered:** Yeovil ring group demand

**Option 8 – Procure flexibility within the Yeovil ring**

**Estimated Flexibility Required (MVA):** 4 MVA+ **Viable**

**Detailed description:** Flexibility services could be procured to alleviate the projected overloads seen on the Yeovil ring. The viability of utilising flexibility will be further investigated as part of the DNOA process.

### Solution Recommendation

It is recommended that the load on the Yeovil ring be reduced first through creating alternative running solutions for Martock T2 and Crewkerne under N-1. This aligns with the solution to the Yeovil infeed constraint and involves:

- uprating the 33 kV construction circuit between Beaminster and Crewkerne to remove N-1 contingency of Crewkerne from the Yeovil ring; and
- building a 7 km stretch of circuit between the Woodcote network and Martock primary, allowing for the abnormal running of Martock T2 from Woodcote instead of Yeovil.

In the longer term, it will be necessary to uprate the circuits on the Yeovil ring to support the load enabled by the increased ASC requested at Yeovil BSP. Given the long distances requiring uprating, consideration should also be given to establishing a new primary substation in Yeovil to de-load the ring.

## 3.3 Yeovil BSP group low volts

### Constraint Overview

Generation **Demand**

The table below outlines the nature of the network constraints identified in the network analysis, with the worst overloads seen at winter peak demand.

*Table 3.3.1 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 |
| Montacute primary substation 11 kV low volts | Yeovil to Montacute circuit fault or arranged outage | - | 2034 | - | - | - |
| Coker primary substation 11 kV low volts | Yeovil to Coker circuit fault or arranged outage | - | 2034 | - | - | - |
| Montacute primary substation 11 kV low volts | Yeovil to Montacute circuit arranged outage | Crewkerne to Woodcote circuit fault | 2028 | 2028 | 2028 | 2034 |
| Coker primary substation 11 kV low volts | Yeovil to Coker circuit arranged outage | Crewkerne to Woodcote circuit fault | 2028 | 2028 | 2028 | - |

**Uncertainty under other Distribution Future Energy Scenarios:** The date this constraint arises varies by scenario, ranging from 2035 to 2029.

### Solution Options

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

*Table 3.3.2 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 | Build new primary substation with direct feed from Yeovil BSP | ✓ | ✓ | ✓ | Viable |
| 2 | Install regulator at Montacute / Coker | × | × | × | Discounted |
| 3 | Create alternative normal running and backfeed solutions for Crewkerne and Martock | × | ✓ | ✓ | Viable |
| **Operational Mitigation** | | | | | |
| 3 | Transfer demand to other BSPs | × | × | × | Discounted |
| 4 | Disable auto-changeover at Crewkerne / Martock | × | ✓ | ✓ | Viable |
| **Flexibility services** | | | | | |
| 5 | Procure flexibility within the Yeovil ring | × | × | × | Discounted |

## 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 0 – No Intervention

**Capacity Released for constraint(s) considered:** 0 MVA — Discounted

**Detailed description:** Doing nothing to mitigate the constraint would result in overloads for the conditions described above. This would lead to an inability to maintain statutory voltage.

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

### Option 1 – Build new primary substation with direct feed from Yeovil BSP

**Capacity Released for constraint(s) considered:** Up to 14 MVA — Viable

**Detailed description:** As the Yeovil ring in 2034 begins to have both voltage issues and thermal constraints under N-1 conditions, building a new primary substation with a direct infeed from Yeovil BSP would help to deload the Yeovil ring, reducing the need for long lengths of overhead reinforcement.

A suitable site for the new primary substation has not yet been determined, but could be sited to the West of Yeovil to support the connection of new developments and be proximal to existing load at Montacute and Coker. This primary substation could therefore permanently take on some of the existing load from Montacute and Coker, as well as supporting the new demand.

The likely date for the primary substation to be completed is around 2029-2030, as this is when overloads start on the Yeovil to Coker circuit.

**New limiting factor for constraint(s) considered:** ASC from Yeovil BSP

### Option 2 – Install regulator at Montacute / Coker

**Capacity Released for constraint(s) considered:** N/A — Discounted

**Detailed description:** This option is unsuitable as the network is a ring and so the regulator would cause issues under normal running arrangement and does not provide wider area benefits.

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

**Option 3 – Create alternative normal running and backfeed solutions for Crewkerne and Martock**

**Capacity released for constraint(s) considered:** 10 - 18 MVA **Viable**

**Detailed description:** This solution is discussed in more detail in the solution options for the Yeovil BSP infeed constraint in this report, but would also serve as a solution to this constraint as it would be reducing load on the Yeovil ring.

**New limiting factor for constraint(s) considered:** Yeovil normal running load growth

**Option 3 – Transfer demand to other BSPs**

**Capacity Released for constraint(s) considered:** Up to 5 MVA **Discounted**

**Detailed description:** Where there are customers fed from Yeovil within reasonable distance of alternative primary substations fed from different BSPs, the headroom of these primary substations are often already reaching capacity towards the end of the study period.

This option could work for the demand on East Chinnock and Coker primary substations, through moving demand to be under Crewkerne primary substation. This would need to be combined with other options such as option 2 in order to reduce Yeovil BSP group demand under N-1 running conditions.

Where a solution has been proposed to install larger transformers (e.g. Crewkerne), it may be possible to transfer load to these sites; however, this could require extensive lengths of 11 kV circuit to be reinforced, rendering the solution unfeasible. Further analysis by the Secondary System Planning Team is required to determine the feasibility of this solution.

If a circuit is built between Crewkerne and Beaminster, then the circuit from Woodcote to Crewkerne may be at risk of overload if additional load is transferred onto it. This solution would therefore also require reinforcements on the 33 kV network.

