FLEET GRID SUPPLY POINT: STRATEGIC DEVELOPMENT PLAN

Our network serving communities across Berkshire and Hampshire
Draft for consultation

June 2025

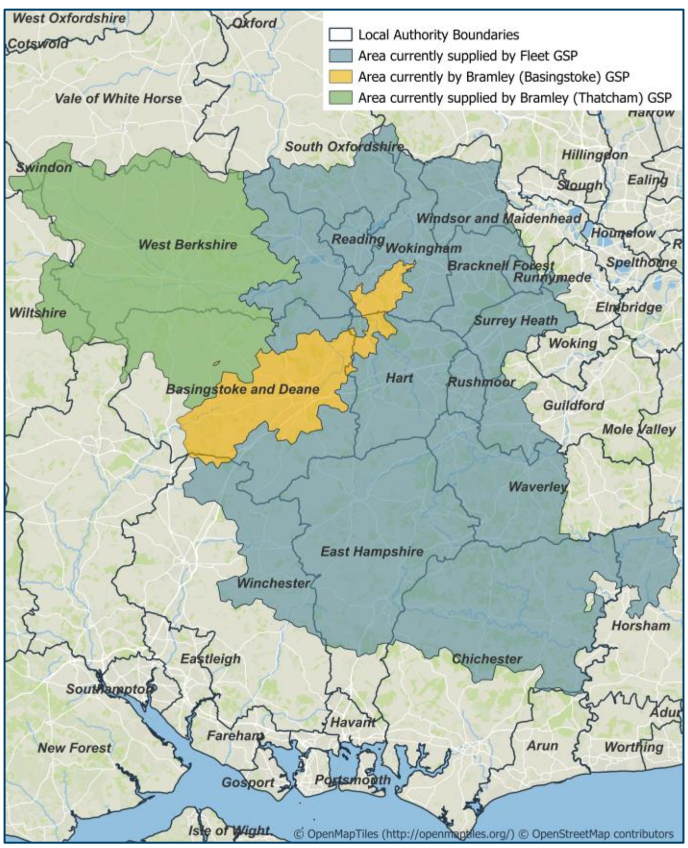
Scottish & Southern Electricity Networks

CONTENTS

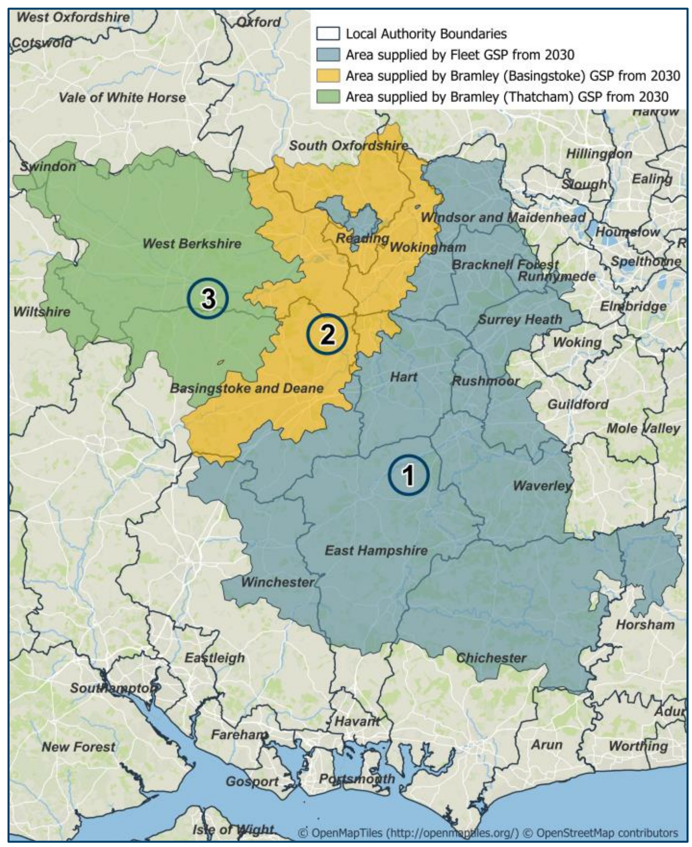
1. EXECUTIVE SUMMARY

SSEN is taking a strategic approach in the development of its distribution networks. This will help to enable the net zero transition at a local level to the homes, businesses, and communities we serve. Our Strategic Development Plans (SDPs) take the feedback we have received from stakeholders on their future energy needs to 2050 and translate these requirements into strategic spatial plans of the future distribution network needs. This helps us transparently present our future conceptual plans and facilitate discussion with local authorities and other stakeholders. The overall methodology and how it fits into our wider strategic planning process is presented in the Strategic Development Plan Methodology (SSEN – Strategic Development Plan Methodology).

This SDP focuses on the area served by Fleet Grid Supply Point (GSP). SSEN is currently undertaking a major project in this GSP to transfer part of the network to Bramley (Basingstoke) GSP and therefore the area fed by Fleet GSP is changing. Figure 1a shows the areas supplied by Fleet GSP, Bramley (Basingstoke) GSP and Bramley (Thatcham) GSP today. In 2030, two bulk supply point (BSP) areas will be moved from being supplied by both Fleet GSP and Bramley (Basingstoke) GSP to being fed by only Bramley (Basingstoke) GSP – Figure 1b shows what the new area fed by Fleet GSP will be from 2030. As this SDP aims to look at the long-term plan for Fleet GSP, the area covered by this SDP is that supplied by Fleet GSP from 2030 onwards which is highlighted in Figure 2 (area 1). Two further SDPs will cover the area fed by Bramley GSP from 2030: Bramley – Basingstoke SDP and Bramley – Thatcham SDP, shown as areas 2 and 3 respectively in Figure 1b.



(a)



(b)

Figures 1a and 1b show the areas supplied by Fleet GSP, Bramley (Basingstoke) GSP and Bramley (Thatcham) GSP today and from 2030 respectively.

This report documents the stakeholder led plans that are driving net zero and growth in the local area, the resulting electricity demands, and the network needs arising from this. Plans from Basingstoke and Deane, Bracknell Forest, Chichester, East Hampshire, Guildford, Hart, Horsham, Reading, Runnymede, Rushmoor, South Oxfordshire, Surrey Heath, Waverley, Winchester, Windsor and Maidenhead, Wokingham, Hampshire County Council, West Sussex County Council, Oxfordshire County Council, and Surrey County Council have been considered in preparation of this plan. A significant amount of work has been triggered in this area through the Distribution Network Options Assessment (DNOA) process.

This SDP utilises the Distribution Future Energy Scenarios (DFES) to understand the pathways to a 2050 network that can support net zero and growth in the local economy. Recommendations from this report outline the initial steps that we believe should be taken on these pathways to develop the network in an efficient and stakeholder led way.

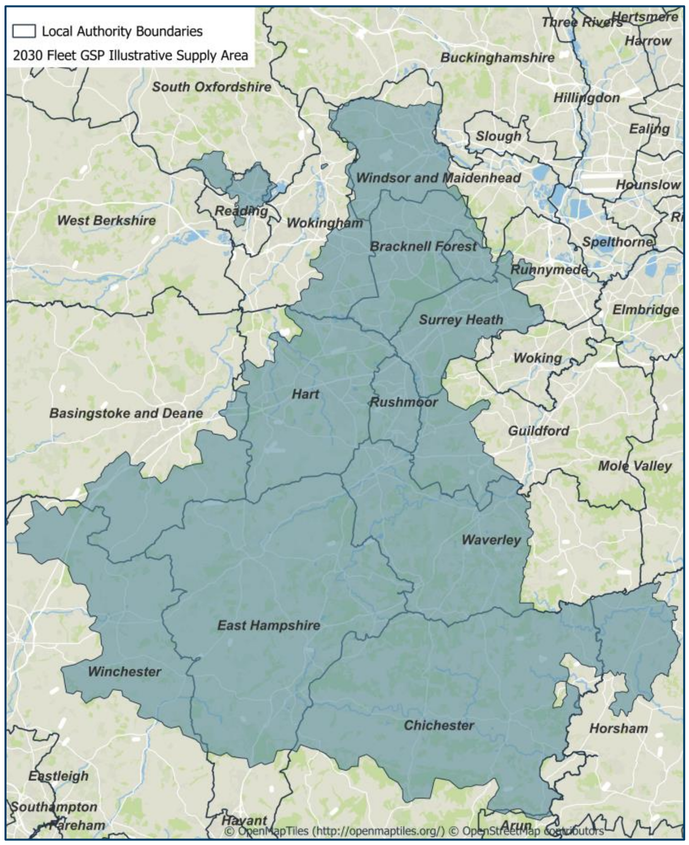


Figure 2 – The Future Fleet GSP supply area and area covered by Fleet SDP with Local Authority Boundaries.

2. INTRODUCTION

This report demonstrates how local, regional, and national targets link with other stakeholder views in the area to provide a robust evidence base for load growth out to 2050 across the Fleet Grid Supply Point (GSP) area. A GSP is an interface point with the national transmission system where SSEN then take power to local homes and businesses within a geographic area. Context for the area this represents is shown above in Figure 1.

To identify the future requirements of the electricity network, SSEN commission Regen to produce the annual Distribution Future Energy Scenarios (DFES). The DFES analysis is based on the National Energy System Operator (NESO) Future Energy Scenarios (FES) while accounting for more granular stakeholder insights from agencies such as local authorities and new demand and generation connection applications. The DFES provides a forward-looking view of how demand and generation may evolve as we move towards the national 2050 net zero target. Due to the timing of when this report was produced, this SDP has been informed by the analysis undertaken as part of the DFES 2023. DFES 2023 consists for four different scenarios which are summarised in Figure 3. SSEN currently use Consumer Transformation as the central case scenario following stakeholder feedback during the RIIO-ED2 development process. This position is reviewed annually. The 2024 edition of DFES outlines three new pathways (Holistic Transition, Electric Engagement, and Hydrogen Evolution) that achieve net zero by 2050 against a Counterfactual. Further detail on DFES 2024 can be found in Appendix B and in the DFES 2024 reports.

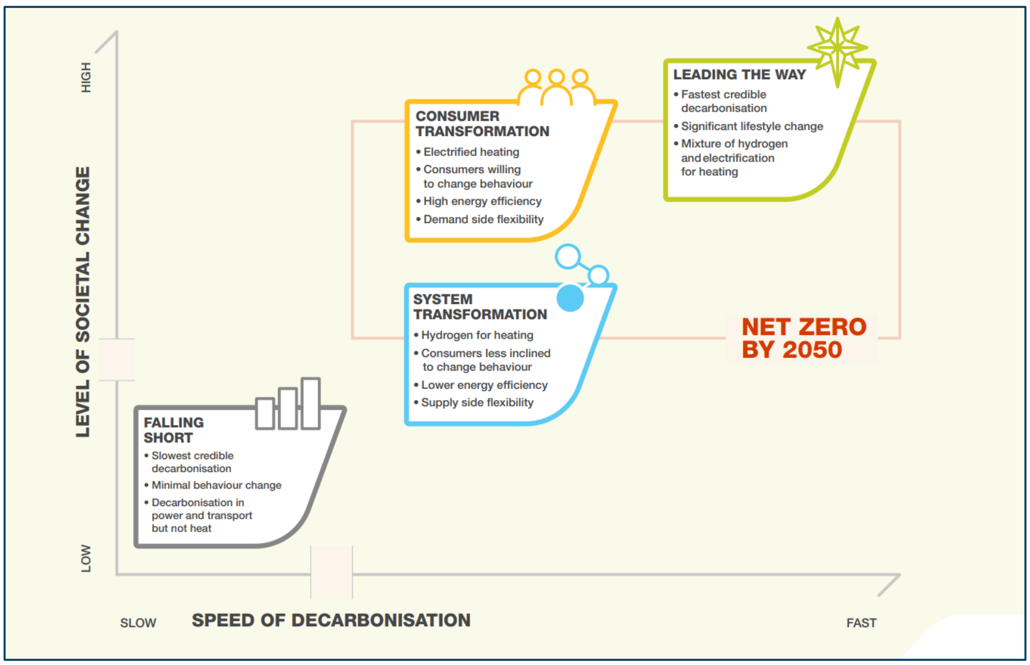


Figure 3 – The 4 Future Energy Scenarios adopted for DFES 2023. Source: NESO FES

Using the DFES, power system analysis has been carried out to identify the future system needs of the electricity network. These needs are summarised by highlighting the year the need is identified under each of the four scenarios, and the projected 2050 load. Here, system needs are identified through power system analysis using the Consumer Transformation scenario in alignment with evidence gathered in preparation of the SSEN ED2 business plan. We also model across the other three scenarios to understand when these needs arise and what demand projections should be planned for in the event each of these scenarios is realised.

The DNOA process will provide more detailed optioneering for each of these reinforcements, improving stakeholder visibility of the strategic planning process. Opportunities for procurement of flexibility will also be highlighted in the DNOA, to cultivate the flexibility markets, and to align with SSEN's flexibility strategy.

3. STAKEHOLDER ENGAGEMENT AND WHOLE SYSTEM CONSIDERATIONS

3.1. Local Authorities and Local Area Energy Planning

The main local authorities that are currently supplied by Fleet GSP are Basingstoke and Deane, Bracknell Forest, Chichester, East Hampshire, Guildford, Hart, Horsham, Reading, Runnymede, Rushmoor, South Oxfordshire, Surrey Heath, Waverley, Winchester, Windsor and Maidenhead, Wokingham, Hampshire County Council, West Sussex County Council, Oxfordshire County Council, and Surrey County Council. From 2030, significant areas of South Oxfordshire, West Berkshire, Reading and Wokingham authorities will no longer be supplied by Fleet GSP. A map showing the local authorities that will be supplied by Fleet GSP in the long term is shown in Figure 4. The development plans for these local authorities will have a significant impact on the potential future electricity load growth on SSEN's distribution network. As such, it is vital for SSEN to engage with these plans when carrying out strategic network investment.

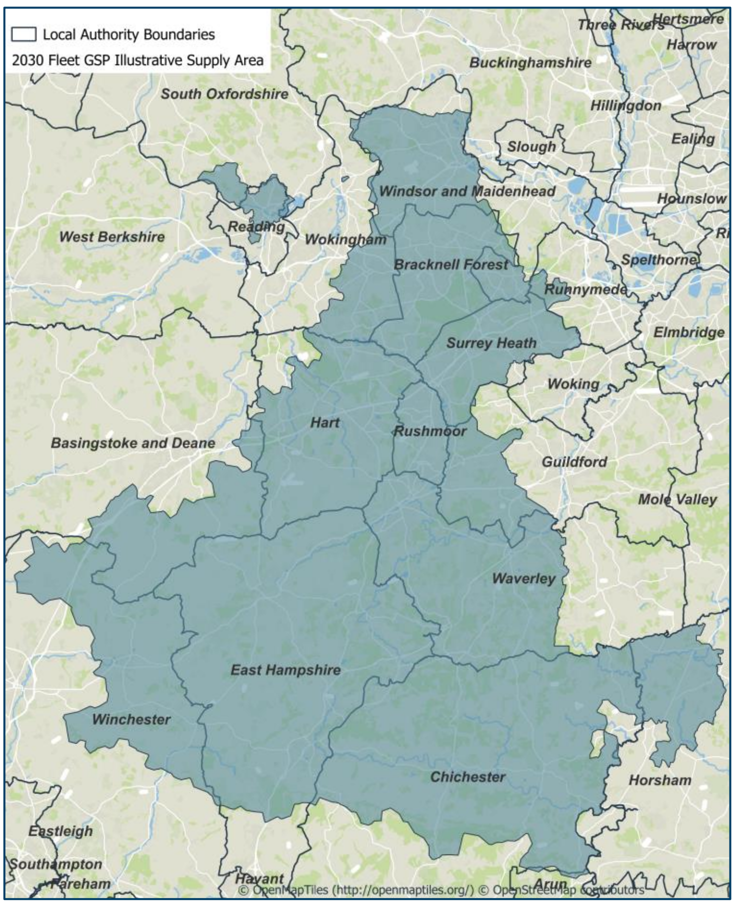


Figure 4 – Fleet GSP Supply Areas from 2030 and Local Authority Boundaries

3.1.1. Basingstoke & Deane

Basingstoke and Deane Borough Council aims for the borough to be net zero by 2030 and council operations to be net zero by 2025. The latest Climate Emergency Action Plan highlights the planned activities to achieve this, and they are currently working on scenario modelling to identify a route map to net zero.

The Council has recently adopted its EV Charging Strategy and has been rolling out chargers in car parks, with a proposal for a facility to be operated by Gridserve on Council land. The Council is also working with the County Council for delivery of on-street chargers and are doing a phased electrification of their vehicle fleet and working with public transport operators to look at the longer-term electrification of their fleets.

The Council has undertaken sustainability audits of their building assets and are rolling out decarbonisation plans. This included commissioning a Solar Panel Study of PV potential for all non-domestic rooftops larger than 30 m^2. They are also carrying out domestic energy surveys and signposting support for retrofit. There are three community energy companies in the borough who have received grant funding to help get projects off the ground, and the council has been rolling out Solar Together schemes.

The Council is in the process of developing their updated local development plan which identifies a number of strategic development locations across the borough. As part of the draft plan, they have included a policy to support the installation of renewable energy and are in the process of identifying the areas that may be suitable for renewables. The draft local plan also sets a requirement for all new homes to have a ‘net zero’ operational energy balance, which means that they are required to generate as much energy as they would use to achieve a ‘net zero’ balance.

3.1.2. Bracknell Forest

Bracknell Forest Council adopted a new Climate Change Strategy 2025-2030 which commits to reducing net council emissions to zero as close to 2030 as possible, and support the reduction of borough net emissions to zero as close to 2030 as possible. Of note, the latter specifically mentions buildings, energy supply and transport. The strategy is accompanied by a Delivery Plan and is split into three phases of delivery. Phase one is 2025/26, phase two 2026/27 and phase three 2027 onwards.

The delivery plan commits to a three-year programme of fully decarbonising four buildings in the council’s estate which includes electrifying heating and installing solar PV. This is in addition to trialing an area-based retrofit approach for blocks of houses, trialing a one-stop retrofit shop for residents and businesses, creating a retrofit partnership, and contributing to school and community centre retrofits.

There is also commitment to build on existing success with collective group buying schemes for solar PV, expanding to heat pumps and in the longer term, the intention is to build a district heat network for Bracknell town centre and business areas as part of phase three. Whilst there is limited potential in the borough for large-scale generation, there are plans for a new solar farm and EV charging station at the London Road landfill site. An investment proposal is being put together for large-scale solar investment on town centre and business areas roofs, and community batteries.

The delivery plan also identifies an enabling action of commissioning a local area energy plan, potentially as part of cross-Berkshire work under phase two. There are a number of supporting strategies. The Electric Vehicle Charging Facilities document indicates that approximately 1,000 electric vehicle charge points will be required across the borough by 2030. This is predominantly made up of standard chargers, with approximately 15% of those being fast to ultra-rapid.

3.1.3. Chichester

Chichester District Council has aimed to reduce emissions 10% year-on-year from 2018 to 2025, which will result in almost a halving of total emissions. Their local plan has been through examination, and they are planning for the electrification of their waste fleet and the infrastructure to support it at the depot. They are keen to develop heat networks, particularly the ring around the historic core, and are looking to electrify some of their rural estates who don't currently have a connection to the gas network.

3.1.4. East Hampshire

East Hampshire District Council aims for the Council's emissions to be net zero by 2035 and for the district to be net zero by 2050, and this is supported by the recently adopted strategy.

