The West Midlands

Network Development Report – West Midlands

May 2024

Electricity Distribution

nationalgrid

Contents

West Midlands

1. Network Overview

The West Midlands is one of the four licence areas within National Grid Electricity Distribution (NGED) network, serving approximately 2.5 million customers. The area covers approximately 13,300 square kilometres and extends from Congleton in the north to the outskirts of Bristol in the south; and from Knighton and the Welsh Marches in the west, to Banbury in the east.

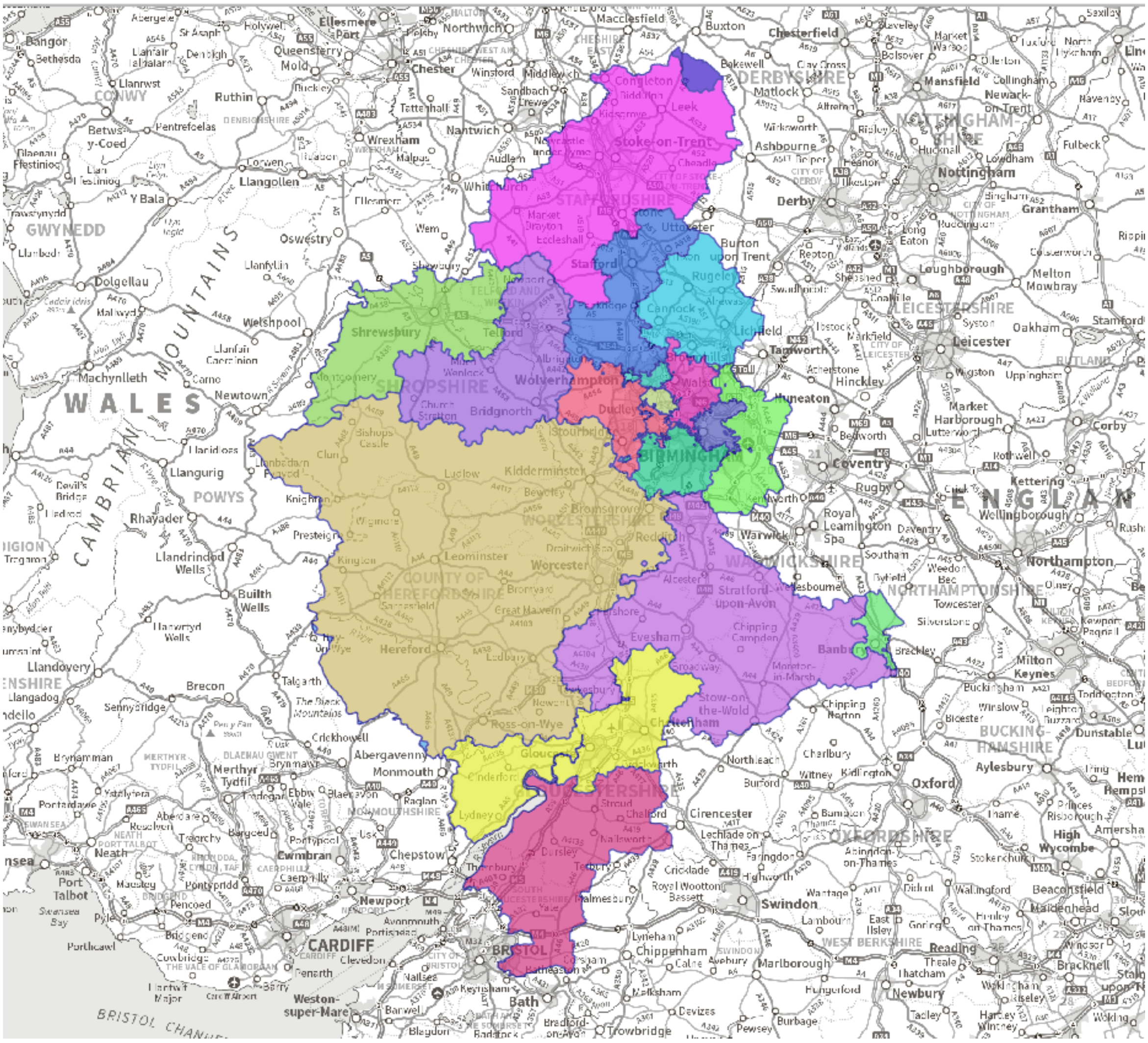

Figure 1.1 West Midlands geographic area

The West Midlands network covers 18 Grid Supply Points (GSPs), each feeding a number of Bulk Supply Points (BSPs) to cover its geographic area. Analysis has been carried out across the primary distribution network and reports discussing existing and future network constraints over a 0-10 year horizon have been provided.

For the purposes of this analysis, the NGED Best View Distribution Future Energy Scenario (DFES) has been used to study each year up to and including 2034. Representative days for each of the four seasons (Winter, Intermediate Cool, Intermediate Warm, and Summer) have been studied to cover the edge case scenarios for the network.

1.1 Network Topology

The GSPs form the boundaries between transmission and distribution networks, typically supplied via 400/132 kV or 275/132 kV Super Grid Transformers (SGTs), with the exception of Feckenham, which is fed via 400/66 kV and 275/66 SGTs. The West Midlands GSPs are listed below:

- **Bishops Wood**: supplied via 4x 275/132 kV SGTs (one on hot-standby)
- **Bushbury**: supplied via 3x 275/132 kV SGTs
- **Bustleholm**: supplied via 4x 275/132 kV SGTs (one on hot-standby)