**New limiting factor for constraint(s) considered:** Crewkerne primary transformer capacity, Woodcote to Crewkerne circuit capacity

**Option 4 – Disable auto-changeover at Crewkerne / Martock**

**Capacity Released for constraint(s) considered:** 3.6 MVA **Viable**

**Detailed description:** The auto-changeover at Crewkerne should be disabled to ensure there is no condition where Martock T1 and Crewkerne are simultaneously fed from the Yeovil ring. In the instance where Crewkerne loses its feed from Woodcote, Martock T1 can be switched out of the Yeovil ring prior to Crewkerne being picked up. This reduces group demand by 3.6 MVA and brings the baseline N-1 back to the ASC.

The same should be done at Martock, particularly at times of arranged outage of the Woodcote to Crewkerne circuit, where Crewkerne will be being fed from Yeovil.

**New limiting factor for constraint(s) considered:** Yeovil ring group demand

**Option 5 – Procure flexibility at Montacute and Coker primary substations**

**Estimated Flexibility Required (MVA):** N/A **Discounted**

**Detailed description:** Flexibility services currently cannot be used to solve voltage issues.

## Solution Recommendation

The recommended solution is to utilise a number of the options above. Initially, the auto-changeover schemes at Martock and/or Crewkerne should be disabled to ensure that the demand of both primary substations is not on the Yeovil ring at the same time.

Following that, the N-1 running arrangements for Crewkerne and Martock T2 should be changed, such that Martock T2 is fed from Woodcote under N-1 conditions, and Crewkerne has another circuit into Woodcote BSP via Beaminster. This will reduce the load on the ring under N-2 conditions where low volts have been identified.

Finally, another option will need to be used (first identified as being needed in 2034 studies), which is to further remove load from the Yeovil ring (particularly Montacute and Coker, which are the primary substations that experience low volts) by building a new primary substation West of Yeovil.

## 3.4 Woodcote BSP group low volts

### Constraint Overview

Generation | Demand

The table below outlines the nature of the network constraints identified in the network analysis, with the worst overloads seen at winter peak demand.

*Table 3.4.1 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 |
| Crewkerne T1 11 kV low volts | Arranged outage on the Yeovil ring between Yeovil 2L5 and the POC with Crewkerne | Fault between Crewkerne Main 2 busbar and Woodcote | Baseline | Baseline | Baseline | 2028 |
| Crewkerne T2 11 kV low volts | Arranged outage on the Crewkerne to Woodcote circuit | Fault on the Yeovil ring between Yeovil 2L5 and the POC with Crewkerne | Baseline | 2028 | 2034 | - |

**Uncertainty under other Distribution Future Energy Scenarios:** As this constraint occurs under baseline, there is no uncertainty about future forecasts. There is a risk that demand reduces, however this is not forecast under any scenario so mitigation against this constraint is definitely required.

### Solution Options

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

*Table 3.4.2 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 | Create alternative normal running and backfeed solutions for Crewkerne | × | ✓ | ✓ | Viable |
| 2 | Install regulator on Crewkerne – Yeovil circuit | ✓ | × | ✓ | Viable |
| **Operational Mitigation** | | | | | |
| 3 | Transfer demand to other primary substations | × | × | ✓ | Discounted |
| 4 | Transfer demand to other BSPs | × | × | ✓ | Discounted |
| **Flexibility services** | | | | | |
| 5 | Procure flexibility within the Yeovil ring | × | × | ✓ | Discounted |

### 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 0 – No Intervention

**Capacity Released for constraint(s) considered:** N/A

Discounted

**Detailed description:** Doing nothing to mitigate the constraint would result in overloads for the conditions described above. This would lead to an inability to maintain statutory voltage.

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

## Option 1 – Create alternative normal running and backfeed solutions for Crewkerne

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

Viable

**Detailed description:** This solution is discussed in the solution options for the Yeovil BSP infeed constraint in this report, but would also serve as a solution to this constraint as it would eliminating the low volts seen on the Crewkerne 11 kV bars.

This solution would need to be assessed to determine potential impact on 33 kV customers teed off the circuits around Crewkerne. If low volts could be experienced by a 33 kV customer, the connection agreement terms around statutory voltage could be reviewed, or alternative solutions found such as voltage regulators.

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

## Option 2 – Install regulator on Crewkerne – Yeovil circuit

**Capacity Released for constraint(s) considered:** N/A

Viable

**Detailed description:** A voltage regulator could be installed to improve the low volts seen at Crewkerne when being fed from Yeovil in an N-2 condition.

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

## Option 3 –Transfer demand to other primary substations

**Capacity Released for constraint(s) considered:** N/A

Discounted

**Detailed description:** Demand could be transferred to other primaries to reduce the load at Crewkerne. Beaminster is a suitable option, but this solution is unlikely to be able to solve the issue as the demand at Coker primary substation is significantly lower than that at Crewkerne, but there are still low volts identified in this outage so Crewkerne would also be likely to experience low volts despite moving demand to be fed from elsewhere.

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

## Option 4 – Transfer demand to other BSPs

**Capacity Released for constraint(s) considered:** 0 MVA

Discounted

**Detailed description:** Transferring Martock T1 to be fed from Bridgwater/Street BSPs does not solve this constraint. There are not alternative solutions for the running of the Yeovil BSP ring at present as the Crewkerne constraints occur under N-1. Other solutions discuss reinforcing the network to enable transfers to other BSPs.