The Council has already rolled out five electric vehicle charge points in the borough and has committed to developing an EV strategy as part of the new climate and environment strategy delivery plan. This is likely to look at centralised locations like car parks for deployment.

Building decarbonisation is focused on the emerging local plan requiring the operational energy of new dwellings to be net zero. In terms of retrofit, the Council is working with communities to encourage eligible residents to apply for grants and operates a COSY loans scheme for those not eligible.

A Renewable and Low Carbon Study was carried out to assess the potential for further renewable generation across the district, which will inform the emerging local plan for potential sites for development.

3.1.5. Guildford

Guildford Borough Council has a 2030 net zero target for both council operations and as a borough. They are working with Surrey County Council to roll out electric vehicle charge points across the borough, and in particular at their own facilities, and are working to transition their vehicle fleet to electric. The Council also has a Parking Standards in New Development supplementary planning document as part of their local plan, which assumes that the majority of charging will take place at home through off-street parking provision, and is in line with the previous 2030 government target to phase out new petrol and diesel vehicles.

In terms of heat, planning policy is the driver. Policy identifies heat priority areas where new developments must consider low carbon heat networks as a priority and requires developments above a certain scale/density to consider them. Technologies are not specified but the expectation is that it should be low carbon (not gas). There are no networks currently proposed within our licence area.

For generation, there is an estimated 5MW of solar energy required to cover offsetting for the Council's carbon reduction calculations. Whilst the Council have tried to allocate a site for solar, they have not found a site that meets requirements yet. They are however working on studies to retrofit their assets with solar PV, including car parks.

3.1.6. Hart

Hart District Council aims to become a carbon-neutral authority by 2035 and to become a carbon-neutral district by 2040. They also have a Climate Change Action Plan.

In terms of transport, the council is working with Hampshire County Council on expanding the electric vehicle charge point network. The Council has started to deliver public electric vehicle charge points in its town/village centre car parks across the district. The Cycle and Car Parking in New Development supplementary planning document, provides guidance on electric vehicle charge points for developers which requests compliance with Part S of building regulations.

The Council is taking a fabric-first approach to upgrading their buildings and feasibility studies are underway to determine whether heat pumps can be used. Whilst there are no plans to build new district heat networks, the Council is undertaking research to understand whether this would be an option in the future.

Solar PV is already being installed on a number of buildings and there are plans for leisure centres in the district to have more installed.

3.1.7. Horsham

Horsham District Council aims for Council operations to be carbon neutral by 2030 and the wider district by 2050. This is supported by a Climate Action Strategy.

In collaboration with the County Council and Connected Kerb, the Council is looking at implementing on-street EV charge points in addition to charge points in car parks. The Council is also exploring the opportunity for a hydrogen refueling station in the district.

The Council has partnered with Community Energy Horsham to roll out solar PV on its buildings and they offer Green LEAP Small Business Grants.

3.1.8. Reading

Reading Borough Council has committed to achieving net zero by 2030 and are currently working on their 2025 to 2030 action plan to achieve this. They are expanding their electric vehicle charge point infrastructure, including putting multiple charge points into a town centre car park.

The Council are doing a local plan review which will include the Future Homes Standard. They are including a heat pump policy in the new local plan which equates to 178 MVA. They want to have heat networks and are doing detailed feasibility studies for the north of the station network and the civic quarter.

3.1.9. Runnymede

Runnymede Brough Council has a 2030 net zero target for its own operations and a target of 2050 for the geographic emissions. The Council's Climate Change Action Plan was adopted in February 2024 and identifies a number of actions.

The Action Plan identifies the need to retrofit and improve energy efficiency and heating systems of existing Council assets including domestic and non-domestic assets. Specific measures are yet to be determined. It also identifies the need to develop an energy strategy which includes exploring solar PV on Council-owned car parks and exploring purchasing battery storage.

The Council's adopted Local Plan also supports the development of stand-alone renewable development and supporting infrastructure such as battery energy storage systems where appropriate. Additionally, it supports the creation of new/expanded heat networks as part of large-scale new developments, but there are none planned as yet. The Council's adopted Local Plan sets out EV charging standards for parking (in the Parking Guidance SPD) and the council has adopted an EV Strategy to increase charging availability across the Borough.

3.1.10. Rushmoor

Rushmoor Borough Council aims for council operations to be carbon neutral by 2030. In their Climate Change Action Plan for 2023-2026, the Council details 12 priority actions, including electrifying their vehicle fleet and collaborating with Hampshire County Council on electric vehicle infrastructure rollout.

3.1.11. South Oxfordshire

South Oxfordshire District Council, together with Oxfordshire County Council and all other district councils in Oxfordshire, have engaged ARUP, to create an OxLAEP that will collect an evidence base, obtain stakeholder feedback, model scenarios, provide actions and develop pathways to Net Zero 2050. The council has a target to become carbon neutral by 2030 and has already secured funding to decarbonise its buildings. The council has seen a population growth of 11% from around 134,000 in 2011 to around 149,000 in 2021; to meet the expected population growth, the council has a target of building 30,056 new homes between 2011-2035. The council has also produced an ambitious Electric Vehicle Infrastructure Strategy that lays the groundwork to accommodate the projected growth in EVs over the next several years.

3.1.12. Surrey Heath

Surrey Heath Borough Council is working towards achieving net-zero carbon emissions by 2030 as an organisation and aims to contribute to making the borough net zero by 2050 (with the aspiration for net zero by 2030). They have a Climate Change Action Plan which was adopted in January 2024.

The emerging local plan (due for adoption in 2025) includes requirements for EV infrastructure and for 25% of a site's energy demand to be delivered through on-site renewables. Other policies have been adapted to ensure future development has a reduced carbon profile.

Work has predominantly focused on decarbonising the Council's organisational emissions, including a programme to install public EV charge points.

A high-level analysis is currently being undertaken to understand the demand for a district heat network within Camberley. The aim is for this to be a low carbon heating source, and a range of options are being investigated.

3.1.13. Waverley

Waverley Borough Council has committed to the council becoming carbon neutral by 2030 and published its Carbon Neutrality Action Plan in 2020. The Council plans to electrify the taxi fleet and to continue rolling out electric vehicle charge points across the borough as per its Electric Vehicle Strategy.

The Council is intending to install solar panels at two of their leisure centres and are undertaking studies to identify further renewable energy generation sites. They are planning a Passivhaus standard leisure centre in Cranleigh and intend to retrofit their commercial and social housing assets. Trajectories have indicated that a 500kWp solar farm would be required to offset hard to reduce emissions.

3.1.14. Winchester

Winchester City Council set aims for the district to be carbon neutral by 2030, and to make the Council's own corporate estate net zero by the end of 2024. It has a Carbon Neutrality Action Plan that sets out a number of interventions to reduce carbon emissions.

Transport interventions include working with local businesses and procurement teams to decarbonise freight fleets and investing in EV charge points to decarbonise private cars. The EV strategy proposes locations for 46 charge points in council car parks, and so far, 35 have been installed. The Council has also recently launched its first electric waste vehicle. Instavolt is also launching the UK's largest rapid-only EV charging Super Hub off the A34 in Winchester in March 2025. It will be powered by on-site PV and energy storage.

To decarbonise buildings, the Council is rolling out several interventions for retrofit across domestic, commercial and industrial properties. Several measures have already been completed across the Council's own estate including the installation of solar PV, and there is an emerging programme of work to encourage businesses in the district to install solar PV and heat pumps.

A future action is to explore the feasibility of developing a hydrogen generating plant as a source of renewable fuel and to divert waste from land fill.

The Council has also committed to developing a local area energy plan (LAEP) as a priority action. Part of this will include the development of a renewable energy generation plan. The Carbon Neutrality Action Plan sets an objective to develop an additional 203MW of renewable energy across the Winchester district.

3.1.15. Windsor & Maidenhead

Royal Borough of Windsor and Maidenhead Council have committed to reach net zero by 2050 and have an Environment and Climate Strategy to support this, which includes incremental targets in preceding years. This is supported by a target to increase renewable generation ten-fold by 2025 from 2019 figures. Solar PV and heat pumps have been installed on council-owned properties, and they have organised a group purchasing scheme for solar PV, Solar Together.

The Council has an Electric Vehicle Chargepoint Implementation Plan which was published in February 2023. They aim to have electric vehicle charge points in all council car parks by 2028, and by 2035, 70% of homes without driveways are within a 5-minute walk of a public charge point.

3.1.16. Wokingham

Wokingham Borough Council has committed to be carbon neutral by 2030 and has a Climate Emergency Action Plan to support this. Development is underway to connect a 20MW solar farm in 2026 and the Council aims to deliver an additional solar farm by 2027. The Council are retrofitting their corporate assets and schools with solar PV and delivering upgrades to the council-owned social housing through the Social Housing Decarbonisation Fund. They are also supporting residential retrofits through schemes like Solar Together, an advice service and supporting residents accessing funding schemes.

The Council has a draft Electric Vehicle Charging Strategy, which identifies that by 2030, the public sector should facilitate the delivery of an additional 783 fast and 49 rapid charging sockets.

3.1.17. Hampshire County Council

Hampshire County Council has two targets: to be carbon neutral by 2050 and to build resilience to a two-degree rise in temperatures. The Council has published a strategy, action plan and strategic framework for action to achieve its carbon neutral aims and details numerous steps it has planned to electrify various sectors of the local economy.

In its strategic framework, the Council lays out plans to develop and roll out an electric vehicle strategy across the county and development of an electric vehicle charge point strategy is underway, supported by the LEVI fund. In terms of its own estates, the Council aims to transition to fossil-fuel-free heating and install solar PV on depot buildings. A retrofit programme for privately owned residential properties has been identified and the Solar Together programme for group buying solar PV and battery storage has already taken place.

The Council intends to work with partners to balance renewable energy generation and demand, building self-sufficient communities throughout the county. A county-wide local area energy plan is to be developed and SSEN will be working closely with the Council and its partners during this process.

3.1.18. West Sussex County Council

West Sussex County Council aims to be a net zero council by 2030 and has an adopted strategy and Climate Action Adaptation Plan, which commits the Council to developing a local area energy plan (LAEP). Supporting this is the Council's Energy Strategy.

The Council already owns and operates two solar farms and has installed solar panels on 80 schools across the county. The Council is continuing to roll out solar PV and battery installations across schools and its own estate and is developing a large-scale energy storage facility. For residents, the Council continues to partner with Solar Together.

The Council has an Electric Vehicle Strategy that ensures there is sufficient charging infrastructure in place to support the vehicles predicted to be reliant on public infrastructure to charge, and that charging points on County Council land or highways are providing renewable energy.

3.1.19. Oxfordshire County Council

Oxfordshire County Council declared a climate emergency in 2019 and has the ambition target of becoming carbon neutral by 2030. Oxfordshire County Council, together with all the other district councils in Oxfordshire, have engaged ARUP, to create an OxLAEP that will collect an evidence base, obtain stakeholder feedback, model scenarios, provide actions and develop pathways to Net Zero 2050. The council was one of three that SSEN partnered with through the RESOP Project to trial LAEP+ (now LENZA), an innovative local area energy planning tool created by Advanced Infrastructure.

3.1.20. Surrey County Council

Surrey County Council aims for the county to reach net zero by 2050. In support of this, they have a Climate Change Strategy and have set a target for 15% of countywide energy needs to be met from solar PV by 2032 and to develop local smart energy systems to facilitate this. The Council is aiming for 2 heat networks within the county and are interested in a hydrogen refueling pilot.

The Council was recently accepted onto the LARA (Local Area Retrofit Accelerator) programme to create a bespoke retrofit strategy for the county.

3.2. Other Stakeholders

3.2.1. Community energy

There are multiple community energy organisations in the area covered by Fleet GSP. Of note is Energise South Downs who work with a number of communities to support carbon reductions. They are currently looking to identify a site for an onshore wind turbine.

3.3. Whole System Considerations

3.3.1. Specific whole system considerations

Fleet GSP is experiencing high levels of battery storage and generation connection applications, the impact of Clean Power 2030 on connections relating to current works and future system needs will need to be carefully considered and this SDP will be updated in future iterations accordingly.

3.3.2. Transmission interactions

In the Fleet-Bramley area, National Grid Electricity Transmission (NGET) have referenced in their T3 business plan (2026-2031) that they plan to replace overhead line conductors on the Bramley – Fleet 1 & 2 circuit to increase capacity on the route[1]. We will continue to work closely with NGET on long-term strategic planning to ensure we are coordinated on the 2050 vision for Fleet GSP. An example of this is that we will work together on finding a whole system solution to the forecasted load growth under Fleet GSP reaching above 1.5GW by 2045 – more information on this can be found in Section 8 – Specific system needs and options to resolve.

3.4. Flexibility Considerations

SSEN procures Flexibility Services from owners, operators, or aggregators of Distributed Energy Resources (DERs) or Consumer Energy Resources (CERs), which can be generators, storage, or demand assets. These services are needed in areas of the network which have capacity constraints at particular times or under certain circumstances. SSEN purchases Flexibility Services from all types of providers (e.g. domestic or commercial). Information on the process for procurement and how to participate are published on the Flexibility Services website and information on real time decision making on which providers are dispatched can be found in the Operational Decision-Making document.[2, 3]

SSEN regularly recruits new Flexibility Services providers and increases the procured Flexibility Services with the latest bidding round for long term requirements held in August 2024 and recruitment through the Mini-Competition process in October 2024.[2]

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1 National Grid – South East: Future Network Blueprint (https://riiot3.nationalgrid.com/document/30126/download)

2 SSEN, Flexibility Services Procurement, Flexibility Services Procurement - SSEN

3 SSEN, 02/2024, Operational Decision Making (ODM), SSEN Operational Decision Making ODM

Figure 5 shows the primary substation areas across Fleet GSP where flexibility has been procured. This map shows all Flexibility Services procured.

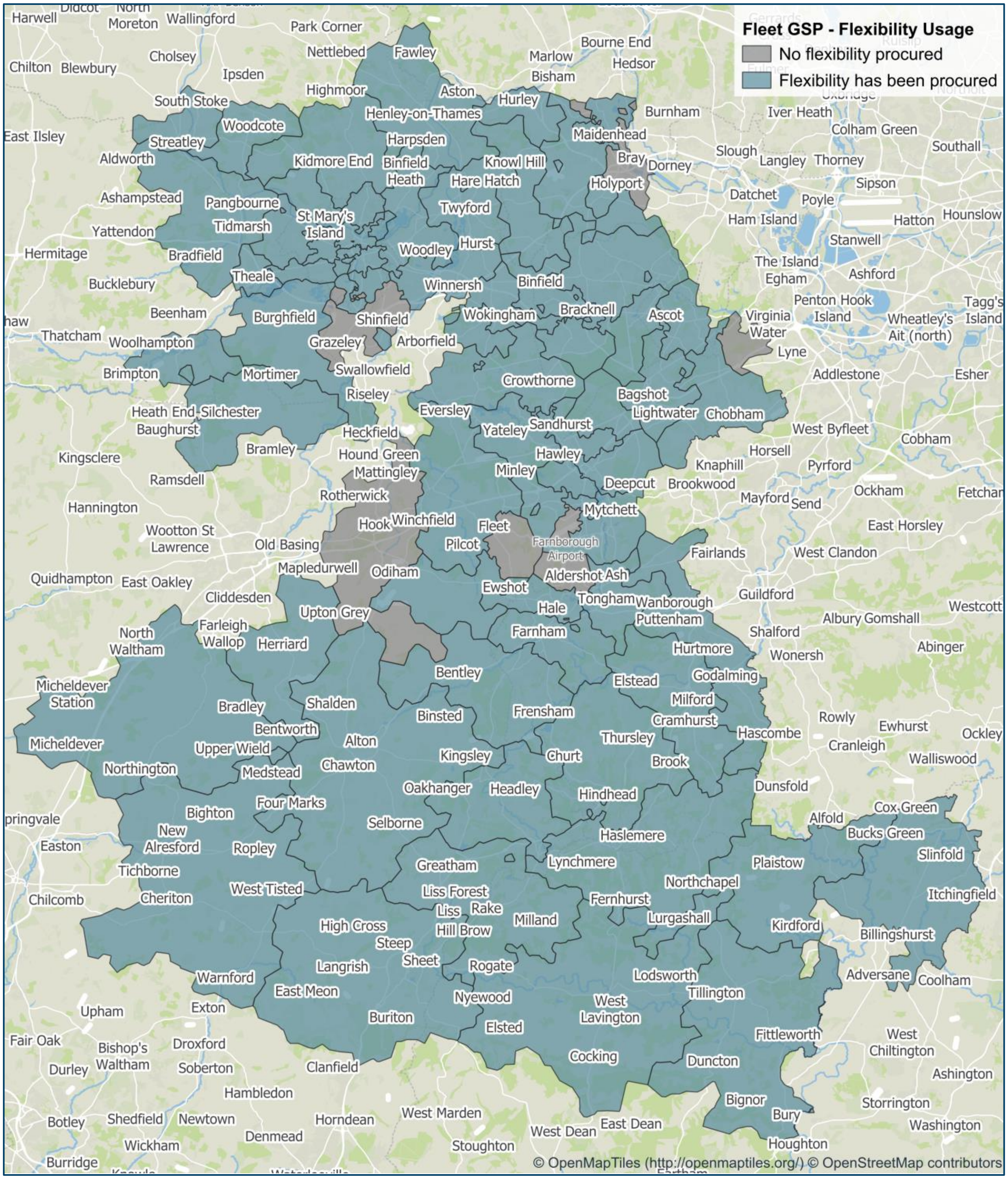

Figure 5 – Flexibility procurement areas across Fleet GSP.

4. EXISTING NETWORK INFRASTRUCTURE

4.1. Fleet Grid Supply Point Context

Fleet GSP covers a large area of the Central Southern England licence area (SEPD) network and is made up of 132kV, 33kV, 11kV, and low voltage (LV) circuits – Figure 6 shows a map with the current network topology. Several large towns such as Reading, Maidenhead, Bracknell and Camberley are fed by Fleet GSP as well as rural areas including parts of the South Downs National Park. In total, the GSP supplies approximately 538,000 customers with the breakdown for each BSP shown in Table 1. Information for Primary substations can be found in Appendix A. The peak maximum demand refers to the peak at each individual substation which may not be at a coincident time as the others (meaning we would not expect the values for each BSP to sum to that at the GSP).

Substation name	Site type	Number of customers served (approximate)	2023-2024 Substation maximum demand in MVA and season with peak demand
Fleet	Grid Supply Point	538,500	1,029.9 (Winter)
Aldershot	Bulk Supply Point	63,200	106.1 (Winter)
Alton	Bulk Supply Point	35,700	62.8 (Winter)
Bracknell	Bulk Supply Point	63,000	120.3 (Winter)
Burghfield Main	Bulk Supply Point	37,600	63.1 (Winter)
Burghfield Reserve	Bulk Supply Point	25,700	48.4 (Winter)
Camberley Main	Bulk Supply Point	42,300	71.2 (Winter)
Camberley Reserve	Bulk Supply Point	31,600	49.2 (Winter)
Coxmoor Wood	Bulk Supply Point	38,600	61.4 (Winter)
Fernhurst	Bulk Supply Point	44,200	73.3 (Winter)
Maidenhead	Bulk Supply Point	32,400	58.8 (Winter)
Pyestock	Bulk Supply Point	9,000	26.8 (Winter)
Reading	Bulk Supply Point	68,700	114.2 (Winter)
Reading Town	Bulk Supply Point	27,500	51.3 (Winter)
Wokingham	Bulk Supply Point	19,000	24.4 (Winter)

Table 1 Customer number breakdown and substation peak demand readings (2023-2024) for Fleet GSP and the BSPs currently fed from Fleet GSP.

