SP Energy Networks | DSO

Network Development Plan

SP Manweb

Parts 1 & 2 - Development & Capacity Report

April 2024

Contents

1 Introduction

1.1 Who we are

We are SP Energy Networks. We own and operate the electricity distribution network in Central and Southern Scotland (our SP Distribution network), and in North Wales, Merseyside, Cheshire, and North Shropshire (our SP Manweb network). It is through these two networks of underground cables, overhead lines, and substations that we provide our 3.5 million customers with a safe, reliable, and efficient supply of electricity.

1.2 Document context and purpose

Sharing data is key to the efficiency of the energy system as we decarbonise to Net Zero. It enables customers and stakeholders to assess market opportunities and participate in flexibility markets, in turn promoting the efficiency and competitiveness of these markets. It enables network companies and key stakeholders to work together to promote efficient whole system planning and operation. And it helps spur innovation and new solutions. Customers benefit from all of these.

In this context, Standard Licence Condition 25B came into force on 31 December 2020. It introduced a requirement for each DNO to publish a Network Development Plan (NDP), and set out a high-level scope of what was to be included. DNOs then worked together via the Energy Networks Association (ENA) to define the detailed scope and content of NDPs; the resulting proposed Form of Statement was published in December 2021.

The primary objective of the NDP is to provide information on available network capacity to accommodate demand and generation growth, and interventions the DNO plans which will increase network capacity (such as flexibility use and reinforcement). The NDP is a medium-term outlook, and is designed to sit between short-term Long Term Development Statements (LTDS) and long-term Distribution Future Energy Scenarios (DFES) forecasts.

Each DNO's NDP must cover three main components:

1. **Part 1: Development report** – detailed information on the interventions we plan that will increase capacity. This includes non-load interventions which are not done to provide capacity but will increase capacity nonetheless (e.g. asset management interventions such as replacing an end-of-life transformer with a larger equivalent).
2. **Part 2: Network scenario headroom report** – the indicative demand and generation capacity available at each primary substation (down to and including the HV busbar). Forecasts are produced for every year for the first 10 years, and then for every five years after that out to 2050. These capacity forecasts must take account of known planned interventions which will increase capacity (i.e. those listed in Part 1).
3. **Part 3: Methodology statement** – a document explaining how we have produced Parts 1 and 2.

Parts 1 and 2 need to be produced for each DNO licence area, down to primary substation group (i.e. the NDP does not include network interventions and capacity headroom for the LV and HV networks). We have two licence areas: SP Distribution and SP Manweb. Therefore to meet our NDP licence obligation we are publishing four NDP documents[1]:

1. A summary document to introduce our NDP, summarise the contents, and set out our consultation questions.
2. A pdf report and supporting excel datasheet for SP Distribution, covering Parts 1 and 2.
3. A pdf report and supporting excel datasheet for SP Manweb, covering Parts 1 and 2. That is this document and supporting excel datasheet.
4. A single document for Part 3, covering SP Manweb and SP Distribution together as the methodology is the same for each. This includes the consultation feedback we received.

Our NDP will be updated annually. Figure 1 shows the document map for these four documents.

[1] www.spenergynetworks.co.uk/NDP

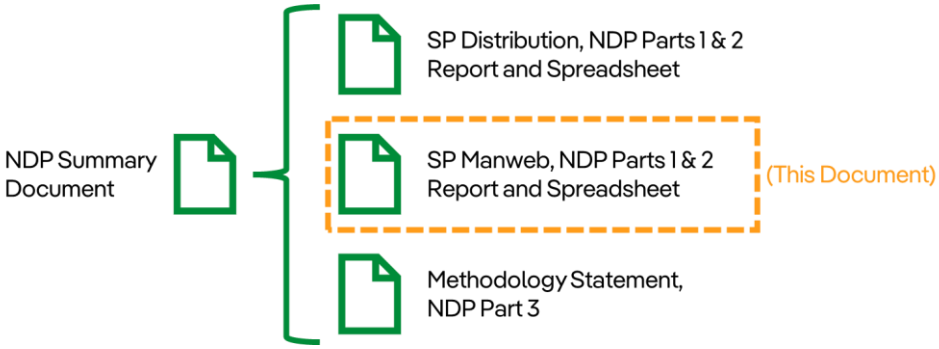


Figure 1: SP Energy Networks' NDP document map

2 SPM – Strategic Context

Electricity networks are at the heart of the Net Zero transition. The scale of decarbonisation means that by 2050 the **peak demand on our distribution networks is forecast to double**, and we could likely see a **five-fold increase in connected generation and storage**. Over recent years we have seen a steady increase in connection rates of domestic low carbon technologies. These trends are expected to accelerate, and we forecast that our customers are likely to connect up to **eight million electric vehicles and heat-pumps by 2050**. The following are some examples of the key issues and trends presently faced across our SP Manweb region.

2.1 Growth in connections activities

A key challenge faced across GB at present is the time being quoted to connect renewable generation to the network due to rapid expansion of the GB connections queue. At the end of 2023, about 500GW of generation was contracted to connect across GB transmission and distribution networks. For comparison, this is over eight times the GB electricity peak demand. Notably, there has been a particularly rapid growth in battery storage applications. We are rising to Britain's Net Zero Challenge by working collectively with industry, government and Ofgem to improve grid connections for our customers.

More information on these activities is available via the ENA website[2].

Whilst growth in generation and storage will be central to a decarbonised energy system, we do not expect that all projects in the current transmission and distribution pipeline will progress through to delivery. However, because this volume of pipeline is unprecedented, exactly where, how quickly and by how much it will reduce are considerable unknowns – and ones that we have to tackle in our DFES energy forecasts. Our NDP Capacity Headroom calculations are underpinned by these DFES forecasts.

2.2 Transmission network capacity

As a result of this rapid expansion of the GB connections queue, many of our GSPs now have connections subject to transmission works. With widespread constraints across the GB transmission system all DER applications >1MW are subject to a transmission Statement of Works process.

Historically, customers could not be connected until transmission network reinforcements had been completed, with some customers having connection dates more than 10 years away. As part of the ENA reforms, we have been proactively working with all system and network operators to allow customers to connect to our network without needing to wait for these major transmission works to be completed. Delegated Technical Limits at GSPs will allow customers to receive earlier connection dates and connect ahead of enabling works, though they may be instructed to reduce their output/consumption when needed.

2.3 Growth in industrial scale battery connections

Applications for storage projects are increasing faster than any other technology. As part of the ENA reforms, we led and implemented the development of tactical solutions to better define network access rights for new distribution-connected electricity storage sites. These created industry best practice, realising better use of existing network capacity, and providing storage customers with a common experience. These solutions enable better use of existing network capacity, reducing the risk of creating additional capacity which is very lightly utilised.

The Capenhurst GSP and Kirkby GSP and surrounding areas have been a particular clusters of connections activity. Within these GSPs alone, we already have over 700MW of connections either already connected, or with contracts to connect to the distribution network.

2.4 Long term capacity requirements in Mid-Wales

There is currently limited existing electricity infrastructure in mid-Wales due to the electricity network being originally designed to supply low levels of localised rural demand with negligible distributed generation.

Our planned interventions accommodate additional demand through to the early 2030s using smart technologies to make the most of the existing network assets. Beyond this (or for large scale generation capacity) a major transmission solution will be required to upgrade the Mid-Wales networks to meet long term demand and generation requirements.

[2] https://www.energynetworks.org/industry/connecting-to-the-networks/reforms

We are working closely with NGET, NGED and Welsh Government to jointly develop a holistic transmission & distribution solution that best meets the long term capacity needs of all parties in Wales, including communities and network customers. We have been assessing a wide range of joint options and are working to narrow these options to a set of preferred solutions.

2.5 Net Zero North West Cluster Plan

We were part of the Net Zero North West Cluster Plan project that published a deliverable investment, technology and infrastructure blueprint for the North West's net zero transition which offers a roadmap to industrial decarbonisation. The consortium consisted of public, private and academic institutions, and included representation from energy intensive industrial consumers based in the North West that recognise the necessity to decarbonise. Since publication of the Cluster Plan Report we are continuing to work with Liverpool City Region Combined Authority and Cheshire & Warrington Enterprise Partnership to develop a long term infrastructure plan to accommodate the large industrial customers in the cluster that are looking to connect additional demand and generation to our network as they decarbonisation their industries across the industrial areas of Ellesmere Port, Runcorn, Halton and St Helens.

2.6 North East Wales Industrial Decarbonisation Plan (NEWID)

We have joined a collaboration with Net Zero Industry Wales, Wales & West Utilities, Bangor University, Uniper and Net Zero Energy Systems to develop a net zero industrial plan for the Flintshire County Council and Wrexham County Borough Council part of North East Wales. We will be working with key regional industrial stakeholders and over 160 industrial customers to understand, map and develop a regional decarbonisation pathway to include electrification, hydrogen and carbon dioxide export. The partnership will publish a Regional Cluster Plan for North East Wales by December 2024 and the main outputs will be included in the ongoing stakeholder engagement for our 2025 DFES publication.

2.7 Electrification of transport – Ultra-rapid charging

We are supporting the rollout of high-capacity electric vehicle charging at some of the region's busiest motorway services. These projects have included creating new electricity capacity for Hapsford, Knutsford, Lymm, Sandbach and Burtonwood motorway service areas. We have also been working with the Welsh government to establish charging facilities along the major A roads in Wales.

We are members of Strategic EV Connections Working Groups with Transport for Scotland, Transport for the North, and Transport for Wales. We support the Scottish and Welsh Blue Lights EV Group to facilitate EVCP connections for our emergency services colleagues for both devolved governments, and are working to develop similar relationships across the similar organisations in England.

2.8 Our role supporting Local Authorities

Our Strategic Optimiser team has supported our 22 Scottish Local Authorities develop their Local Heat and Energy Efficiency Strategy (LHEES) submissions to Scottish government. This support included proactively developing a LHEES tool for each of the Local Authorities to complete high level analysis and develop their plans, with SPEN's network information as an integral part of the process. We've also been actively involved in the development of our eight Welsh Local Authorities' equivalent Local Area Energy Plans (LAEPs), and have laid the groundwork to extend this support to our 10 English Local Authorities over the next year. Separately, we've supported Local Authorities optimise the design and implementation of public EV charging and heat electrification initiatives, including by providing costs and timescales for 1,400 potential locations, and are working with Fife Council and Liverpool City Council to develop a heat network proposal for Dunfermline and four locations in Liverpool. These activities place us at the heart of our Local Authorities' decarbonisation plans – the insights this gives us informs our network development plans, meaning they are coordinated with our Local Authorities' ambitions and plans.

2.9 Register of strategic projects

Some projects and developments will be key catalysts or enablers for Net Zero and would benefit from early visibility and coordination. This is particularly true of cross vector projects and industrial clusters of decarbonisation. Over the last year we have been working with stakeholders to develop a register of projects with strategic significance in our areas. This register includes information on the nature of each project (location, capacity requirement range, how these requirements are likely to change over time); the project's significance (links to government targets, policy landscape etc.); and whether any additional support needs to be sought.

3 DSO Network Infrastructure

We are delivering DSO network infrastructure, tools and capabilities. These are outside the scope of the NDP, but are relevant as they help make better use of existing capacity, better target load-driven interventions, and increase the range of tools we have available to create capacity – these all help provide the capacity our customers need.

The following are key examples of the DNO network infrastructure and tools we are in the process of delivering:

3.1 Scalable network management and flexibility dispatch infrastructure

Constraint Management Zones (CMZs) enable greater use of customer flexibility, automation, and provide operational tools to provide capacity instead of reinforcement. CMZs include advanced control systems that actively coordinate and dispatch operational solutions. These help to save money by avoiding significant reinforcements and help make best use of existing capacity. As an example, one functionality of CMZs is to automatically manage the output from large generators, such as wind farms, to ensure that network electricity flows don't exceed what the network is capable of. We are also developing our CMZs with additional functionality such as flexibility service coordination to enable real time dispatch, active fault level management to maximise capacity for generation, and coordination of System Restoration in the unlikely event of a national power issue. This architecture is key to enabling the DSO and we are deploying 30 wide area CMZs covering over 50% of our networks.

We have proven the technology by deployed four constraint management zones (CMZs) in SPD.

In RIIO-ED2, in SP Manweb, we will deliver 16 CMZs and we will extend their functionality to help our control team manage the increasingly complex and interactive network. This next generation of CMZs will coordinate and dispatch operational solutions – using network models, live data from network monitors, and automated analysis, they can make better decisions in shorter timescales than humans can to keep network power flows within limits and defer the need for reinforcement.

CMZs, along with the ANM platform, are a key component of enable a smarter and more flexible network that safely makes best use of existing network capacity. For more information see our DSO Strategy[3].

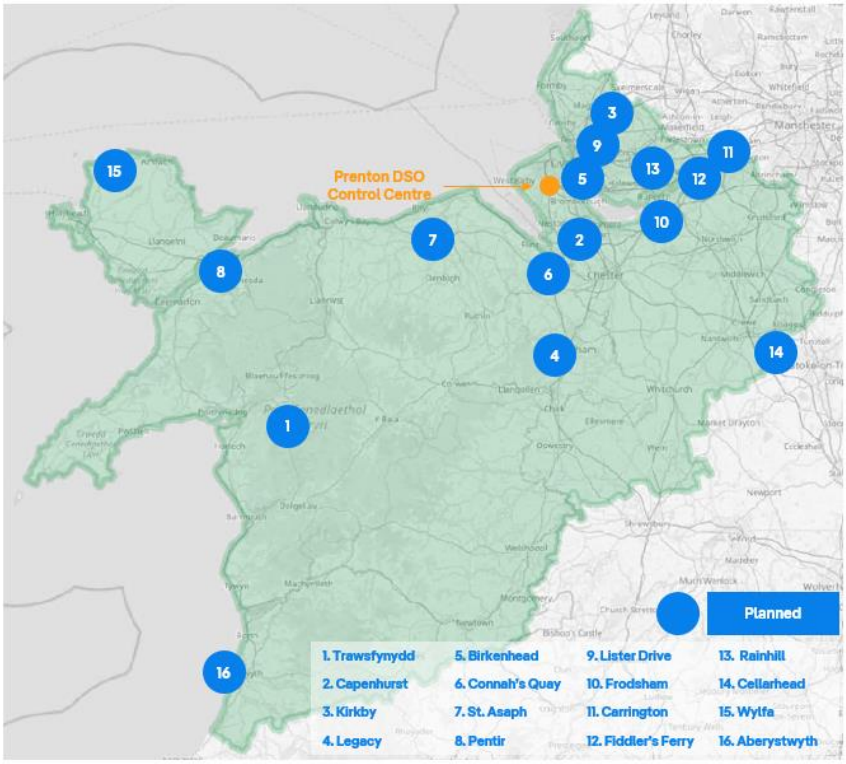


Figure 2: Planned CMZs

[3] Our DSO Strategy is available at https://www.spenergynetworks.co.uk/userfiles/file/SPEN_ED2_DSO_Strategy_Report_July_2021.pdf

3.2 Operational IT and telecoms

Operational IT and telecoms is the network's nervous system, which our flexibility, innovative, and smart interventions to provide capacity depend on. We will be investing to deliver the reliable, cyber-secure, low latency communication network that DSO outputs and other DSO infrastructure depend on.

3.3 Network visibility

Visibility of network demand, generation, and power flows is important to help us efficiently and safely plan and operate the network to meet our customers' needs – it helps us get more out of existing network capacity and make more targeted, timely, and efficient intervention to provide capacity. We are rolling out real time fault level monitoring and LV monitoring across our network and making greater use of smart meter data. In RIIO-ED2 we are deploying LV monitoring at over 14,000 LV substations. This will extend monitoring coverage to 76% of customers.

3.4 Enhanced forecasting

By better forecasting customer requirements we can better respond to them with more efficient and timely interventions to provide capacity. We will continue to use our industry-leading EV-Up and Heat-Up forecasting tools and continue to calibrate to keep them accurate.

3.5 Simulation and modelling

Combining simulation and modelling with measures to increase network visibility, these help us to make high quality planning and operational decisions to help ensure there is sufficient network capacity. This helps keep our network safe, efficient, and reliable for our customers as we transition to Net Zero. Central to this is our new central network planning and operational tool – our ENZ Platform. This combines network data sources (enhanced and near-time forecasts, network monitoring, smart meters, weather correction, LCT notifications, asset condition data) with a whole network model to create a real-time data-driven, whole network analytical model. This tells us what is happening on the network now, and in planning and operational timescales.

3.6 Digitalisation and IT platforms

Digitalisation and IT platforms are needed for our forecasting, modelling, flexibility platforms, and data sharing capabilities. Like with operational IT and telecoms, these are enabling investments which allow us to use a wider range of interventions to provide capacity.

4 Our Network Development Plan

4.1 Overarching process

This document is the NDP Parts 1 and 2 Network Development and Scenario Headroom Report for SP Manweb. The process below summarises how we produced NDP Parts 1 and 2 for SP Distribution and SP Manweb. For further details please refer to NDP Part 3 Methodology Statement.

- **Step 1, forecasting:** we develop our network to accommodate our customers' demand and generation requirements. Therefore the first step of network planning is to understand what these are. We do this using forecasts.
- **Step 2, network impact assessments:** we undertake industry-leading assessments to understand where, when, and how much additional network capacity is needed to accommodate these forecast customer requirements.
- **Step 3, options assessment for load-driven investment:** to provide the capacity in the optimal way, we fairly and impartially assess different types and combinations of interventions (flexibility, energy efficiency, smart, innovation, and reinforcement), different delivery models (reactive, proactive), and how they could be coordinated with other interventions to reduce customer cost and disruption.
- **Step 4, flexibility tenders:** where our assessments show we need additional capacity, we tender for flexibility services to understand the availability and cost of using flexibility to provide it.

These four steps identify the RIIO-ED2 load interventions we will make that add network capacity – these are a key input to NDP Parts 1 and 2. Whilst these create the majority of the additional capacity we will deliver, the NDP requires that we include all interventions that increase capacity:

- **Step 5, NDP Part 1 – reporting of network interventions which add capacity:** we combine the load driven interventions identified in steps 1-4 with connections-driven, losses-driven, and non-load driven interventions which add capacity, to produce NDP Part 1.

After these five steps we know all the interventions we plan to make that will add capacity – this means Part 1 of the NDP is complete. To complete Part 2:

- **Step 6, NDP Part 2 – reporting network scenario headroom:** combining our existing network model, our scenario forecasts, and our known intervention plans to calculate the "post-intervention" headroom. Our NDP Part 2 Capacity Headroom spreadsheet data files provide an indication of headroom for each primary substation/substation group for each year through to 2050.

4.2 Scope of NDP

This document is the NDP Parts 1 and 2 for SP Manweb. The scope of the Network Development report (Part 1) and Network Scenario Headroom report (Part 2) and are summarised below.

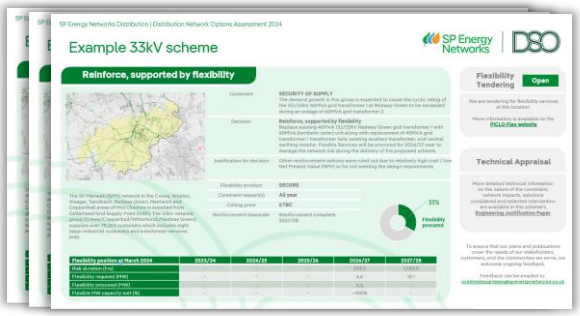
<table>
<tr><th>Parameters</th><th>Network Development</th><th colspan="2">Network Scenario Headroom</th></tr>
<tr><td>Date Range</td><td>Planned interventions for the next 10 years.</td><td colspan="2">Up to 2050.
Consideration to 2050 matches the DFES date range and so can reflect the uncertainty on long term network impacts.</td></tr>
<tr><td>Reporting granularity</td><td>Location, magnitude (MW) and timescales of interventions.</td><td colspan="2">Every year for the first ten years.
Every five years beyond that to the end of 2050.</td></tr>
<tr><td>Network coverage</td><td>All Bulk Supply Points (132/33 kV) and Primary substations (33/11 kV).</td><td colspan="2">All Bulk Supply Points (132/33 kV) and Primary substations (33/11 kV).
NOTE: In Scotland the 132/33 kV substations are considered as Grid Supply Points (GSPs), and are excluded from this document.</td></tr>
<tr><td>Forecast scenarios</td><td rowspan="4"></td><td colspan="2">Load scenarios based on DFES for all years up to 2050.</td></tr>
<tr><td>Reported headroom</td><td>Demand</td><td>Generation</td></tr>
<tr><td>Network parameters underlying headroom calculations</td><td>Thermal loading</td><td>Thermal loading (including reverse power flows)
Fault level</td></tr>
<tr><td>Evaluation methodology</td><td colspan="2">Detailed analysis for the short-term where practical.
Simple tabular comparisons for the longer-term to 2050 (loading versus firm capacity).</td></tr>
</table>

4.3 Distribution Network Options Assessment (DNOA)

For every location where our network assessments have identified that there will be insufficient network capacity to meet customer needs, we have a decision to make – how should we best intervene to provide the capacity? Our **DSO Decision Making Framework**[4] provides detail and transparency on the process we follow to impartially select optimal solutions and how we decide when and where to rely on flexibility services instead of other network interventions.