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

## Option 5 – Procure flexibility at Crewkerne Primary substation

**Estimated Flexibility Required (MVA):** N/A

Discounted

**Detailed description:** Flexibility services currently cannot be used to solve voltage issues

## Solution Recommendation

The recommended option to proceed with is to create an alternative normal running and backfeed solution for Crewkerne, by reinstating the 33 kV circuit between Beaminster and Crewkerne to run at 33 kV, rather than 11 kV as it is currently being run at.

This solution has the benefit of also solving other constraints within this report; however, it's recommended further analysis is done to determine potential impact on 33 kV customers teed off the circuits around Crewkerne, to ensure their connection remains compliant.

## 3.5 Coker single transformer primary 11 kV backfeed

### Constraint Overview

Generation | **Demand**

The table below outlines the nature of the network constraints identified in the network analysis, with the worst overloads seen at winter peak demand.

*Table 3.5.1 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 |
| Coker 11 kV low volts | Arranged outage of Yeovil to Coker circuit | Fault leading to Crewkerne being fed from Yeovil | 2034 | - | - | - |
| Coker 11 kV backfeed capacity | Coker T1 arranged outage or fault. | - | 2032 | 2032 | 2034 | - |

**Uncertainty under other Distribution Future Energy Scenarios:** There is variation in when this constraint will be triggered across the scenarios. In Falling Short, this is triggered in 2040 and in Leading the Way this is triggered in 2032. In addition to the DFES, there has been a new demand acceptance on this primary substation, which would result in an additional 1.5MVA being fed from this substation, likely connecting in phases from 2025.

### Solution Options

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

*Table 3.5.2 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 | Install second primary transformer | ✓ | × | ✓ | Viable |
| 2 | Build new primary substation nearby | ✓ | ✓ | ✓ | Viable |
| 3 | Create alternative normal running and backfeed solutions for Crewkerne | ✓ | ✓ | ✓ | Viable |
| **Operational Mitigation** | | | | | |
| 4 | Transfer demand to other primary substations | × | × | ✓ | Discounted |
| **Load Management Schemes** | | | | | |
| 5 | Post-fault transfers | × | × | × | Discounted |
| **Flexibility services** | | | | | |
| 6 | Procure flexibility at Coker primary | ✓ | × | ✓ | 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 0 – No Intervention**

**Capacity Released for constraint(s) considered:** 0 MVA — **Discounted**

**Detailed description:** Doing nothing to mitigate the constraint would result in overloads for the conditions described above. This would lead to an inability to meet the Security of Supply requirements of Engineering Recommendation P2 for the Coker primary substation.

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

## Option 1 – Install secondary primary transformer at Coker

**Capacity Released for constraint(s) considered:** 8 MVA — Viable

**Detailed description:** As this primary substation already has two incoming circuits, installing a second primary transformer on site would be a good solution to ensure that the demand at Coker can be picked up under a first circuit outage of the transformer at Coker once 11 kV backfeed capacity is exceeded. This solution would also serve to increase the capacity at Coker. Based on the DFES future load, this is likely to be required in 2032; however, the need for this could be brought forward by new connections in the pipeline. There are upcoming 11 kV board asset replacement works due, so this solution would capitalise on the works.

This solution would not significantly improve the voltage issues on the Yeovil ring.

**New limiting factor for constraint(s) considered:** Low volts at Coker substation, Yeovil ring circuit overloads

## Option 2 – Build new primary substation with direct feed from Yeovil BSP

**Capacity Released for constraint(s) considered:** Up to 14 MVA — Viable

**Detailed description:** As the Yeovil ring in 2034 begins to have both voltage issues and thermal constraints under N-1 conditions, building a new primary substation with a direct infeed from Yeovil BSP would help to deload the Yeovil ring, reducing the need for long lengths of overhead reinforcement.

By building this new substation to the West of Yeovil, this would support the connection of new developments and be proximal to existing load Coker. This primary substation could therefore permanently take on some of the existing load from Montacute and Coker, as well as supporting the new demand.

This solution could also provide additional backfeed capacity to Coker primary under condition of the single transformer outage, but would need to be paired with 11 kV circuit reinforcement to enable load transfers

The likely date for the primary substation needing to be completed is around 2029-2030, as this is when overloads start on the Yeovil to Coker circuit.

**New limiting factor for constraint(s) considered:** ASC from Yeovil BSP

## Option 3 – Create alternative normal running and backfeed solutions for Crewkerne

**Capacity released for constraint(s) considered:** 10 - 18 MVA — Viable

**Detailed description:** This solution is discussed in the solution options for the Yeovil BSP infeed constraint in this report, but would also serve as a solution to this constraint as it would be reducing load on the Yeovil ring, and increasing the voltage at Coker which solves the N-2 constraint, but does not solve the backfeed capacity constraint.

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

## Option 4 – Transfer demand to other Primary substations under arranged outage

**Capacity Released for constraint(s) considered:** — Discounted

Dependent upon 11kV circuit capacity assessments

**Detailed description:** This solution would not be suitable due to other primary substation constraints that would be triggered under different N-2 conditions if they were to have increased demand.

**New limiting factor for constraint(s) considered:** Available capacity at other primary substations

## Option 5 – Post-fault transfers

**Capacity Released for constraint(s) considered:** 0 MVA — Discounted

**Detailed description:** Post-fault transfers would not be a suitable solution for this constraint due to the network conditions that cause the constraint.

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

**Option 6 – Procure flexibility at Coker Primary**

**Estimated Flexibility Required (MVA):** 1.6 MVA+ Viable

**Detailed description:** Flexibility services could be procured to alleviate the projected overloads seen on Coker primary. The viability of utilising flexibility will be further investigated as part of the DNOA process.

### Solution Recommendation

To solve the backfeed capacity constraint that would impact Coker's security of supply, the recommended solution is to build a new primary transformer between Montacute and Coker, and transfer demand to this new primary or reinforce the 11 kV backfeed capability. This would have wider area benefits in reducing circuit overloads on the Yeovil ring.