4.2. Current Network Topology

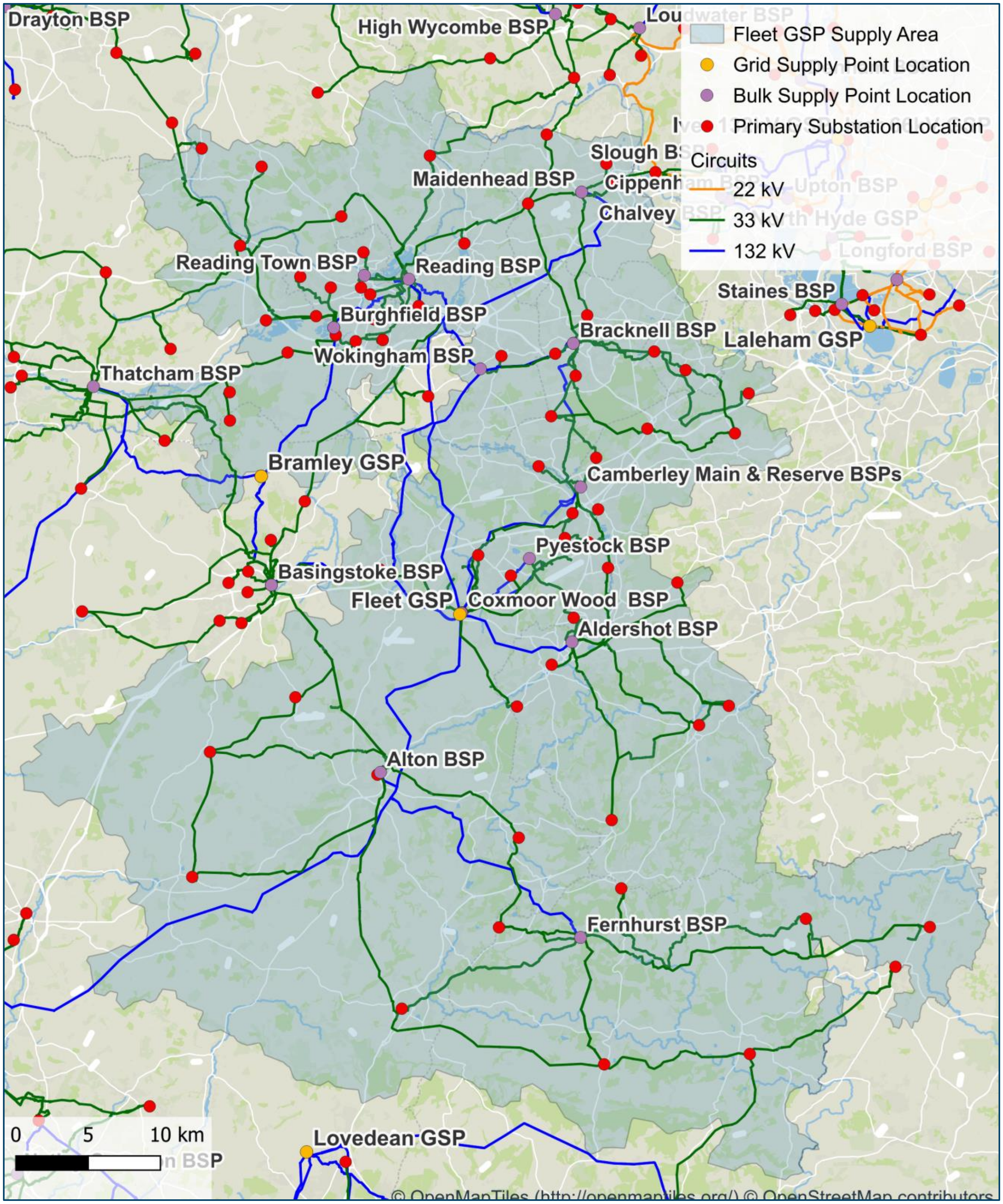

Figure 6 - Current network topology of Fleet GSP.

4.3. Current Network Schematic

Figure 7 shows an illustrative 132kV network schematic for Fleet GSP, please see Appendix C for 33kV network schematics for the current network.

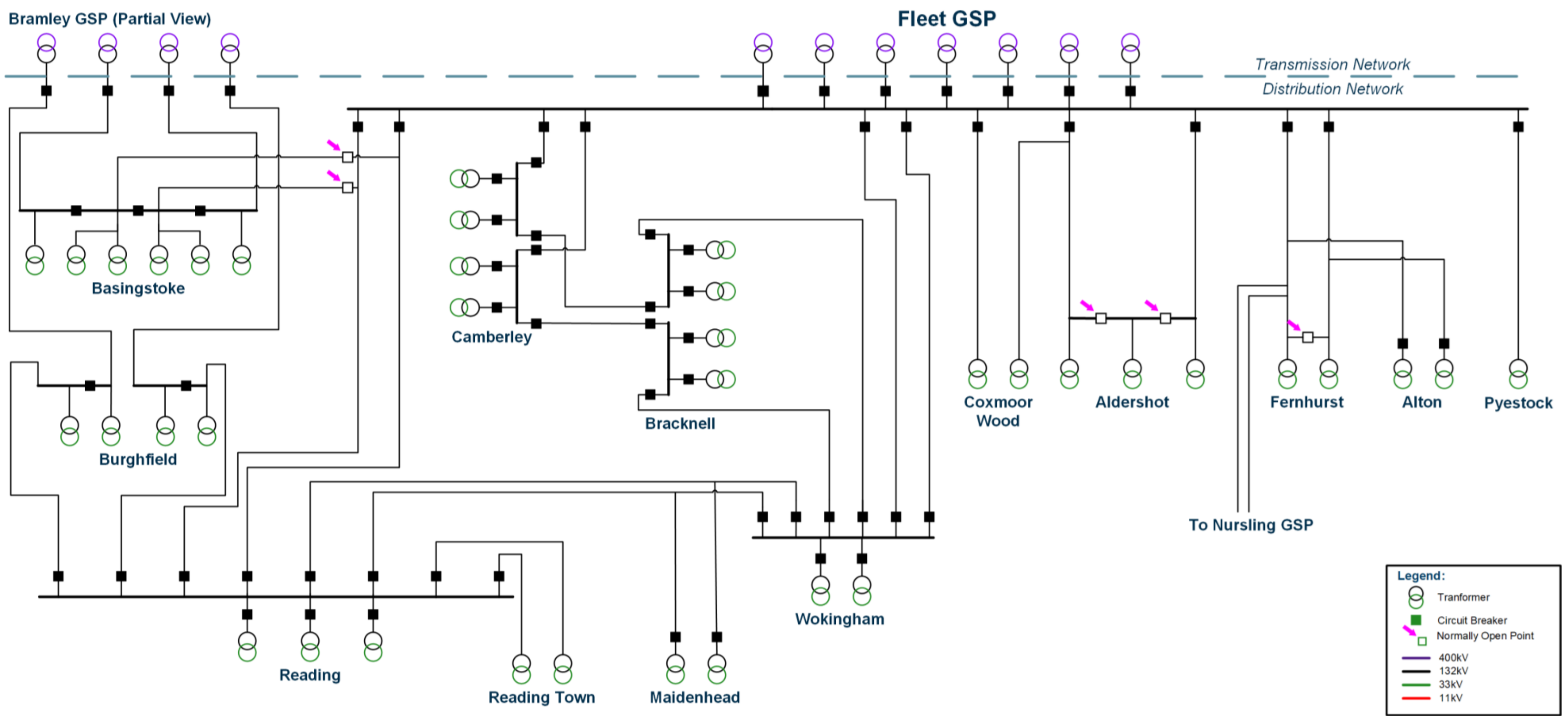

Figure 7 - Existing 132kV network supplied by Fleet GSP

5. FUTURE ELECTRICITY LOAD AT FLEET GSP

The following section details load growth across the technologies projected in the Distribution Future Energy Scenarios (DFES) 2023[4]. There are important notes on the values presented here:

- The load growth described in this section is based upon DFES 2023 to align with the DFES data used to analyse network needs in this report. DFES 2024 insights are now available and can be found in Appendix B.
- This SDP and the analysis conducted has been completed ahead of any changes arising from Clean Power 2030.
- These projections relate to the GSP supply area highlighted in Figure 1b and are not directly aligned to a particular local authority.
- Where MW values are presented in this section, they represent total installed capacity**.** When conducting network studies these values are appropriately diversified to reflect the likely peak demand experienced on the network. Diversifying load values accounts for the fact that not all demand load connected to the network peaks at the same time and so provides a more realistic total expected peak power.

For future iterations of the DFES, additional work will be carried out to ensure that the demand projections are rationalised against local area energy plans (LAEPs) produced in the Fleet GSP area.

5.1. Distributed Energy Resource

The area covered by Fleet GSP includes a mix of urban and semi-rural towns which affects land availability and energy demand patterns. This leads to a diverse portfolio of distributed energy resource (DER) which includes hydropower, onshore wind, renewable engines (landfill gas, sewage gas and other biogas), and gas. The current installed capacity of these equates to 198MW, with the installed capacity projected to reach 861MW by 2050. There is a continued decommissioning of diesel generation which notably does not feature in the predicted 2050 portfolio in any of the four scenarios after 2035 which aligns with net zero targets in the area.

5.1.1. DFES Projections

5.1.1.1. Generation

The biggest source of distributed energy is represented by solar PV with a predicted uptake rising to 800MW accounting for 93% of the energy mix in 2050 as illustrated by Figure 8. Gas generation is set to decrease under Consumer Transformation and to increase under System Transformation, representing the different trajectories for the transition from the use of natural gas to hydrogen technologies under alternate scenarios. Additionally, there is a significant uptake of onshore wind technologies which is projected to grow to from less than 1MW to 25MW under Consumer Transformation, however this still only represents 2.88% of the overall energy mix. The solar PV growth is expected to come from a mix of large-scale and small-scale installations. Stakeholder engagement and local area plans suggest an increase in solar PV installations on domestic properties, school rooftops, depot buildings and council-owned properties, alongside the increase of large-scale solar farms (of more than 1MW).

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4 SSEN Distribution Future Energy Scenarios 2023

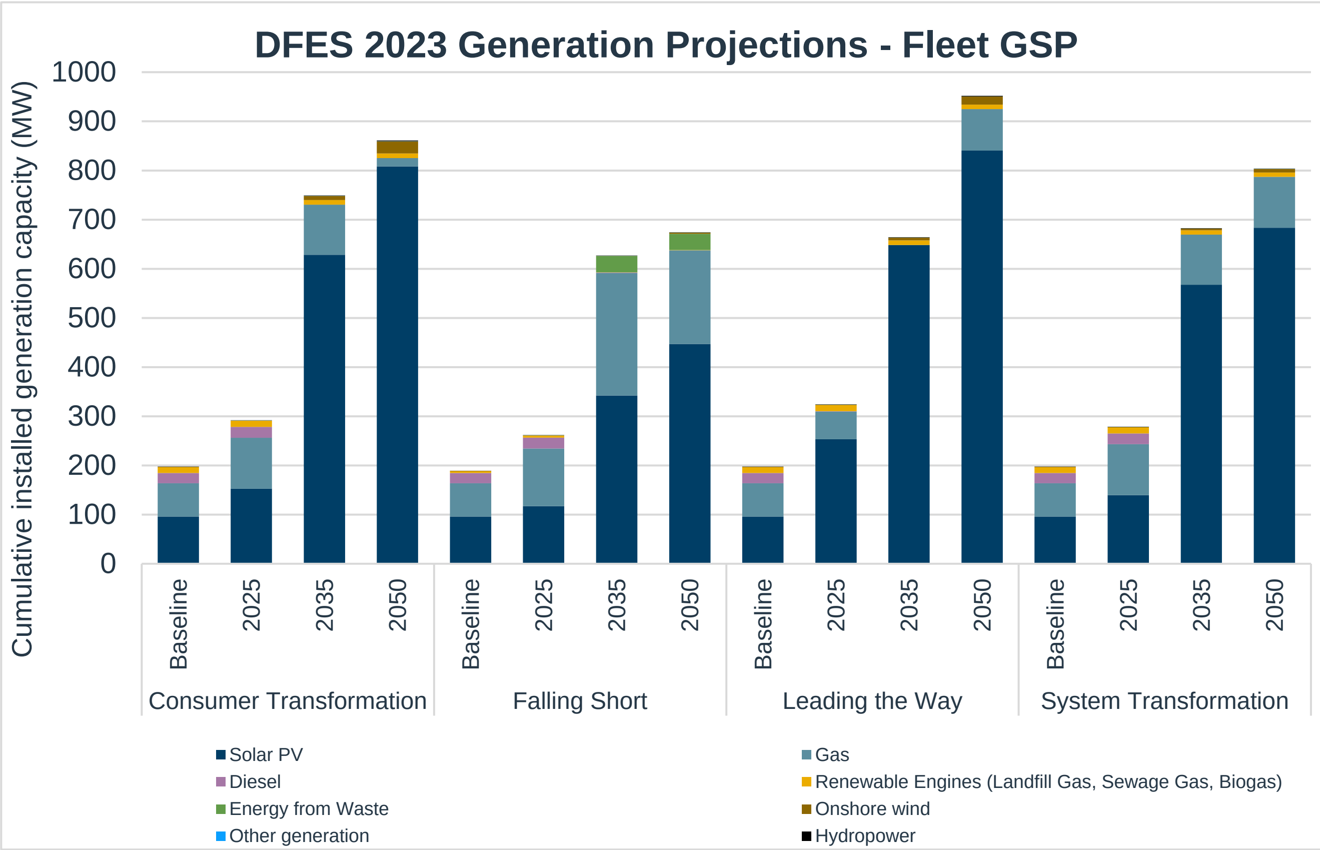

Figure 8 - Projected cumulative distributed generation capacity across Fleet GSP (MW). Source: SSEN DFES 2023

5.1.1.2. Storage

Following the increased projected generation from distributed energy resources, there will be a higher utilisation of battery storage technologies. Battery energy storage systems (BESS) are becoming increasingly important in the Fleet GSP region. Figure 9 shows the baseline of 8.75MW which will increase to 542MW under Consumer Transformation. It is likely that existing generation connections will also benefit from battery retrofitting.

In the baseline scenario, domestic storage accounts for 85.98% of the portfolio. Across all four scenarios there is a diversification and uptake of battery storage technologies out to 2050, with standalone grid services predicted to grow the most from 1.2MW to 279MW under Consumer Transformation displacing domestic storage as the largest sub-technology. Under Consumer Transformation and Leading the Way, this sub-technology continues to play a significant role in the portfolio. Generation co-location also has a significant increase from zero in the baseline scenario to 101MW by 2050 under the Consumer Transformation scenario. The highest uptake in battery storage is seen in Consumer Transformation and Leading the Way, which matches the higher consumer engagement predicted in these scenarios. There is also likely to be increased deployment of behind-the-meter storage (BTM) represented by the high energy users in Figure 9 which typically range between 3-5MW for commercial and industrial applications. The substantial growth of battery storage in the region could suggest large potential expansion for energy intensive sectors such as manufacturing or large-scale continuous operations as batteries can decrease operational costs and provide backup power.

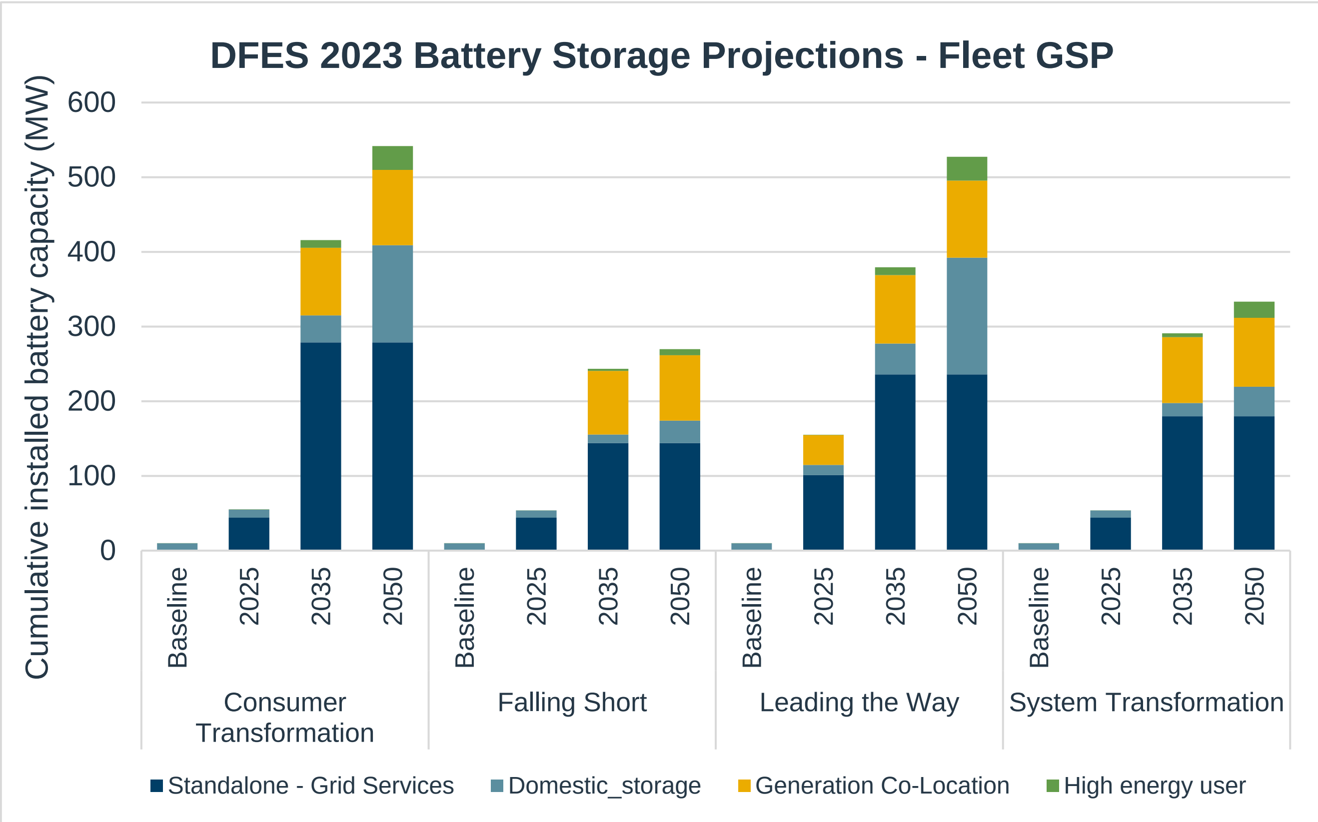

Figure 9 - Projected battery storage capacity across Fleet GSP. Source: SSEN DFES 2023

5.2. Transport Electrification

There are two primary motorways within the Fleet GSP region, the M3 and the M4. The DFES projections of EV charging points at motorway services and on national networks indicate significant upscaling to meet the increasing demand from EVs. The regions also have proximity to Heathrow and Gatwick airport, which will drive mass electrification of logistics surrounding these transport hubs. It is critical to account for Heavy Good Vehicles (HGV), Light Commercial Vehicle (LCV) and fleet depot electrification given its role as a key freight corridor connecting London, Heathrow and Southampton Port. This could also deliver essential insights in understanding the growth in the en-route national network areas which may have not previously been captured by the DFES.