The outcome of these decisions is published in our NDP Part 1, where we list the interventions we have planned, grouped by GSP. Where these are driven by a requirement for capacity we provide a link to our detailed Engineering Justification Paper to give transparency in the decision making process at a scheme by scheme level.

We are also trialling the publication of Distribution Network Options Assessments (DNOA) to provide stakeholders with more information on individual scheme decisions. This provides an overview of the individual constraint, how we are managing it, and where flexibility forms part of our solution we provide details of the flexibility requirements at this location. As we move to monthly tendering for flexibility the annual DNOA publication will signpost upcoming longer-term requirements.



We intend to publish our DNOA alongside the NDP annually, and there will be links to each DNOA scheme page in the reporting of network interventions in the NDP Part 1.

For this draft of the NDP 2024, we will provide a sample of scheme pages which we link to within the NDP Part 1; these form part of the NDP consultation (see Section 4.4). We would welcome stakeholder feedback on these draft DNOA scheme pages. For our final NDP publication, we will produce DNOA scheme pages for all interventions, and the publication will be available to download in its entirety.

4.4 Stakeholder engagement

Our NDP documents and the example DNOA pages are now out for consultation until **22 April 2024**.

We recognise that stakeholders views and plans can change. It is important that we keep in step with our stakeholder requirements to ensure that we continue to plan and develop our networks with the most up-to-date information. Given the purpose of the NDP is to share information with stakeholders it's important that these documents meet our stakeholders' needs. We therefore welcome stakeholder views. Consultation questions and details on how stakeholders can feedback are given in our NDP summary document. Feedback can be emailed to systemdesignteam@spenergynetworks.co.uk

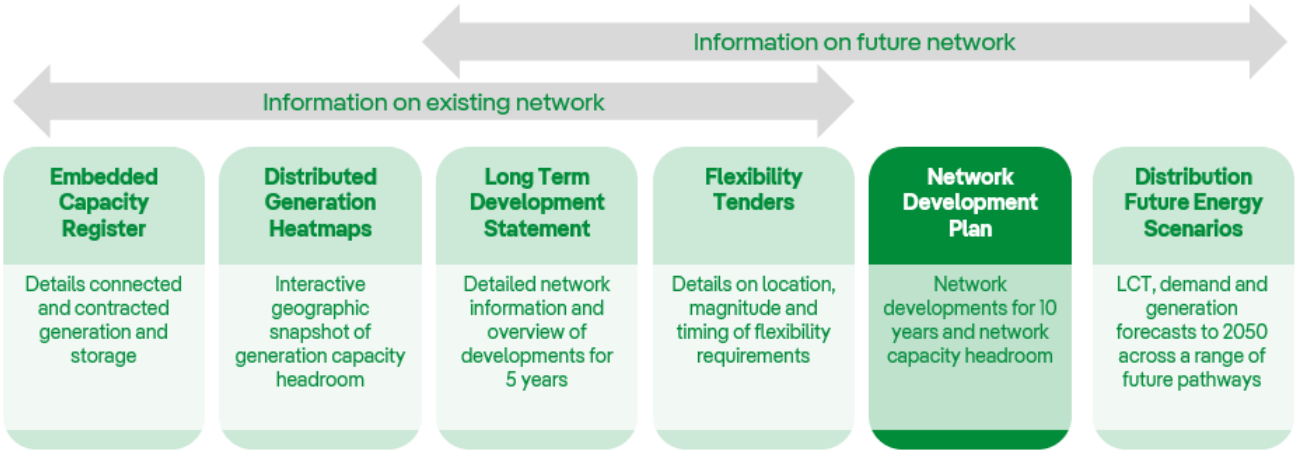
The consultation period will close **22 April 2024**. We will then publish the finalised versions of our NDP documents by **01 May 2024**.

Our NDP documents were last consulted upon in 2022. A summary of the feedback received and the actions we took is available in our NDP Methodology Statement.

[4] Our Decision Making Framework is available here: DSO Decision Making Framework - SP Energy Networks

4.5 How the NDP fits with other planning data publications

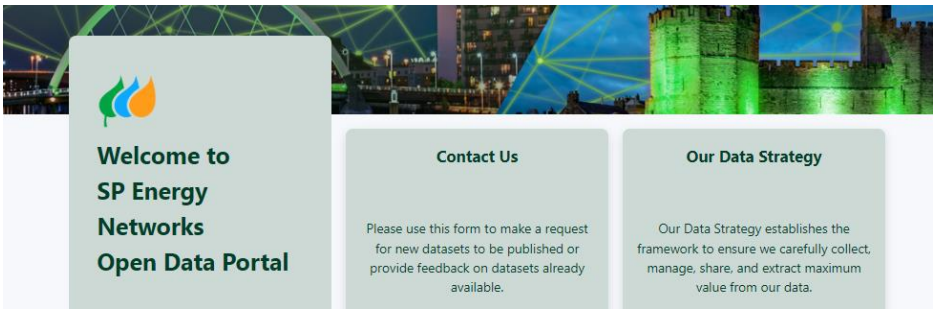
Publishing our NDP is just one measure we are taking to increase the transparency of how we plan and operate our distribution network, and is aligned with our approach of sharing an increasing range of network data with stakeholders. Other current data provision includes:



- **DFES forecasts**[5] – these are forecasts for key customer demand and generation metrics up until 2050. We develop these considering a range of sources, including UK and devolved government targets and other industry forecasts. Given the uncertainties out to 2050, we create forecasts for multiple energy scenarios. These scenarios represent differing levels of customer ambition, government and policy support, economic growth, and technology development. Our stakeholders review our forecasts and we make changes based on their well-justified feedback. We will update our DFES annually.
- **LTDS**[6] – these statements contain a range of information on our 132kV, 33kV and 11kV network. This includes network asset technical data, network configuration, geographic plans, fault level information, demand and generation levels, and planned works. This information helps customers identify opportunities and carry out high level assessments of the capability of the network to accommodate new demand and generation. A main update is published every November with a minor update every May.
- **Embedded Capacity Register**[7] – previously known as the System Wide Resource Register, this currently provides information on generation and storage resources (≥50kW) that are connected, or accepted to connect, to our distribution network. It is updated on the 10th working day of each month.
- **Heatmaps**[8] – these provide a geographic view of where there is available network capacity to accommodate new generation.
- **Flexibility tenders**[9] – we tender for flexibility for all viable network constraints. When we run tenders we publish information on the location, magnitude, and duration of the constraint. In some cases we will also send ceiling price information.

[5] Our DFES is available here: Distribution Future Energy Scenarios - SP Energy Networks
[6] Our LTDS is available here: Long Term Development Statement - SP Energy Networks
[7] Our Embedded Capacity Register is available here: Embedded Capacity Register - SP Energy Networks
[8] Our heatmaps are available here: Distributed Generation Heat Maps - SP Energy Networks
[9] Our flexibility services and tenders are available here: Flexibility Services - SP Energy Networks

4.6 Our commitment to open data



Our Open Data portal provides a single, easy-to-access interface for our users, enabling them to easily explore, filter, view, download and consume our available data. Via our portal, stakeholders can :

- Download data in multiple formats
- Consume data via an API
- Feedback on datasets
- Subscribe for datasets specific updates

SP Energy Networks is committed to becoming a data-centric organisation, harnessing the power of data to drive strategic decision-making, foster innovation, and embrace sustainability. We recognise that access to data, and information, will be a key enabler in our ability to achieve net zero, and that we have an important role in facilitating efficient whole system planning and operation, and supporting the development of new markets and opportunities. We are committed to sharing data with our customers and stakeholders on a "presumed open" basis. Through our ongoing engagement, we are aware that stakeholders require access to data and information about our network to develop accurate plans, enhance project proposals, and to understand their impact on our network. It is also important for transparency that our decision making and our future plans are shared with our stakeholders, allow them to feedback their views and to use this data and information to inform their decision making.

To enable us to efficiently and effectively share our data, we have developed and launched an online "Open Data Portal". This portal was launched in 2023 and can be freely accessed by our customers and stakeholders via the SP Energy Networks website. The site enables users to search, view, and export datasets in simple, standardised format. Users can easily search our data catalogue and detailed metadata, as well as independently download, export and consume data via an API. We are also working to develop the visualisation capabilities of the portal, enhancing the provision of information for users. Our datasets are easy to find in our Open Data Portal. Users have the ability to search on keywords and themes of the datasets. We also have detailed descriptions and definitions in place to support our stakeholders to understand the content. Work has been carried out this year to implement standardised terms in our Open Data Portal , and we are now looking forward to working with the wider industry to ensure that these terms align.

We make it easy for stakeholders to access our data, with all our openly published, and shared, datasets hosted on our Open Data Portal. The portal is accessible via our SP Energy Networks website, and we have recently undertaken changes to our website to promote visibility, providing our stakeholders with a clear and simple path to access our data. All datasets have been transitioned to our Open Data Portal, meaning that our Stakeholders do not need to visit more than one location when looking for access to our data. We have also uploaded the datasets that underpin our strategic documentation into the Open Data Portal, facilitating our Stakeholders to download the datasets and perform their own analysis. We recognise that not all stakeholders have the same requirements when it comes to accessing data and that is why we make our datasets available in a number of formats including CSV, Excel and JSON, and with the ability for them to be downloaded via an API. We also work alongside our stakeholders, where possible, to provide data in their preferred format. As an example, we recently converted our GIS Shapefiles into Excel format following a stakeholder request in January 2024.

We embrace continuous review and improvement of the data that we publish to better meet our stakeholder needs. Shortly after implementation of our Open Data Portal, we uploaded our GIS Shapefiles onto our Portal, under a shared data licence, in direct response to high stakeholder demand. Access to these files has been well received by our stakeholders and we continue to work alongside them to identify opportunities for refinement, whilst always ensuring a robust data triage assessment is applied prior to publication. In October 2023, we extended our GIS Shapefiles to include additional information on poles and stays, and non-powered cables and lines in direct response to working with our stakeholders.

4.7 Information and contact

The information used to compile this report is derived from SP Manweb plc's own data. Whilst all reasonable care has been taken in the preparation of this data, SP Manweb plc is not responsible for any loss that may be attributed to the use of this information.

Opportunities exist for the connection of new load or generation throughout the SP Manweb system. System conditions and connection parameters are site specific and therefore the economics of a development may vary across the system. Developers are encouraged to discuss their development opportunities and SP Manweb will be pleased to advise on connection issues.

To discuss a specific enquiry about a new connection to the distribution network, or an enhancement to an existing connection, please contact: gettingconnected@scottishpower.com

5 Understanding the results in this document

5.1 Network Development Plan results (NDP Part 1)

Our NDP Part 1 outlines the specific details of all the interventions we are planning in the SP Manweb network that increase network capacity. This means that in our NDP Part 1 we have not only included load-driven interventions but also included losses-driven and asset management-driven interventions which increase network capacity, even though this is not the primary reason for the intervention.

We have included interventions that add capacity and are part of our Business Plan for RIIO-ED2 (April 2023 – March 2028). Beyond 2028 we are yet to plan interventions (we will start this in 2025 when we start preparing for RIIO-ED3). The capacity headroom results (Part 2) provide an indication of potential future intervention needs for the period between 2028-2031, for the range of scenarios.

The Engineering Justification Papers (EJPs) for each RIIO-ED2 capacity driven intervention are linked to in the NDP Part 1 tables to give transparency in the decision making process at a scheme by scheme level. These are the technical and cost appraisals undertaken to develop robust, efficient, and fully justified intervention plans for our load and non-load plans.

In reviewing the planned network interventions, it is worth noting that the timing and type of network intervention may vary, depending on the rate of change in stakeholder requirements influenced by regional and national policies, requirements for emerging new connections, and further development of flexibility markets.

5.1.1 Types of constraints

There are three main types of network constraint. These are:

Thermal constraints – where network current would exceed equipment thermal ratings. Thermal constraints can affect any type of asset at any voltage level. High loadings on certain assets may simply reduce their life, however significant overloading introduces safety risk. For example, an overhead line conductor will sag more if it is overloaded – this may risk the statutory minimum safety clearance distances outlined in the ESQCR[10].

The thermal loading on each asset is considered against its capability under normal and fault/outage conditions. Equipment thermal ratings are considered to vary seasonally with temperature through the year. Cyclic thermal ratings of assets are used when assessing the network under fault/outage conditions. The cumulative time exposure to overloads, and whether equipment has sufficient cool back periods are considered. We prioritise interventions when the network assets are at risk of exceeding 100% of their thermal rating.

Voltage constraints – where network voltage would be in breach of statutory limits. Network voltages can be too low (usually caused by excess demand), too high (usually caused by excess generation), or change too quickly (instantaneous change in voltage due to planned/unplanned outages). Voltage excursions can cause damage to customer equipment and network assets, or introduce safety risks.

We have a duty to maintain voltages within the statutory limits at each voltage level. We prioritise interventions when the network is at risk of breaching these limits.

Fault current constraints – where the network fault current would exceed the fault current rating of switchgear. If this happened, it would represent a serious safety risk as the network could not be safely isolated in the event of a fault. Fault current constraints can affect equipment at any voltage level.

Circuit breakers may be called upon to disconnect faulting equipment from the network; or energise onto faulty or earthed equipment. A range of types of fault (including 3-phase and single-phase faults) are assessed under make and break fault duties. Where substations are approaching switchgear capability or operationally managed, detailed assessments of the maximum fault flows through each individual breaker are undertaken. Substation infrastructure such as busbars, supporting structures, flexible connections, current transformers, and terminations must be capable of withstanding the mechanical forces associated with the passage of high magnitude fault current i.e. through-current withstand duty. Where switchgear is in excess of 95% of equipment or design rating we consider the substation to be constrained.

[10] Electricity Safety, Quality and Continuity Regulations (ESQCR). Available here: https://www.hse.gov.uk/esqcr/index.htm

These constraints can occur together or independently. In all cases, these network constraints are a result of there being insufficient network capacity to accommodate customer power flows.

5.1.2 Types of interventions

To resolve constraints we consider a range of flexible, energy efficient, smart, innovative, and conventional intervention solutions. Table 1 shows the six main categories of interventions to add capacity. They are not mutually exclusive, so can be combined to provide capacity.

Table 1: Types of intervention

	Intervention Type	Description
	**Asset intervention**	Where we permanently increase network capacity by replacing existing assets or adding more assets – for example, a new substation.
	**Flexibility Services**	Where customers agree to actively manage their demand/generation to help avoid constraints (see Section 5.1.3 for more information).
	**Innovative Solutions**	
	Smart Network Interventions	Where we look to get more out of existing network capacity.
	Using Enhanced Network Asset Ratings	Where we seek to increase the thermal capacity of individual existing network assets without having to replace them.
	Network Reconfiguration	Where we temporarily or permanently adjust the topography of the network to better match existing network capacity with customer power flows.
	Energy Efficiency	Where customers have agreed to passive measures to manage their demand to help avoid constraints.

5.1.3 Flexibility

To meet evolving customer needs, we are developing smarter, more flexible network solutions to help mitigate the need for traditional reinforcement and reduce costs for our customers. This is cheaper for our customers as it enables us to delay expensive reinforcement work for as long as possible.

Flexibility services are where our customers agree to actively manage their demand or generation to help us manage capacity constraints on our network. Flexibility services can help us defer or avoid new network capacity, can be deployed more quickly than reinforcement interventions, and can help democratise and bring competition to the energy sector. They provide an agile smart means of managing our network, and are complementary to reinforcement solutions by providing short-term solutions where we need to act quickly or manage uncertainty. They will play a key part in helping to manage the pace of the Net Zero transition.

Given this, we tender for flexibility for all viable network constraints. This helps us understand the availability and cost of flexibility, which we use in our options assessment.

In previous years, we procured the ENA products under Sustain, Secure, Restore and Dynamic. These products have now been updated under the 2023 Products Alignment Programme. Table 2 shows the definitions and how the new aligned products will be utilised. More information on the new aligned products developed by the ENA Working Group is available on the ON Flexibility Products Review and Alignment page on the ENA website[11].

When we tender for flexibility we state the location, service product (see Table 2), service window and time (e.g. 4-6pm weeknights between October and March), required magnitude (MW/MVArs), and any other necessary technical parameters (e.g. response time). In some cases we will also send ceiling price information.

[11] https://www.energynetworks.org/publications/on-flexibility-products-review-and-alignment-(feb-2024)

Table 2: Flexibility products

Flexibility Product	Product Description
Scheduled Utilisation (SU)	In this product, the time that flexibility is delivered has been pre-agreed in advance with the provider. This product will primarily benefit flexibility service providers that cannot respond in real-time or near to real-time. This service is used to manage seasonal peak demands and defer network reinforcement.
Operational Utilisation (OU)	This product allows for the use case where the amount of flexibility delivered is agreed nearer to real time. This can be utilised to facilitate a change in demand profile from flexibility service providers based on network conditions close to real-time. The assets will be dispatched for the required level of service that is required based upon actual network measurement data thus managing the cost. We utilise this product in order to restore network supplies following an unplanned outage/fault where the regulatory funding does not allow for availability payments e.g. customer interruptions (CI).
Operational Utilisation + Scheduled Availability (OUSA)	This product procures, ahead of time, the ability of a flexibility service provider to deliver an agreed change following a network abnormality. The availability will be defined at the point of procurement and cannot be modified once the contract has been agreed. The assets will be dispatched for the required level of service that is required based upon actual network measurement data, meaning that the DNO/ESO is only paying utilisation payments based upon the actual needs of the network. An example use case for this product is when a DNO is planning for sufficiency of flexible services contracts based upon long range forecasting of network constraints.
Operational Utilisation + Variable Availability (OUVA)	This product allows for DNOs to procure a level of contracted capacity, but then refine the requirements in terms of availability closer to the event. The assets will be dispatched for the required level of service that is required based upon actual network measurement data, meaning that the DNO is only paying utilisation payments based upon the actual needs of the network. An example use case for this product is when a DNO is planning for sufficiency of flexible services contracts based upon short-medium range forecasting of network constraints.

We will continue to test every viable network constraint for flexibility. To date we have operated bi-annual bidding rounds, in the spring and autumn, which seek to procure long-term requirements often over multiple years. Based on stakeholder feedback regarding the ability to deliver long term contracts. we are moving to a new procurement model and from May 2024 we will begin tendering on a monthly basis for the following month's requirements. This will also increase the certainty of service delivery from flexibility service providers, increasing the confidence by DSOs that flexibility services can provide practical solutions to network constraints.

For more information on our flexibility activities, please visit the flexibility area of our website[12]. This includes links to our tenders on the Piclo procurement platform.

[12] https://www.spenergynetworks.co.uk/pages/flexibility.aspx

5.1.4 Summary of interventions

Figure 3 summarises the interventions by driver (i.e. why we need to make them). Figure 4 summarises the interventions by type (i.e. how we are making them). As a reminder, these graphs only show interventions on primary substations upwards given the scope of the NDP. This means they exclude interventions on the LV and HV networks, which account for the vast majority of the interventions we need to make to provide capacity.