## 3.6 Martock Transformers T1/T2 overloads

This constraint is discussed within the Street BSP NDP Report.

## 3.7 Woodcote 33 kV Circuit Demand Overloads

### Constraint Overview

Generation Demand

The table below outlines the nature of the network constraints identified in the network analysis, with the worst overloads seen at winter peak demand.

*Table 3.7.1 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 |
| 25PL3_ZFV94 to Woodcote 2L5 circuit overload | Arranged outage of Waterlake Main 2 busbar | Fault between Cricket St Thomas solar farm and Dowlish Ford primary substation. | 2028 | 2028 | 2028 | 2034 |
| 25PL3_ZFV94 to Woodcote 2L5 circuit overload | Arranged outage 8L5 circuit feeding Waterlake from Woodcote | Fault on the Woodcote 8L5 circuit | 2028 | 2028 | 2028 | 2034 |
| 25PL3_ZFV94 to Woodcote 2L5 circuit overload | Woodcote Main 2 busbar fault | - | 2034 | - | - | - |
| Woodcote 4L5 to Waterlake 2L3 circuit overload | Woodcote Main 3 busbar fault | - | 2034 | - | - | - |

**Uncertainty under other Distribution Future Energy Scenarios:** The date that this constraint arises varies by scenario, and could arise any time between 2032 and 2037.

### Solution Options

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

*Table 3.7.2 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 existing 33 kV circuits | ✓ | × | ✓ | Viable |
| **Operational Mitigation** | | | | | |
| 2 | Reduce outage season | × | × | ✓ | Viable |
| **Flexibility services** | | | | | |
| 3 | Procure flexibility across Woodcote | × | × | ✓ | 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 0 – No Intervention

**Capacity Released for constraint(s) considered:** 0 MVA — Discounted

**Detailed description:** Doing nothing to mitigate the constraint would result in overloads for the conditions described above. This would lead to an inability to meet the Security of Supply requirements of Engineering Recommendation P2 for the primary substations fed by the circuits in question.

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

### Option 1 – Reinforce existing 33 kV circuits

**Capacity released for constraint(s) considered:** 3.4 MVA & 3.4 MVA — Viable

**Detailed description:** The circuits with constraints discussed within this section are both subject to cable proximity constraints at Woodcote BSP. Investing in overcoming these constraints would remove the constraints within the timeframe being studied.

**New limiting factor for constraint(s) considered:** None

### Option 2 – Reduce outage season

**Capacity Released for constraint(s) considered:** N/A — Viable

**Detailed description:** Due to the seasons in which the constraints listed are found, it would be possible to reduce the outage season for the first circuit outage, to ensure that the second circuit outage condition does not occur at these times of increased loading.

This would solve the 25PL3_ZFV94 to WOCO3_2L5 L1 circuit overload until 2034, however would not be a solution for the first circuit outage constraints.

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

### Option 3 – Procure flexibility at primary substations fed by Woodcote BSP

**Estimated Flexibility Required (MVA):** 2 MVA — Viable

**Detailed description:** Flexibility services could be procured to alleviate projected overloads. This could be a good solution if the reinforcement works are likely to take a long time or are particularly complex.

Suitable sites for procurement include Waterlake, Chard, or Dowlish Ford primary substations.

### Solution Recommendation

It is recommended that works are done on the cable to overcome the cable proximity restrictions, which will solve the constraints for the studied time period. In the interim, a reduced outage season can be followed to remove the earlier constraints from arising in second circuit outage conditions.

## 3.8 Woodcote group security of supply

### Constraint Overview

Generation Demand

The table below summarises the scale of the demand forecast to connect to the Woodcote 33 kV network up to 2034 under NGEDs DFES Best View scenario.

*Table 4.4.1 Maximum demand forecast to connect to the Woodcote 33 kV network*

| DFES Scenario | Demand | | |
|---|---|---|---|
| | **Baseline** | **2028** | **2034** |
| Best View | 72.92 MW | 88.67 MW | 110.99 MW |

By 2034, these figures takes into account both background load growth and several new connections that are expected to connect within the group.
This group becomes vulnerable to outage conditions throughout the 0-10 year horizon period as a result of the load growth projections.  These limitations identified in the network analysis are highlighted below.

*Table 3.8.1 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** |
| Lost Woodcote load - exceeding P2/8 allowance | Arranged outage of one Axminster GSP to Woodcote BSP circuit | Fault on second Axminster GSP to Woodcote BSP circuit | 2032 | - | - | - |
| Overload of Woodcote GT3 | Arranged outage resulting in the loss of a GT at Woodcote | Fault of one of the remaining two GTs at Woodcote | 2035 | - | - | - |

**Uncertainty under other Distribution Future Energy Scenarios:** Under Leading the Way Scenario, this constraint is predicted to arise in 2031 and under Falling Short it is predicted to arise in 2038.

### Solution Options

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

*Table 3.8.2 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 | Increase Bridport infeed from Winterbourne Abbas primary substation | ✓ | ✓ | ✓ | Viable |
| 2 | Build third circuit between Axminster GSP and Woodcote BSP | ✓ | × | ✓ | Viable |

| | | | | | |
|---|---|---|---|---|---|
| 3 | Build new BSP at Crewkerne to take load off Yeovil and Woodcote BSP | ✓ | ✓ | × | Viable |
| **Operational Mitigation** | | | | | |
| 4 | Transfer demand to other BSPs | × | × | ✓ | Discounted |
| 5 | Carry out ancillary rating checks | × | ✓ | ✓ | Viable |
| **Load Management Schemes** | | | | | |
| 6 | Post-fault transfers | × | × | ✓ | Discounted |
| **Flexibility services** | | | | | |
| 7 | Procure flexibility within Woodcote BSP | ✓ | × | ✓ | Discounted |

## 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 0 – No Intervention

**Capacity Released for constraint(s) considered:** 0 MVA ⬇ **Discounted**

**Detailed description:** Doing nothing to mitigate the constraint would result in overloads for the conditions described above. This would lead to an inability to meet the Security of Supply requirements of Engineering Recommendation P2 for Woodcote BSP.