5.2.1. DFES Projections

Figure 10 shows that under all four scenarios the uptake in EV charge points is predicted to increase substantially with the capacity is forecast to increase from the baseline of 21MW to a cumulative maximum of 503MW in 2050 under the Falling Short scenario. However, more rapid growth is expected in the next 10 years under the Consumer Transformation and the Leading the Way scenarios.

Within Fleet GSP, the largest contributor to EV charge point capacity is from domestic on street chargers with forecasted capacity across the four scenarios ranging from 83MW to 167MW by 2050. Councils are investing heavily in electric vehicle charge point infrastructure and plan to electrify their council vehicle fleet drawing from various funding and grants which will contribute to electrification of local businesses and residential areas. Under all four scenarios, the en-route national network capacity experiences notable growth. In the Consumer Transformation scenario, there is a predicted increase from 1.62MW to 17MW in 2050 as shown in Figure 10.

The number of electric vehicles increases falling into the range 61,000 – 76,000 by 2050 across the four scenarios.

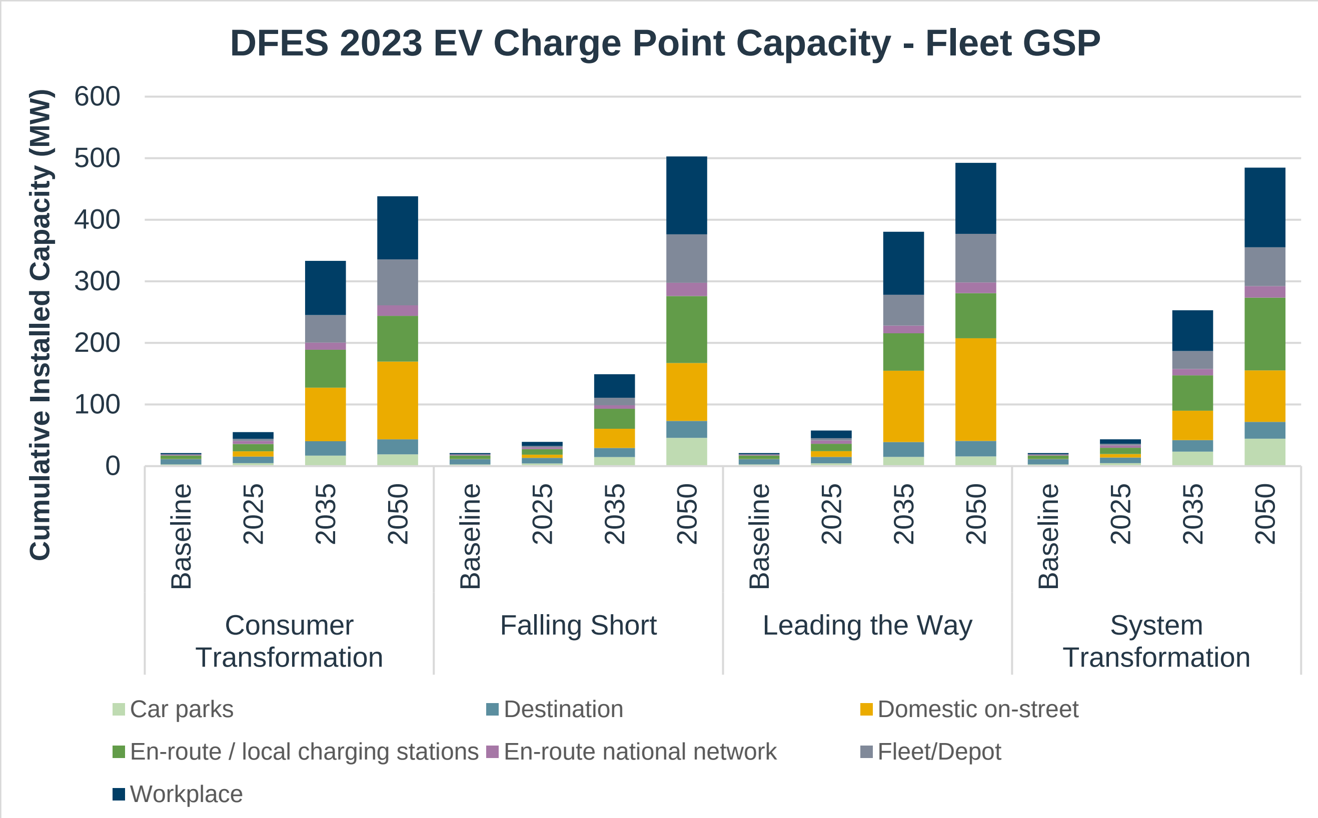

Figure 10 - Projected EV charge point capacity across Fleet GSP. Source: SSEN DFES 2023.

5.3. Electrification of heat

5.3.1. DFES Projections

Most homes currently in the Fleet GSP area rely on fossil fuel heating systems and require conversion to meet carbon reduction goals, leading to the increase of domestic heat pumps from 3,700 to over 346,500 by 2050 under Consumer Transformation. There is a marked scale up in the uptake of domestic heat pumps across all four scenarios, whilst domestic direct electric heating is anticipated to decrease as shown in Figure 11. Due to evolving consumer behaviors, an uptake in air conditioning also features in all four scenarios although the adoption of this technology in the Leading the Way scenario is limited. The increase in air conditioning is most significant under the Falling Short scenario.

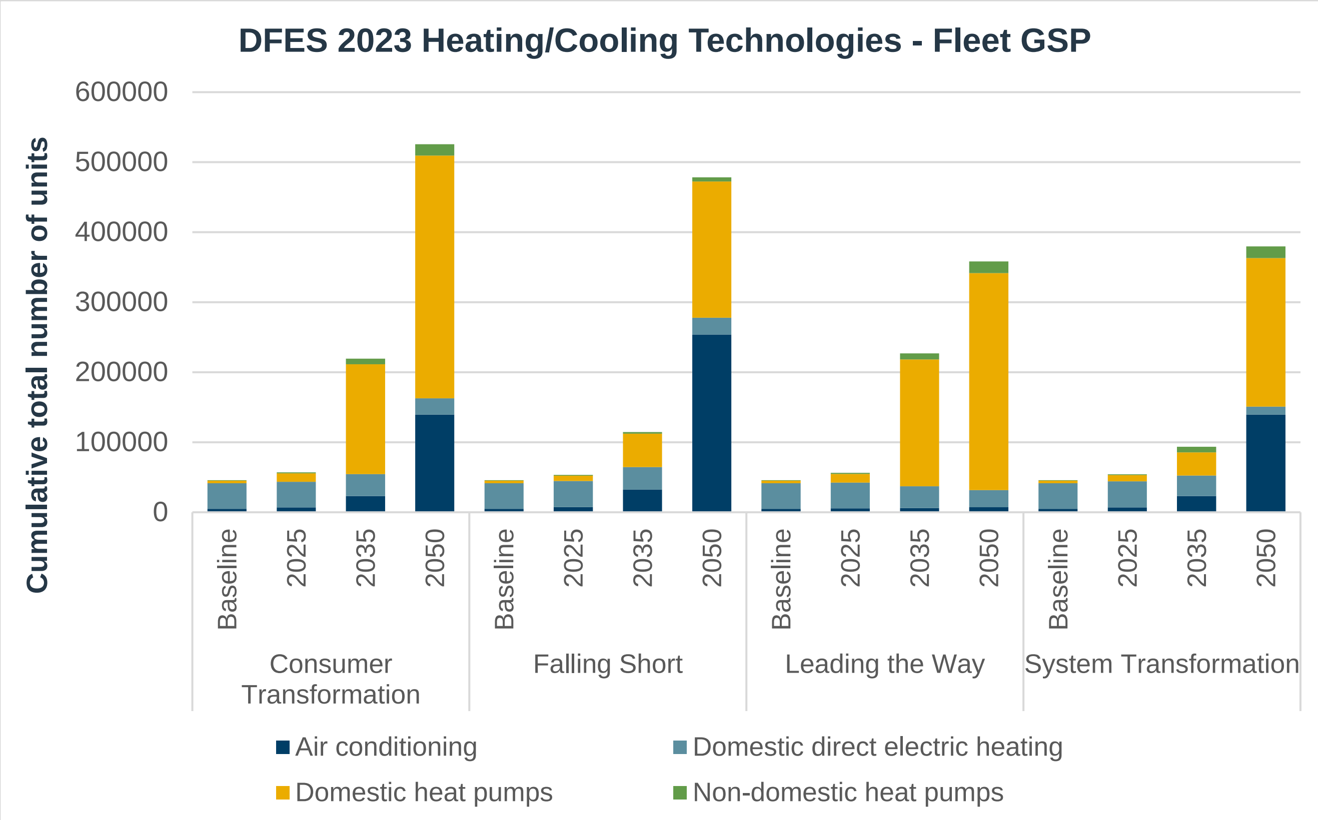

Figure 11 - Projected number of heating/cooling technologies across Fleet GSP. Source: SSEN DFES 2023.

5.4. New building developments

A key stage in producing the DFES is engagement with Local Authorities. On an annual basis local authorities provide their current best view of new development plans to inform these projections. The results presented here have used the information shared by local authorities during the DFES 2023 development process. Where we do not have responses from local authorities these values are determined from published documents, for example adopted local plans.

5.4.1. DFES Projections

For the Fleet GSP region, 46,364 new homes are projected by 2050 under the Consumer Transformation scenario. In addition to domestic development, the DFES also projects the cumulative floorspace of non-domestic new developments. As shown in Figure 12, the two non-domestic building classifications with the largest floorspace growth are new office space followed by factory and warehouse developments which are predicted to increase by 284,190 m^2 and 224,592 m^2 respectively, by 2050. Please note that as this information is directly fed from local authorities the projections are closely aligned across the four scenarios.

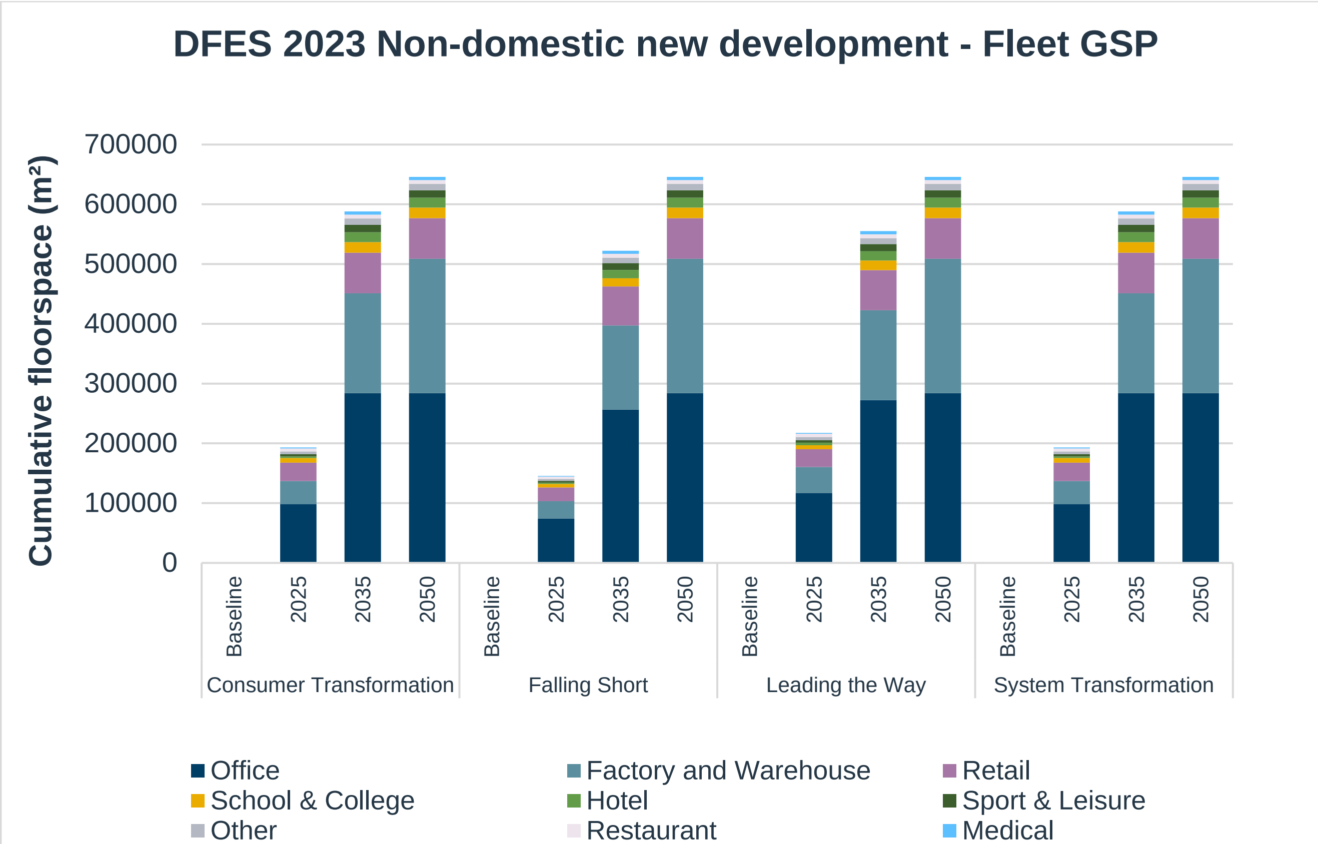

Figure 12 - Projected non-domestic new development across Fleet GSP. Source: SSEN DFES 2023

5.5. Commercial and industrial electrification

5.5.1. Large-Scale Commercial Battery Storage

In line with what has been seen in Section 5.1.1.2, Fleet GSP has experienced high levels of large-scale battery storage connection applications which due to their high import capacity capability have a significant impact on the network and available network capacity.

5.5.2. Data Centres

Fleet GSP does not expect to see the same levels of data centre connection as other part of the network such as West London. However, there have been recent data centre applications and connections in the area. As large demand users, the impact on network capacity is significant even though only a relatively small number have applied.

5.5.3. Industrial Energy Users

SSEN regularly engage with large industrial demand users in the area. Close collaboration on required capacity and how best to facilitate this is carried out. This is key to enable investment and development of the local economy.

6. WORKS IN PROGRESS

Network interventions can be caused by a variety of different drivers. Examples of common drivers are load-related growth, specific customer connections, and asset health. Across Fleet GSP these drivers have already triggered network interventions that have now progressed to detailed design and delivery. For this report, these works are assumed to be complete, with any resulting increase in capacity considered to be released. The drivers listed in the below table are predominantly where a customer connection application has driven the work or whether investment proposals developed through our DNOA process is driving the reinforcement work. The published DNOA outcomes relevant to Fleet GSP are included in Appendix G. The work included here is all work that has passed through the ID2 gate of our Distribution Governance and Investment Framework (DGIF), further information on this process is available in the DSO service statement 2025.[5] The network considered for long-term modelling is shown in Figure 13. Summary of existing works shown below in Table 2.

ID	Substation	Description	Driver	Forecast completion	Resolves future strategic needs to 2050?
		Fleet-Bramley Demand Group Split			
1a	Bramley GSP	Install a new 132kV Gas Insulated Switchgear (GIS). Connected to this switchboard: • Two Super Grid Transformers (SGTs) currently feeding Basingstoke BSP. • Two Super Grid Transformers (SGTs) currently feeding Burghfield BSP. • Two 132kV circuits to Basingstoke BSP. • Four 132kV circuits to Burghfield BSP including two new circuits.	DNOA Process	2030	
1b	Burghfield BSP	Install a new 132kV GIS switchboard at Burghfield BSP and add two additional circuits from Bramley GSP to Burghfield BSP.			
1c	Fleet-Basingstoke-Reading Tee Circuit	Upgrade sections of the Fleet GSP – Basingstoke BSP – Reading BSP tee-circuit.			
1d	Reading BSP	Adjust the normal switching arrangement on the 132kV switchboard at Reading BSP to split			

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		Reading BSP from Fleet GSP so that it is fed from Bramley GSP.			
1e	Wokingham BSP	Replace two 132kV switch disconnectors on the 132kV bus.			
		Fleet GSP			
2	Fleet GSP	Upgrade the switchgear at Fleet GSP from Air Insulated Switchgear (AIS) to Gas Insulated Switchgear (GIS).	DNOA Process	2032	
		Aldershot BSP			
3	Tongham PSS	Two new underground circuits from Aldershot BSP to Tongham PSS and modify the existing circuit to create an interconnector between Farnborough PSS and Aldershot BSP.	DNOA Process	2027	
		Alton BSP			
4	Bordon North PSS	Build a new primary substation – Bordon North PSS.	Customer Connection	2025	
5	Alton BSP, Fernhurst BSP, and Winchester BSP	New 132kV GIS switching station to feed Alton BSP, Fernhurst BSP, and Winchester BSP.	DNOA Process	2028	
6	Alton BSP	Upgrade the 33kV switchgear at Alton BSP from AIS to GIS.	DNOA Process	2028	
7	Alresford PSS	Upgrade existing 33/11kV transformers to 15/30MVA. Reinforce part of the Alton BSP to Alresford PSS 33kV overhead line.	DNOA Process	2028	
		Bracknell BSP			
8	Bracknell BSP	Upgrade the 33kV switchgear at Bracknell BSP from AIS to GIS.	Customer Connection	2029	
9	Chobham PSS	Replace both transformers with 12/24MVA transformers.	Asset Replacement	2027	
		Camberley Main BSP			

10	Crowthorne PSS	Replace the two smaller transformers with 12/24MVA transformers.	Asset Replacement	2027	
Coxmoor Wood BSP					
11	Coxmoor Wood BSP	Upgrade the tapchanger on one of the 132/33kV transformers at Coxmoor Wood BSP.	Customer Connection	2025	
12	Hawley PSS	Transfer Hawley PSS to Camberley Reserve BSP through changing the normally open points at Hawley PSS.	Customer Connection	2026	
13	Coxmoor Wood BSP	Replace one of the 132/33kV transformers at Coxmoor Wood BSP.	Asset replacement	2027	
14	Coxmoor Wood BSP	Addition of a 3rd 132/33kV transformer at Coxmoor Wood BSP with additional 132kV circuit from Fleet GSP. Upgrade the 33kV switchgear from AIS to GIS.	DNOA Process	2031	
Fernhurst BSP					
15	Haslingbourne PSS	Replace the two transformers with 12/24MVA transformers.	Asset replacement	2026	
16	Plaistow PSS	Replace both 33/11kV transformers at Plaistow PSS with transformers rated at 30MVA.	Customer Connection	2028	
17	Fernhurst BSP	Replace both 132/33kV transformers at Fernhurst BSP with transformers rated at 120MVA.	Customer Connection	2029	
Pyestock BSP					
18	Pyestock BSP	Extend and rearrange the 33kV GIS switchboard.	Customer Connection	2026	
19	Crookham Church PSS & Farnborough Airfield PSS	Transfer Crookham Church PSS and Farnborough Airfield PSS to Coxmoor Wood BSP	Customer Connection	2026	

Table 2 - Works already triggered through customer connections and the DNOA process.

Where the above works are marked as not providing sufficient capacity for 2050 peak demands, it is important to note that this relates to the individual primary substation’s firm capacity. When considering the further works identified in this report, the holistic plans provide capacity across the GSP for 2050.