- **Cellarhead**: supplied via 5x 400/132 kV SGTs (one on hot-standby)
- **East Claydon**: supplied via 4x 400/132 kV SGTs
- **Feckenham**: supplied via 3x 400/66 kV SGTs, and 1x 275/66 kV SGT
- **Iron Acton**: supplied via 6x 275/132 kV SGTs
- **Ironbridge**: supplied via 3x 400/132 kV SGTs
- **Shrewsbury**: supplied via 1x 400/132 kV SGT
- **Kitwell**: supplied via 4x 275/132 kV SGTs (one on hot-standby)
- **Lea Marston**: supplied via 4x 400/132 kV SGTs
- **Nechells East**: supplied via 4x 275/132 kV SGTs
- **Ocker Hill**: supplied via 3x 275/132 kV SGTs (one on hot-standby)
- **Oldbury**: supplied via 2x 275/132 kV SGTs (a third currently being installed)
- **Penn**: supplied via 4x 275/132 kV SGTs
- **Port Ham (Walham)**: supplied via 4x 400/132 kV SGTs
- **Rugeley**: supplied via 2x 400/132 kV SGTs
- **Willenhall**: supplied via 2x 275/132 kV SGTs

With the exception of Ironbridge and Shrewsbury GSPs, that run in parallel at 132 kV (and are often represented as a group), the GSPs within the West Midlands network often run split from one another, and very few share with other Distribution Network Operators (DNOs), see below:

- Cellarhead GSP is shared with Scottish Power Manweb DNO.
- Lea Marston and East Claydon GSPs are shared with NGED's East Midlands license area.
- Iron Acton GSP is shared with NGED's South West licence area.

The GSPs typically supply multiple BSPs including 132/66 kV, 132/33 kV and 132/11 kV sites. The 132/11 kV BSPs are more common in the Birmingham and surrounding areas, where there are high density demand locations; whereas 132/66 kV BSPs typically supply more rural areas around Herefordshire and Worcestershire, where the demand is more widely distributed.