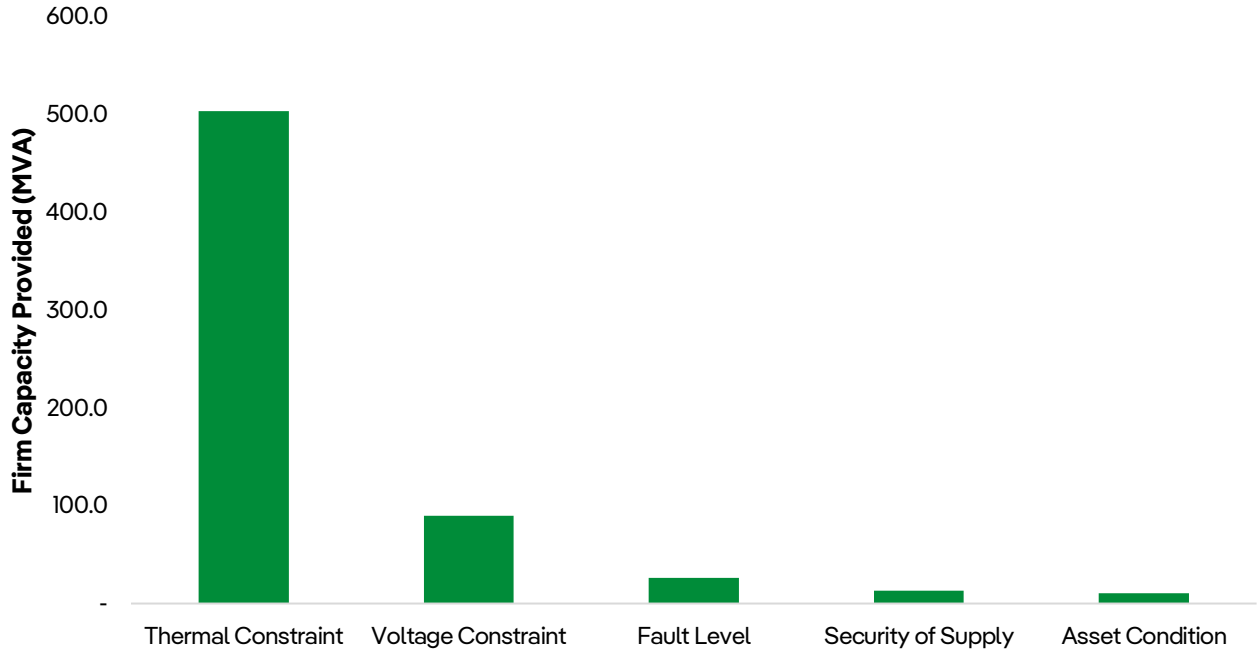


Figure 3: SP Manweb summary of interventions by driver to 2028

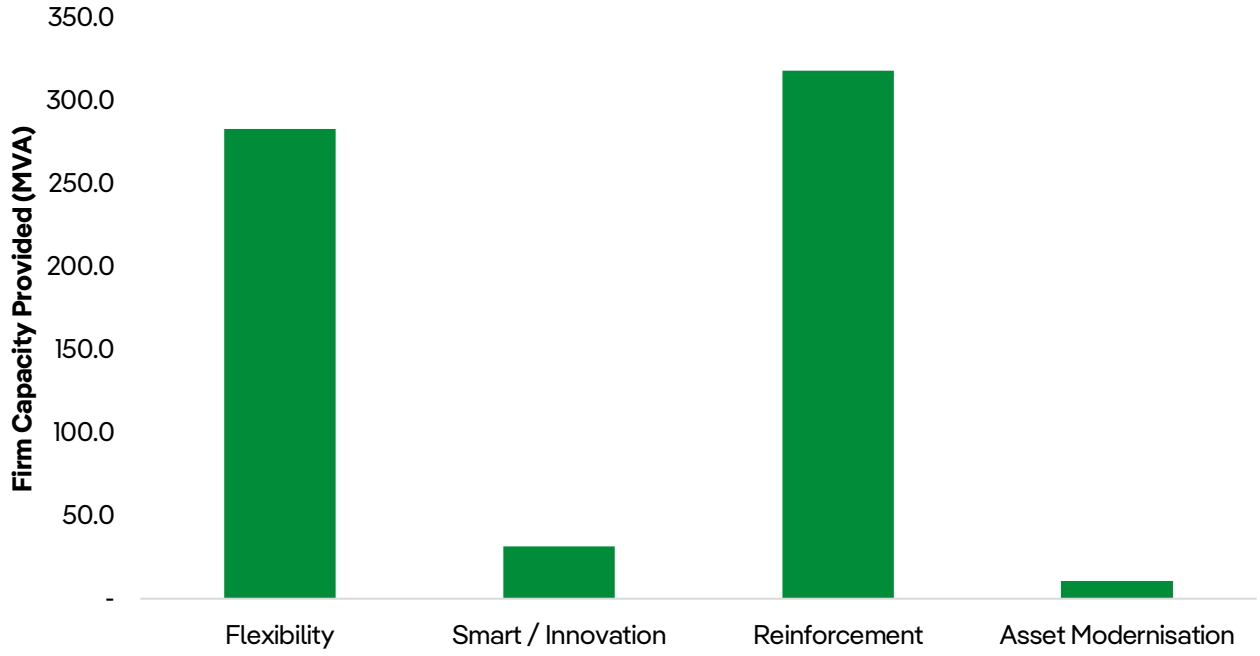


Figure 4: SP Manweb summary of interventions by type to 2028

Figure 3 shows that the need to provide thermal capacity is the main driver of interventions. Figure 4 shows that reinforcements and flexibility account for the great majority of the interventions we will make to provide capacity.

Our load and non-load intervention plans are both designed to be adaptable so they can respond to emerging customer needs. This means the interventions we actually deliver may differ slightly from those we currently plan to deliver. We will only make changes to the delivery plan where it is in customers' interests.

5.2 Network scenario headroom results (NDP Part 2)

Future network scenario headroom is indicated for all SP Manweb grid (132/33kV) and primary substations (33/11kV) in terms of demand and generation. For further details on the process to forecast capacity headroom see our NDP Methodology Statement.

5.2.1 Demand headroom

To calculate the demand headroom, we consider the expected increase in demand from the baseline, low and high scenarios, up to 2050, and compare these with the firm capacity of the group, including all planned interventions that increase capacity and flexibility services. **A positive number indicates spare capacity and zero indicates a forecast constraint.**

In reviewing the capacity headroom results, it is worth noting:

- The firm capacity is the maximum load the substation (or substation group) can support whilst keeping the network operating safely within limits. For primary substations this is generally the capacity available during single circuit outage conditions.
- When calculating the firm capacity, we consider the season of most onerous demand (typically winter). This is because the ratings of some equipment differ seasonally.
- For multi-transformer substations, the firm capacity considers only the capacity that can be available through automatic processes (e.g. parallel operation of the transformers or automatic changeover schemes).
- For single-transformer substations, the firm capacity values include the capacity that will be available through both automatic and manual switching processes, provided these can be carried out within the time constraints specified in Engineering Recommendation P2.
- The firm capacity of solidly interconnected network groups in SP Manweb must be calculated from network analysis due to the more complex interconnected nature of the system.
- In the headroom calculations we consider demand for developments that are due to connect, including that of Green Recovery schemes.

5.2.2 Generation headroom

To calculate the generation headroom, we consider the expected increase in generation from the baseline, low and high scenarios, up to 2050, and compare these against the reverse power flow capability of the substation/substation group, and the fault level limits. **A positive number indicates spare capacity and zero or negative number indicates a forecast constraint.**

The fault levels are calculated under the most onerous network conditions to yield the maximum anticipated fault currents. The most onerous network condition is considered to be when the following conditions occur concurrently:

- all generating apparatus is in service;
- all transformers are set to nominal tap position;
- the system is intact (N); and
- fault level contributions are included from all independent generators.

Fault contributions from synchronous generators and converter connected generators are treated differently. Typical fault current contributions from synchronous generators and converter connected generators are used to determine the available fault level headroom when considering forecast generation.

5.2.3 Further considerations

In reviewing the capacity headroom results, it is worth noting:

- Headroom results take account of planned interventions, as outlined in Section 6 of this document. A negative headroom result changing to a positive result is indicative of a planned intervention taking place or a decrease in demand.

- Headroom results do not take account of the additional capacity provided through the rollout of Constraint Management Zones (CMZs) or other flexible connection arrangements - see Section 3 of this document.
- Generation headroom at a substation/group may be limited by upstream constraints beyond our network boundary. These upstream constraints are flagged in column E within the Part 2 spreadsheets, but are not reflected within the capacity headroom values. Any new generation connections where there are upstream constraints beyond our network boundary will be subject to detailed network assessments to determine the actual generation capacity headroom.
- The SP Manweb distribution network is configured as a mesh network with interconnection at all voltage levels (see Section 5.3). Headroom results provide the calculated headroom of the substation/substation group. The actual headroom at a particular location within interconnected networks is subject to further assessments, as the changing distribution of demand and generation across the mesh may alter available headroom.
- Demand and generation forecasts are subject to factors which can change over time and influence pre-determined plans.
- The timing and type of network interventions may vary, depending on the rate of change in stakeholder requirements influenced by regional and national policies, and requirements for emerging new connections.
- We have taken all reasonable endeavours to ensure the accuracy of the results using information available at the time of publishing. We are not responsible for any loss that may be attributed to the use of the information presented in this report and the capacity headroom results.

5.3 Consideration of the SP Manweb Interconnected network

The SPM network is unique in its design, configuration and operation. Over half of our network – predominantly that in urban areas across Merseyside, Cheshire, and Wirral – is operated fully interconnected at all voltage levels. The primary system is wholly configured to support this interconnected operation.

This interconnected operation means power can flow through more than one path to reach its destination in normal operation. By comparison, most distribution networks in Great Britain, including SP Distribution, have a radial design, where power typically has only one possible path. Meshed networks give exceptionally high reliability but, once capacity is saturated, are typically more expensive to reinforce.

The tools we have developed to identify our planned interventions and assess network scenario headroom, work for both meshed and radial networks.

6 Part 1 – Network development information

Our NDP Part 1 outlines the specific details of all the interventions we are planning in the SP Manweb network that increase network capacity. This means we have also included in our NDP Part 1 losses-driven and asset management-driven interventions which increase network capacity even though this is not the primary reason for the intervention. This section provides a detailed breakdown of our 10-year intervention plans, arranged by GSP and disaggregated by intervention driver, down to the HV voltage level of primary (33kV/HV) sites. The information provided is as follows:

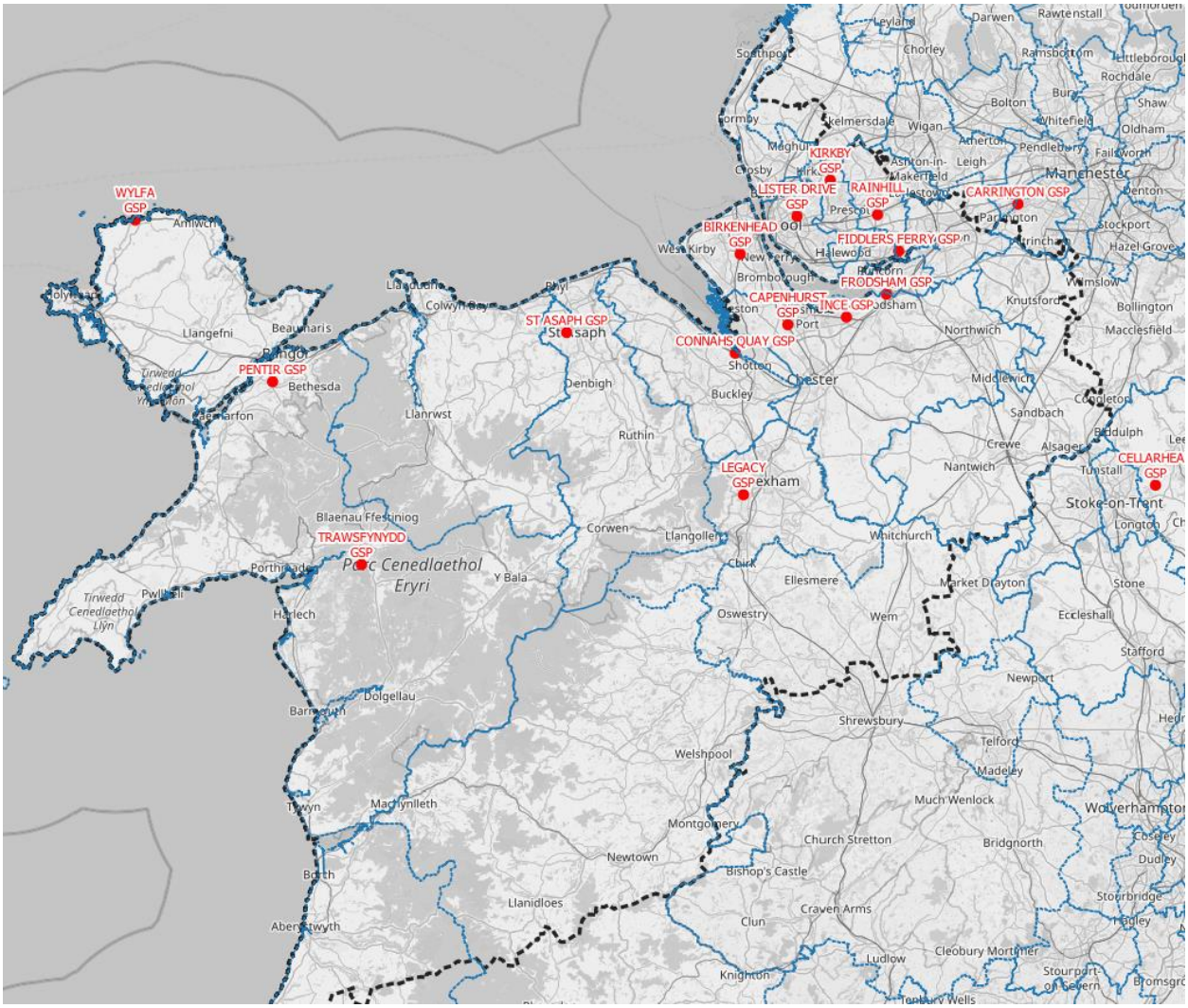
For each individual intervention the following information is summarised:

- Network Area: Name of the network group where the intervention is to be carried out.
- Driver: Primary driver for the intervention (thermal, voltage, fault level, asset modernisation[13], etc.).
- Type: Type of intervention (Section 5.1.2).
- Solution: Brief description of the intervention.
- Flexibility: Flexible capacity to be employed in MW.
- Increase in firm capacity: Capacity change resulting from the intervention in MVA.
- Expected by: Expected intervention completion year.
- Status: Whether the intervention is in delivery or planned.

In addition to the list of interventions summarised in the following sections, we are planning to install enhanced voltage control at a number of grid (132kV/33kV) and primary (33kV/HV) sites during RIIO-ED2 (1 April 2023 - 31 March 2028).

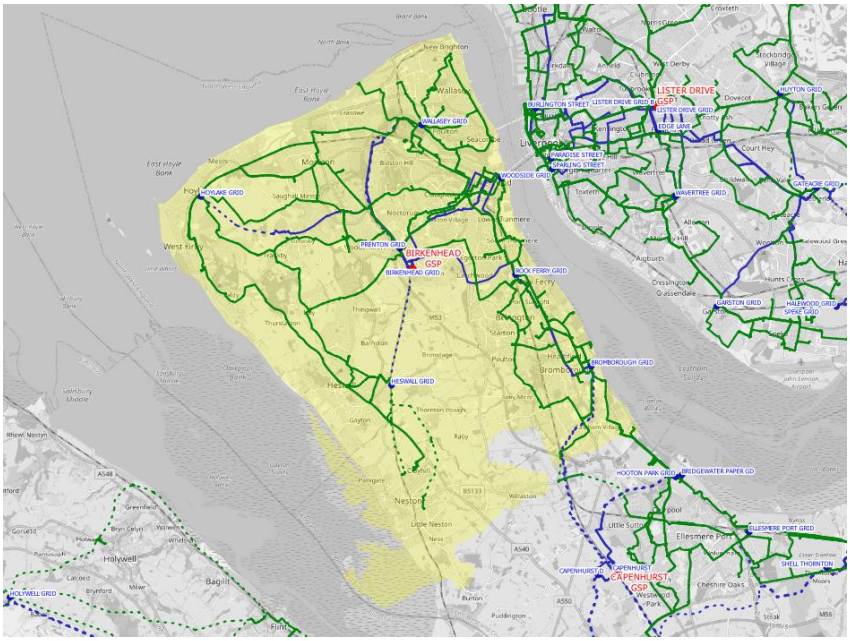
[13] Only asset modernisation interventions associated with substation asset replacement are included.

The map below shows the GSP locations. Users assessing this document electronically can navigate to the GSP of interest by clicking on the names of the GSPs in the list further below.



1 - Birkenhead	6 - Frodsham – Ince	11 - Swansea North
2 - Capenhurst	7 - Kirkby	12 -Trawsfynydd
3 - Carrington – Fiddlers Ferry	8 - Legacy	13 - Wylfa
4 - Cellarhead	9 - Lister Drive	
5 - Connah's Quay – Pentir – St. Asaph	10 - Rainhill	

6.1 Birkenhead



This section of network is fed via three 240MVA 275/132kV super grid transformers. This group supplies around 165,000 consumers in Bromoborough, Woodside, Prenton, Rock Ferry, Heswall, Hoylake, Wallasey and surrounding areas.

Summary	**Number of Interventions and Schemes**	**132kV**	-
		132kV/EHV	2
		EHV	12*
		EHV/HV	9*
		HV	6*
	Capacity Added (MVA)		4.5
	Flexibility Services (MW)		12.9

*Could increase generation hosting capacity.

132kV/EHV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
BROMBOROUGH GT3 / ROCK FERRY GT2	Asset Mod.		**132kV Transformer Modernisation** 132kV transformer replacement and refurbishment at Rock Ferry	-	*	2024/25	Planned
WALLASEY GT1 / WALLASEY GT2 / WOODSIDE GT2	Asset Mod.		**132kV Transformer Modernisation** 132kV transformer replacement at Woodside	-	*	2027/28	Planned

*Could increase generation hosting capacity.

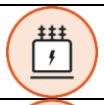
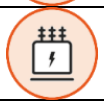
EHV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
BROMBOROUGH GT3 / ROCK FERRY GT2	Asset Mod.		**EHV RMU Modernisation** EHV RMU replacement at BXL Bromborough	-	*	2025/26	Planned
HESWALL GT1 / HOYLAKE GT2 / PRENTON GT3	Asset Mod.		**EHV RMU Modernisation** EHV RMU replacements at Greasby	-	*	2024/25	Planned
PRENTON GT1 / ROCK FERRY GT1	Thermal	SU	**Flexibility Services for High Utilisation Groups** Flexibility services to manage thermal constraints For details see: EJP	9.8	-	2025/26 to 2027/28	Planned
	Asset Mod.		**EHV RMU Modernisation** EHV RMU replacement at Shell Tranmere	-	*	2027/28	Planned
	Asset Mod.		**EHV RMU Modernisation** EHV RMU replacement at Cammell Laird North	-	*	2024/25	Planned
	Asset Mod.		**EHV RMU Modernisation** EHV RMU replacements at Cammell Laird South	-	*	2024/25	Planned
WALLASEY GT1 / WALLASEY GT2 / WOODSIDE GT2	Fault Level		**Woodside Grid 33kV Fault Level Mitigation** Replace EHV switchgear and associated remote end protection modifications For details see: EJP	-	*	2025/26	Planned
	Fault Level		**SPM 33kV RMUs Fault Level Mitigation** Replace the EHV RMUs at BR Shore Road and Mobil Oil Wallasey For details see: EJP	-	*	2023/24	Delivery
	Asset Mod.		**EHV RMU Modernisation** EHV RMU replacement at New Brighton	-	*	2023/24	Delivery
	Asset Mod.		**EHV RMU Modernisation** EHV RMU replacements at Egremont	-	*	2024/25	Planned
	Asset Mod.		**EHV RMU Modernisation** EHV RMU replacements at Gilbrook Dock	-	*	2027/28	Planned
	Asset Mod.		**EHV RMU Modernisation** EHV RMU replacements at Seaview Road	-	*	2027/28	Planned

*Could increase generation hosting capacity.