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

### Option 1 – Increase Bridport infeed from Winterbourne Abbas primary substation

**Capacity released for constraint(s) considered:** 5 MVA ⬆ **Viable**

**Detailed description:** In order to ensure that the P2/8 security of supply standards are adhered to for a second circuit outage where both of the infeeds from Axminster GSP to Woodcote BSP are offline, Bridport primary substation should be able to be fed from Winterbourne Abbas. Currently, this is limited by both the ASC with SSEN, and the circuit between Bridport primary substation and Winterbourne Abbas primary substation for transfers of demand above 17.5 MVA. The circuit and ASC could be increased to 22.7 MVA to match the Woodcote to Bridport infeed, and the transformer capacities.

From 2035, these uprated assets would no longer be able to support the full transfer of Bridport primary substation to be fed from SSEN's network, at which point an additional solution would be required.

**New limiting factor for constraint(s) considered:** SSEN ASC**,** Bridport circuit and primary transformer ratings

### Option 2 – Build third circuit between Axminster GSP and Woodcote BSP

**Capacity Released for constraint(s) considered:** 60 MVA ⬆ **Viable**

**Detailed description:** This option would involve building a third circuit between Axminster GSP and Woodcote BSP, to remove the risk of a second circuit outage removing all infeeds to Woodcote BSP. This would ensure that the site's security of supply remains P2/8 compliant, and also creates a solution for when the demand of Bridport exceeds the circuit ratings for the firm and non-firm running of Bridport.

Grid transformer overloads have been identified beyond the range of the study, and so the construction of the third circuit (and the existing circuits) would need to be sufficient for supporting outage period peak demand of Woodcote through one circuit and one transformer.

The two sites of Axminster GSP and Woodcote BSP are extremely close, so the length of new circuit would only need to be in the region of a few hundred metres.

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

**Option 3 – Build new BSP at Crewkerne to take load off Yeovil and Woodcote BSP**

**Capacity released for constraint(s) considered:** 100 MVA — **Viable**

**Detailed description:** This solution is discussed in more detail in the solution options for the Yeovil BSP infeed constraint in this report, but would also serve as a solution to this constraint as it would be reducing load on the Woodcote BSP ring.

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

**Option 4 – Transfer demand to other BSPs**

**Capacity Released for constraint(s) considered:** 0 MVA — **Discounted**

**Detailed description:** The ability to transfer demand to other BSPs is limited once demand at Bridport primary substation exceeds the Winterbourne Abbas – Bridport primary circuit capacity, or the agreed supply capacity from SSEN. Beyond this (17.6 MVA, 2032 under Best View), alternative solutions involving reinforcement would be required as discussed above.

**New limiting factor for constraint(s) considered:** SSEN ASC**,** Bridport circuit ratings

**Option 5 – Carry out ancillary rating checks**

**Capacity Released for constraint(s) considered:** 6 - 18 MVA — **Viable**

**Detailed description:** The transformers at Woodcote are currently rated at 60 MVA for the purpose of this study, due to requiring ancillary rating checks to remove the limitations. The ancillary rating checks could identify upgrade works required, or they could confirm that the transformer can be run at its nameplate ratings.

Removing ancillary ratings would increase the intermediate cool, intermediate warm, and summer ratings by 6 MVA, and the winter ratings by 18 MVA.

**New limiting factor for constraint(s) considered:** Security of supply of Woodcote infeed

**Option 6 – Post-fault transfers**

**Capacity Released for constraint(s) considered:** 0 MVA — **Discounted**

**Detailed description:** Post fault transfers cannot be utilised past 2032 as there is not sufficient transfer capacity to meet security of supply standards without the reinforcement works mentioned in the earlier options.

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

**Option 7 – Procure flexibility within Woodcote BSP**

**Estimated Flexibility Required (MVA):** 1.5 + MVA — **Viable**

**Detailed description:** Flexibility services could be procured to alleviate the projected overloads seen on Woodcote BSP. The viability of utilising flexibility will be further investigated as part of the DNOA process.

### Solution Recommendation

The recommended solution is to increase the non-firm feed of Bridport primary substation to match the capacity of the infeed from Woodcote through increasing the ASC with SSEN and uprating the circuit between Winterbourne Abbas and Bridport primary substation.

Following that, a third circuit would need to be built between Axminster GSP and Woodcote BSP once the demand at Bridport primary exceeds 22.7 MVA. In the DFES, this is projected to happen in 2035/2036.

## 3.9 Bridport primary substation alternative feed

### Constraint Overview

Generation | **Demand**

The table below outlines the nature of the network constraints identified in the network analysis, with the worst overloads seen at winter peak demand.

*Table 3.9.1 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 |
| Bridport Security of Supply | Fault on Bridport to Woodcote circuit | None | Baseline | Baseline | 2024 | 2029 |
| SSEN ASC (18 MVA) exceeded | Loss of Woodcote infeed to Bridport | None | 2032 | 2033 | 2034 | 2036 |
| BRID3_2L5 circuit overload (17.6 MVA) | Loss of Woodcote infeed to Bridport | None | 2032 | 2032 | 2034 | 2036 |

**Uncertainty under other Distribution Future Energy Scenarios:** Under Leading the Way Scenario, this constraint is predicted to arise in 2029 and under Falling Short it is predicted to arise in 2034.