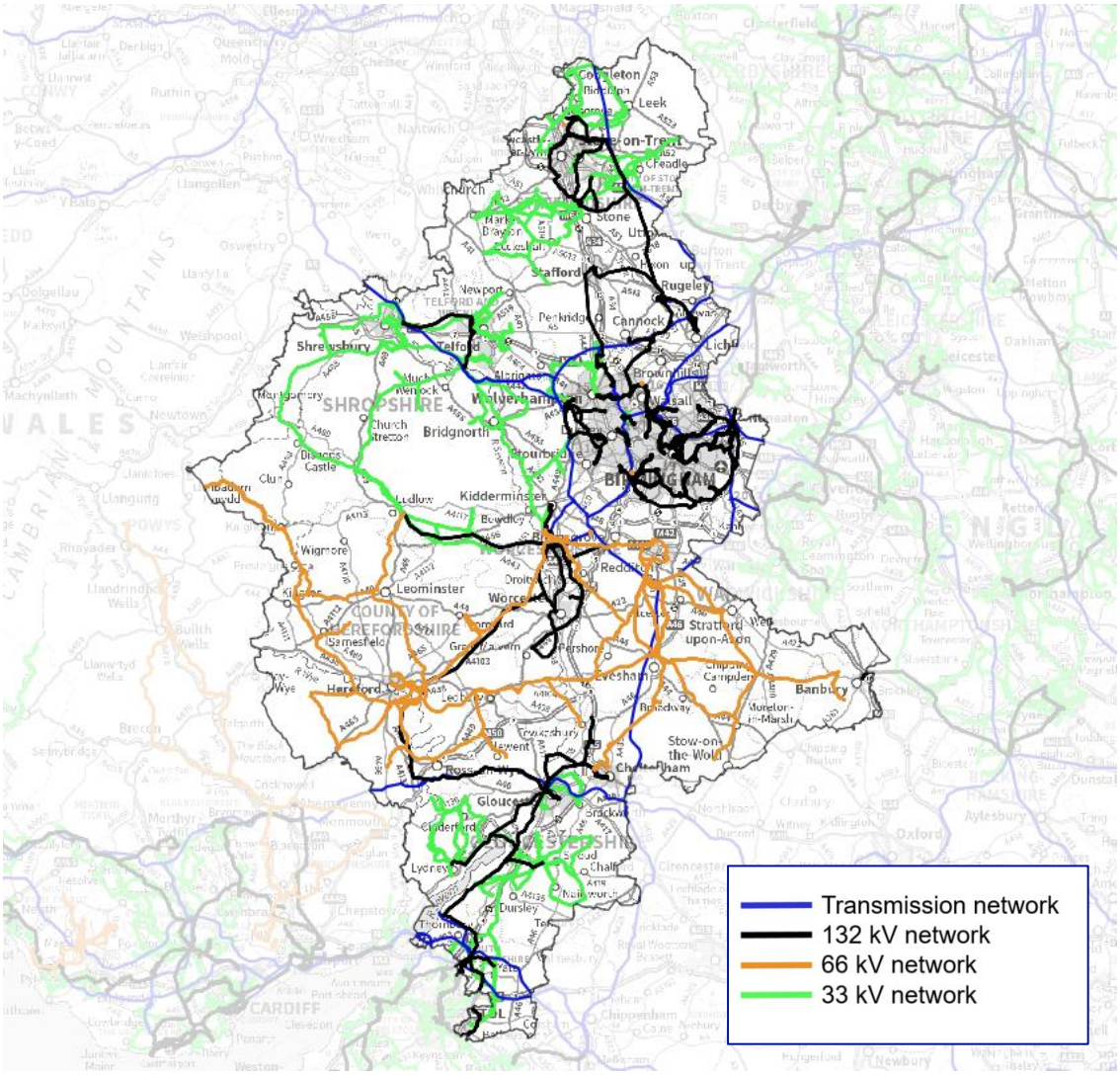

Figure 1.1.1 West Midlands primary network geographic

2. GSP Network Constraint Summary

The tables below highlight the BSPs within each GSP, and indicate the trigger year of any identified major constraint up to and including 2034. Details of the individual constraints are covered within the GSP reports. However, in some cases where the constraint is solely due to the lack of cyclic ratings of a transformer, the details are shown under section 4 below (Grid Transformer Cyclic Ratings) instead of the GSP report; and for Oldbury and Ocker Hill GSPs, such constraints were the only ones identified and therefore there was no requirement for a GSP report for either.