EHV/HV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
BENTINCK ST T1 / BENTINCK ST T2 / CHESTER ST T1	Fault Level		**SPM 6.6kV Network Groups Fault Level Mitigation** Uprating from 6.6kV to 11kV For details see: EJP	-	1.8	2027/28	Planned
GILBROOK DOCK T1 / HILL RD T1 / MOBIL OIL (WALLASEY) T1	Fault Level		**SPM 6.6kV Network Groups Fault Level Mitigation** Uprating from 6.6kV to 11kV For details see: EJP	-	1.8	2025/26	Planned
HESWALL GT1 / HOYLAKE GT2 / PRENTON GRID GT3	Asset Mod.		**EHV Transformer Modernisation** EHV Transformer replacement at Thingwall	-	*	2023/24	Delivery
MDHB EGERTON DOCK T1 / MDHB EGERTON DOCK T2	Fault Level		**SPM 6.6kV Network Groups Fault Level Mitigation** Uprating from 6.6kV to 11kV For details see: EJP	-	0.9	2027/28	Planned
PRENTON GRID GT1 / ROCK FERRY GT1	Thermal	SU	**Flexibility Services for High Utilisation Groups** Flexibility services to manage thermal constraints at Mere For details see: EJP	3.1	-	2026/27 to 2027/28	Planned
	Asset Mod.		**EHV Transformer Modernisation** EHV transformer replacement at Cammell Laird North	-	*	2023/24	Delivery
	Asset Mod.		**EHV Transformer Modernisation** EHV transformer replacements at Cammell Laird South	-	*	2023/24	Delivery
	Asset Mod.		**EHV Transformer Modernisation** EHV transformer replacement at Tranmere	-	*	2024/25	Delivery
WALLASEY GT1 / WALLASEY GT2 / WOODSIDE GT2	Asset Mod.		**EHV Transformer Modernisation** EHV transformer replacements at BR Shore Road Primary	-	*	2025/26	Planned

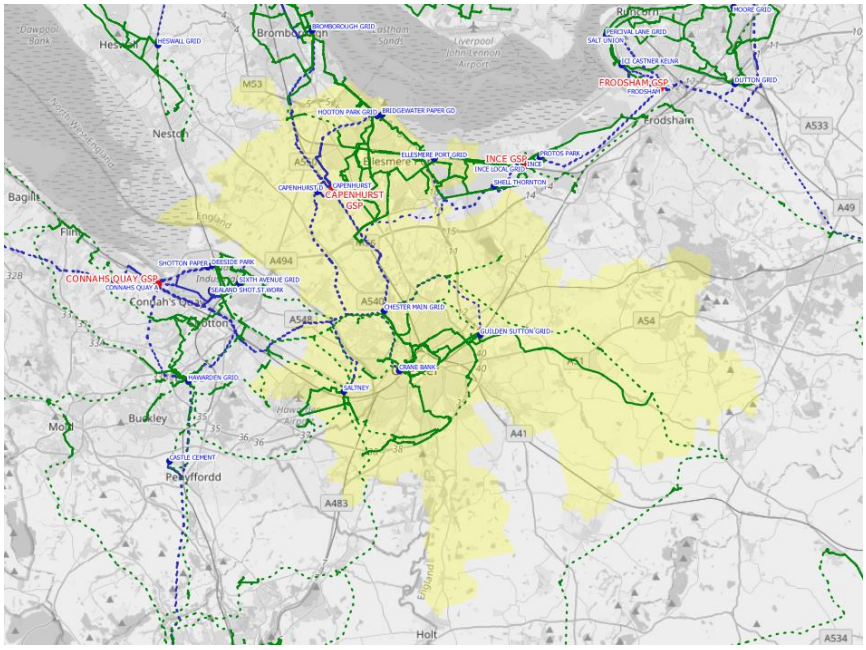
*Could increase generation hosting capacity.

HV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
PRENTON GRID GT1 / ROCK FERRY GT1	Asset Mod.		**HV Switchgear Primary Condition Modernisation Programme** Replace Switchgear at Shell Tranmere	-	*	2026/27	Planned
	Asset Mod.		**HV Switchgear Primary Condition Modernisation Programme** Replace Switchgear at Cammell Laird North	-	*	2023/24	Delivery
	Asset Mod.		**HV Switchgear Primary Condition Modernisation Programme** Replace Switchgear at Egerton	-	*	2024/25	Planned

	Asset Mod.		**HV Switchgear Primary Condition Modernisation Programme** Replace Switchgear at Ford	-	*	2024/25	Planned
	Asset Mod.		**HV Switchgear Primary Condition Modernisation Programme** Replace Switchgear at Singleton Avenue	-	*	2027/28	Planned
WALLASEY GT1 / WALLASEY GT2 / WOODSIDE GT2	Asset Mod.		**HV Switchgear Primary Condition Modernisation Programme** Replace Switchgear at Mobil Oil (Wallasey)	-	*	2023/24	Delivery

*Could increase generation hosting capacity.

6.2 Capenhurst



This section of network is fed via three 180MVA 275/132kV super grid transformers. This group supplies around 101,000 consumers in Bromborough, Hooton Park, Ellesmere Port, Chester Main, Guilden Sutton, Crane Bank and surrounding areas.

Summary	**Number of Interventions and Schemes**	**132kV**	-
		132kV/EHV	-
		EHV	6*
		EHV/HV	4*
		HV	-
	Capacity Added (MVA)		-
	Flexibility Services (MW)		2.1

*Could increase generation hosting capacity.

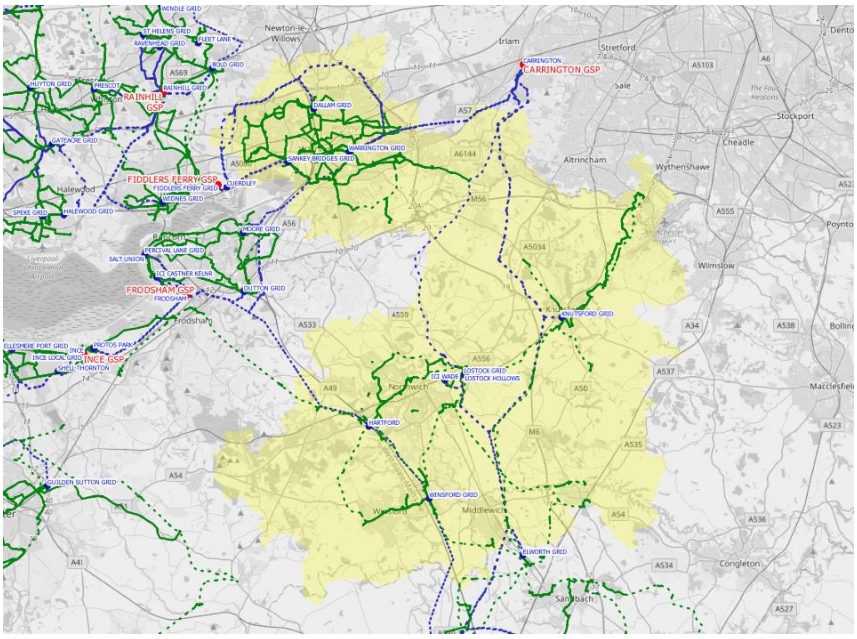
EHV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
BROMBOROUGH GT2 / ELLESMERE PORT GT1 / HOOTON PK GT1A / HOOTON PK GT2A	Fault Level		**SPM 33kV RMUs Fault Level Mitigation** Installation of Real Time Fault Level Monitoring equipment at Hooton Park Grid B For details see: EJP	-	*	2027/28	Planned
CHESTER MAIN GT4 / CRANE BANK GT1 / GUILDEN SUTTON GT1 / SALTNEY G2A	Fault Level		**SPM 33kV RMUs Fault Level Mitigation** Replace the EHV RMU at Mannings Lane For details see: EJP	-	*	2023/24	Planned
	Fault Level		**SPM 33kV RMUs Fault Level Mitigation** Installation of Real Time Fault Level Monitoring equipment at Northgate Terrace For details see: EJP	-	*	2027/28	Planned
	Asset Mod.		**EHV CB Modernisation** EHV circuit breaker replacements at LCWW Huntington	-	*	2026/27	Planned
	Asset Mod.		**EHV CB Modernisation** EHV circuit breaker replacements at Tarvin	-	*	2026/27	Planned
HOOTON PK GT1B / HOOTON PK GT2B	Fault Level		**Fault Level Monitoring and Management** Install Real Time Fault Level Monitoring equipment at Hooton Park Grid B For details see: EJP	-	*	2023/24	Delivery

*Could increase generation hosting capacity.

EHV/HV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
BROMBOROUGH GT2 / ELLESMERE PORT GT1 / HOOTON PK GT1A / HOOTON PK GT2A	Thermal		**EHV Transformer Modernisation** EHV Transformer replacement at Vauxhall	-	*	2023/24	Delivery
CHESTER MAIN GT4 / CRANE BANK GT1 / GUILDEN SUTTON GT1 / SALTNEY G2A	Thermal	SU	**Flexibility Services for High Utilisation Groups** Flexibility services to manage thermal constraints at Tarvin For details see: EJP	2.1	-	2025/26 to 2027/28	Planned
	Thermal		**EHV Transformer Modernisation** EHV Transformer replacement at Crane Bank	-	*	2024/25	Planned
	Thermal		**EHV Transformer Modernisation** EHV Transformer replacement at Grosvenor Street	-	*	2024/25	Planned

*Could increase generation hosting capacity.

6.3 Carrington – Fiddlers Ferry



This section of network is normally fed via two 240MVA 275/132kV super grid transformers at Fiddlers Ferry and two 120MVA 275/132kV super grid transformers at Carrington. This group supplies around 153,000 consumers in Warrington, Dallam, Knutsford, Sankey Bridges, Elworth, Hartford, Lostock and Winsford areas.

Summary	**Number of Interventions and Schemes**	**132kV**	2*
		132kV/EHV	3*
		EHV	5*
		EHV/HV	9
		HV	2*
	Capacity Added (MVA)		62.5
	Flexibility Services (MW)		45.8

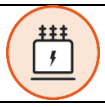
*Could increase generation hosting capacity.

132kV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
DALLAM GT1 / SANKEY BRIDGES GT1 / WARRINGTON GT3	Asset Mod.		**132kV Switchgear Modernisation** Replace switching isolator at Dallam	-	*	2027/28	Planned
ELWORTH GT1 / ELWORTH GT2 / KNUTSFORD GT1 / KNUTSFORD GT2	Asset Mod.		**132kV Switchgear Modernisation** 132kV switchgear replacement at ICI Wade	-	*	2023/24	Delivery

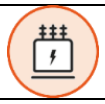
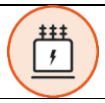
*Could increase generation hosting capacity.

132kV/EHV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
Carrington - Fiddlers Ferry 132KV Group	Thermal		**Carrington Fiddlers Ferry 132kV Reinforcement** Construct a 132/33kV substation near Hulseheath For details see: DNOA and EJP	-	60.0	RIIO-ED3	Deferred
		 OUSA	**Carrington Fiddlers Ferry 132kV Smart Management** Dedicated monitoring and automation at Cuerdley 132kV substation Flexibility services to manage the Sankey Bridges to Hartford 132kV circuit For details see: DNOA and EJP	16.4	-	2026/27 to 2027/28	Planned
HARTFORD GT1 / LOSTOCK GT2 / WINSFORD GT1 / WINSFORD GT2	Asset Mod.		**132kV Transformer Modernisation** 132kV transformer replacement and refurbishment at Lostock	-	*	2025/26	Planned

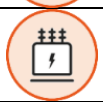
*Could increase generation hosting capacity.

EHV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
DALLAM GT1 / SANKEY BRIDGES GT1 / WARRINGTON GT3	Fault Level		**SPM 33kV RMUs Fault Level Mitigation** Installation of Real Time Fault Level Monitoring equipment at Hawleys Lane For details see: EJP	-	*	2027/28	Planned
	Thermal	 SU	**Flexibility Services for High Utilisation Groups** Flexibility services to manage thermal constraints For details see: EJP	22.1	-	2026/27 to 2027/28	Planned
SANKEY BRIDGES GT3 / WARRINGTON GT5	Fault Level		**SPM 33kV RMUs Fault Level Mitigation** Installation of Real Time Fault Level Monitoring equipment at Stockton Heath For details see: EJP	-	*	2026/27	Planned
	Fault Level		**Fault Level Monitoring and Management** Installation of Real Time Fault Level Monitoring equipment at Crossfields and Solvay Interox For details see: EJP	-	*	2025/26	Planned
	Asset Mod.		**EHV RMU Modernisation** EHV RMU replacement at Gigg Lane Thelwall	-	*	2025/26	Planned

*Could increase generation hosting capacity.

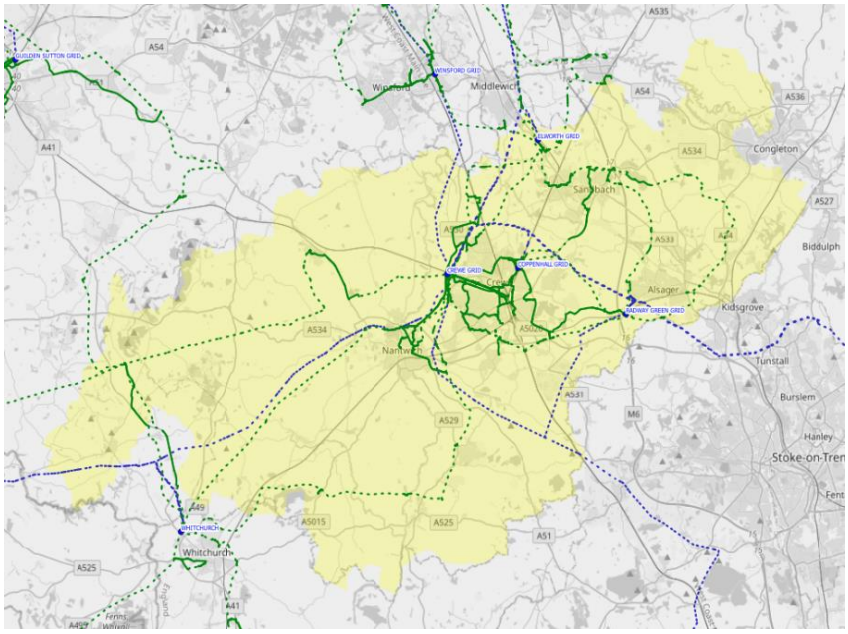
EHV/HV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
HARTFORD GT1 / LOSTOCK GT2 / WINSFORD GT1 / WINSFORD GT2	Thermal	 SU	**Flexibility Services for High Utilisation Groups** Flexibility services to manage thermal constraints at Anderton For details see: EJP	0.9	-	2026/27 to 2027/28	Planned
	Thermal	 SU	**Flexibility Services for High Utilisation Groups** Flexibility services to manage thermal constraints at Hartford For details see: EJP	3.3	-	2025/26 to 2027/28	Planned
	Asset Mod.		**EHV Transformer Modernisation** EHV Transformer replacement at Northwich Town	-	*	2027/28	Planned
ELWORTH GT1 / ELWORTH GT2 / KNUTSFORD GT1 / KNUTSFORD GT2	Thermal		**Middlewich Primary Reinforcement** Additional 10MVA 33/11kV transformer. Extension of the 33kV switchboard Transfer Morrisons primary into Lostock-Gadbrook 33kV circuit and re-route the existing 33kV Lostock- Morrisons circuit to Middlewich primary For details see: EJP	-	2.5	2025/26	Planned
		 SU	**Middlewich Primary Reinforcement** Flexibility services to manage the network risk during delivery of reinforcement For details see: EJP	1.8	-	2023/24 to 2024/25	Planned
	Thermal	 SU	**Flexibility Services for High Utilisation Groups** Flexibility services to manage thermal constraints at Holmes Chapel For details see: EJP	0.3	-	2027/28	Planned
SANKEY BRIDGES GT3 / WARRINGTON GT5	Thermal		**Flexibility Services for High Utilisation Groups** Enhanced transformer ratings and installation of network automation at Lymm T1 / Whiteleggs T1	-	-	2024/25	Planned
		 SU	**Flexibility Services for High Utilisation Groups** Flexibility services to manage thermal constraints at Lymm T1 / Whiteleggs T1 For details see: EJP	1.0	-	2025/26 to 2027/28	Planned
	Asset Mod.		**EHV Transformer Modernisation** EHV Transformer replacement at Solvay Interox	-	*	2027/28	Planned

*Could increase generation hosting capacity.

HV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
BRITISH ALUMINIUM LATCHFORD	Asset Mod.		**HV Switchgear Primary Condition Modernisation Programme** Replace Switchgear	-	*	2023/24	Delivery
STOCKTON HEATH	Asset Mod.		**HV Switchgear Primary Condition Modernisation Programme** Replace Switchgear	-	*	2027/28	Planned

*Could increase generation hosting capacity.

6.4 Cellarhead



This section of network is fed via one 132kV circuit from the Cellarhead GSP, one 132kV circuit from Whitfield (NGED) and one 132kV circuit from Barlaston (NGED). This group supplies around 80,000 consumers in Coppenhall, Radway Green, Barlaston, Crewe, Whitchurch and surrounding areas.

Summary	**Number of Interventions and Schemes**	**132kV**	1*
		132kV/EHV	2
		EHV	5*
		EHV/HV	7*
		HV	-
	Capacity Added (MVA)		33.0
	Flexibility Services (MW)		34.7

*Could increase generation hosting capacity.

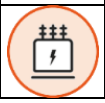
132kV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
COPPENHALL GT1 / CREWE GT1 / CREWE GT2A / CREWE GT4A / RADWAY GREEN GT1 / RADWAY GREEN GT2 / WHITCHURCH GT2	Asset Mod.		**132kV Switchgear Modernisation** 132kV switchgear replacement at Cellarhead For details see: **EJP**	-	*	2025/26	Planned

*Could increase generation hosting capacity.

132kV/EHV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
COPPENHALL GT1 / CREWE GT1 / CREWE GT2A / CREWE GT4A / RADWAY GREEN GT1 / RADWAY GREEN GT2 / WHITCHURCH GT2	Thermal		**Radway Green 33kV Reinforcement** Replace the Radway Green 45MVA GT1 with a 60MVA unit For details see: DNOA and EJP	-	15.0	2026/27	Planned
		SU	**Radway Green 33kV** Flexibility services to manage the network risk during delivery of reinforcement For details see: DNOA and EJP	19.7	-	2026/27 - 2027/28	Planned

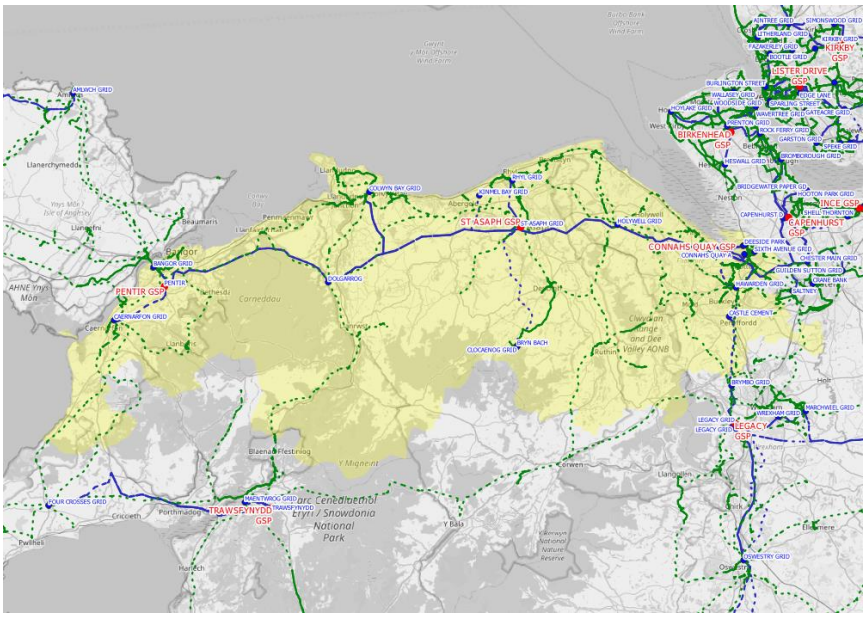
EHV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
COPPENHALL GT1 / CREWE GT1 / CREWE GT2A / CREWE GT4A / RADWAY GREEN GT1 / RADWAY GREEN GT2 / WHITCHURCH GT2	Thermal		**Weston – Basford Sidings 33kV Circuit Reinforcement** Replace 1.2km of overhead line between Weston – HS2 Hough Overlay 0.8km of cable between Weston – HS2 Hough For details see: EJP	-	8.0	2027/28	Planned
		SU	**Weston – Basford Sidings** Flexibility services to manage the network risk during delivery of reinforcement For details see: EJP	4.6	-	2026/27	Planned
	Asset Mod.		**EHV CB Modernisation** EHV circuit breaker replacements at Wrenbury Frith	-	*	2023/24	Delivery
	Asset Mod.		**EHV CB Modernisation** EHV circuit breaker replacements at Audlem	-	*	2024/25	Planned
	Asset Mod.		**EHV CB Modernisation** EHV circuit breaker replacements at Smallwood	-	*	2024/25	Planned

*Could increase generation hosting capacity.