As shown in section 3.4, alongside the asset solutions detailed in the table above, there is active flexibility service procurement ongoing across areas of the Fleet-Bramley GSP area.

6.1. Network Schematic (following completion of above works)

Figure 13 shows an illustrative 132kV network schematic for Fleet GSP following the completion of the works in Table 2, please see Appendix D for 33kV network schematics for the future network.

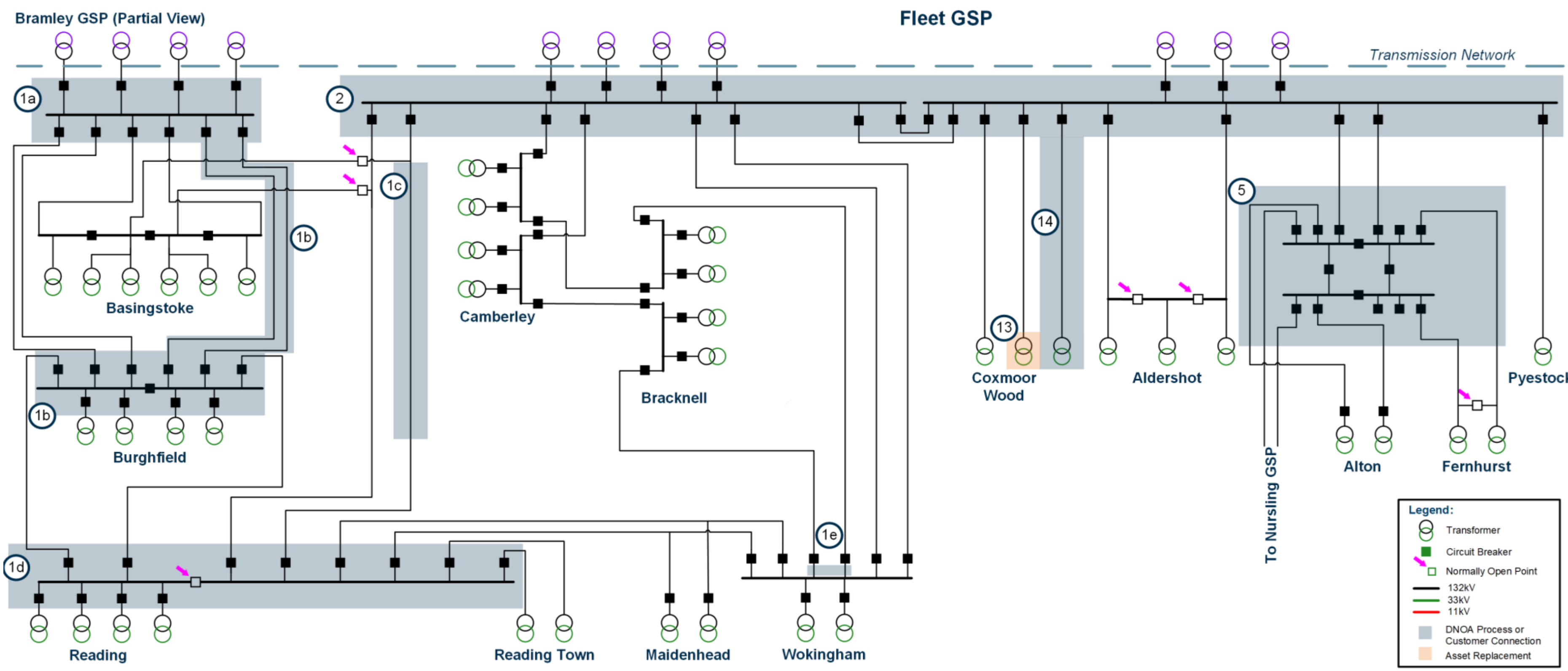

Figure 13 - Future 132kV network for Fleet GSP and part of Bramley BSP to illustrate how they will be connected after they are split.

7. SPATIAL PLAN OF FUTURE NEEDS

7.1. Extra High Voltage / High Voltage spatial plans

The EHV/HV spatial plan shown below in Figure 14 shows the projected headroom or capacity shortfall due to demand increases at primary substations across the Fleet SDP study area. Darker blue shades indicate that there is a projected capacity shortfall whereas lighter blue shades indicate that there is headroom capacity based on current projections. EHV/HV spatial plans for the other DFES scenarios are presented in Appendix E.

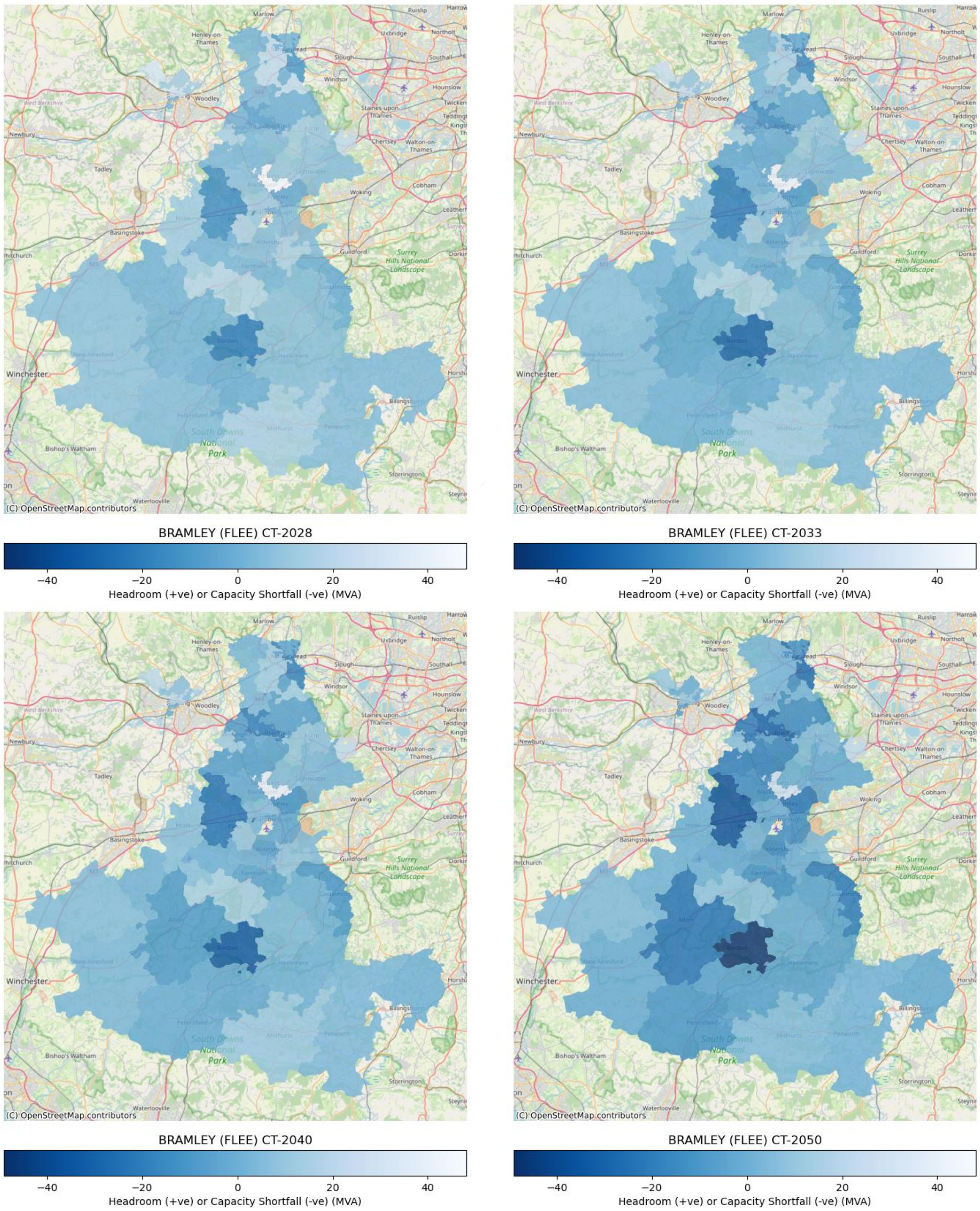

Figure 14 - Fleet GSP - EHV/HV Spatial Plan - Consumer Transformation

7.2. HV/LV spatial plans

The HV/LV spatial plans shown below in Figure 15 show the point locations of secondary transformers supplied by Fleet GSP. The points are colourised based on the projected percentage loading with red meaning higher percentage loading and green being lower percentage loading. The HV/LV spatial plans for the other DFES scenarios are available in Appendix F.

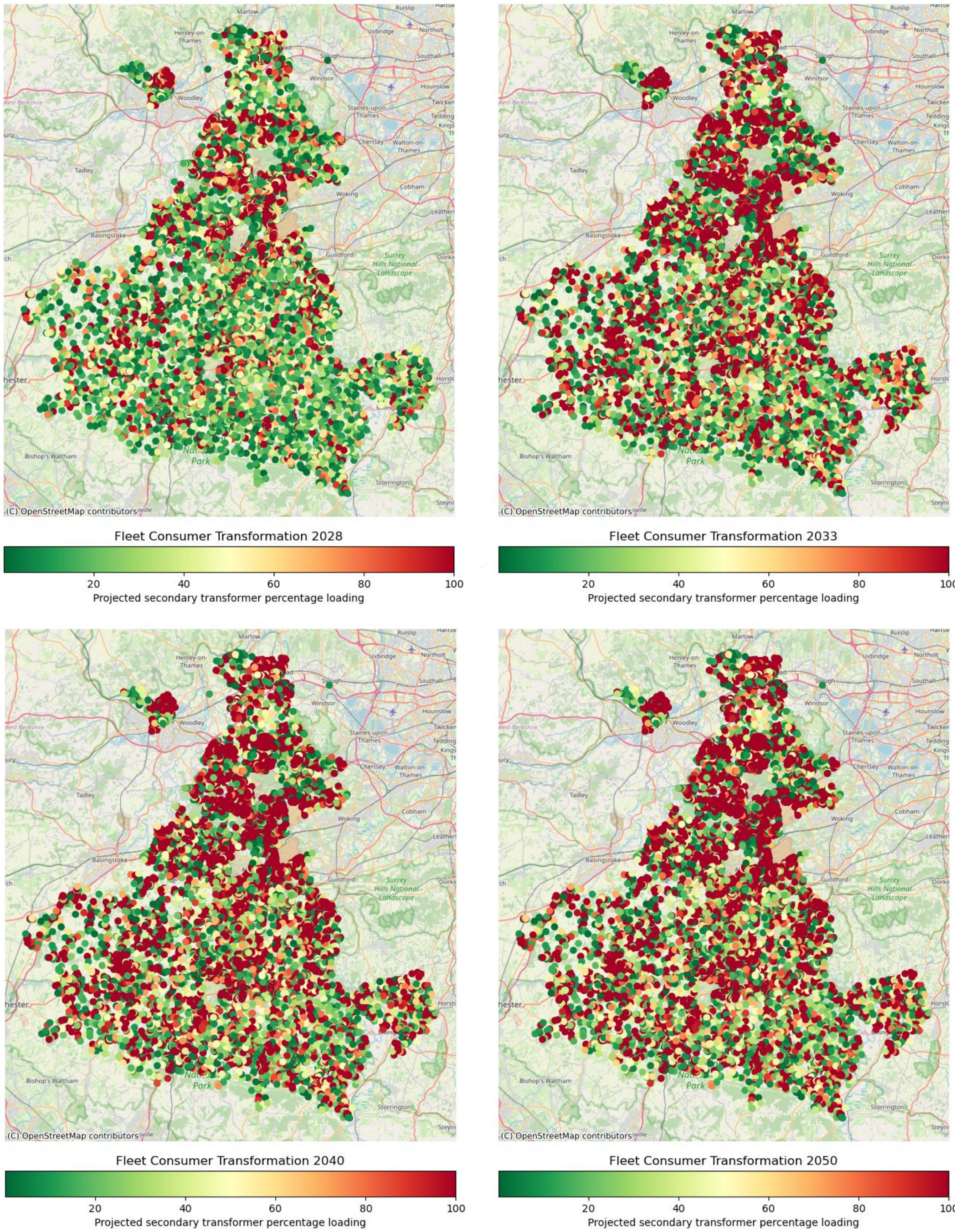

Figure 15 - Fleet GSP - HV/LV Spatial Plans - Consumer Transformation

8. SPECIFIC SYSTEM NEEDS AND OPTIONS TO RESOLVE

In this section we summarise the specific needs arising from our future spatial plans. The outputs of the power system analysis in this section show where we may observe the need for further intervention on the distribution network. This could be through asset solutions or flexibility services including access products which may be used to enable connection of projects ahead of reinforcement delivery. We propose some initial options to resolve the needs forecasted. If required during the next seven years, these will be further developed through the DNOA process. The map in Figure 16 summarises analysis conducted for this section and indicates the timing of the need for intervention on primary substation transformers based on the forecasted demand load for the DFES 2023 Consumer Transformation scenario.

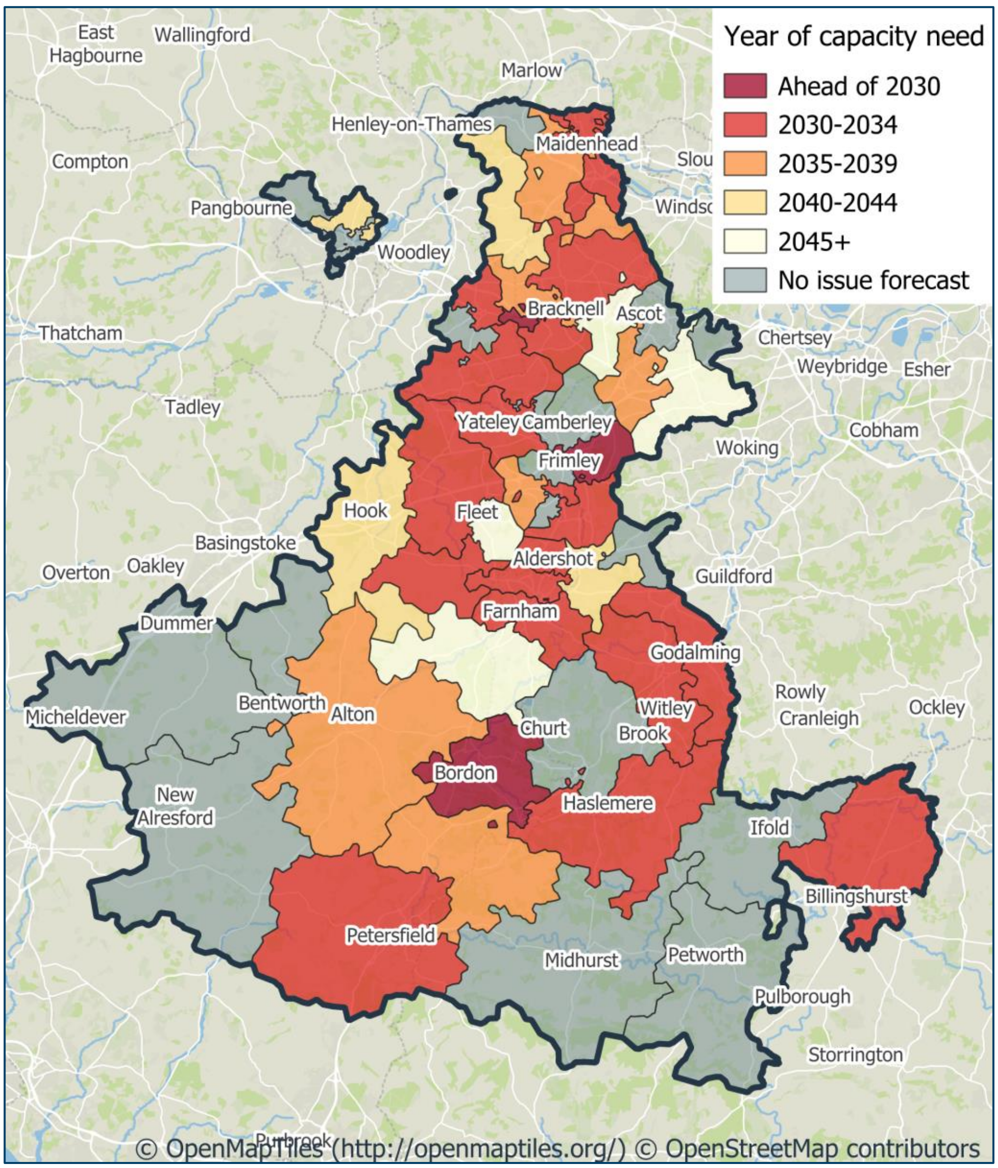

Figure 16 – Map summarising the timing of need for primary intervention across Fleet GSP based on Consumer Transformation.

The section consists of three sets of results:

- Future EHV system needs to 2040 – these needs are more certain and therefore we have more clearly defined options to meet the requirements. For needs within the next ten years, we recommend that these are progressed through the DNOA process. In all cases, we are proposing solutions that meet the projected requirements for 2050 and where appropriate, system needs arising in the early 2040s are taken into account to ensure a holistic solution. We also provide a summary of more strategic elements that also need to be considered in these timeframes.
- Future EHV system needs to 2050 – there is a greater degree of uncertainty of outcomes in this time frame. This also provides more opportunities to work with stakeholders to develop strategic plans and our outline solutions reflect this initial phase of the work as we look to engage with interested parties.
- Future HV/LV system needs to 2050 – the future needs of the HV and LV networks are locationally specific but can be considered as an aggregated volume. In this section we provide information on our future forecasts for local HV and LV network needs.

8.1. Overall dependencies, risks, and mitigations

There are a number of overarching risks to the delivery of our strategic plan. Below we list these alongside proposed mitigating actions. We will work with stakeholders to develop these mitigating actions further.

Dependency: Delivery of the reinforcement work highlighted in the works in progress section (section 6) will be required to enable both capacity in the near-term but also to enable the proposed future options in this system needs section.
Risks: Delays or changes to triggered works fail to release capacity in the near-term and/or do not provide flexibility of future investment.
Mitigation: Existing reinforcement schemes consider this, for example the 132kV indoor busbar proposed at Fleet GSP allows for board extension in the future which will facilitate new 132kV circuit terminations in the future and resolves space constraints at the site. Proposed work should approach space constraints at sites and ensure that proposed work is enabling future network development.

Dependency: Triggered works and future proposed options are particularly dependent on the completion of works to enable the Fleet-Bramley demand group to be split and on the 132kV indoor busbar proposed at Fleet GSP.
Risks: Delays to works have the potential to delay customers connecting and dependent reinforcement schemes.
Mitigation: Continue productive engagement with National Grid Electricity Transmission to enable detailed design and planning of the Fleet-Bramley split and Fleet GSP 132kV indoor busbar.

Dependency: Proposed recommendations are based upon the demand class of substations and demand groups.
Risks: Load growth under Bulk Supply Points may mean that changed resilience requirements impact the options available.
Mitigation: When taking proposed recommendations through the DNOA process, consider the possibility of resilience requirements for sites changing by 2050 and the impact of these on the options available.

Dependency: Procurement of new land across Fleet GSP is likely to be necessary.
Risks: High cost of land and the challenge of finding suitable sites, especially at sites surrounded by areas with high biodiversity.
Mitigation: Identify need ahead of time to account for environmental concerns and work with relevant stakeholders.

Dependency: Procurement of flexibility services is required to optimise load-related needs.
Risks: Complexity in the network configuration limits deployment of flexibility services.
Mitigations: Consider options which remove barriers for flexibility provisions.