Bishops Wood GSP:

BSP / 132 kV	Trigger Year
132 kV Network	2025
Hereford	Baseline
Kidderminster	-
Stourport	Baseline
Ludlow	2029

BSP / 132 kV	Trigger Year
Malvern	2028
Upton Warren	-
Timberdine	-
Warndon	-
Worcester	-

Bustleholm GSP:

BSP / 132 kV	Trigger Year
132 kV Network	2028
Bustleholm	2032
Kingstanding	2034
Ladywood	-
Perry Barr	Baseline
Rushall	2025
Smethwick	2034
Winson Green	2026
Walsall	-

Cellarhead GSP:

BSP / 132 kV	Trigger Year
132 kV network	2027
Meaford C	Baseline
Forsbrook	2025
Newcastle	2031
Whitfield	Baseline
Stagefields	2032
Longton	-
Burslem	-
Boothen	Baseline

East Claydon GSP:

BSP / 132 kV	Trigger Year
132 kV network	-
Banbury	-

Feckenham GSP:

BSP / 132 kV	Trigger Year
132 kV network	N/A
Feckenham	Baseline

Iron Acton GSP:

BSP / 132 kV	Trigger Year
132 kV network	-
Chipping Sodbury	Baseline
Ryeford	Baseline

Ironbridge / Shrewsbury GSPs:

BSP / 132 kV	Trigger Year
132 kV network	2025
Hortonwood	-
Ironbridge	Baseline
Ketley	2030
Shrewsbury	Baseline

Kitwell GSP:

BSP / 132 kV	Trigger Year
132 kV network	Baseline
Bartley Green	2027
Bournville	-
Chad Valley	-
Halesowen	-
Hall Green	-
Highters Heath	-
Longbridge	2027
Rednal	2028
Selly Oak	2027
Shirley	2027

Lea Marston GSP:

BSP / 132 kV	Trigger Year
132 kV network	Baseline
Chelmsley Wood	-
Copt Heath	-
Elmdon	-
Hams Hall South	-
Kitts Green	-
Solihull	Baseline
Sutton Coldfield	-
Boughton Road	-
Castle Bromwich	-

Nechells East GSP:

BSP / 132 kV	Trigger Year
132 kV network	2032
Bordesley	-
Boughton Road	-
Castle Bromwich	-
Chester Street	-
Erdington	-
Hockley	2032
Nechells West	-
Sparkbrook	2028
Summer Lane	-

Ocker Hill GSP:

BSP / 132 kV	Trigger Year
132 kV network	-
Ocker Hill	Baseline
Ocker Hill B	-
Black Lake	-

Oldbury GSP:

BSP / 132 kV	Trigger Year
132 kV network	-
Birchfield Lane	2032
Oldbury B	-
Tividale	-

Penn GSP:

BSP / 132 kV	Trigger Year
132 kV network	2029
Coseley	2034
Dudley	
Hinksford	2031
Lye	Baseline
Wolverhampton West	2028
Woodside	-

Port Ham (Walham) GSP:

BSP / 132 kV	Trigger Year
132 kV network	2027
Castle Mead	2025
Commercial Road	
Cheltenham	Baseline
Eastern Avenue	-
Lydney	2025
Marle Hill	-
Montpellier	-
Tewkesbury Grid	-

Rugeley GSP:

BSP / 132 kV	Trigger Year
132 kV network	-
Burntwood	-
Cannock	2031
Lichfield	2029
Rugeley Town	-

Willenhall GSP:

BSP / 132 kV	Trigger Year
132 kV network	-
Bentley	2029
Willenhall	-
Wolverhampton	-
Burntwood	-

3. Transmission-Distribution Interface

As discussed earlier, these GSPs typically form the boundary between the transmission and distribution networks. Across the West Midlands, and in most of its GSPs, high levels of new connection activity (mainly dominated by energy storage connections and photovoltaic generation schemes) have triggered constraints at the transmission network including SGT capacity, 275 kV and 400 kV circuit ratings, and 132 kV switchgear fault level limits.