EHV/HV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
COPPENHALL GT1 / CREWE GT1 / CREWE GT2A / CREWE GT4A / RADWAY GREEN GT1 / RADWAY GREEN GT2 / WHITCHURCH GT2	Thermal		**Acer Avenue Primary Reinforcement** Additional 10MVA 33/11kV transformer Replace 33kV and 11kV switchgear Transfer Acer-Avenue into Coppenhall-Wheelock 33kV circuit and re-route the existing 33kV Coppenhall-Acer Avenue circuit to Rolls Royce primary. For details see: EJP	-	2.5	2026/27	Planned
		 SU	**Acer Avenue** Flexibility services to manage the network risk during delivery of reinforcement. For details see: EJP	7.9	-	2023/24 to 2026/27	Planned
	Thermal		**Sandbach Primary Reinforcement** Additional 10MVA 33/11kV transformer at Fodens. Replace 33kV and 11kV switchgear. Establish new 11kV interconnector between Sandbach and Fodens For details see: EJP	-	7.5	2024/25	Planned
		 SU	**Sandbach** Flexibility services to manage the network risk during delivery of reinforcement For details see: EJP	4.7	-	2023/24 to 2025/26	Planned
	Thermal	 SU	**Flexibility Services for High Utilisation Groups** Flexibility services to manage thermal constraints at Smallwood For details see: EJP	3.9	-	2025/26 to 2027/28	Planned
	Thermal	 SU	**Flexibility Services for High Utilisation Groups** Flexibility services to manage thermal constraints at Nantwich For details see: EJP	2.1	-	2026/27 to 2027/28	Planned
	Asset Mod.		**EHV Transformer Modernisation** EHV Transformer replacement at B Rly Steelworks	-	*	2024/25	Planned

*Could increase generation hosting capacity.

6.5 Connah's Quay – Pentir – St. Asaph



This section of network is fed via four 240MVA 400/132kV super grid transformers at Connah's Quay, two 240MVA super grid transformers at Pentir and one 240MVA 400/132kV super grid transformer at St Asaph. This group supplies arond 200,000 consumers in Deeside Park, Saltney, Hawarden, Castle Cement, Brymbo, Holywell, Rhyl, Colwyn Bay, Dolgarrog, Bangor, Caernarfon and surrounding areas.

Summary	**Number of Interventions and Schemes**	**132kV**	2
		132kV/EHV	2*
		EHV	13*
		EHV/HV	6*
		HV	2*
	Capacity Added (MVA)		134.8
	Flexibility Services (MW)		88.8

*Could increase generation hosting capacity.

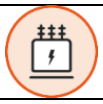
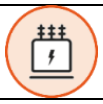
132kV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
Connah's Quay 132kV group DEESIDE PK GT1 / SIXTH AVE GT1 CASTLE CEMENT GT1 / HAWARDEN GT1 / SALTNEY GT1 / SALTNEY G2B	Thermal and Security of Supply		**Connahs Quay 132kV Reinforcement** Install 60MVA GT at Deeside Park. Install 132kV Bus Section circuit breaker at Connahs Quay to enable 2+2 SGT operational arrangement. Swap Sixth Avenue GT with RAF Sealand circuit. Transfer Sixth Avenue GT onto busbar section "C" and "Normally open" bus section reactor. Run the bus section reactor at Hawarden - Normally Open For details see: DNOA and EJP	-	130.0	2027/28	Planned
		 SU	**Connahs Quay 132kV** Flexibility services to manage the network risk during delivery of reinforcement For details see: DNOA and EJP	43.2	-	2026/27 to 2027/28	Planned

132kV/EHV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
BRYMBO GT2 / HAWARDEN GT2 / HOLYWELL GT2	Asset Mod.		**132kV Transformer Modernisation** Replace and refurbish 132kV transformers at Hawarden	-	*	2024/25	Planned
COLWYN BAY GT1 / COLWYN BAY GT2 / DOLGARROG GT2	Asset Mod.		**132kV Transformer Modernisation** Replace and refurbish 132kV transformers at Colwyn Bay	-	*	2027/28	Planned

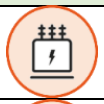
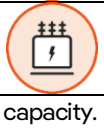
*Could increase generation hosting capacity.

EHV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
BANGOR GT2 / CAERNARFON GT2	Asset Mod.		**EHV CB Modernisation** EHV circuit breaker replacement at Peblic Mills	-	*	2025/26	Planned
	Asset Mod.		**EHV CB Modernisation** EHV circuit breaker replacements at Bangor Hospital	-	*	2025/26	Planned
BRYMBO GT2 / HAWARDEN GT2 / HOLYWELL GT2	Voltage	SU	**Brymbo-Hawarden-Holywell 33kV** Contract flexibility services to mitigate low voltage issues in the group For details see: DNOA and EJP	26.7	-	2023/24 to 2027/28	Planned
	Asset Mod.		**EHV CB Modernisation** EHV circuit breaker replacement at North Wales Paper	-	*	2023/24	Delivery
CASTLE CEMENT GT1 / HAWARDEN GT1 / SALTNEY GT1 / SALTNEY G2B	Asset Mod.		**EHV CB Modernisation** EHV circuit breaker replacements at Queensferry	-	*	2025/26	Planned
COLWYN BAY GT1 / COLWYN BAY GT2 / DOLGARROG GT2	Security of Supply		**Colwyn Bay-Dolgarrog 33kV Reinforcement** Install 25MVA 33kV 5% reactor at Colwyn Bay Grid substation For details see: DNOA and EJP	-	*	2025/26	Planned
	Security of Supply	OUSA	**Colwyn Bay-Dolgarrog 33kV** Flexibility services to manage the constraint on the 33kV circuit from Colwyn Bay to Dolgarrog For details see: DNOA and EJP	13.0	-	2023/24 to 2027/28	Planned
	Asset Mod.		**EHV CB Modernisation** EHV circuit breaker replacements at Conwy	-	*	2023/24	Delivery
	Asset Mod.		**EHV CB Modernisation** EHV circuit breaker replacements at Penmaenmawr	-	*	2026/27	Planned
DEESIDE PK GT1 / SIXTH AVE GT1	Fault Level		**Fault Level Monitoring and Management** Installation of Real Time Fault Level Monitoring at Deeside Ind Park For details see: EJP	-	*	2024/25	Planned
HOLYWELL GT1 / RHYL GT1 / ST ASAPH GT2 / ST ASAPH GT4	Asset Mod.		**EHV CB Modernisation** EHV circuit breaker replacements at Llanfwrog	-	*	2023/24	Delivery
	Fault Level		**Fault Level Monitoring and Management** Installation of Real Time Fault Level Monitoring equipment and Active Fault Level Monitoring equipment at St Asaph Grid For details see: EJP	-	*	2025/26	Planned
	Asset Mod.		**EHV CB Modernisation** EHV circuit breaker replacements at Rhuddlan	-	*	2023/24	Delivery

*Could increase generation hosting capacity.

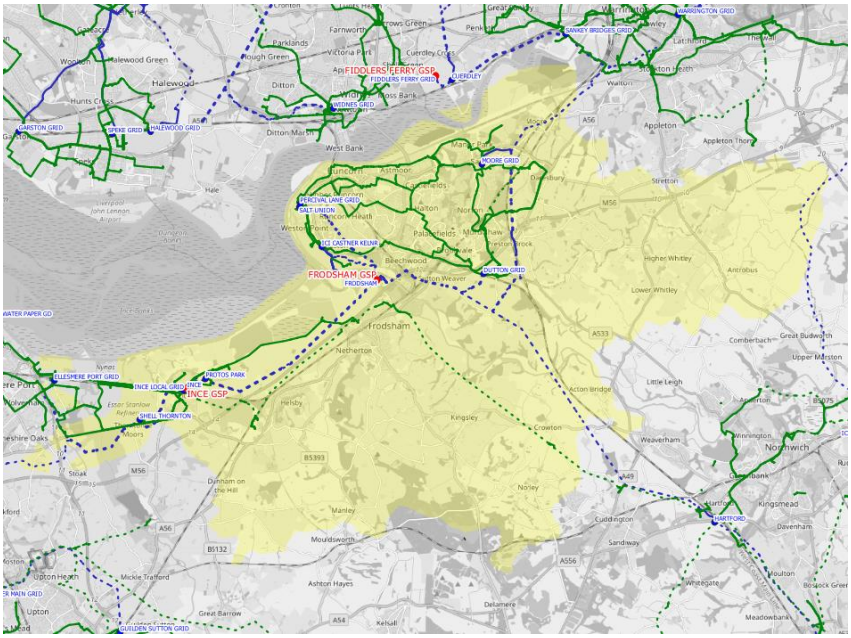
EHV/HV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
CASTLE CEMENT GT1 / HAWARDEN GT1 / SALTNEY GT1 / SALTNEY G2B	Thermal	 SU	**Flexibility Services for High Utilisation Groups** Flexibility services to manage thermal constraints at Caergwrle T1 For details see: EJP	4.6	-	2025/26 to 2027/28	Planned
	Asset Mod.		**EHV Transformer Replacement** Replace transformer at Hawarden	-	*	2026/27	Planned
COLWYN BAY GT1 / COLWYN BAY GT2 / DOLGARROG GT2	Thermal	 SU	**Flexibility Services for High Utilisation Groups** Flexibility services to manage thermal constraints at Nant-Y-Gamar T1 For details see: EJP	0.1	-	2027/28	Planned
	Asset Mod.		**EHV Transformer Replacement** Replace transformer at Ivy Street	-	*	2023/24	Delivery
HOLYWELL GT1 / RHYL GT1 / ST ASAPH GT2 / ST ASAPH GT4	Thermal	 SU	**Flexibility Services for High Utilisation Groups** Flexibility services to manage thermal constraints at Abergele T1 / Pensarn T1 For details see: EJP	1.2	-	2026/27 to 2027/28	Planned
WIMPEYS PANT QUARRY T1 / WIMPEYS PANT QUARRY T2	Asset Mod.		**EHV Transformer Replacement** Replace Wimpeys Pant Quarry T2 with a 7.5/10MVA unit	-	4.8	2024/25	Planned

*Could increase generation hosting capacity.

HV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
BANGOR GT2 / CAERNARFON GT2	Asset Mod.		**HV Switchgear Primary Condition Modernisation Programme** Replace Switchgear at Ferodo	-	*	2024/25	Planned
HOLYWELL GT1 / RHYL GT1 / ST ASAPH GT2 / ST ASAPH GT4	Asset Mod.		**HV Switchgear Primary Condition Modernisation Programme** Replace Switchgear at Promenade	-	*	2026/27	Planned

*Could increase generation hosting capacity.

6.6 Frodsham – Ince



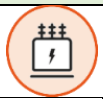
This section of network is fed via one 180MVA and one 240MVA 275/132kV super grid transformers at Frodsham and three 180MVA 275/132kV SGTs at Capenhurst. This group supplies arond 43,000 consumers in Moore, Dutton, Percival Lane, Ince Local, Ellesmere Port and surrounding areas.

Summary	**Number of Interventions and Schemes**	**132kV**	-
		132kV/EHV	-
		EHV	-
		EHV/HV	2*
		HV	1*
	Capacity Added (MVA)		-
	Flexibility Services (MW)		0.4

*Could increase generation hosting capacity.

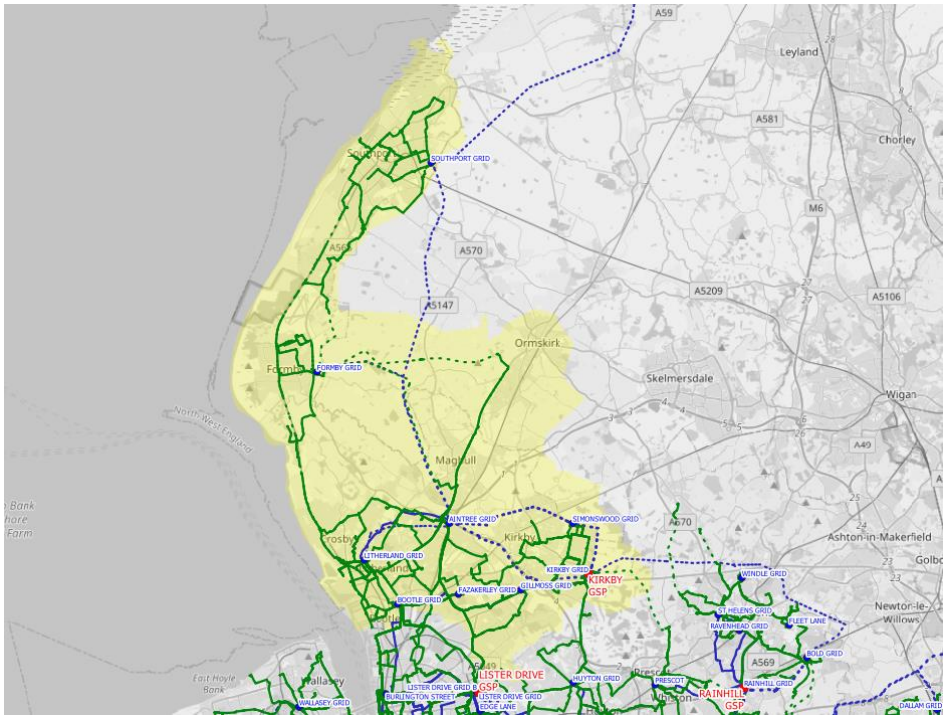
EHV/HV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
DUTTON GT2 / MOORE GT1 / PERCIVAL LA GT1	Asset Mod.		**EHV Transformer Replacement** Replace transformer at Manor Park	-	*	2024/25	Planned
ELLESMERE PORT GT2 / INCE LOCAL GT1 / INCE LOCAL GT2	Thermal	SU	**Flexibility Services for High Utilisation Groups** Flexibility services to manage thermal constraints at Frodsham Local For details see: EJP	0.4	-	2027/28	Planned

*Could increase generation hosting capacity.

HV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
DUTTON GT2 / MOORE GT1 / PERCIVAL LA GT1	Asset Mod.		**HV Switchgear Primary Condition Modernisation Programme** Replace Switchgear at Percival Lane	-	*	2026/27	Planned

*Could increase generation hosting capacity.

6.7 Kirkby

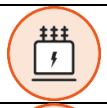
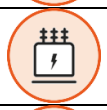
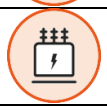


This section of network is fed via three 240MVA 275/132kV super grid transformers and one 180MVA 400/132kV super grid transformer. This group supplies arond 192,000 consumers in Kirkby, Litherland, Simonswood, Aintree, Formby, Southport, Gillmoss, Fazakerley, Bootle and surrounding areas.

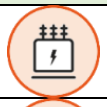
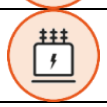
Summary	**Number of Interventions and Schemes**	**132kV**	-
		132kV/EHV	-
		EHV	13*
		EHV/HV	3*
		HV	4*
	Capacity Added (MVA)		38.0
	Flexibility Services (MW)		24.5

*Could increase generation hosting capacity.

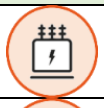
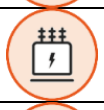
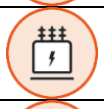
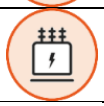
EHV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
AINTREE GT1 / FORMBY GT2A / LITHERLAND GT1B	Thermal	SU	**Flexibility Services for High Utilisation Groups** Flexibility services to manage thermal constraints For details see: EJP	0.8	-	2027/28	Planned
AINTREE GT2 / FAZAKERLEY GT1 / GILLMOSS GT2	Fault Level		**SPM 33kV RMUs Fault Level Mitigation** Installation of Real Time Fault Level Monitoring equipment at Jacobs For details see: EJP	-	*	2027/28	Planned

FORMBY GT2B / SOUTHPORT GT1 / SOUTHPORT GT2	Thermal		**Formby-Southport 33kV Reinforcement** Overlay 14km of cable and establish new 33kV interconnector between Formby and Southport. Extend 33kV switchboard at Formby by one circuit breaker. Refurbish and use spare circuit breaker at Southport Grid substation For details see: DNOA and EJP	-	28.0	2025/26	Planned
		 SU	**Formby-Southport 33kV** Flexibility services to manage the network risk during delivery of reinforcement For details see: DNOA and EJP	23.7	-	2023/24 to 2027/28	Planned
	Asset Mod.		**EHV RMU Modernisation** EHV RMU replacement at Mullards Balmoral Road	-	*	2025/26	Planned
	Asset Mod.		**EHV RMU Modernisation** EHV RMU replacements at Grantham Close	-	*	2024/25	Planned
	Asset Mod.		**EHV RMU Modernisation** EHV RMU replacements at Market Street	-	*	2025/26	Planned
	Asset Mod.		**EHV RMU Modernisation** EHV RMU replacements at York Road	-	*	2024/25	Planned
GILLMOSS GT1 / KIRKBY GT2 / SIMONSWOOD GT1	Fault Level		**SPM 33kV RMUs Fault Level Mitigation** Replace 33kV RMU at Hammond Road For details see: EJP	-	*	2026/27	Planned
	Fault Level		**SPM 33kV RMUs Fault Level Mitigation** Replace 33kV RMU at Dickinsons For details see: EJP	-	*	2026/27	Planned
	Fault Level		**SPM 33kV RMUs Fault Level Mitigation** Replace 33kV RMU at St Ivel Foods For details see: EJP	-	*	2026/27	Planned
	Fault Level		**Fault Level Monitoring and Management** Installation of Real Time Fault Level Monitoring equipment at Yorkshire Imperial Metals For details see: EJP	-	*	2024/25	Planned
	Fault Level		**Fault Level Monitoring and Management** Installation of Real Time Fault Level Monitoring equipment at Acornfield Road For details see: EJP	-	*	2024/25	Planned

*Could increase generation hosting capacity.