## Solution Options

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

*Table 3.9.2 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 auto-changeover scheme | ✓ | × | ✓ | Viable |
| 2 | Request additional ASC from SSEN | ✓ | ✓ | ✓ | Viable |
| 2 | Uprate existing circuit | ✓ | ✓ | ✓ | Viable |
| 3 | Install additional 33 kV circuit to provide alternative feed to Bridport | ✓ | × | ✓ | Viable |
| **Operational Mitigation** | | | | | |
| 4 | Transfer demand to other primary substations | ✓ | ✓ | ✓ | Viable |
| **Load Management Schemes** | | | | | |
| 5 | Post-fault transfers | × | × | ✓ | Discounted |
| **Flexibility services** | | | | | |
| 6 | Procure flexibility at Bridport Primary | ✓ | × | ✓ | Discounted |

## 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 0 – No Intervention

**Capacity Released for constraint(s) considered:** 0 MVA — Discounted

**Detailed description:** Doing nothing to mitigate the constraint would result in overloads for the conditions described above. This would lead to an inability to meet the Security of Supply requirements of Engineering Recommendation P2 for Bridport primary substation.

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

## Option 1 – Install auto-changeover scheme

**Capacity Released for constraint(s) considered:** 0 MVA — Viable

**Detailed description:** As Bridport has recently gone over the 12 MVA demand threshold, the security of supply requirements have increased such that supply must be restored within a shorter timeframe. To ensure compliance without the requirement for manual intervention, an auto-changeover scheme should be installed.

This is particularly necessary as the control of the infeed from Winterbourne Abbas is a remote control scheme operated by SSEN control, which requires multiple steps of communication between the control rooms of the DNOs.

**New limiting factor:** Bridport to Winterbourne Abbas circuit capacity and ASC

## Option 2 – Request additional ASC from SSEN

**Capacity Released for constraint(s) considered:** 5 MVA — Viable

**Detailed description:** This solution involves increasing the ASC with SSEN for an N-1 infeed to Bridport primary. The existing ASC is for 18MVA, and this could be increased to 23MVA to match the capacity of the normal running circuit into Bridport from Woodcote BSP. This would meet demand until past 2035.

**New limiting factor for constraint(s) considered:** Bridport to Winterbourne Abbas circuit

## Option 2 – Uprate existing circuit

**Capacity released for constraint(s) considered:** 12.8 MVA — Viable

(Assuming 0.1 $in^2$ HDC 33 kV overhead conductor is re-conductored with 150 $mm^2$ Cu)

**Detailed description:** The circuit between Bridport and Winterbourne Abbas primary substation is currently rated at 17.6MVA, whereas the overhead circuit between Bridport and Woodcote BSP is rated at 22.7 MVA.

The sections of circuit to be replaced include:

- CT limitations
- 11.3 km Overhead (OH) HDC

It is recommended that the circuits are uprated to at least 22.7 to match the other circuit feeding Bridport Primary. This would increase the firm capacity of Bridport to 22 MVA, and is estimated to solve the constraint until 2035. This is dependent on being able to secure the additional ASC from SSEN to support this.

**New limiting factor for constraint(s) considered:** SSEN ASC**,** Bridport circuit and primary transformer ratings

## Option 3 – Install additional 33 kV circuits

**Capacity released for constraint(s) considered:** 5 MVA — Discounted

**Detailed description:** Installing a third circuit into Bridport (Bridport to Beaminster) would prevent overloads seen. It would also secure Beaminster primary onto Bridport for FCO and it would no longer need to be transferred to Chickerell BSP. Beaminster, however, already has another 33 kV circuit (run at 11 kV) to Crewkerne which could be uprated as discussed in section 3.2, which would mean this benefit may already be realised, and this would lead to a complex network arrangement which may not be the preferred option

The next closest primary that a new 33 kV circuit could be built to is Penn Cross; however it is a coastal route so would be more challenging to construct a 33 kV circuit.

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

## Option 4 – Transfer demand to other primary substations

**Capacity Released for constraint(s) considered:** > 5 MVA — Viable

**Detailed description:** As the feed between Woodcote and Bridport is radial, there is the option for feeding some of the Bridport demand from other primary substations through the 11 kV network to reduce the demand being picked up by the BRID3_2L5 circuit under N-1. Potential solutions include moving the normally open point on the S route to feed more of the demand from Beaminster (where there is sufficient capacity on the primary transformer), or doing the same on the 11 kV network between Bridport and Penn Cross.

Based on population density, the area around Oxbridge and Bradpole may be of suitable size to alleviate the constraint once transferred to Beaminster; however, more detailed analysis would need to be carried out by the Secondary System Planning Team to determine whether this solution can solve the constraint.

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

**Option 5 – Post-fault transfers**

**Capacity Released for constraint(s) considered:** 0 MVA **Discounted**

**Detailed description:** Post fault transfers cannot be utilised as the circuit between Bridport and Winterbourne Abbas is already reserved for post-fault conditions meaning there is no window to reduce the load on the 33 kV circuits through load management.

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

**Option 6 – Procure flexibility Bridport Primary Substation**

**Estimated Flexibility Required (MVA):** up to 4 MVA **Viable**

**Detailed description:** Flexibility services could be procured to alleviate the projected overloads seen on Bridport Primary. The viability of utilising flexibility will be further investigated as part of the DNOA process.

### Solution Recommendation

The recommended solution is to increase the non-firm feed of Bridport primary substation to match the capacity of the infeed from Woodcote through increasing the ASC with SSEN and uprating the circuit between Winterbourne Abbas and Bridport primary substations.