Discussions are ongoing with the transmission network owner with regards to the best viable solution to mitigate these constraints, with options varying from uprating the existing assets to establishing additional GSPs in locations that best suit the network and its serving customers.

Some of the GSPs where new sites are being considered include:

- Cellarhead GSP
- Rugeley GSP
- Lea Marston GSP
- Iron Acton GSP
- Bishops Wood GSP
- Penn GSP

In addition to thermal and fault level constraints, there are spaces limitations at several of the GSPs with regards to installing additional bays for new connection and network reinforcement purposes; establishing new sites could therefore help mitigate this and make provisions for accommodating the increasing number of bays required.

4. Grid Transformer Cyclic Ratings

Across the West Midlands, BSPs include Grid Transformers (GTs) that do not always have their cyclic ratings fully utilised. This generally applies to 132/66 kV, 132/33 kV, 132/11 kV, and three-winding 132/11/11 kV grid transformers. Utilising these cyclic ratings would include carrying out further assessments and site checks to determine the appropriate level to uprate them to.

BSP sites where these GTs are the limiting factors and where the potential cyclic rating of the transformer could mitigate the constraint (up to and including the year 2034), have not been included in the individual GSP reports but have been listed in the table below instead.

GSP	BSP	Voltage / kV	GT	Name-plate rating / MVA	Trigger Year (per season)		
					Winter	Inter Cool	Inter Warm
Cellarhead	Meaford C	132/33	GT1, GT2	45/90	2031	2032	2034
Cellarhead	Newcastle	132/11/11	GT3	30/60	2031	-	-
Cellarhead	Stagefields	132/11/11	GT3, GT4	30/60	2032	-	-
Rugeley	Cannock	132/11/11	GT1	30/60	2031	2032	-
Bustleholm	Kingstanding	132/11/11	GT1, GT2	30/60	2034	-	-
Bustleholm	Smethwick	132/11	GT2B, GT3B, GT4B	15/30	2034	-	-
Bushbury	Wednesfield	132/11/11	GT2, GT3	30/60	2034	-	-
Ocker Hill	Ocker Hill	132/11	GT3B, GT4	15/30	Baseline	Baseline	2028
Oldbury	Birchfield Lane	132/11	GT1, GT2, GT3	15/30	2032	-	-
Penn	Coseley	132/11	GT1A, GT2	15/30	2034	-	-
Penn	Coseley	132/11	GT2	15/30	2034	-	-
Bishops Wood	Ludlow	132/33	GT3	60/90	2031	2033	-
Bishops Wood	Ludlow	132/66	GT2B	30/60	Baseline	Baseline	2029
Bishops Wood	Malvern	132/11	GT1, GT3	15/30	2028	2029	2032
Nechells East	Hockley	132/11/11	GT1, GT2	30/60	2032	2033	-
Nechells East	Sparkbrook	132/11/11	GT1, GT2	30/60	2028	2029	2033
Nechells East	Sparkbrook	132/11/11	GT2	30/60	2028	2029	2033
Kitwell	Selly Oak	132/11	GT1, GT2	15/30	2027	2029	2032
Kitwell	Rednal Green	132/11	GT2, GT3	15/30	2028	2029	2032

GSP	BSP	Voltage / kV	GT	Name-plate rating / MVA	Trigger Year (per season)		
Kitwell	Longbridge	132/11	GT3	15/30	2027	2029	-
Port Ham	Cheltenham	132/11	GT3, GT4	15/30	2030	2031	2033
Port Ham	Hereford	132/66	GT4, GT5, GT6	45/90	2032	2033	-
Port Ham	Castle Meads	132/33	GT3, GT4	30/60	2031	2032	-
Iron Acton	Chipping Sodbury	132/33	GT1B, GT2B	15/30	2030	2032	-
Iron Acton	Chipping Sodbury	132/33	GT2B	15/30	2030	2032	-
Iron Acton	Chipping Sodbury	132/33	GT1A, GT2A	45/90	2026	2028	2030
Ironbridge / Shrewsbury	Ketley	132/33	GT1, GT2	45/90	2032	-	-

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