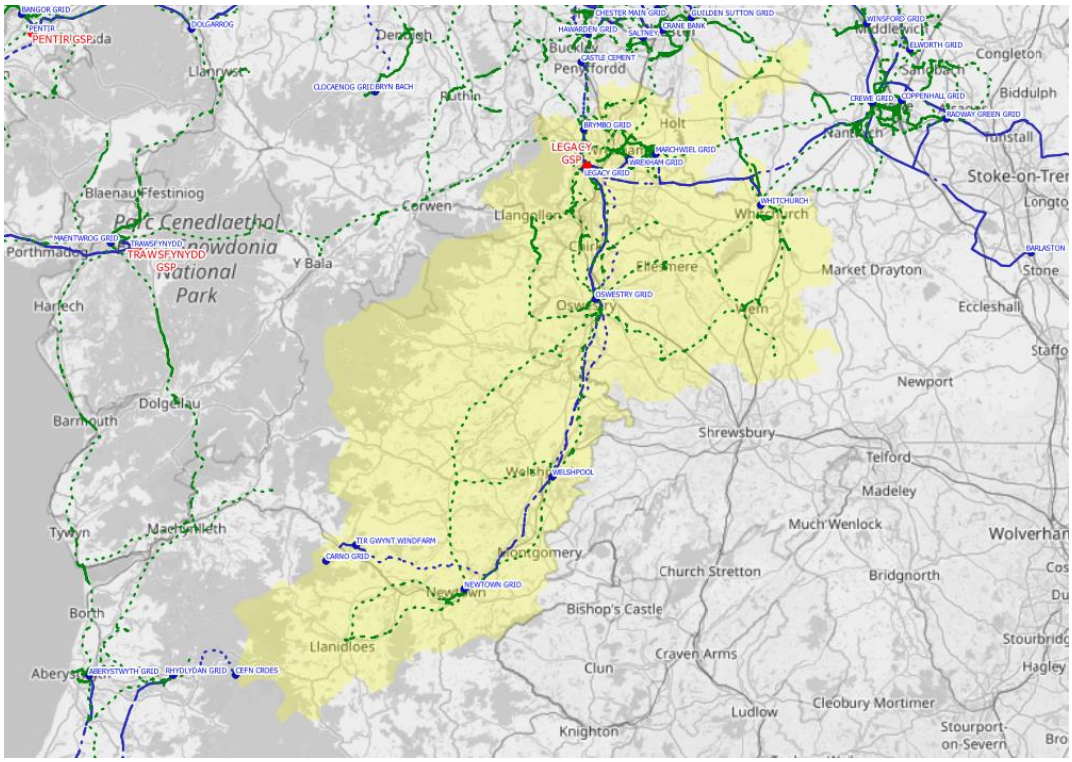
EHV/HV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
AINTREE GT2 / FAZAKERLEY GT1 / GILLMOSS GT2	Asset Mod.		**EHV Transformer Replacement** Replace transformer at Aintree	-	*	2023/24	Delivery
	Asset Mod.		**EHV Transformer Replacement** Replace transformer at Orb Close	-	*	2026/27	Planned
GILLMOSS GT1 / KIRKBY GT2 / SIMONSWOOD GT1	Fault Level		**SPM 11kV Network Group Fault Level Mitigation** Establish a new 7.5/10MVA 33/11kV transformer at Ainsworth Lane substation by looping into the Kirkby-Palco 33kV circuit via 2 x 0.8km cable to split the Kelco-News International-Palco-Southdene group For details see: EJP	-	10.0	2025/26	Planned

*Could increase generation hosting capacity.

HV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
AINTREE GT1 / FORMBY GT2A / LITHERLAND GT1B	Asset Mod.		**HV Switchgear Primary Condition Modernisation Programme** Replace Switchgear at Atlantic Complex	-	*	2024/25	Planned
AINTREE GT2 / FAZAKERLEY GT1 / GILLMOSS GT2	Asset Mod.		**HV Switchgear Primary Condition Modernisation Programme** Replace Switchgear at Lucas Fazakerley	-	*	2024/25	Planned
	Asset Mod.		**HV Switchgear Primary Condition Modernisation Programme** Replace Switchgear at Orb Close	-	*	2025/26	Planned
FORMBY GT2B / SOUTHPORT GT1 / SOUTHPORT GT2	Asset Mod.		**HV Switchgear Primary Condition Modernisation Programme** Replace Switchgear at Marshside	-	*	2025/26	Planned

*Could increase generation hosting capacity.

6.8 Legacy



This section of network is fed via four 240MVA 400/132kV super grid transformers. This group supplies arond 145,000 consumers in Legacy Local, Wrexham, Marchwiel, Whitchurch, Oswestry, Welshpool, Newtown, Brymbo and surrounding areas.

Summary	**Number of Interventions and Schemes**	**132kV**	1
		132kV/EHV	-
		EHV	13*
		EHV/HV	10*
		HV	1*
	Capacity Added (MVA)		17.2
	Flexibility Services (MW)		40.1

*Could increase generation hosting capacity.

132kV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
Legacy 132kV Group	Security of Supply		**Legacy 132kV Reinforcement** Swap SGT2 and SGT4 tails across the 132kV busbar. Install bus section circuit breaker between reserve busbars For details see: **EJP**	-	0.0	2025/26	Planned

EHV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
BRYMBO GT1 / LEGACY LOCAL GT1 / MARCHWIEL GT1 / MARCHWIEL GT2 / WREXHAM GT1	Asset Mod.		**EHV CB Modernisation** EHV circuit breaker replacements at Clywedog Road	-	*	2027/28	Planned
	Asset Mod.		**EHV RMU Modernisation** EHV RMU replacement at Ash Road	-	*	2024/25	Planned
	Asset Mod.		**EHV RMU Modernisation** EHV RMU replacement at Llay	-	*	2023/24	Delivery
	Asset Mod.		**EHV RMU Modernisation** EHV RMU replacement at Davy Way	-	*	2026/27	Planned
	Asset Mod.		**EHV CB Modernisation** EHV circuit breaker replacements at Fibreglass	-	*	2026/27	Planned
	Asset Mod.		**EHV CB Modernisation** EHV circuit breaker replacements at Maelor Creamery	-	*	2027/28	Planned
	Asset Mod.		**EHV CB Modernisation** EHV circuit breaker replacement at Rhosnesni	-	*	2023/24	Delivery
LEGACY LOCAL GT2 / NEWTOWN GT2 / OSWESTRY GT8 / WELSHPOOL GT1	Voltage		**Newtown-Morda 33kV Reinforcement** Additional 10MVAr STATCOM at Newton Grid substation, 33/11 kV step up transformer and outdoor circuit breaker. Additional 33kV, 5MVAr MSC and outdoor circuit breaker at Morda Substation For details see: DNOA and EJP	-	15.0	2027/28	Planned
		SU	**Newtown-Morda 33kV** Flexibility services to manage the network risk during delivery of reinforcement For details see: DNOA and EJP	32.1	-	2023/24 to 2027/28	Planned
	Fault Level		**Fault Level Monitoring and Management** Installation of Real Time Fault Level Monitoring equipment and Active Fault Level Monitoring at Oswestry Grid For details see: EJP	-	*	2024/25	Planned
	Asset Mod.		**EHV CB Modernisation** EHV circuit breaker replacement at Llanddu Quarry	-	*	2025/26	Planned
	Asset Mod.		**EHV CB Modernisation** EHV circuit breaker replacements at Milford	-	*	2024/25	Planned
OSWESTRY GT5 / WHITCHURCH GT1	Asset Mod.		**EHV CB Modernisation** EHV circuit breaker replacements at West Felton	-	*	2024/25	Planned

*Could increase generation hosting capacity.

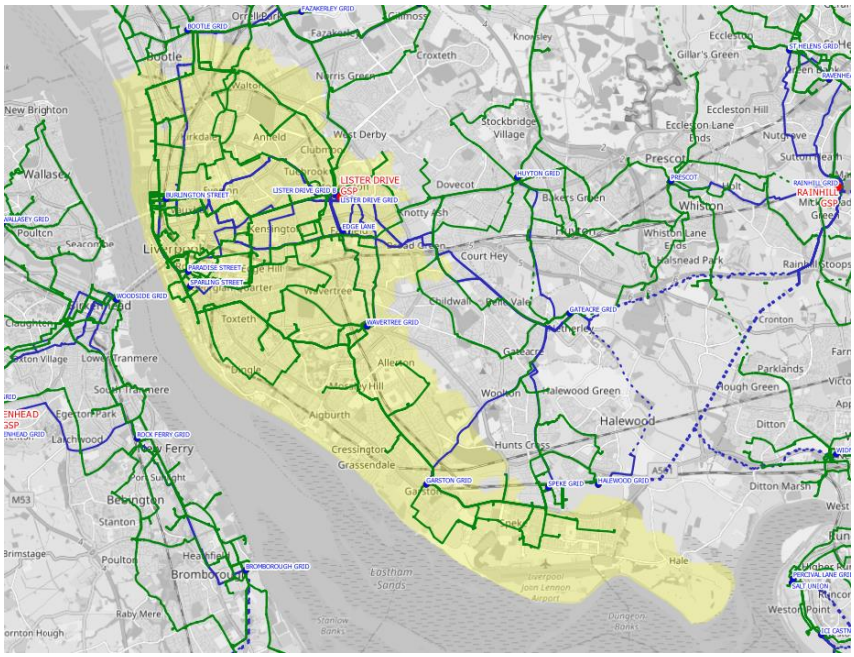
EHV/HV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
BRYMBO GT1 / LEGACY LOCAL GT1 / MARCHWIEL GT1 / MARCHWIEL GT2 / WREXHAM GT1	Thermal	SU	**Flexibility Services for High Utilisation Groups** Flexibility services to manage thermal constraints at Coedpoeth T1 / Coedpoeth T2 For details see: EJP	1.0	-	2027/28	Planned
	Thermal	SU	**Flexibility Services for High Utilisation Groups** Flexibility services to manage thermal constraints at Gwersyllt T1 For details see: EJP	4.3	-	2025/26 to 2027/28	Planned
	Asset Mod.		**EHV Transformer Replacement** Replace transformer at Rhosnesni	-	*	2023/24	Delivery
LEGACY LOCAL GT2 / NEWTOWN GT2 / OSWESTRY GT8 / WELSHPOOL GT1	Thermal	SU	**Flexibility Services for High Utilisation Groups** Flexibility services to manage thermal constraints at Forden T1 For details see: EJP	0.3	-	2026/27 to 2027/28	Planned
	Thermal	SU	**Flexibility Services for High Utilisation Groups** Flexibility services to manage thermal constraints at Johnstown T1 For details see: EJP	0.6	-	2026/27 to 2027/28	Planned
	Thermal	SU	**Flexibility Services for High Utilisation Groups** Flexibility services to manage thermal constraints at Llandrinio T1 For details see: EJP	0.7	-	2025/26 to 2027/28	Planned
	Thermal	SU	**Flexibility Services for High Utilisation Groups** Flexibility services to manage thermal constraints at Llanidloes T1 / Llanidloes T2 For details see: EJP	0.7	-	2026/27 to 2027/28	Planned
	Thermal	SU	**Flexibility Services for High Utilisation Groups** Flexibility services to manage thermal constraints at Raven Square T1 For details see: EJP	0.6	-	2027/28	Planned
	Asset Mod.		**EHV Transformer Replacement** Replace Llanfyllin T1 and T2 with 7.5/10MVA units	-	2.2	2026/27	Planned
	Asset Mod.		**EHV Transformer Replacement** Replace transformer at Llanddu Quarry	-	*	2025/26	Planned

*Could increase generation hosting capacity.

HV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
BRYMBO GT1 / LEGACY LOCAL GT1 / MARCHWIEL GT1 / MARCHWIEL GT2 / WREXHAM GT1	Asset Mod.		**HV Switchgear Primary Condition Modernisation Programme** Replace Switchgear at Ind Coope	-	*	2025/26	Planned

*Could increase generation hosting capacity.

6.9 Lister Drive

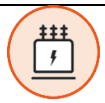
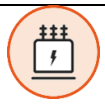
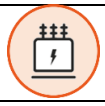


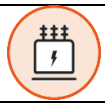
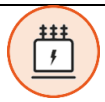
This section of network is normally fed via three 240MVA 275/132kV super grid transformers. This group supplies arond 165,000 consumers in Lister Drive, Wavertree, Burlington Street, Sparling Street, Paradise Street, Garston, Bootle and surrounding areas.

Summary	**Number of Interventions and Schemes**	**132kV**	2
		132kV/EHV	-
		EHV	13
		EHV/HV	4*
		HV	3*
	Capacity Added (MVA)		5.1
	Flexibility Services (MW)		22.2

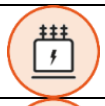
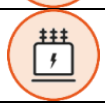
*Could increase generation hosting capacity.

132kV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
Lister Drive 132kV Group	Thermal		**Lister Drive 132kV Reinforcement** Install real time thermal monitoring equipment on 132kV circuit to Burlington Street. CMZ based automation scheme to trip Burlington St. – Bootle circuit and close either line or bus section beaker at Bootle. Annual tendering for flexibility to reduce dependence on automation scheme and higher demand turnout For details see: DNOA and EJP	-	-	2027/28	Planned
		 SU	**Lister Drive 132kV** Flexibility services to manage the network risk during delivery of reinforcement For details see: DNOA and EJP	22.2	-	2024/25 to 2027/28	Planned

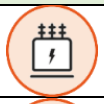
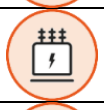
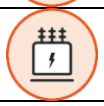
EHV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
BOOTLE GT2A / BURLINGTON ST GT1 / LISTER DV A GT2	Fault Level		**Fault Level Monitoring and Management** Installation of Real Time Fault Level Monitoring equipment at Bootle Grid B For details see: EJP	-	*	2023/24	Delivery
	Fault Level		**SPM 33kV RMUs Fault Level Mitigation** Replace EHV RMU at Gardners Row For details see: EJP	-	*	2024/25	Planned
	Fault Level		**SPM 33kV RMUs Fault Level Mitigation** Replace EHV RMU at Regent Road For details see: EJP	-	*	2024/25	Planned
	Fault Level		**SPM 33kV RMUs Fault Level Mitigation** Replace EHV RMU at Sheil Park For details see: EJP	-	*	2024/25	Planned
	Fault Level		**SPM 33kV RMUs Fault Level Mitigation** Installation of Real Time Fault Level Monitoring equipment at Suburban Road For details see: EJP	-	*	2026/27	Planned
	Asset Mod.		**EHV CB Modernisation** EHV circuit breaker replacements at Lister Drive	-	*	2023/24	Delivery

BURLINGTON ST GT2 / LISTER DV B GT1 / PARADISE ST GT1	Fault Level		**Fault Level Monitoring and Management** Installation of Real Time Fault Level Monitoring equipment at Paradise Street For details see: EJP	-	*	2026/27	Planned
	Fault Level		**SPM 33kV RMUs Fault Level Mitigation** Replace EHV RMU at Littlewoods For details see: EJP	-	*	2027/28	Planned
	Asset Mod.		**EHV RMU Modernisation** EHV RMU replacement at Oldham Place	-	*	2024/25	Planned
GARSTON GT2 / SPEKE GT3 / WAVERTREE GT1A	Fault Level		**SPM 33kV RMUs Fault Level Mitigation** Replace EHV RMU at Weaver Ind Estate For details see: EJP	-	*	2027/28	Planned
LISTER DV B GT3 / SPARLING ST GT1 / WAVERTREE GT2	Fault Level		**SPM 33kV RMUs Fault Level Mitigation** Replace EHV RMUs at St James For details see: EJP	-	*	2025/26	Planned
	Fault Level		**SPM 33kV RMUs Fault Level Mitigation** Replace EHV RMUs at Blundell Street For details see: EJP	-	*	2025/26	Planned
	Fault Level		**SPM 33kV RMUs Fault Level Mitigation** Installation of Real Time Fault Level Monitoring equipment at Stoneycroft For details see: EJP	-	*	2025/26	Planned

*Could increase generation hosting capacity.

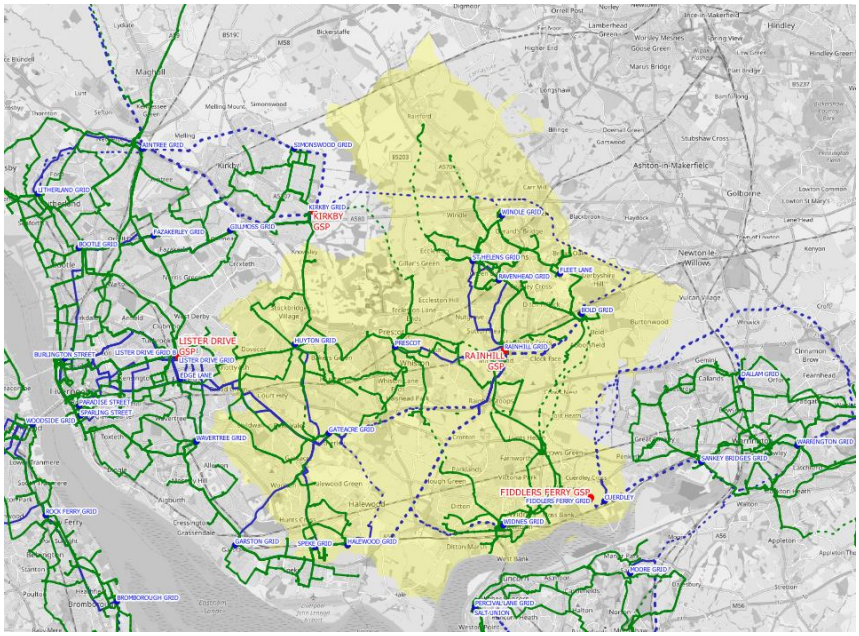
EHV/HV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
BOOTLE GT2A / BURLINGTON ST GT1 / LISTER DV A GT2	Thermal and Fault Level		**Bootle Canal Quarter Regeneration Scheme** Voltage uprating to 11kV at Bibbys. Delamore Street, Inland Revenue, Kirkdale, Regent Road, Sandhills Lane and Walton For details see: EJP	-	5.1	2026/27	Planned
	Asset Mod.		**EHV Transformer Replacement** Replace transformer at Dunlops Walton	-	*	2025/26	Planned
BURLINGTON ST GT2 / LISTER DV B GT1 / PARADISE ST GT1	Asset Mod.		**EHV Transformer Replacement** Replace transformer at Highfield Street A	-	*	2024/25	Planned
	Asset Mod.		**EHV Transformer Replacement** Replace transformer at Royal Ins	-	*	2026/27	Planned

*Could increase generation hosting capacity.

HV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
BOOTLE GT2A / BURLINGTON ST GT1 / LISTER DV A GT2	Asset Mod.		**HV Switchgear Primary Condition Modernisation Programme** Replace Switchgear at Lister Drive	-	*	2025/26	Planned
GARSTON GT2 / SPEKE GT3 / WAVERTREE GT1A	Asset Mod.		**HV Switchgear Primary Condition Modernisation Programme** Replace Switchgear at Yew Tree Road	-	*	2027/28	Planned
LISTER DV B GT3 / SPARLING ST GT1 / WAVERTREE GT2	Asset Mod.		**HV Switchgear Primary Condition Modernisation Programme** Replace Switchgear at Blundell Street	-	*	2023/24	Delivery

*Could increase generation hosting capacity.

6.10 Rainhill



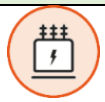
This section of network is fed via four 180MVA 275/132kV super grid transformers. This group supplies arond 177,000 consumers in Prescot, Gateacre, Huyton, Ravenhead, St. Helens, Halewood, Widnes, Speke and surrouding areas.

Summary	**Number of Interventions and Schemes**	**132kV**	2*
		132kV/EHV	1*
		EHV	6*
		EHV/HV	5*
		HV	10*
	Capacity Added (MVA)		14.5
	Flexibility Services (MW)		4.9

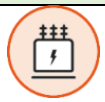
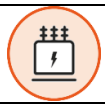
*Could increase generation hosting capacity.

132kV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
GATEACRE GT1 / HUYTON GT1 / KIRKBY GT3 / PRESCOT GT1A	Asset Mod.		**Gateacre 132kV Modernisation** Replace 132kV circuit breaker at Gateacre	-	*	2026/27	Planned
HALEWOOD G1B / HALEWOOD G2B / HALEWOOD GT3 / SPEKE GT1A	Asset Mod.		**Halewood 132kV Modernisation** Replace 132kV circuit breakers at Halewood	-	*	2027/28	Planned

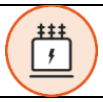
*Could increase generation hosting capacity.

132kV/EHV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
GATEACRE GT1 / HUYTON GT1 / KIRKBY GT3 / PRESCOT GT1A	Asset Mod.		**Gateacre 132kV Modernisation** Replace 132kV transformer at Gateacre	-	*	2026/27	Planned

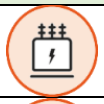
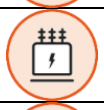
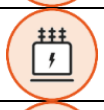
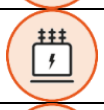
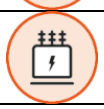
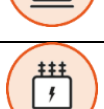
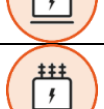
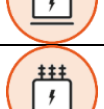
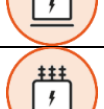
*Could increase generation hosting capacity.