8.2. Future EHV System Needs

In this section, a detailed list of the constraints identified through network modelling is presented alongside potential options to meet forecasted demand. The interactions between possible options have been considered to identify potential synergies and efficiencies. As such, constraints have been grouped strategically to be considered alongside each other and any additional interactions between constraints referenced.

The identified future EHV system needs are divided into three network areas:

- **Alton & Fernhurst BSPs**
  - Local authorities: Basingstoke and Deane, East Hampshire, Chichester, Hart, Horsham, Waverley and Winchester.
- **Aldershot, Coxmoor Wood & Pyestock BSPs**
  - Local authorities: Basingstoke and Deane, East Hampshire, Guildford, Hart, Rushmoor and Waverley.
- **The Fleet Ring** consisting of Bracknell BSP, Camberley BSP, Maidenhead BSP, Reading Town BSP, and Wokingham BSP
  - Local authorities: Bracknell Forest, Guildford, Hart, Reading, Runnymede, Rushmoor, South Oxfordshire, Surrey Heath, Windsor and Maidenhead, and Wokingham.

The three areas are highlighted in Figure 17.

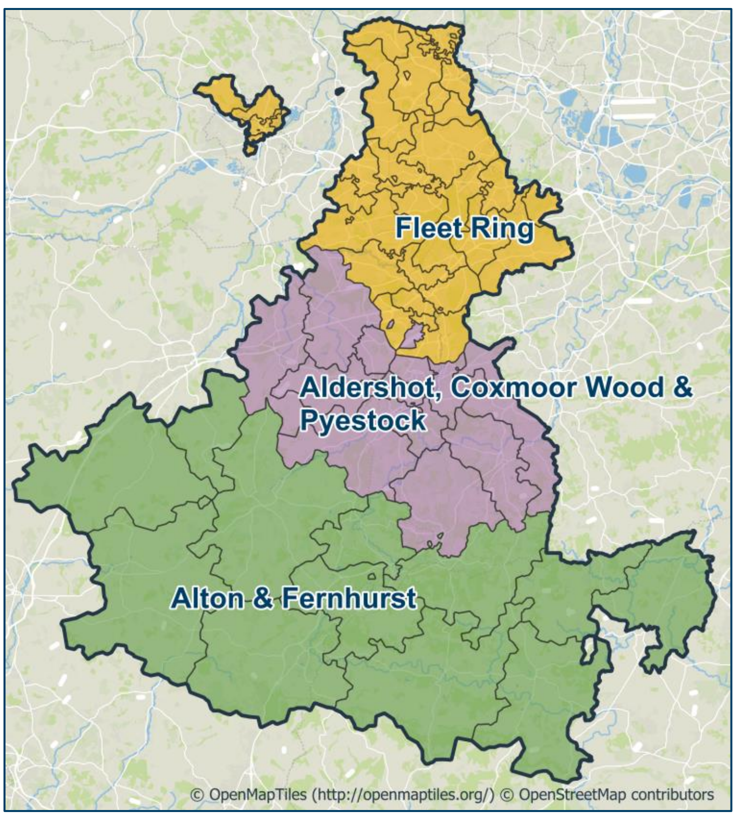

Figure 17 - Map illustrating the structure of the Future EHV System Needs results.

8.2.1. System needs out to 2040

Constraint ID	Alton & Fernhurst						
	Location of proposed intervention	**CT Year**	**ST Year**	**LW Year**	**FS Year**	**Network state[6]**	**Comments and potential options to resolve the system need**
	132kV Network						
1	Alton BSP transformers	2035 - 2039	2040 - 2044	2030 - 2034	2040 - 2044	N-1: Loss of one BSP transformer or 132kV circuit. N-2: Loss of one circuit to Alton BSP and one circuit to Fernhurst BSP or loss of one 132/33kV transformer at Alton BSP and one 132/33kV transformer at Fernhurst BSP.	Due to the proximity and shared 132kV circuits from Fleet GSP, the constraints under Alton BSP and Fernhurst BSP should be considered together. Option a: i. Add a third 90MVA transformer at Alton BSP and a third circuit from Alton 132kV switching station. ii. Build two 33kV circuits between Alton BSP and Fernhurst BSP to act as a backfeed during N-1 and N-2 events. Option b: i. Build a new BSP between Alton BSP and Fernhurst BSP and transfer load to the new BSP. ii. There is the option to build the BSP at the site of the new Alton 132kV switching station. If a different site is chosen, this will require two 132kV circuits to the new BSP either from Alton Switching Station or directly from Fleet GSP. Option c: i. At Alton BSP, add a third 90MVA BSP transformer and a third 132kV circuit from Alton 132kV switching station. ii. At Fernhurst BSP, add a third BSP transformer rated at 90MVA and a third 132kV circuit from Alton 132kV switching station.
	132kV circuits to Alton BSP	2035 - 2039	2045+	2035 - 2039	2045+		
	Fernhurst BSP transformers	2035 - 2039	No issue	2035 - 2039	2045+		
	132kV circuits to Fernhurst BSP	2035 - 2039	2040 - 2044	2035 - 2039	2045+		
2	132kV circuits from Fleet GSP to Alton 132kV switching station	2030 - 2034	2035 - 2039	2030 - 2034	2040 - 2044	N-1: Loss of one circuit from Fleet GSP to Alton 132kV switching station.	Option a: i. Add a third circuit from Fleet GSP to Alton 132kV Switching-Station utilising available circuit breakers. Option b: i. If option 1b is chosen and the new BSP is not connected to the new Alton 132kV Switching Station, then there is an option to add two new 132kV circuits to the new BSP and transfer load to the new BSP to resolve this constraint.
	33kV Network						
3	Five Oaks PSS transformers	2030 - 2034	2030 - 2034	2030 - 2034	2034 - 2039	N-1: Loss of one of the transformers or 33kV circuits.	There is capacity at Plaistow PSS out to 2051 so a load transfer to defer reinforcement can be considered alongside asset options. Option a:

6 Network state refers to the situation where the asset becomes overloaded. N-1 refers to a scenario where an outage is taken on the network, **or** a fault occurs. N-2 refers to a scenario where an outage is taken on the network **and** a fault occurs.

							i. Add a third 7.5/15MVA transformer. Option b: i. Replace both transformers with 12/24MVA transformers.
4	33kV circuit from Fernhurst BSP to Plaistow PSS	2030 - 2034	2030 - 2034	2030 - 2034	2040 - 2044	N-1: Loss of part of the Five Oaks – Plaistow ring.	Option a: i. Upgrade the 33kV circuit. Option b: i. Add a direct 33kV circuit from Fernhurst BSP to Five Oaks PSS.
5	Haslemere PSS transformers and circuits	2030 - 2034	2040 - 2044	2030 - 2034	2040 - 2044	N-1: Loss of one of the transformers or 33kV circuits.	These three primary substations under Fernhurst BSP all see constraints within RIIO-ED4 and lie in close proximity to each other - it is therefore recommended that all three are considered in parallel when considering the long-term solution for this area. Option a: i. Replace both transformers and add a third transformer to Langley Court PSS. ii. Transfer load from Haslemere PSS and Petersfield PSS to Langley Court PSS. Option b: i. At Petersfield PSS, replace both transformers. ii. At Langley Court PSS, add an additional transformer. iii. At Haslemere PSS, replace the 15/30MVA transformer. Option c: i. At Petersfield PSS, replace both transformers. ii. At Haslemere PSS, replace both transformers. This would additionally add the benefit of no longer having transformers with different ratings at Haslemere PSS. iii. Load transfer from Langley Court PSS.
	Petersfield PSS transformers	2030 - 2034	2035 - 2039	2030 - 2034	2035 – 2039	N-1: Loss of one transformer.	
	33kV circuits to Petersfield PSS	2030 - 2034	2035 - 2039	2030 - 2034	2035 - 2039	N-1: Loss of one of the 33kV circuits.	
	Langley Court PSS transformers	2035 - 2039	2045+	2035 - 2039	2045+	N-1: Loss of one transformer.	
	33kV circuits to Langley Court PSS	2040 - 2044	No issue	No issue	No issue	N-1: Loss of the 33kV circuit from Fernhurst BSP to Langley Court transformer 1. N-1: Loss of one of the Midhurst PSS transformers due to tee point to Alton BSP.	
6	Alton Local PSS transformers	2035 - 2039	2045+	2035 - 2039	2045+	N-1: Loss of one transformer or one circuit from Alton BSP.	Option a: i. At Alton Local PSS, replace the three existing transformers and the three 33kV circuits from Alton BSP. ii. Transfer load from Alton Local PSS to Preston Candover PSS and Alresford PSS. iii. Add a direct circuit from Alton BSP to Alresford PSS to remove load from the ringed circuits. Option b: i. At Herriard PSS, replace the existing transformer and add an additional transformer to make it a larger primary substation. ii. Add a direct circuit from Alton BSP to Herriard PSS to remove the tee point. iii. Transfer load from Alton Local PSS to Herriard PSS. iv. Add a direct circuit from Alton BSP to Alresford PSS to remove load from the ringed circuits.
	33kV circuits to Alton Local PSS	2030 - 2034	2035 - 2039	2030 - 2034	2040 - 2044		
	33kV circuit from Alton BSP to the tee point between Herriard PSS and a normally open point to Down Grange PSS.	2035 - 2039	2040 - 2044	2035 - 2039	2045+	N-1: Loss of the 33kV circuit from Alton BSP to the tee point between Preston Candover PSS and a normally open point to Down Grange PSS.	
	33kV circuits from Alton BSP to Alresford PSS and from Alresford PSS to Preston Candover PSS.	2035 - 2039	2045+	2035 - 2039	2045+	N-1: Loss of one of the 33kV circuits to Alresford.	

							Option c (for constraint on Alton-Alresford-Preston Candover circuit only): i. If option b is chosen for constraint 1, consider moving Alresford PSS to the new BSP or adding a 33kV circuit from the new BSP to Alresford PSS.
7	Bordon PSS transformers	Ahead of 2030	2030 - 2035	Ahead of 2030	2030 - 2035	N-1: Loss of one transformer.	Option a: i. Replace the three existing transformers at Bordon PSS with three 20/40MVA transformers. Option b: i. Utilise the new Bordon North PSS by adding two 20/40MVA transformers. ii. Transfer load from Bordon PSS to Bordon North PSS.
8	33kV circuits connecting Alton BSP, Bordon PSS and Langley Court PSS.	2030 - 2034	2040 - 2044	2030 - 2034	2040 - 2044	N-1: Loss of the circuit connecting Bordon North PSS to Bordon PSS.	As the 33kV circuits between Bordon PSS and Langley Court PSS connect Fernhurst BSP and Alton BSP. The option considered for these circuits should be looked at in tangent with constraint 1. Option a: i. Add an additional circuit to Bordon PSS from Alton BSP. Option b: i. If a new BSP is planned, consider moving Bordon PSS to the new BSP.

Table 3 - Summary of system needs identified in this strategy out to 2040 along with indicative solutions for Alton & Fernhurst

Constraint ID	Aldershot, Coxmoor Wood & Pyestock						
	Location of proposed intervention	**CT Year**	**ST Year**	**LW Year**	**FS Year**	**Network state**	**Comments and potential options to resolve the system need**
	132kV Network						
9	Aldershot BSP Transformers	2030 - 2034	2035 - 2039	2030 - 2034	2040 - 2044	N-1: Loss of one transformer or circuit.	Aldershot BSP is forecast to have significant load growth in the area. Consideration is needed of the future level of resilience required and how options may provide additional long-term resilience. Option a: i. Add a 4th 90MVA transformer and a third 132kV circuit from Fleet GSP. Option b: i. Replace the three existing transformers with 120MVA transformers. ii. Add a third 132kV circuit from Fleet GSP. iii. Transfer load to Camberly Reserve BSP. Option c: i. If option b is chosen for constraint 1, increase the proposed capacity of the new BSP and look to transfer load from Aldershot BSP to the new BSP.
	132kV circuits from Fleet GSP to Aldershot BSP	2030 - 2034	2035 - 2039	2030 - 2034	2040 - 2044		

	33kV Network						
10	Godalming PSS transformers	2030 - 2035	2035 - 2039	2030 - 2035	2035 - 2039	N-1: Loss of one transformer or one circuit from Aldershot BSP.	Option a: i. Replace the circuit from the Godalming-Normandy tee to Godalming PSS. ii. Add a third 24MVA transformer to Godalming PSS and transfer load from Milford PSS to Hindhead PSS and Godalming PSS. iii. Remove the ringed circuit between Godalming PSS, Milford PSS and Hindhead PSS through one of the following options: • Add two new circuits to Milford PSS from Aldershot BSP. • Add two new circuits to Hindhead PSS from Aldershot BSP. • Move Hindhead PSS to Fernhurst BSP through two new 33kV circuits. Option b: i. Add a new primary substation between Milford PSS and Godalming PSS with 2 new 33kV circuits from Aldershot BSP and transfer load away from these primaries.
	Milford PSS transformers	2030 - 2035	2035 - 2039	2030 - 2035	2045+	N-1: Loss of the circuit from Milford to Godalming.	
	33kV ringed circuits connecting Aldershot BSP to Hindhead PSS, Milford PSS, Normandy PSS and Godalming PSS.	2030 - 2035	2035 - 2039	2030 - 2035	2035 - 2039	N-1: Circuit losses on the ringed network.	
11	Aldershot PSS transformers	2030 - 2034	2035 - 2039	2030 - 2034	2040 - 2044	N-1: Loss of one transformer.	Option a: i. At Aldershot PSS, replace the 15MVA transformer with a 15/30MVA transformer. ii. Build a new primary substation with two 20/40MVA transformers and two circuits from Aldershot BSP. iii. Transfer load from Farnham PSS, Laburnam Road PSS, and if required, Aldershot PSS to the new primary substation. Option b: i. At Farnham PSS, add a third 15/30 MVA transformer and a third circuit from Aldershot BSP. ii. At Aldershot PSS, replace the 15MVA Transformer with a 15/30MVA transformer. iii. At Laburnam Road PSS, replace the three existing transformers with 20/40MVA transformers. iv. If required, transfer load to Laburnam Road PSS from Aldershot PSS.
	Farnham PSS transformers	2030 - 2034	2035 - 2039	2030 - 2034	2035 - 2039	N-1: Loss of one transformer.	
	33kV circuits from Aldershot BSP to Farnham PSS	2030 - 2034	2035 - 2039	2030 - 2034	2040 - 2044	N-1: Loss of one transformer or one circuit from Aldershot BSP.	
	Laburnam Road PSS transformers	2030 - 2034	2035 - 2039	2030 - 2034	2035 - 2039	N-1: Loss of one transformer.	
	33kV circuits from Aldershot BSP to Laburnam Road PSS and a normally open point connection to Coxmoor Wood BSP and Pyestock BSP.	2030 - 2034	2035 - 2039	2030 - 2034	2040 - 2044	N-1: Loss of one of the 33kV circuits feeding Laburnam Road PSS.	
12	Coxmoor Wood PSS transformers	2030 - 2034	2035 - 2039	2030 - 2034	2040 - 2044	Intact conditions.	Option a: i. At Hitches Lane PSS, add a third 20/40MVA transformer and a third 33kV circuit from Coxmoor wood BSP. ii. At Coxmoor Wood PSS, add a second 10MVA transformer. iii. At Hook PSS, add a third 15/30MVA transformer. Option b: i. Coxmoor Wood PSS is next to Fleet GSP and with the planned work to remove Fleet air-insulated switchgear (AIS) there may be an opportunity to expand the Coxmoor Wood site. It is therefore recommended to consider
	Hitches Lane PSS transformers	2030 - 2034	2035 - 2039	2030 - 2034	2040 - 2044	N-1: Loss of one transformer.	
	33kV circuits to Hitches Lane PSS	2030 - 2034	2040 - 2044	2030 - 2034	2040 - 2044	N-1: Loss of one transformer or one circuit from Coxmoor Wood BSP.	
	Hook PSS transformers	2040 - 2044	2045+	2040 - 2044	2045+	N-1: Loss of one transformer.	

							replacing the existing 10MVA transformer at Coxmoor Wood PSS with two 20/40MVA transformers and transfer load from Hitches Lane PSS and Hook PSS to Coxmoor Wood PSS.

Table 4 - Summary of system needs identified in this strategy out to 2040 along with indicative solutions for Aldershot, Coxmoor Wood & Pyestock

Constraint ID	Fleet Ring						
	Location of proposed intervention	**CT Year**	**ST Year**	**LW Year**	**FS Year**	**Network state**	**Comments and potential options to resolve the system need**
132kV Network							
13	Camberley Main BSP transformers	2035 - 2039	2045+	2035 - 2039	2045+	N-1: Loss of one transformer.	The load growth at the Camberley BSPs requires investment for the long-term needs in the area. The reinforcement at the Camberley BSPs should be considered alongside the reinforcement at Aldershot BSP where there is significant growth as it is recommended to consider moving load away from Aldershot BSP to Camberley Reserve BSP. Option a: i. Add a third 90MVA transformer at both Camberley Main BSP and Camberley Reserve BSP. ii. Add two new circuits from Fleet to the Camberley BSPs. Option b: i. Replace both existing transformers with 120MVA transformers. ii. Add two new circuits from Fleet to the Camberley BSPs.
	Camberley Reserve BSP transformers	2035 - 2039	2035 - 2039	2030 - 2034	2040 - 2044		
	132kV circuits from Fleet GSP to Camberley BSPs.	2035 - 2039	2040 - 2044	2030 - 2034	2040 - 2044	N-1: Loss of one of the circuits from Fleet GSP to Wokingham BSP.	
14	Maidenhead BSP transformers	2030 - 2035	2040 - 2044	2030 - 2035	2040 - 2044	N-1: Loss of one transformer.	Maidenhead BSP and Bracknell BSP are situated at the north of the Fleet GSP area and there is an existing 33kV connection between the two. There is significant load growth forecast across both BSPs. In particular with Bracknell, because of its load growth, consideration is needed of the level of resilience required and how options may provide additional long-term resilience. Maidenhead BSP has existing 33kV interconnections with High Wycombe BSP in Cowley GSP and Slough BSP in Iver 132kV GSP – both of which also experience capacity constraints out to 2050. It is therefore recommended that the long-term strategic plans for Maidenhead and Bracknell are considered alongside High Wycombe BSP and Slough BSP. Option a: i. At Maidenhead BSP, replace both transformers with 120MVA transformers or add a third 90MVA transformer.
	Bracknell BSP transformers	2040 - 2044	No issue	2035-2039	No issue		

							ii. Consider transferring load from Maidenhead BSP to Wokingham BSP or Bracknell BSP. iii. At Bracknell BSP, add two 90MVA transformers. Option b: i. Build a new BSP with two 120MVA transformers. ii. Transfer load from Maidenhead BSP and Bracknell to the new BSP and to Wokingham BSP.
15	132kV ringed circuits connecting Bracknell BSP and Maidenhead BSP to Fleet GSP.	From 2030 - 2034	From 2040 - 2044	From 2030 - 2034	From 2040 - 2044	N-1: Loss of part of the Fleet 132kV ringed circuit.	Option a: i. Three direct circuits from Fleet to Bracknell to remove it from the 132kV ring. ii. Replace the circuits from Wokingham BSP to Reading BSP and from Reading BSP to Maidenhead BSP and add a third circuit if required based on the option chosen for constraint 14. iii. Replace the two existing circuits or add a third 132kV circuit from Fleet GSP to Reading BSP. Option b: i. Two direct circuits from Fleet GSP to Maidenhead BSP to remove it from the 132kV ring. ii. Replace the circuits from Wokingham BSP to Bracknell BSP and add a third circuit from Fleet GSP to Bracknell BSP. Option c: i. Add two 132kV circuits from a neighbouring GSP to Bracknell BSP – options include Laleham GSP, Iver 132kV GSP and Bramley GSP. ii. Two direct circuits from Fleet GSP to Maidenhead BSP to remove it from the 132kV ring. Option d: i. Resolve constraints on the Fleet Ring 132kV circuits through considering the option of a whole system solution for Bracknell BSP and Maidenhead BSP with High Wycombe BSP and Slough BSP (additional detail in Section 8.2.2.1).
	132kV circuits from Fleet GSP to Reading 132kV switchboard	2035 - 2039	No issue	No issue	No issue	N-1: Loss of Fleet GSP to Wokingham 132kV circuit.	
16	Reading Town BSP transformers	2035-2039	2045+	2035 - 2039	2045+	N-1: Loss of one transformer.	Option a: i. Add a third 90MVA transformer. ii. Add a third 132kV circuit from Reading BSP. Option b: i. Replace both transformers with 120MVA transformers. ii. Replace both 132kV circuits to Reading and under N-2 scenarios, use the 33kV connection to Reading.
	132kV circuits from Reading BSP to Reading Town BSP.	2045+	No issue	2045+	No issue	N-1: Loss of one of the circuits feeding Reading Town BSP.	