To complement this, an auto-changeover scheme should be installed to ensure that Bridport primary can be picked up by Winterbourne Abbas within acceptable timeframes according to P2/8 Security of Supply Standards.

Following these solutions being implemented, the demand at Bridport primary substation continues to grow under the DFES Best View; however, it is more appropriate to begin to alter the normal running arrangement such that demand is transferred and fed from other primary substations, based on further analysis by the Secondary System Planning Team.

## 3.10 Bridport primary transformer overloads

### Constraint Overview

Generation | **Demand**

The table below outlines the nature of the network constraints identified in the network analysis, with the worst overloads seen at winter peak demand.

*Table 3.10.1 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 |
| Bridport T1 overload | Bridport T2 fault or arranged outage | None | 2035 | 2033 | - | - |
| Bridport T2 overload | Bridport T1 fault or arranged outage | None | 2035 | 2033 | - | - |

**Uncertainty under other Distribution Future Energy Scenarios:** Under Leading the Way Scenario, this constraint is forecast to arise in 2030 and under Falling Short it is predicted to arise after 2035.

## Solution Options

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

*Table 3.10.2 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 | Increase the size of both transformers on site | × | × | × | Discounted |
| 2 | Add third primary transformer to Bridport site | ✓ | × | × | Discounted |
| 3 | Build new primary to remove load from Bridport | ✓ | × | × | Viable |
| 4 | Add second primary transformer at Beaminster and transfer load from Bridport | × | ✓ | ✓ | Viable |
| **Load Management Schemes** | | | | | |
| 5 | Post-fault transfers | × | × | ✓ | Viable |
| **Operational Mitigation** | | | | | |
| 6 | Transfer demand to other primary substations | ✓ | ✓ | ✓ | Viable |
| **Flexibility services** | | | | | |
| 7 | Procure flexibility at Bridport Primary | ✓ | × | ✓ | Discounted |

## 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 0 – No Intervention

**Capacity Released for constraint(s) considered:** 0 MVA Discounted

**Detailed description:** Doing nothing to mitigate the constraint would result in overloads for the conditions described above. This would lead to an inability to meet the Security of Supply requirements of Engineering Recommendation P2 for Bridport primary substation.

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

### Option 1 – Increase the size of both transformers on site

**Capacity Released for constraint(s) considered:** Discounted

Minimal, as to utilise the additional transformer capacity, further works would be required.

**Detailed description:** The transformers currently installed on site are 12/24 MVA transformers, which could be replaced with 20/40 MVA transformers. The circuits into both Woodcote and Winterbourne Abbas from Bridport would need to be fully rebuilt to support this increased load, and additional capacity would have to be requested from SSEN for the interconnection to Winterbourne Abbas.

**New limiting factor for constraint(s) considered:** Woodcote to Bridport and Winterbourne Abbas to Bridport circuits, Bridport non-firm feed agreed supply capacity.

## Option 2 – Add third primary transformer to Bridport site

**Capacity released for constraint(s) considered:** 23 MVA **Discounted**

**Detailed description:** Installing a third primary transformer at Bridport primary would prevent overloads seen; however, is not considered a futureproof solution as a third circuit would need to be constructed to gain the full benefit of the third transformer.

**New limiting factor for constraint(s) considered:** Woodcote to Bridport and Winterbourne Abbas to Bridport circuits, Bridport non-firm feed agreed supply capacity.

## Option 3 – Build new primary to remove load from Bridport

**Capacity Released for constraint(s) considered:** 24 MVA **Viable**

**Detailed description:** As it is not feasible to uprate the existing transformers, it may be more beneficial to install a new primary to remove load fed from Bridport Primary, rather than install a third transformer on the existing Bridport primary site. As Bridport is coastal, consideration would need to be taken to ensure that any proposed 33 kV circuits have minimal impact on the surrounding environment.

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

## Option 3 – Add second primary transformer at Beaminster and transfer load from Bridport

**Capacity Released for constraint(s) considered:** 6 MVA **Viable**

**Detailed description:** Beaminster primary substation currently has two 33 kV construction circuits feeding into the site, however, one of these circuits is run at 11 kV. Within the other constraints discussed in this report the option to use this 33 kV circuit at 33 kV has been proposed. If Beaminster had two 33 kV infeeds, it would be a good candidate for having an additional 7.5/15 MVA transformer installed on site, and is also a neighbouring primary substation to Bridport.

This solution would require further work be done to increase the capacity of the circuits between Beaminster primary substation and Woodcote BSP, and Crewkerne primary substation and Woodcote BSP. Although there are cable proximity restrictions, which could more easily be overcome, there are also long stretches of relatively low rated circuits, which would either need reconductoring, or new poles and conductor being installed. By the time that this constraint appears, there will already be limited capacity remaining on these circuits.

**New limiting factor for constraint(s) considered:** Woodcote circuit capacities

## Option 4 – Post-fault transfers

**Capacity Released for constraint(s) considered:** **Viable**

Dependent upon further studies of available capacity both at other primaries and on the interconnecting 11 kV circuits.

**Detailed description:** Post fault transfers can be utilised as the overloads are initially quite low, so can be run on emergency ratings while load is transferred to other primary substations.

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

## Option 5 – Transfer demand to other primary substations

**Capacity Released for constraint(s) considered:** > 5 MVA **Viable**

**Detailed description:** As the feed between Woodcote and Bridport is radial, there is the option for feeding some of the Bridport demand from other primary substations through the 11 kV network to reduce the demand being picked up by the BRID3_2L5 circuit under N-1. Potential solutions include moving the normally open point on the S route to feed more of the demand from Beaminster (where there is sufficient capacity on the primary transformer), or doing the same on the 11 kV network between Bridport and Penn Cross.