EHV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
BOLD G4A / PRESCOT GT1B / WIDNES GT1 / WIDNES GT2	Fault Level		**SPM 33kV RMUs Fault Level Mitigation** Replace EHV RMU at Hills Moss For details see: EJP	-	*	2023/24	Planned
	Asset Mod.		**EHV RMU Modernisation** EHV RMU replacement at Pilk Sullivan	-	*	2027/28	Planned
GATEACRE GT1 / HUYTON GT1 / KIRKBY GT3 / PRESCOT GT1A	Fault Level		**Fault Level Monitoring and Management** Installation of Real Time Fault Level Monitoring equipment at East Prescot Road (Finch Lane) For details see: EJP	-	*	2024/25	Planned
	Fault Level		**Prescot Grid 33kV Fault Level Mitigation** Install 60MVA 33kV 6% reactor For details see: EJP	-	*	2027/28	Planned
HALEWOOD G1B / HALEWOOD G2B / HALEWOOD GT3 / SPEKE GT1A	Fault Level		**Fault Level Monitoring and Management** Installation of Real Time Fault Level Monitoring equipment at Halewood Grid For details see: EJP	-	*	2023/24	Delivery
	Fault Level		**SPM 33kV RMUs Fault Level Mitigation** Replace 33kV RMU at Woodend Avenue For details see: EJP	-	*	2027/28	Planned

*Could increase generation hosting capacity.

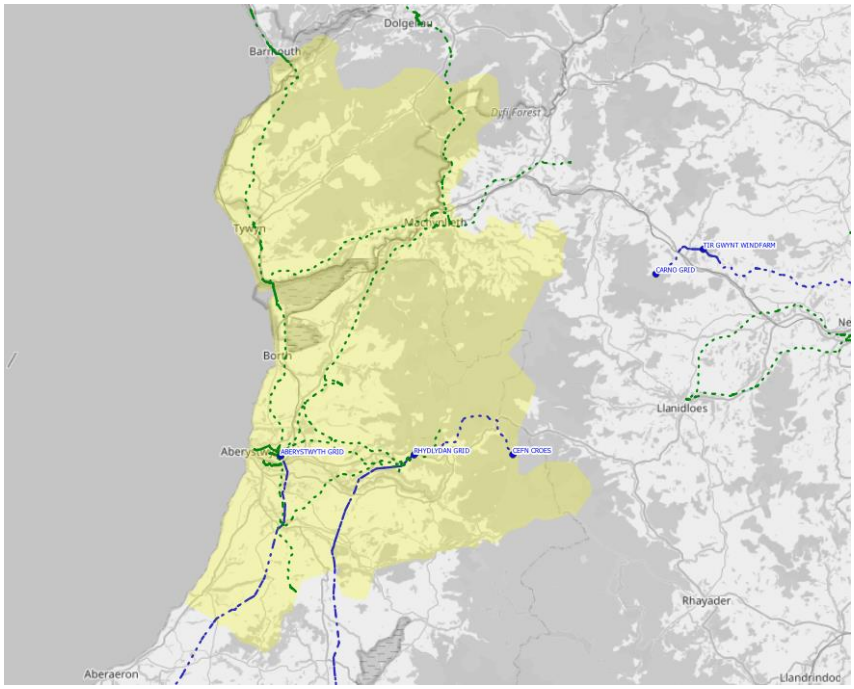
EHV/HV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
BOLD G2A / PRESCOT GT1B / WIDNES GT1 / WIDNES GT2	Thermal	 SU	**Flexibility Services for High Utilisation Groups** Flexibility services to manage thermal constraints at Appleton T1 / Hornsbridge T1 / Lugsdale T2 For details see: EJP	4.9	-	2026/27 to 2027/28	Planned
	Asset Mod.		**EHV Transformer Replacement** Replace transformer at Peter Spence	-	*	2023/24	Delivery
BOLD G2B / RAVENHEAD G1A2 / ST HELENS GT2A	Fault Level		**SPM 6.6kV Network Groups Fault Level Mitigation** Uprating from 6.6 to 11kV at British Sidac For details see: EJP	-	11.8	2025/26	Planned
	Thermal and Fault Level		**St. Helens 6.6kV uprating** Uprating from 6.6 to 11kV at Sherdley Road	-	1.8	2023/24	Delivery
	Thermal and Fault Level		**St. Helens 6.6kV uprating** Uprating from 6.6 to 11kV at Watery Lane	-	0.9	2023/24	Delivery

*Could increase generation hosting capacity.

HV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
BOLD G2A / PRESCOT GT1B / WIDNES GT1 / WIDNES GT2	Asset Mod.		**HV Switchgear Primary Condition Modernisation Programme** Replace Switchgear at Clockface	-	*	2023/24	Delivery
BOLD G2B / RAVENHEAD G1A2 / ST HELENS GT2A	Asset Mod.		**HV Switchgear Primary Condition Modernisation Programme** Replace Switchgear at Almatex	-	*	2023/24	Delivery
	Asset Mod.		**HV Switchgear Primary Condition Modernisation Programme** Replace Switchgear at Chalon Way	-	*	2024/25	Planned
GATEACRE GT1 / HUYTON GT1 / KIRKBY GT3 / PRESCOT GT1A	Asset Mod.		**HV Switchgear Primary Condition Modernisation Programme** Replace Switchgear at Bedburn Drive	-	*	2023/24	Delivery
	Asset Mod.		**HV Switchgear Primary Condition Modernisation Programme** Replace Switchgear at Brook Bridge	-	*	2026/27	Planned
	Asset Mod.		**HV Switchgear Primary Condition Modernisation Programme** Replace Switchgear at Childwall Fiveways	-	*	2023/24	Delivery
	Asset Mod.		**HV Switchgear Primary Condition Modernisation Programme** Replace Switchgear at Lyndene Road	-	*	2024/25	Planned
	Asset Mod.		**HV Switchgear Primary Condition Modernisation Programme** Replace Switchgear at Marled Hey	-	*	2026/27	Planned
RAVENHEAD G1A1 / ST HELENS GT2B / WINDLE GT1	Asset Mod.		**HV Switchgear Primary Condition Modernisation Programme** Replace Switchgear at British Oxygen	-	*	2023/24	Delivery
	Asset Mod.		**HV Switchgear Primary Condition Modernisation Programme** Replace Switchgear at Windlehurst	-	*	2027/28	Planned

*Could increase generation hosting capacity.

6.11 Swansea North



This section of network is fed via two 132kV circuits from Rhos (NGED). This group supplies arond 23,000 consumers in Aberystwyth, Rhydlydan and surrounding areas.

Summary	**Number of Interventions and Schemes**	**132kV**	-
		132kV/EHV	-
		EHV	2
		EHV/HV	4*
		HV	-
	Capacity Added (MVA)		10.0
	Flexibility Services (MW)		9.8

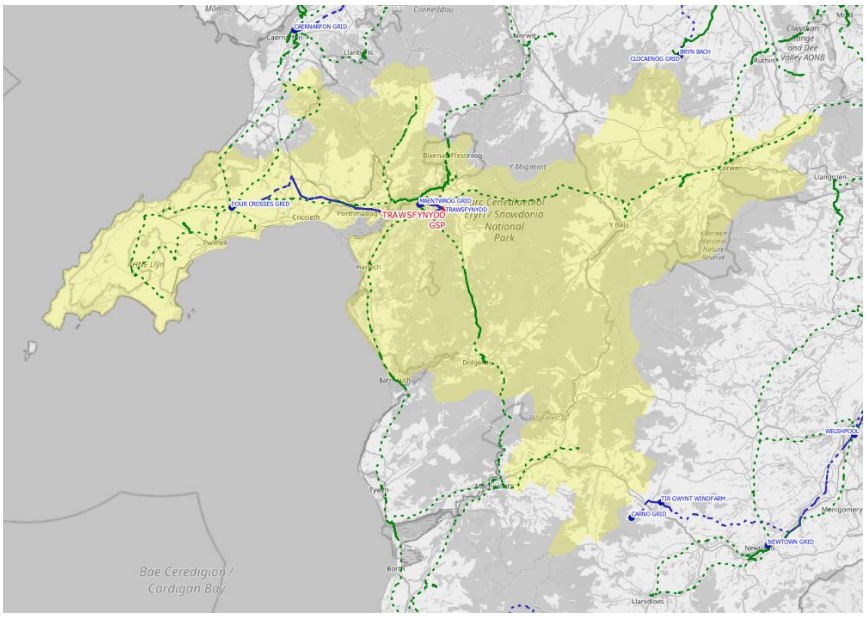
*Could increase generation hosting capacity.

EHV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
ABERYSTWYTH GT2 / RHYDLYDAN GT1	Voltage		**Aberdyfi-Harlech 33kV Reinforcement** Installation of 10MVAr STATCOM, 33/11kV step up transformer and 33kV board extension at Aberdyfi For details see: EJP	-	10.0	2027/28	Planned
		SU	**Aberdyfi-Harlech 33kV Reinforcement** Flexibility services to manage the network risk during delivery of reinforcement For details see: EJP	7.8	-	2023/24 to 2027/28	Planned

EHV/HV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
ABERYSTWYTH GT2 / RHYDLYDAN GT1	Thermal	SU	**Flexibility Services for High Utilisation Groups** Flexibility services to manage thermal constraints at Bos St T1 For details see: EJP	0.4	-	2027/28	Planned
	Thermal	SU	**Flexibility Services for High Utilisation Groups** Flexibility services to manage thermal constraints at Llanilar For details see: EJP	1.0	-	2026/27 to 2027/28	Planned
	Thermal	SU	**Flexibility Services for High Utilisation Groups** Flexibility services to manage thermal constraints at Machynlleth T1 For details see: EJP	0.6	-	2027/28	Planned
	Asset Mod.		**EHV Transformer Replacement** Replace transformer at Rhydlydan	-	*	2024/25	Planned

*Could increase generation hosting capacity.

6.12 Trawsfynydd



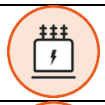
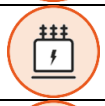
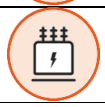
This section of network is fed via two 120MVA 275/132kV super grid transformers. This group supplies arond 42,000 consumers in Four Crosses, Maentwrog and surrounding areas.

Summary	**Number of Interventions and Schemes**	**132kV**	1*
		132kV/EHV	-
		EHV	6*
		EHV/HV	4
		HV	-
	Capacity Added (MVA)		21.2
	Flexibility Services (MW)		30.3

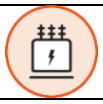
*Could increase generation hosting capacity.

132kV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
FOUR CROSSES GT2 / MAENTWROG GT1 / MAENTWROG GT2	Asset Mod.		**Trawsfynydd 132kV Modernisation** Replace 132kV circuit breakers at Trawsfynydd	-	*	2026/27	Planned

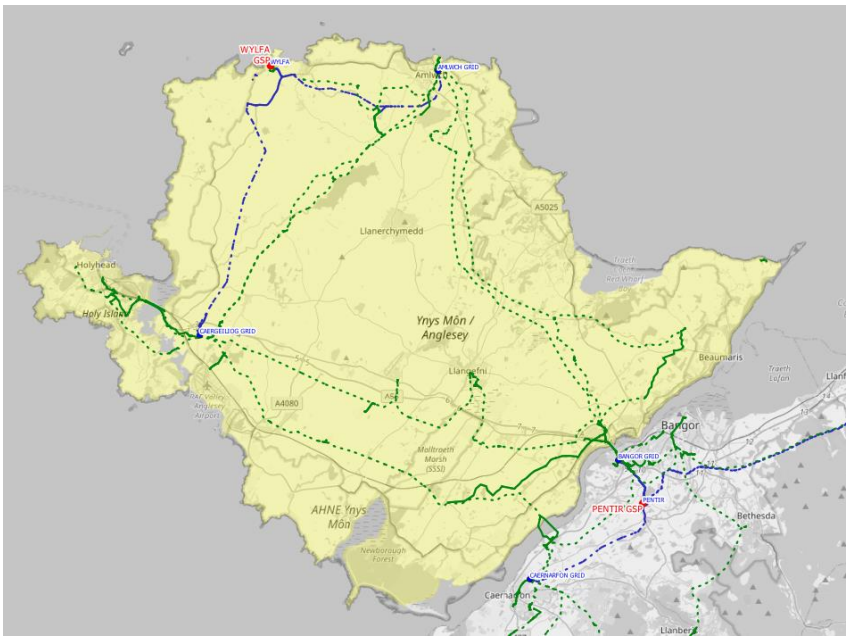
*Could increase generation hosting capacity.

EHV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
FOUR CROSSES GT2 / MAENTWROG GT1 / MAENTWROG GT2	Voltage		**Aberdyfi-Harlech 33kV Reinforcement** Installation of 33kV, 5MVAr MSC and replacement of 33kV AIS breakers with 5-panel switch board at Harlech primary substation For details see: EJP	-	5.0	2027/28	Planned
	Thermal		**Maentwrog-Porthmadog 33kV Reinforcement** Overlay 11km of cable and establish new 33kV circuit between Maentwrog and Porthmadog. Extend 33kV switchboard at Maentwrog and Porthmadog Substations For details see: DNOA and EJP	-	15.0	2025/26	Planned
		 SU	**Maentwrog-Porthmadog 33kV Reinforcement** Flexibility services to manage the network risk during delivery of reinforcement For details see: DNOA and EJP	27.5	-	2023/24 to 2025/26	Planned
	Asset Mod.		**EHV CB Modernisation** EHV circuit breaker replacements at Rhoslan	-	*	2025/26	Planned
	Asset Mod.		**EHV CB Modernisation** EHV circuit breaker replacements at Manod	-	*	2023/24	Delivery
	Asset Mod.		**EHV CB Modernisation** EHV circuit breaker replacements at Rivals	-	*	2027/28	Planned

*Could increase generation hosting capacity.

EHV/HV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
FOUR CROSSES GT2 / MAENTWROG GT1 / MAENTWROG GT2	Thermal	 SU	**Flexibility Services for High Utilisation Groups** Flexibility services to manage thermal constraints at Abersoch T1 For details see: **EJP**	0.2	-	2025/26	Planned
	Thermal	 SU	**Flexibility Services for High Utilisation Groups** Flexibility services to manage thermal constraints at Cemmaes Rd T1 For details see: **EJP**	0.1	-	2027/28	Planned
	Thermal	 SU	**Flexibility Services for High Utilisation Groups** Flexibility services to manage thermal constraints at Edern T1 For details see: **EJP**	2.5	-	2024/25 to 2027/28	Planned
	Asset Mod.		**Primary Transformer Replacement** Replace T1 with a 7.5/10MVA unit	-	1.2	2026/27	Planned

6.13 Wylfa



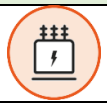
This section of network is fed via two 240MVA 400/132kV super grid transformers. This group supplies arond 39,000 consumers in Amlwch, Caergeiliog and surrounding areas.

Summary	**Number of Interventions and Schemes**	**132kV**	1*
		132kV/EHV	1*
		EHV	4*
		EHV/HV	-
		HV	-
	Capacity Added (MVA)		-
	Flexibility Services (MW)		-

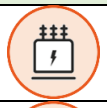
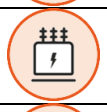
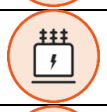
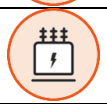
*Could increase generation hosting capacity.

132kV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
AMLWCH GT1 / CAERGEILIOG GT1	Asset Mod.		**Trawsfynydd 132kV Modernisation** Replace 132kV circuit breakers at Wylfa	-	*	2025/26	Planned

*Could increase generation hosting capacity.

132kV/EHV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
AMLWCH GT1 / CAERGEILIOG GT1	Asset Mod.		**Amlwch 132kV Modernisation** Replace 132kV transformer at Amlwch	-	*	2025/26	Planned

*Could increase generation hosting capacity.

EHV Interventions							
Network Area	**Driver**	**Type**	**Solution**	**Flexibility (MW)**	**Increase in Firm Capacity (MVA)**	**Expected By**	**Status**
AMLWCH GT1 / CAERGEILIOG GT1 / CAERGEILIOG GT2	Asset Mod.		**33kV CB Modernisation** 33kV circuit breaker replacements at Llangefni Ind Estate	-	*	2024/25	Planned
	Asset Mod.		**33kV CB Modernisation** 33kV circuit breaker replacements at Llandyfrydog	-	*	2027/28	Planned
	Asset Mod.		**33kV CB Modernisation** 33kV circuit breaker replacements at Llanddeusant	-	*	2023/24	Delivery
	Asset Mod.		**33kV CB Modernisation** 33kV circuit breaker replacement at Llanfaelog	-	*	2024/25	Planned

*Could increase generation hosting capacity.

7 Part 2 – Network scenario headroom

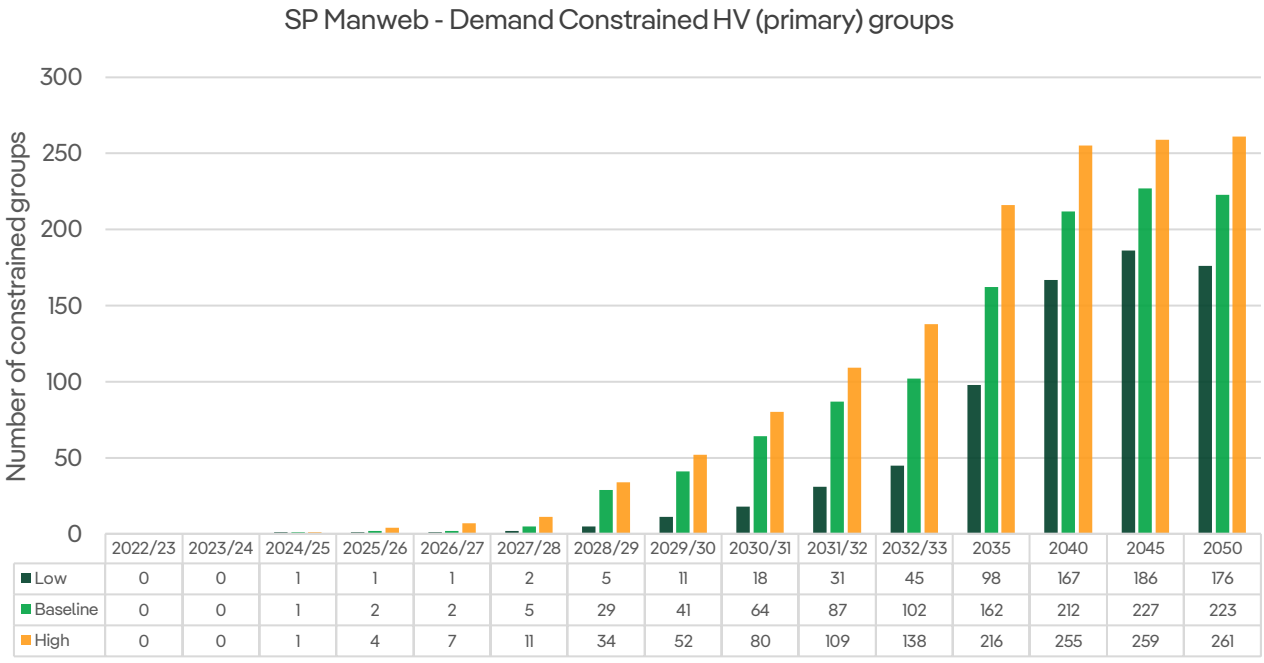
This section provides a forecast of post-intervention headroom across all network groups out to 2050. We've calculated this post-intervention headroom by combining our existing network model, our scenario forecasts, and our known intervention plans.

Our NDP Capacity Headroom spreadsheet data files provide this information for each grid (132/33kV) and primary (33kV/HV) substation/substation group for each year for the first ten years and every five years thereafter through to 2050. Given the forecast uncertainty in future pathways to achieve Net Zero, we have done this for each of the low, baseline, and high scenarios (see NDP Methodology Statement). We provide our headroom calculation for demand and generation separately as the constraints limiting each can be different (see Section 5.2).