33kV Network							
17	Frimley PSS transformers	Ahead of 2030	Ahead of 2030	Ahead of 2030	Ahead of 2030	N-1: Loss of one transformer.	Option a: i. At Frimley PSS, replace the two existing transformers and add a third transformer all rated at 20/40MVA and transfer load from Cove PSS to Frimley PSS. ii. Add a third 33kV circuit from Camberley Reserve BSP to Frimley PSS. Remove the tee from Frimley PSS to Farnborough PSS through adding an additional direct 33kV circuit from Frimley PSS to Camberley Reserve BSP. iii. At Queensmead PSS, replace both existing transformers with 20/40MVA transformers and transfer load from Farnborough PSS to Queensmead PSS. iv. Add two 33kV direct circuits from Camberley Reserve BSP to Queensmead PSS. v. Replace the circuits from Camberley Reserve BSP and Coxmoor Wood BSP to Hawley PSS and Cove PSS. Option b: i. Build a new primary substation between Farnborough PSS and Frimley PSS with two 20/40MVA transformers and two new 33kV circuits from Camberley Reserve BSP. Transfer load from Farnborough PSS and Frimley PSS to the new primary substation. ii. At Queensmead PSS, add a third 12/24MVA transformer or replace both existing transformers with 15/30MVA transformers. Transfer load from Cove PSS to Queensmead PSS. iii. Remove Queensmead PSS from the ringed circuit with two new 33kV circuits from Camberley Reserve BSP to Queensmead PSS. iv. Replace the 33kV circuits from Camberley Reserve BSP and Coxmoor Wood BSP to Hawley PSS and Cove PSS. Option c: i. At Frimley PSS, replace the 2 existing transformers and add a third transformer all rated at 20/40MVA. Add a new circuit from Camberley Reserve BSP to Frimley PSS. ii. At Queensmead PSS, add a third 10MVA transformer or replace both transformers with 12/24MVA transformers. Add two new direct circuits from Camberley Reserve BSP to Queensmead PSS. iii. At Farnborough PSS, add a third 15/30MVA transformer or replace both existing transformers with 20/40MVA transformers and transfer load. Add a third circuit from Camberley Reserve BSP or replace the existing circuits.
	Queensmead PSS transformers	2030 - 2034	2030 - 2034	2030 - 2034	2030 - 2034	N-1: Loss of one transformer.	
	Farnborough PSS transformers	2030 - 2034	2035 - 2039	2030 - 2034	2035 - 2039	N-1: Loss of one transformer or one of the 33kV circuits.	
	Cove PSS transformers	2035 - 2039	2040 - 2044	2030 - 2034	2040 - 2044	N-1: Loss of one transformer.	
	33kV circuits connecting Camberley Reserve to the primary substations connected to it, including the ringed circuits.	Ahead of 2030	Ahead of 2030	Ahead of 2030	Ahead of 2030	N-1: A loss of part of the 33kV network under Camberley Reserve BSP	
	33kV backfeed from Coxmoor Wood BSP to Hawley PSS.	2040 - 2044	No issue	2040 - 2044	2045+	N-1: Loss of circuit from Camberley Reserve BSP	

							iv. At Cove PSS, replace both transformers with 15/30MVA transformers or add a third 12/24MVA transformer. v. Add a second circuit from Camberley Reserve BSP to Hawley PSS.
18	Crowthorne PSS transformers	2030 - 2034	2035 - 2039	2030 - 2034	2035 - 2039	N-1: Loss of the largest transformer at Crowthorne PSS.	Both Sandhurst and Crowthorne are predicted to see significant load growth beyond their current capacity out to 2050, it is therefore recommended to consider a solution to both constraints in parallel. Options to resolve: Option a: i. Build a new primary substation with two 20/40MVA transformers. Build two new 33kV circuits to the new primary substation from Camberley Main BSP. ii. Transfer load from Crowthorne PSS and Sandhurst PSS to the new primary substation and to Camberley PSS, where there is capacity. iii. Replace the 33kV circuits to Kings Ride PSS. Option b: i. Add a third 15/30MVA transformer at Sandhurst PSS along with a third 33kV circuit from Camberley Main BSP. ii. Add a fourth 12/24MVA transformer at Crowthorne PSS. iii. Transfer load from Crowthorne PSS and Sandhurst PSS to Camberley PSS and Kings Ride PSS. iv. Remove the 33kV tee with Crowthorne PSS and Kings Ride PSS through adding a new 33kV circuit directly from Camberley Main BSP to Crowthorne PSS. v. Replace the existing 33kV circuit from Camberley Main BSP to Crowthorne PSS. vi. Replace the existing direct circuit from Camberley BSP to Kings Ride PSS.
	Sandhurst PSS transformers	2030 - 2034	2040 - 2044	2030 - 2034	2040 - 2044	N-1: Loss of one transformer or one of the circuits to Sandhurst.	
	33kV circuits to Sandhurst PSS	2035 - 2039	No issue	2035 - 2039	2045+		
	33kV circuits to Crowthorne PSS and Kings Ride PSS	2035 - 2039	2045+	2035 - 2039	2045+	N-1: Loss of one of the circuits feeding Crowthorne PSS and/or Kings Ride PSS.	
19	Maidenhead PSS transformers	2035 - 2039	2040 - 2044	2030 - 2034	2040 - 2044	N-1: Loss of one transformer.	Option a: i. Build a new primary substation with two 20/40MVA transformers and two 33kV circuits from Maidenhead BSP. ii. Transfer load from Maidenhead PSS, Knowl Hill PSS, Cordwallis PSS, and Braywick Road PSS to the new primary substation. Option b: i. Replace both transformers at Knowl Hill PSS with two 20/40MVA transformers and add two new 33kV direct circuits from Maidenhead BSP to Knowl Hill PSS. ii. Transfer load from Maidenhead PSS, Cordwallis PSS, and Braywick Road PSS to Knowl Hill PSS. Option c: i. Both Braywick Road PSS and Cordwallis PSS experience similar levels of load growth. Therefore, one option is to add a
	Braywick Road PSS transformers	2030 - 2034	2035 - 2039	2030 - 2034	2035 - 2039	N-1: Loss of one transformer or of one of the circuits feeding Braywick Road PSS.	
	33kV circuits to Braywick Road PSS	2040 - 2044	No issue	No issue	No issue		
	Cordwallis PSS transformers	2030 - 2034	2035 - 2039	2030 - 2034	2040 - 2044	N-1: Loss of one transformer or of one of the circuits feeding Cordwallis PSS.	
	33kV circuits to Cordwallis PSS	2035 - 2039	No issue	2035 - 2039	No issue		
	Knowl Hill PSS transformers	2040 - 2044	2045+	2035 - 2039	2045+	N-1: Loss of one transformer.	

							third 15/30MVA transformer and a third 33kV circuit from Maidenhead BSP at both sites. Alternatively, if there is a space issue at one site, replace both transformers at that site with transformers rated at 20/40MVA and replace both 33kV circuits from Maidenhead BSP. At the other site, add a third 15/30MVA transformer and a third 33kV circuit and transfer load between the two primaries. ii. At Maidenhead PSS, replace all three transformers with 20/40MVA transformers and transfer load to either Cordwallis PSS or Braywick Road PSS. iii. At Knowl Hill PSS, replace both transformers with 7.5/15MVA transformers
20	Peacock Farm PSS transformers	Ahead of 2030	Ahead of 2030	Ahead of 2030	Ahead of 2030	N-1: Loss of one transformer.	Option a: i. At Peacock Farm PSS, replace the two existing transformers with 15/30MVA transformers. ii. At Elms Road PSS, replace the two existing transformers with three 15/30MVA transformers. Replace the two existing 33kV circuits and add a third 33kV circuit from Wokingham BSP. Transfer load from Elms Road PSS to Wokingham PSS. iii. If a load transfer between Elms Road PSS and Wokingham PSS is not possible, replace the existing transformers with three 20/40MVA transformers. Option b: i. Invest ahead of need at Elms Road PSS and transfer load from Peacock Farm PSS to Elms Road PSS and Wokingham PSS. ii. At Elms Road PSS, replace the two existing transformers with three 15/30MVA transformers. Replace the two existing 33kV circuits and add a third 33kV circuit from Wokingham BSP. Option c: i. At Peacock Farm PSS, replace the two existing transformers with three 15/30MVA transformers. ii. Transfer load from Elms Road PSS to Peacock Farm PSS and Wokingham PSS. Option d: i. Build a new primary substation with two 15/30MVA transformers. ii. Transfer load from Peacock Farm PSS and Elms Road PSS to the new primary substation and Wokingham PSS.
	Elms Road PSS transformers	2030 - 2034	2035 - 2039	2030 - 2034	2035 - 2039	N-1: Loss of one transformer or of one of the circuits feeding Elms Road PSS.	
	33kV circuits to Elms Road PSS	2035 - 2039	2040 - 2044	2030 - 2034	2040 - 2044		
21	33kV circuits to The Mall PSS.	2035 - 2039	No issue	2035 - 2039	2045+	N-1: Loss of one transformer or of one of the circuits feeding The Mall PSS.	Option a: i. Replace the two existing 33kV circuits to The Mall PSS.
22	Bagshot PSS transformers	2035 - 2039	2040 - 2044	2030 - 2034	2040 - 2044	N-1: Loss of one transformer.	Option a: i. Load transfer to M V E E PSS. Option b:

							i. Add a third 12/24MVA transformer. Option c: i. Replace both transformers with 15/30MVA transformers.
23	Bracknell PSS transformers	2035 - 2039	2040 - 2044	2045+	2045+	Intact conditions	Option a: i. Build a new primary substation with three 20/40MVA transformers. ii. Transfer load from Bracknell PSS, Easthampstead PSS, and Warfield PSS to the new primary. Option b: i. At Easthampstead PSS, replace the two existing transformers with three 20/40MVA transformers. Replace the two 33kV circuits from Bracknell BSP and add a third circuit. ii. At Bracknell PSS, add a fourth 20/40MVA transformer and split the load on the 11kV busbar. iii. At Warfield PSS, add a third 15/30MVA transformer and a third 33kV circuit from Bracknell BSP.
	Easthampstead PSS transformers	2030 - 2034	2035 - 2039	2030 - 2034	2035 - 2039	N-1: Loss of one transformer.	
	Warfield PSS transformers	2030 - 2034	2035 - 2039	2030 - 2034	2035 - 2039	N-1: Loss of one transformer.	
	33kV circuits from Bracknell-Knowl Hill-Warfield tee to Warfield PSS	2030 - 2034	2040 - 2044	2030 - 2034	2035 - 2039	N-1: Loss of one transformer or circuit feeding Warfield PSS.	
24	33kV ringed circuits connecting Bagshot PSS, Chobham PSS, Easthampstead PSS, and Sunninghill PSS.	2030 - 2039	2035 - 2039	2030 - 2034	2035 - 2039	N-1 scenarios where part of the ring is lost.	The system needs on this ringed circuit are resolved through the options under constraints 22 and 23.
25	33kV circuit from Bracknell BSP to the Warfield-Maidenhead tee.	Ahead of 2030	2030 - 2034	Ahead of 2030	2030 - 2034	N-1: Loss of one of the Warfield 33kV circuits or transformers. & N-1: Loss of one of the Maidenhead BSP transformers or 132kV circuits.	The 33kV circuits from Bracknell BSP to Warfield PSS, connect Bracknell BSP and Maidenhead BSP. As such, the options progressed here should consider the options under constraints 14 and 15 as well as load growth under Warfield PSS itself. Option a: i. Replace the two existing 33kV circuits from Bracknell BSP Option b: i. Add a direct 33kV circuit between Bracknell BSP and Maidenhead BSP to remove the tee point and replace the 33kV circuit to the Warfield-Knowl Hill tee.
	33kV circuit from Bracknell BSP to the Warfield – Knowl Hill tee.	Ahead of 2030	Ahead of 2030	Ahead of 2030	Ahead of 2030		
	33kV circuit from Maidenhead BSP to Warfield-Bracknell tee.	2035 - 2039	No issue	2030 - 2034	2040 - 2044	N-1: Loss of one of the 132kV circuits feeding Maidenhead BSP.	
26	33kV circuit from Maidenhead BSP to Knowl Hill PSS	2040 - 2044	2045+	2035 - 2039	2045+	N-1: Loss of 33kV circuit feeding Twyford PSS in Reading BSP.	Constraints on these circuits will be considered as part of the wider plan for Reading BSP in Bramley-Basingstoke SDP.
	33kV back feed from Knowl Hill PSS to Twyford PSS	2040-2044	No issue	2035 - 2039	2045+		

Table 5 - Summary of system needs identified in this strategy out to 2040 along with indicative solutions for the Fleet Ring.

8.2.2. System needs out to 2050

8.2.2.1. System needs at Fleet GSP boundary

It is forecasted that demand load at Fleet GSP will rise above 1.5GW by 2040 - 2045 which subsequently would move the GSP to be in demand Class F (ENA Engineering Recommendation P2/8 Security of Supply). This would require meeting National Electricity Transmission System Security and Quality of Supply Standards (NETS SQSS), and large-scale system reinforcement would be required to meet the increased level of resilience required at the GSP. The timing of when Fleet GSP is forecast to go above 1.5GW is sensitive to large scale connections projects such as data centres and battery storage projects.

To manage the system needs caused by demand load growing to above 1.5GW, it is recommended to consider the following whole system options with NGET and the National Energy System Operator (NESO):

1. The Fleet 132kV GIS project currently underway will enable Fleet GSP to be split through opening of circuit breakers on the new switchboard. This would split the demand load and therefore mitigate against Fleet GSP moving to Class F. This option would potentially require NGET to install an eighth Super Grid Transformer at Fleet GSP.
2. Build a new GSP to remove load from Fleet GSP as well as neighbouring GSPs of Cowley and Iver 132kV. This would resolve constraints in multiple GSPs and offer additional site level resilience.
3. Implement system reinforcement to comply with NETS SQSS requirements.

8.2.2.2. System needs under Fleet GSP

Constraint ID	Alton & Fernhurst						
	Location of proposed intervention	**CT Year**	**ST Year**	**LW Year**	**FS Year**	**Network state**	**Comments and potential options to resolve the system need**
	33kV Network						
27	Voltage issue impacting the Midhurst PSS transformers and 33kV circuit from Fernhurst BSP to the Midhurst-Haslingbourne tee. This expands to be a thermal issue under LW after 2045.	2040 - 2044	No issue	2040 - 2044	No issue	N-1: Loss of one of the 33kV circuits feeding Midhurst PSS or loss of one transformer.	Option a: i. Transfer Load to away from Midhurst PSS or Haslingbourne PSS. Option b: i. Add a direct 33kV circuit from Fernhurst BSP to Midhurst PSS to remove the tee point with Haslingbourne.

Table 6 - Summary of system needs identified in this strategy out to 2050 along with indicative solutions for Alton & Fernhurst.

Constraint ID	Aldershot, Coxmoor Wood & Pyestock						
	Location of proposed intervention	**CT Year**	**ST Year**	**LW Year**	**FS Year**	**Network state**	**Comments and potential options to resolve the system need**
	33kV Network						
28	33kV circuits to Hook PSS	2045+	No issue	No issue	No issue	N-1: Loss of one of the circuits to Hook PSS.	Option a: i. If option 12a) is chosen, reinforce the existing circuit section. Option b: i. If option 12b) is chosen, this constraint can be resolved through the load transfer.
29	Wrecclesham PSS transformers	2045+	No issue	No issue	No issue	N-1: Loss of one transformer.	Option a: i. Depending on the option chosen for constraint 12, load transfer to Hook PSS, Hitches Lane PSS, and/or Coxmoor Wood PSS. Option b: i. Add a third 15/30MVA transformer.
30	Crookham Church PSS transformers	2045+	No issue	No issue	No issue	N-1: Loss of one transformer or one of the circuits feeding Crookham Church PSS.	Option a: i. Depending on the option chosen for constraint 12, load transfer to Hook PSS, Hitches Lane PSS, and/or Coxmoor Wood PSS. Option b: i. Add a third 15/30MVA transformer. Option c: i. Replace both existing transformers with 20/40MVA transformers.
31	Tongham PSS Transformers	2040 - 2044	No issue	2040 - 2044	No issue	N-1: Loss of one transformer.	Option a: i. Add a third 15/30MVA transformer. Option b: i. Replace both existing transformers with 20/40MVA transformers.

Table 7 - Summary of system needs identified in this strategy out to 2050 along with indicative solutions for Aldershot, Coxmoor Wood & Pyestock.

Constraint ID	Fleet Ring						
	Location of proposed intervention	**CT Year**	**ST Year**	**LW Year**	**FS Year**	**Network state**	**Comments and potential options to resolve the system need**
	132kV Network						
32	Wokingham BSP transformers	No issue	No issue	2045+	No issue	N-1: Loss of one transformer.	The transformers at Wokingham BSP only experience a forecasted constraint under the Leading the Way scenario. The likelihood of this constraint arising should be monitored and updated in future iterations of this SDP. Option a: i. Replace both transformers with 120MVA transformers. Option b: i. Add a third 90MVA transformer.

33kV Network							
33	Ascot PSS transformers	2045+	No issue	2035 - 2039	2045+	N-1: Loss of one transformer or one of the circuits feeding Ascot PSS.	Option a: i. Depending on the option chosen for constraints 22 & 23, load transfer to Bracknell PSS, Easthampstead PSS or a new primary substation.
34	Caversham PSS Transformers	2040 - 2044	No issue	2040 - 2044	No issue	N-1: Loss of one transformer or one of the circuits feeding Caversham PSS.	Option a: i. Load transfer to The Mall PSS. Option b: i. Add a third 7.5/15MVA transformer. Option c: i. Replace both transformers with 20/40MVA transformers.
35	Chobham PSS transformers	2045+	No issue	2035 - 2039	No issue	N-1: Loss of one transformer.	Option a: i. Transfer load to M V E E PSS
36	Temple Farm PSS transformers	No issue	2040 - 2044	2040 - 2044	2045+	Intact conditions	Option a: i. Transfer load to Knowl Hill PSS. Option b: i. Replace the existing transformer with a 7.5/15MVA transformer
37	Sunninghill PSS transformers	No issue	No issue	2045+	No issue	N-1: Loss of one transformer.	Option a: i. Add a third 12/24MVA transformer. Option b: i. Replace both existing transformers with 15/30MVA transformers

Table 8 – Summary of system needs identified in this strategy out to 2050 along with indicative solutions for the Fleet Ring.