Based on population density, the area around Oxbridge and Bradpole may be of suitable size to alleviate the constraint once transferred to Beaminster; however, more detailed analysis would need to be carried out by the Secondary System Planning Team to determine whether this solution can solve the constraint.

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

**Option 6 – Procure flexibility Bridport Primary Substation**

**Estimated Flexibility Required (MVA):** up to 4 MVA Viable

**Detailed description:** Flexibility services could be procured at Bridport to alleviate projected overloads; however, flexibility would need to be procured for long periods of time which would need to be taken into consideration when carrying out the flexibility assessment.

### Solution Recommendation

When demand increases to the point where there is no remaining capacity at Bridport primary substation on the transformers, it is recommended that demand is transferred to neighbouring primary substations such as Penn Cross and Beaminster substations, following assessment by the Secondary System Planning Team.

## 3.11 Crewkerne primary transformer overloads

### Constraint Overview

Generation Demand

The table below outlines the nature of the network constraints identified in the network analysis, with the worst overloads seen at winter peak demand.

*Table 3.11.1 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 |
| Crewkerne T1 overload | Crewkerne T2 fault or arranged outage | None | 2032 | 2032 | 2034 | - |
| Crewkerne T2 overload | Crewkerne T1 fault or arranged outage | None | 2032 | 2032 | 2034 | - |

**Uncertainty under other Distribution Future Energy Scenarios:** Under Leading the Way Scenario, this constraint is forecast to arise in 2029 and under Falling Short it is predicted to arise after 2035.

### Solution Options

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

*Table 3.11.2 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 | Increase the size of both transformers on site | ✓ | × | ✓ | Viable |
| 2 | Carry out ancillary ratings checks | × | × | ✓ | Viable |
| 3 | Add third primary transformer to Crewkerne site | × | × | × | Discounted |
| 4 | Build new primary to remove load from Crewkerne | ✓ | × | ✓ | Discounted |
| **Operational Mitigation** | | | | | |
| 4 | Transfer demand to other primary substations | ✓ | ✓ | ✓ | Viable |
| **Load Management Schemes** | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 5 | Post-fault transfers | × | × | ✓ | **Discounted** |
| **Flexibility services** | | | | | |
| 6 | Procure flexibility at Crewkerne Primary substation | ✓ | × | ✓ | **Discounted** |

## 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 0 – No Intervention

**Capacity Released for constraint(s) considered:** 0 MVA **Discounted**

**Detailed description:** Doing nothing to mitigate the constraint would result in overloads for the conditions described above. This would lead to an inability to meet the Security of Supply requirements of Engineering Recommendation P2 for Crewkerne primary substation.

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

### Option 1 – Carry out ancillary ratings checks

**Capacity Released for constraint(s) considered:** 0.5 MVA **Viable**

**Detailed description:** The existing transformers have ancillary ratings applied, which should be assessed to determine whether works are required to increase the available capacity of the assets. If the ancillary ratings were removed, the winter ratings could be increased significantly; however, the ratings used in the other seasons would only be 0.5 MVA higher than the ancillary ratings currently used.

**New limiting factor for constraint(s) considered:** Transformer ratings

### Option 2 – Increase the size of both transformers on site

**Capacity Released for constraint(s) considered**: 3.5 MVA (summer rating) / **Viable**

4.8 MVA (winter rating)

**Detailed description:** The existing transformers are 10/14 MVA rated, meaning that they could be increased in size to 12/24 MVA, releasing capacity on the site. Relevant ancillary ratings would also need to be reviewed.

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

### Option 3 – Add third primary transformer to Crewkerne site

**Capacity released for constraint(s) considered:** 12 MVA **Discounted**

**Detailed description:** Installing a third primary transformer at Crewkerne primary would prevent overloads seen; however, is not considered a futureproof solution as there would not be a third infeed to the site without additional works.

**New limiting factor for constraint(s) considered:** Crewkerne infeed circuits

### Option 4 – Build new primary to remove load from Crewkerne

**Capacity Released for constraint(s) considered:** up to 24 MVA **Discounted**

**Detailed description:** It would be possible to install a new primary to remove load fed from Crewkerne Primary; however, given that there are alternative solutions where nearby sites have available capacity, this is less cost optimal.

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

## Option 3 – Transfer demand to other primary substations

**Capacity Released for constraint(s) considered:** Viable

Dependent on available load transfers

**Detailed description:** This solution has been discussed in section 3.1, and spare capacity at Beaminster marks it as particularly suitable to transfer demand to through changing the normally open points on the U route. If demand continues to grow past the horizon of this analysis, Beaminster having two infeeds makes it suitable for having a second transformer installed on site.

This solution will need to be analysed in more detail by the Secondary System Planning Team.

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

## Option 4 – Post-fault transfers

**Capacity Released for constraint(s) considered:** 0 MVA Discounted

**Detailed description:** Transferring demand after the fault occurs could be done, however it would be more suitable to change the normal running position to prevent unnecessary wear to the assets.

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

## Option 5 – Procure flexibility at Crewkerne Primary Substation

**Estimated Flexibility Required (MVA):** up to 300 kVA Viable

**Detailed description:** Flexibility services could be procured to alleviate the projected overloads seen on Crewkerne primary substation. The viability of utilising flexibility will be further investigated as part of the DNOA process.

## Solution Recommendation

In the short term, the recommended solution is to utilise flexibility services to manage the constraint, and remove ancillary rating limitations.

In the longer term, the existing transformers should be replaced with 12/24 MVA transformers, which could be tied in with asset replacement as the existing transformers were commissioned in 1960/1963.