7.1 Demand headroom results

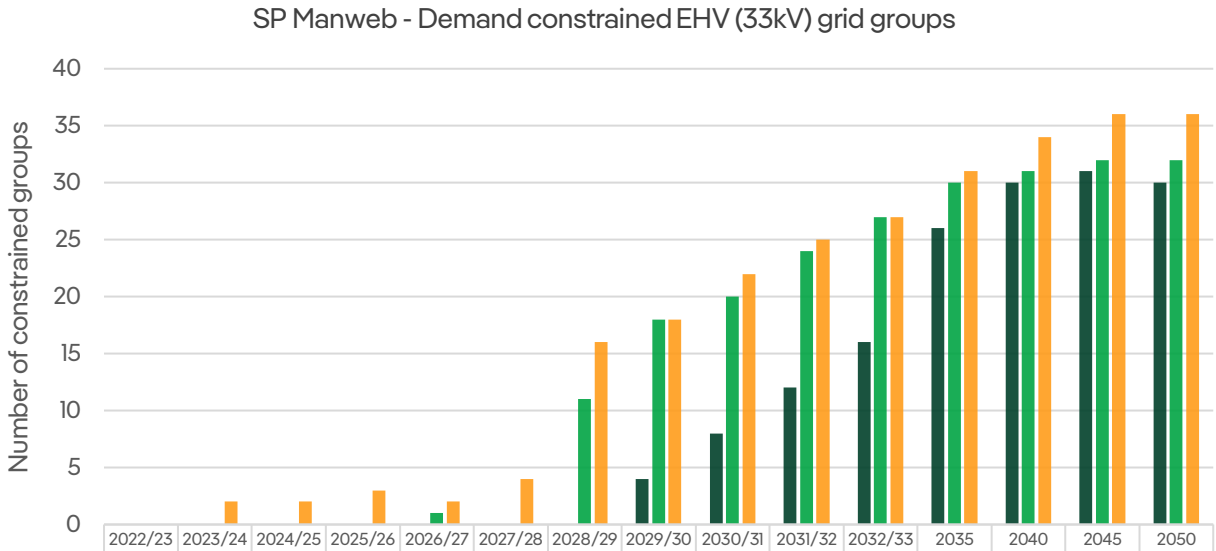
Demand growth is increasing from now out to 2050 due to the decarbonisation of heat and transport. This isn't fully reflected in Figure 5, which shows the number of constrained primary groups only increasing after 2028, as this constraint data incorporates our planned RIIO-ED1 and RIIO-ED2 investments (i.e. there are few constraints up to 2028 as we have planned interventions to resolve these rather than because there is no demand increase). Constraints increase after this point, as we haven't yet planned interventions for that period (we will start this in 2025 when we start preparing for RIIO-ED3).

The difference in constraints pre-2028 and post-2028 illustrates an important point: we can provide the interventions our customers need to decarbonise providing Ofgem authorise the investment. However if the interventions aren't made then the network will suffer from widespread constraints. These would make 2050 Net Zero target unachievable, and the network would be overloaded, exposing customers to safety risks, supply interruptions, and higher overall costs. It is absolutely in our customers' interests for us to deliver additional capacity.



	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33	2035	2040	2045	2050
Low	0	0	1	1	1	2	5	11	18	31	45	98	167	186	176
Baseline	0	0	1	2	2	5	29	41	64	87	102	162	212	227	223
High	0	0	1	4	7	11	34	52	80	109	138	216	255	259	261

Figure 5: SP Manweb number of demand constrained primary substation groups



	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33	2035	2040	2045	2050
Low	0	0	0	0	0	0	0	4	8	12	16	26	30	31	30
Baseline	0	0	0	0	1	0	11	18	20	24	27	30	31	32	32
High	0	2	2	3	2	4	16	18	22	25	27	31	34	36	36

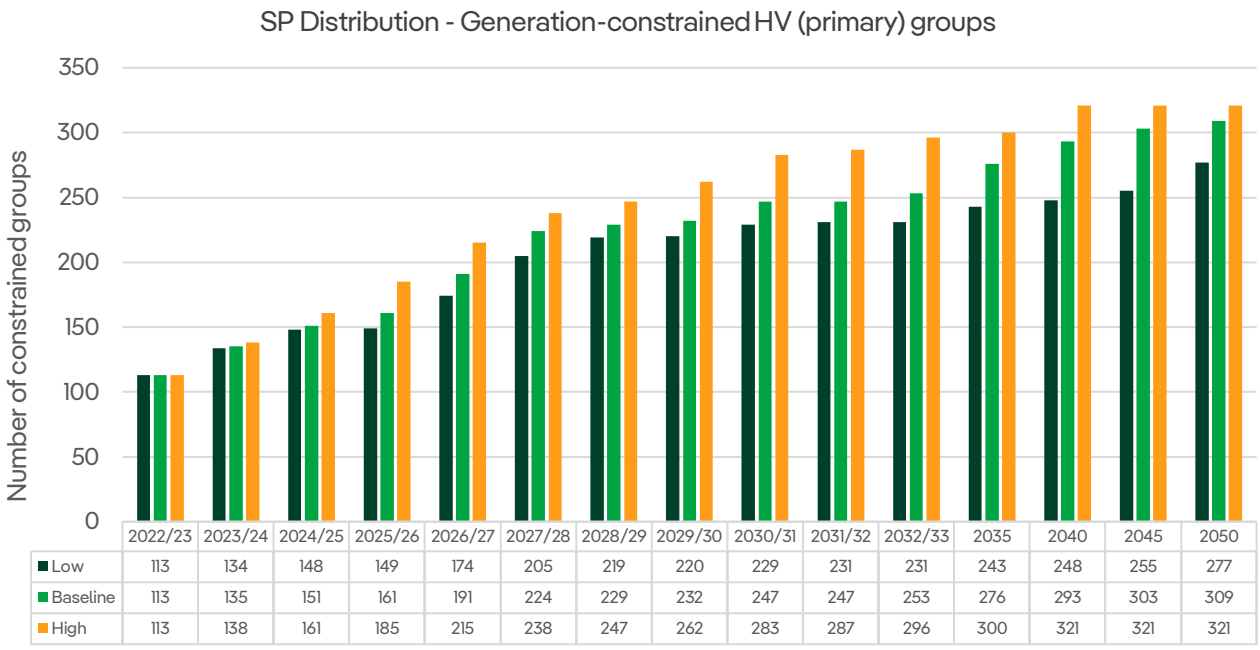
Figure 6: SP Manweb number of demand constrained EHV (33kV) grid groups

7.2 Generation headroom results

Generation growth is increasing from now out to 2050. This isn't fully reflected in Figure 7, which shows the number of constrained primary groups only increasing after 2028, as this constraint data incorporates our planned RIIO-ED1 and RIIO-ED2 investments (i.e. there are reducing constraints up to 2028 as we have already planned interventions to resolve these). Constraints increase after this point as we haven't yet planned interventions for that period (we will start this in 2025 when we start preparing for RIIO-ED3).

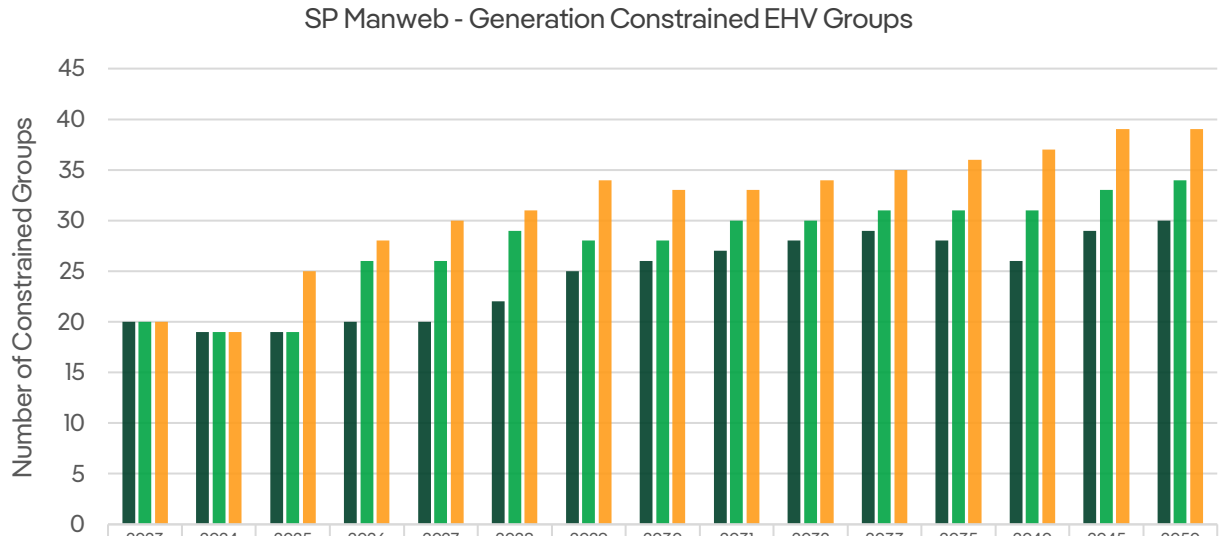
These figures show that we are not reducing all known generation constraints within RIIO-ED2. Some key points:

1. Figure 7 shows the number of primary substation groups with no spare firm capacity. However we are enabling generation to connect to some of these primary substation groups through flexible connection arrangements such as ANM and AFLM.
2. As these show constrained primary substations, these constraints will likely not impede larger-scale generation where this connects to 33kV or 132kV network assets.
3. These constraints will likely not impede domestic-scale (<50kW) generation given its minimal contribution to network constraints.
4. Figure 7 does not incorporate upstream constraints beyond our network boundary. However these are flagged within the Part 2 spreadsheets.



	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33	2035	2040	2045	2050
Low	113	134	148	149	174	205	219	220	229	231	231	243	248	255	277
Baseline	113	135	151	161	191	224	229	232	247	247	253	276	293	303	309
High	113	138	161	185	215	238	247	262	283	287	296	300	321	321	321

Figure 7: SP Manweb number of generation constrained primary substation groups



	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2035	2040	2045	2050
Low	20	19	19	20	20	22	25	26	27	28	29	28	26	29	30
Baseline	20	19	19	26	26	29	28	28	30	30	31	31	31	33	34
High	20	19	25	28	30	31	34	33	33	34	35	36	37	39	39

Figure 8: SP Manweb number of generation constrained EHV (33kV) grid groups

8 Glossary

Constraint Management Zone (CMZ) – CMZs are areas of network we have an automated control system to coordinate and dispatch different operational solutions.

Customer – means anyone connected to our network and who depends on us for an electricity supply. This includes demand, generation, and storage sites, and IDNO networks.

Decarbonisation – the process to reduce the amount of carbon dioxide (CO2) and other greenhouse gas emissions by introducing new low carbon alternatives and technologies. Much of the UK's decarbonisation strategy is based on switching carbon energy vectors (e.g. petrol/diesel for transport, and natural gas and oil for heating) to electricity and powering them with renewable generation.

Decentralisation – this reflects the extent to which generation is sited closer to demand consumption (or is even undertaken by consumers themselves) via the use of smaller-scale technologies such as solar PV and local energy storage. A less decentralised system would be characterised by fewer, larger-scale generators sited further from where the electricity is ultimately consumed (demand); a more decentralised system would be characterised by more smaller-scale generators sited closer to demand.

Distribution Future Energy Scenarios (DFES) – detailed forecasts we publish annually for our two distribution networks. We work with an external party to determine and produce them. They cover a range of demand and generation metrics (e.g. EVs, heat pumps, different generation technologies) out to 2050. https://www.spenergynetworks.co.uk/pages/distribution_future_energy_scenarios.aspx

Distributed Generation (DG) – generation connected to the distribution network, as opposed to the transmission network.

Distribution network – in England and Wales this consists of overhead lines, underground cables and other network infrastructure that operate at 132kV and below; in Scotland this is the infrastructure that operates at 33kV and below. Nearly all demand in GB is connected to the distribution network; only very large demand users (e.g. the rail network) are connected to the transmission network. Nearly all medium-scale and smaller scale generation in GB is connected to the distribution network; typically only large fossil fuel power stations, offshore generation, and large onshore generation are connected to the transmission network.

Electricity System Operator (ESO) – the company responsible for operating the GB transmission network. They have two main operational functions: balancing the total demand and generation on the system to maintain system frequency at 50Hz, and ensuring transmission power flows remain within transmission network capability and statutory limits.

Extra high voltage (EHV) – all distribution voltages greater than 22kV.

Flexibility – the ability of a consumer or generator to change their operation (i.e. their generation/consumption levels) in response to an external signal. With the push towards the electrification of heat and transport, being able to flexibly utilise demand and generation will help minimise the amount of additional network capacity required, balance the system, and provide system stability – these can all help reduce customer electricity bills.

Grid Supply Point (GSP) – the interface substations between the transmission and distribution network.

GW – equal to 1,000 MW.

High voltage (HV) – all voltages above 1kV up to and including 22kV.

Low carbon technologies (LCTs) – means the range of customer technologies that are needed to deliver decarbonisation. For example, EVs, heat pumps, storage, and renewable generation.

Low voltage (LV) – all voltages up to and including 1kV.

MVAr – mega volt amps (reactive) is a unit of reactive power. It can be useful to help manage network voltage levels. It can describe both the amount of reactive power that a user is importing (e.g. this generator is importing 1MVAr of reactive power"), and the amount of reactive power that a user is exporting (e.g. "this generator is exporting 1MVAr of reactive power").

MW – megawatt is a unit of power (not energy). It can describe both the amount of power that a demand user is consuming (e.g. "this town's peak demand has increased by 3MW due to an increase in EVs and heat pumps"), and

the amount of power that a generator is producing (e.g. "3MW of solar PV generation has been installed in this area").

Minimum demand – the point in the year, typically during the summer months, when our distribution network as a whole sees the lowest demand. It is an important study condition (along with peak demand) as a network with low demand can experience voltage control issues.

Net Zero – means the legislated target of reducing greenhouse gas emissions to net zero. For the UK, there are three Net Zero targets:

i. The UK Government has introduced the Climate Change Act 2008 (2050 Target Amendment) Order 2019. This legislation introduces a legally binding target for the UK to have net zero greenhouse gas emissions by 2050. The legislation is available at: http://www.legislation.gov.uk/ukpga/2008/27/contents

ii. The Scottish Government has introduced the Scottish Climate Change (Emissions Reduction Targets) Act 2019. This legislation introduces a legally binding target for Scotland to have net zero greenhouse gas emissions by 2045. The legislation is available at: http://www.legislation.gov.uk/asp/2019/15/contents/enacted

iii. The Welsh Government has introduced The Environment (Wales) Act 2016 (Amendment of 2050 Emissions Target) Regulations 2021. This introduces a legally binding target for Wales to have net zero greenhouse gas emissions by 2050. The legislation is available at: https://www.legislation.gov.uk/anaw/2016/3/contents

Open Networks – this is a pan-industry project involving transmission and distribution network companies, the ESO, the Department for Business, Energy, and Industrial Strategy (BEIS), Ofgem, and other stakeholders. It has done much work developing DSO models, the customer experience, whole electricity system planning and distribution to transmission data exchange, and flexibility services.

Peak demand – the point in the year, typically during the winter months, when our distribution network as a whole sees the highest demand. It is an important study condition (along with minimum demand) as it places the greatest need on network capacity – our network must be able to accommodate peak demand.

Primary substation – see 'Substation'.

RIIO-ED2 – means the distribution network price control period which runs from 1st April 2023 to 31st March 2028. Before this period starts, we will agree with Ofgem the outputs we will deliver during this period, and the funding, incentives, and penalties for delivering those outputs.

Services (aka DER services or flexibility services) – DER can change its import/export position in a controlled manner in response to a signal. This capability can be utilised for the benefit of the network or wider system (e.g. a DER reducing their import to reduce the overall level of demand the network must supply). Where we utilise this capability, the DER is providing us with a 'service'. See also 'Flexibility' and 'Distribution energy resources'.

SP Transmission (SPT) – the Transmission Network Owner for Central and Southern Scotland, that owns the transmission network at 132kV, 275kV and 400kV.

SP Distribution (SPD) – the Distribution network Operator for Central and Southern Scotland, that owns the distribution network at 33kV, 11kV and LV up to customers' meters.

SP Manweb (SPM) – the Distribution Network Operator for Merseyside, Cheshire, North Shropshire, and North Wales, that owns the distribution network at 132kV, 33kV, 11kV and LV up to customers' meters.

Substation – a building or outdoor compound which contains one or more transformers and switchgear protection. The primary purpose of a substation is to change the network power flow from one voltage level to another. In a primary substation the highest voltage is EHV (primary substations are typically 33kV/11kV); in a secondary substation the highest voltage is HV (secondary substations are typically 11kV/LV).

Transmission Network – the high voltage electricity network used for the bulk transfer of electrical energy across large distances. The transmission network takes electricity from large generators (e.g. coal, gas, nuclear and offshore wind) to supply large industrial customers and the distribution network.

9 Appendix A – Procured flexibility by year

Network Area	Flexible Capacity (MW)				
	2023/24	2024/25	2025/26	2026/27	2027/28
ACER AVE T1	0.429	0.524	1.944	2.277	2.753
EDERN T1	-	0.474	0.128	0.638	1.238
SANDBACH T1	1.009	1.514	2.128	-	-
MERE T1	-	-	-	0.853	2.197
LYMM T1 / WHITELEGGS LA T1	-	-	0.605	-	0.303
JOHNSTOWN T1	-	-	-	0.287	0.361
NANTWICH T1	-	-	-	0.600	1.539
RADWAY GREEN T1	-	-	-	0.660	1.377
RAVEN SQUARE T1	-	-	-	-	0.561
MIDDLEWICH T1	0.890	0.920	-	-	-
LLANILAR T1	-	-	-	0.300	0.680
ABERYSTWYTH GT2 / RHYDLYDAN GT1	1.239	2.089	-	2.839	1.648
LEGACY LOCAL GT2 / NEWTOWN GT2 / OSWESTRY GT8 / WELSHPOOL GT1	0.050	0.070	2.141	2.981	0.562
COLWYN BAY GT1 / COLWYN BAY GT2 / DOLGARROG GT2	0.320	0.320	0.320	0.320	0.320
COPPENHALL GT1 / CREWE GT1 / CREWE GT2A / CREWE GT4A / RADWAY GREEN GT1 / RADWAY GREEN GT2 / WHITCHURCH GT2	-	-	-	11.510	-
AINTREE GT1 / FORMBY GT2A / LITHERLAND GT1B	-	-	-	-	2.567
FORMBY GT2B / SOUTHPORT GT1 / SOUTHPORT GT2	0.050	0.079	0.158	1.313	1.630
Connah's Quay 132kV	-	-	-	29.955	-
Lister Drive 132kV		9.574	12.828	4.927	16.470
CAERGWRLE T1	-	-	0.157	1.781	2.651
APPLETON T1 / HORNSBRIDGE T1 / LUGSDALE T2	-	-	-	1.224	3.701
GWERSYLLT T1	-	-	0.529	0.947	2.848
TARVIN T1	-	-	0.068	0.477	1.526
ABERGELE T1 / PENSARN T1	-	-	-	-	1.212
COEDPOETH T1 / COEDPOETH T2	-	-	-	-	1.027
ANDERTON T1	-	-	-	0.334	0.542
HARTFORD T1	-	-	0.777	1.557	0.924
MACHYNLLETH T2	-	-	-	-	-
ABERSOCH T1	-	-	0.200	-	-
LLANIDLOES T1 / LLANIDLOES T2	-	-	-	0.254	0.411
FORDEN T1	-	-	-	0.130	0.200
LLANDRINIO T1	-	-	0.136	0.292	0.292
FRODSHAM LOCAL T1	-	-		-	0.419
SMALLWOOD T1	-	-	1.092	1.540	1.224

CEMMAES RD T1	-	-	-	-	0.100
HOLMES CHAPEL T1	-	-	-	-	0.288
BOW ST T1	-	-	-	-	0.365
NANT-Y-GAMAR T1	-	-	-	-	0.103
DALLAM GT1 / SANKEY BRIDGES GT1 / WARRINGTON GT3	-	-	-	10.169	11.927
PRENTON GRID GT1 / ROCK FERRY GT1	-	-	2.846	5.258	7.750
Carrington - Fiddlers Ferry 132kV	-	-	-	8.000	8.400
BRYMBO GT2 / HAWARDEN GT2 / HOLYWELL GT2	4.967	4.967	5.137	6.136	6.406
FOUR CROSSES GT2 / MAENTWROG GT1 / MAENTWROG GT2	4.001	4.808	5.200	-	-

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