8.3. Future requirements of the High Voltage and Low Voltage Networks

Our HV/LV spatial plans have shown that there while the overloading of the secondary network is mostly apparent around areas of high population density, within these areas there is no clear trend. We are therefore planning on a forecast volume basis, and this section provides further context on this work for both the Fleet high voltage and low voltage network needs to 2050.

8.3.1. High Voltage Networks

As well as the EHV system needs identified in the previous section, increased penetration of low carbon technologies (LCTs) connecting to the distribution network will result in system needs on the High Voltage (HV) and Low Voltage (LV) networks. To provide a view on the impact of these technologies on the distribution network here we have used the load model that is produced by SSEN's Data and Analytics team[7].

The load model is a machine learning product which estimates a half-hourly annual demand profile for each household based on a series of demographic, geographic and heating type factors. This enables us to estimate capacity on the electricity network while protecting individual customers data privacy by using modelled data. These views are then aggregated up the network hierarchy based on the combinations of customers associated with each asset. This view is supplemented by the DFES to highlight the projected impact of LCTs on the network.

For all the primary substations supplied by Fleet GSP, the percentage of secondary substations where projected peak loading exceeds the nameplate rating of the secondary transformer was taken from the load model data. Figure 18 demonstrates how this percentage changes under each DFES scenario from now to 2050.

To satisfy these requirements a variety of solutions will need to be investigated. It is likely that a combination of flexibility and asset replacement will be employed to resolve the projected HV system needs. It is important to note that for HV needs, flexibility is likely to be provided through Distributed Energy Resources (DER), Consumer Energy Resources (CER), and domestic/commercial Demand Side Response (DSR). One of the challenges associated with procuring flexibility to High Voltage and Low Voltage system needs is that only a small number of customers can provide a flexible service due to the requirement to be supplied by a specific secondary transformer. As the role of aggregators develops, we may see a shift in the potential for flexibility in an area. Where the magnitude of an overload is too large for flexibility to be feasible, addition of new assets or asset replacement will be necessary.

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7 SSEN Open Data Portal, 2023, SSEN Secondary Transformer – Asset Capacity and Low Carbon Technology Growth

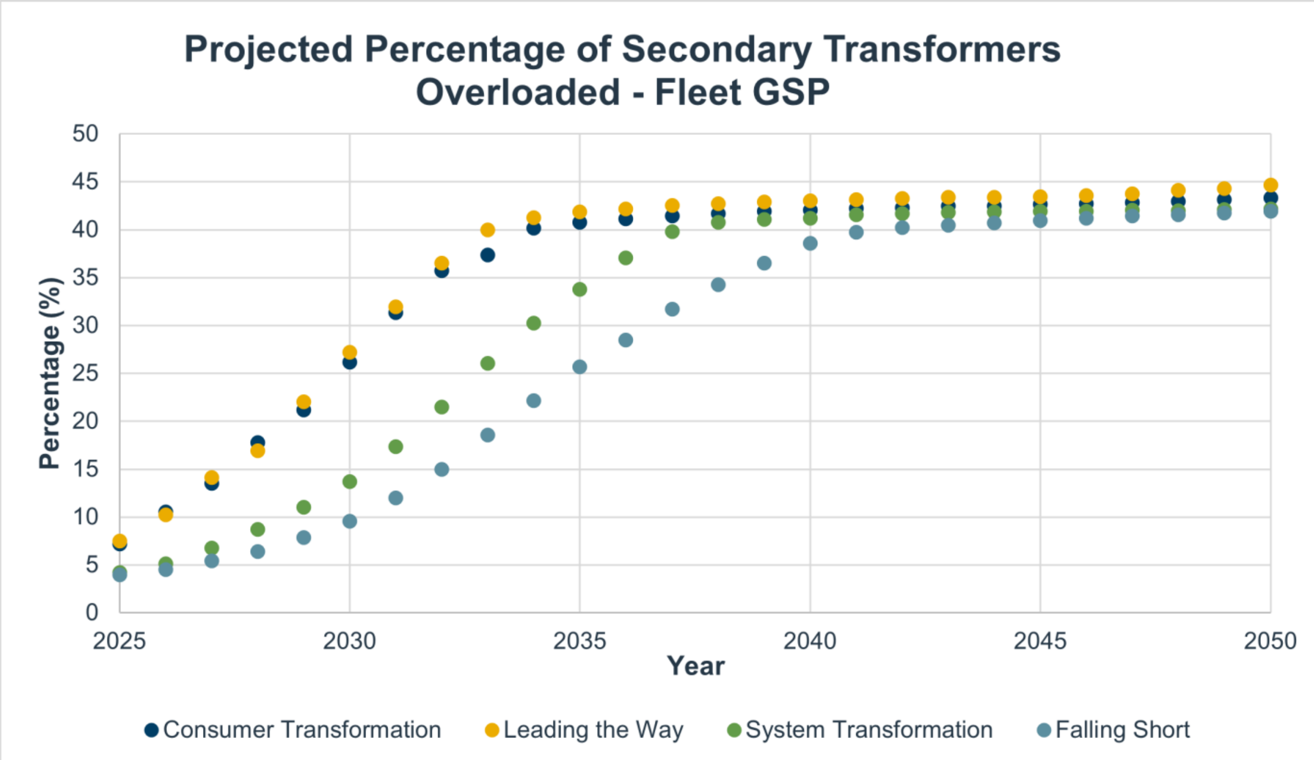


Figure 18 - Fleet GSP Projected Secondary Transformer Loading. Source: SSEN Load Model

Considering the Just Transition in HV development

SSEN are building on the findings from the Vulnerability Future Energy Scenarios (VFES). This innovation project investigated how the use of new foresighting techniques, along with data analytics and expert validation could be used to identify and forecast consumers in vulnerable situations as we move toward net zero. Use of the outputs from the VFES enable SSEN to develop the network in a way that truly accounts for the levels of vulnerability their customers in different locations face. Inclusion of the use of the VFES also acts as an example of how this data can be used more broadly by SSEN as well as other organisations for spatial planning. For example, it can help us identify areas where energy efficiency mechanisms could help reduce the need for network investment.

One of the outputs from this innovation project was the report produced by the Smith Institute[8]. This work groups LSOAs[9] that share similar drivers of vulnerability. The groupings were informed by mathematical analysis of demographic data and of SSEN's priority service register, using machine learning to model the complex relationships that exist between the two. The resulting group numbers and descriptions are shown in Table 9.

Group Number & Level of Vulnerability	Description of Group
1 – Very high	Driven up by higher levels of poor health and disability/mental health benefit claimants, reduced by smaller household sizes.

8 VFES Machine Learning Discovery of Vulnerability Signatures Report, Smith Institute, 08/11/2022, (NIA SSEN 0063: VFES – Vulnerability Future Energy Scenarios | SSEN Innovation)

9 Lower layer Super Output Areas (LSOAs) (Statistical geographies - Office for National Statistics)

2 – High	Driven up by larger household sizes, reduced by lower elderly population levels.
3 – High	Driven up by larger elderly population levels, reduced by lower levels of disability and mental health benefit claimants.
4 – Slightly higher than average	Driven up by larger elder population levels and moderately higher provision of care, reduced by smaller household sizes.
5 – Slightly lower than average	Driven down by lower elderly population levels and larger levels of ethnic diversity, increased by higher household sizes and greater provision of care.
6 – Low	Driven down by lower level of bad health and disability/mental health benefit claimants, increased by moderate elderly population levels and household sizes.
7 – Very low	Driven down by substantially lower elderly population levels, less provision of care and a higher level of households in private rented dwellings.

Table 9 - VFES Groupings

To understand the vulnerability groupings across Fleet GSP supply area we have visualised the LSOA categorisation for the study area. By overlaying secondary transformers that are projected to be overloaded by 2028 (under the Consumer Transformation scenario), we begin to understand the crossover between network capacity needs and areas categorised as high vulnerability through the VFES work. This is shown below in Figure 19.

The majority of the Fleet GSP area falls into category 6 with low vulnerability. This low level of vulnerability is driven down by lower levels of poor health and increased by moderate elderly population levels and household sizes. There are two notable types of areas seen in Figure 19 with higher vulnerability. The first is a wider area with broadly high vulnerability – this is seen around Midhurst and Petworth where there is a large semi-rural area of higher vulnerability. The second is a smaller area of higher vulnerability in the Aldershot area.

By overlaying the point locations of secondary transformers projected to be overloaded (in 2028 under the Consumer Transformation scenario) we identify areas that are categorised as more vulnerable and also may have capacity shortfalls at the secondary network level. More vulnerable groups may have lower level of adoption of LCTs and therefore provide less ability to manage overloads through flexibility services. Further they may point towards areas of social housing where there could be a more sudden rollout of LCTs such as heat pumps in the future. They may also highlight areas where there is an evidential need for energy efficiency measures.

We recommend the use of these insights to prioritise work in heavily loaded areas of our network ensuring the network remains secure, stable, and resilient in the areas where vulnerable customers would be most disadvantaged by power outages.

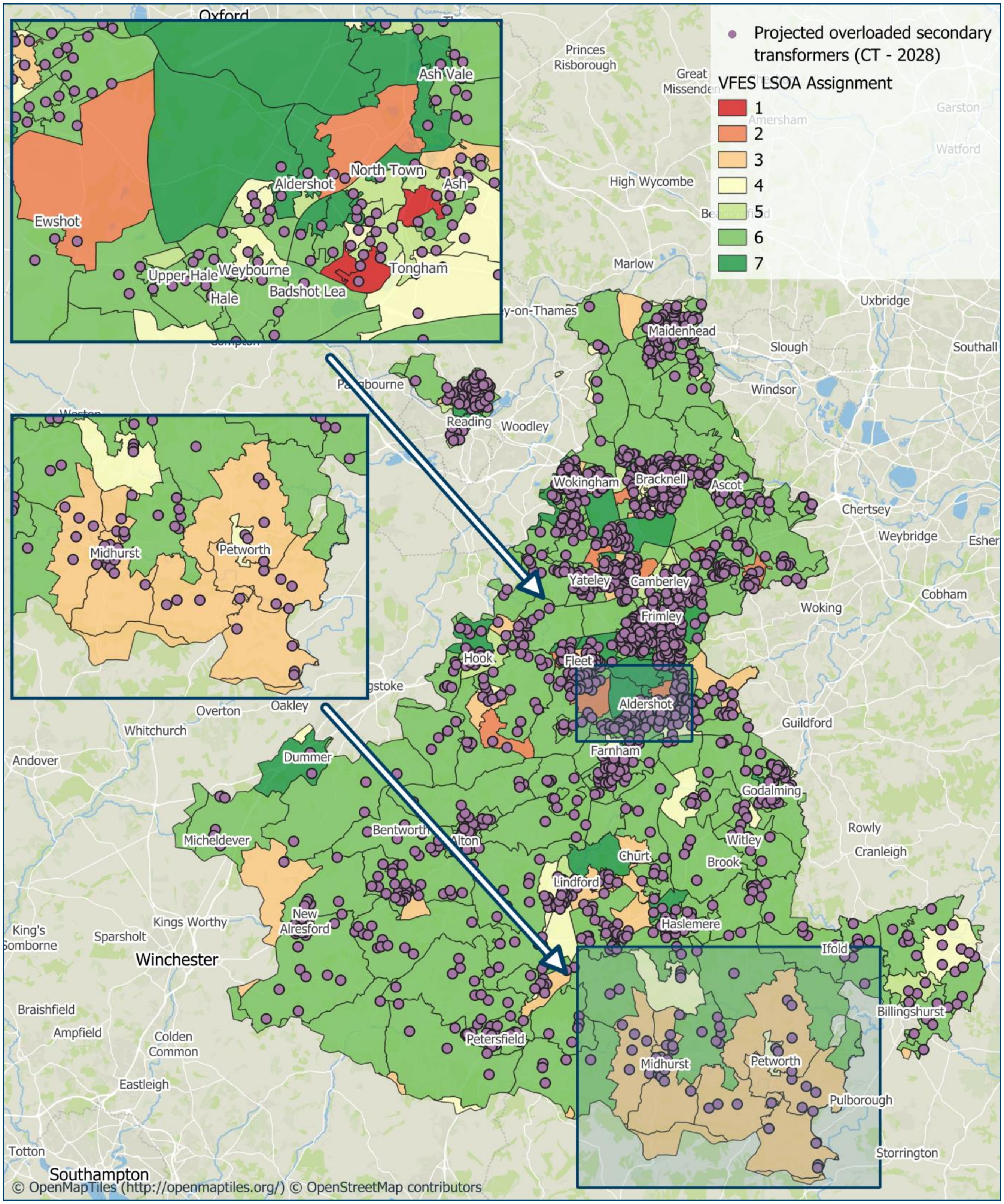


Figure 19 - Fleet GSP VFES heat map with overloaded secondary transformers.

8.3.2. Low Voltage Networks

Drivers for interventions in low voltage networks may be either capacity related or be driven by voltage requirements. We are progressing options to resolve both drivers. From a network perspective the solution typically involves upgrading the number of LV feeders to split/ balance the load and improve voltage or to install another substation at the remote end of the LV network to balance load and improve voltage. In both instances, flexibility at a local level, especially voltage management products linked to battery export and embedded generation such as solar is likely to be required alongside traditional reinforcement.

We are leveraging recent innovation work through Project LEO (Local Energy Oxfordshire) and My Electric Avenue to inform this strategy. Enhanced network visibility through Smart meter data analytics and low-cost substation feeder monitoring is also necessary to enable appropriate dispatch of services and network reconfiguration.

Initial analysis indicates that across Fleet GSP, 23% of low voltage feeders may need intervention by 2035 and 26% by 2050 under the CT scenario as shown in Figure 20. The need is unlikely to be triggered until 2028 onwards. However, due to the timeline to grow workforce, with jointing skills taking typically 4 years to be fully competent, it is necessary to start recruitment and initiate programmes ahead of need to be able to deliver the required volumes from 2028 onwards.

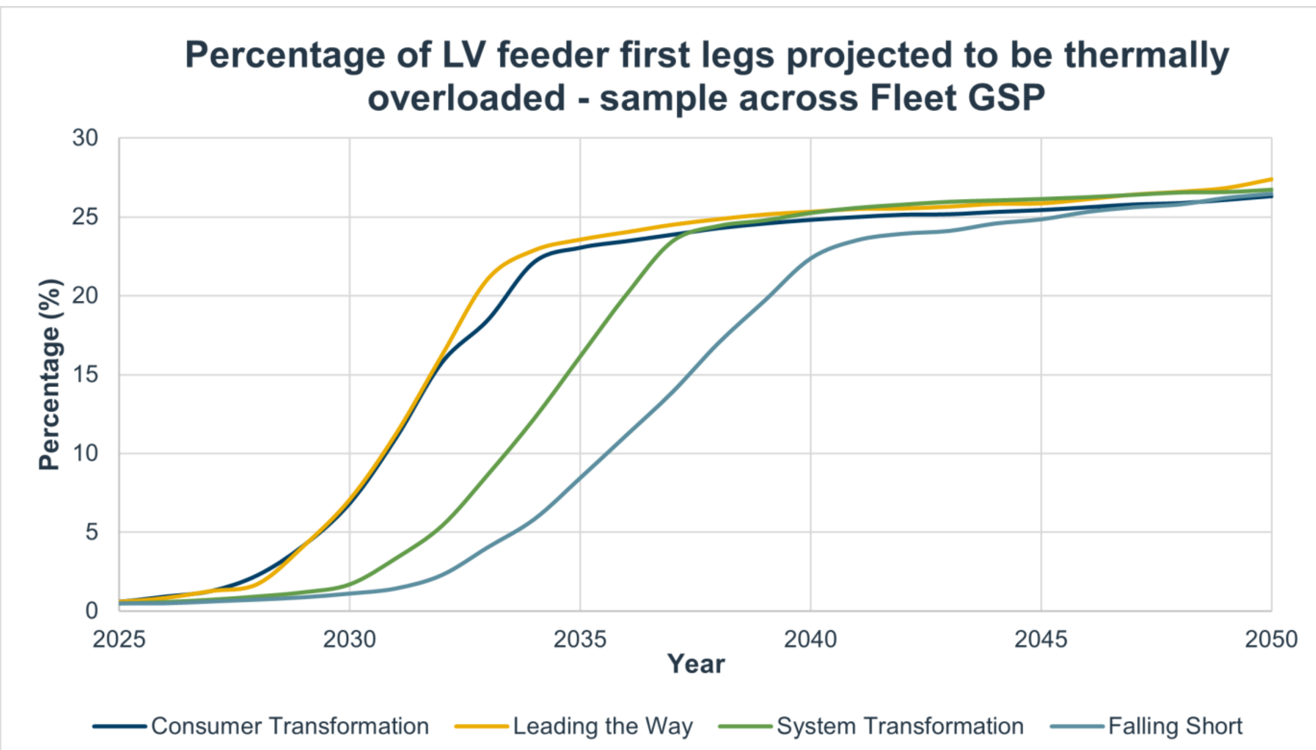


Figure 20 - Percentage of LV feeders projected to be overloaded under Fleet GSP.

9. RECOMMENDATIONS

The review of stakeholder engagement and the SSEN 2023 DFES analysis provides a robust evidence base for load growth across Fleet GSP group in both the near and longer term. Drivers for load growth across Fleet GSP arise from multiple sectors and technologies. These drivers impact not only our EHV network but will drive system needs across all voltage levels.

Across Fleet GSP group, there are significant 132kV and 33kV works already triggered through the DNOA process and published in DNOA Outcomes Reports. These are driven by customer connections and system needs that will arise this decade but are being developed to meet 2050 needs.

There are three key recommendations from this report:

1. Where we have identified work that is required in the next 10 years, this should be progressed through the DNOA process. Through detailed study we will understand the network requirements in more detail and progress these where appropriate. This includes the following system needs which are forecasted to arise ahead of 2030:
    a. Bordon PSS transformers (constraint 7).
    b. Frimley PSS transformers and the 33kV ringed circuits connecting primary substations to Camberley Reserve BSP (constraint 17).
    c. Peacock Farm PSS transformers (constraint 20).
    d. 33kV circuits from Bracknell BSP to Warfield PSS (constraint 25).

    It is possible that some of the above constraints may not have a near term system need based on actual load growth and therefore will not initially result in a DNOA outcome. Annual reassessment will enable us to confirm whether these system needs are likely to arise. When carrying out this annual reassessment the delivery timelines of the work should be considered alongside the potential for flexibility services to manage network capacity.

2. Considering the significant load growth expected across Fleet GSP, engagement with NGET and NESO should be proactive to create a long-term plan for the area.

3. Fleet GSP is experiencing significant large connection requests, some of which are subject to change through Clean Power 2030 connections reform. This has the potential to accelerate a number of the proposals in this SDP and it is important that such connection requests are assessed against our strategic proposals.

Actioning these recommendations will allow SSEN to develop a network that supports local net zero ambitions and enables growth in the local economy. By doing so, this will ultimately contribute to net zero targets at a national level.

Appendix A: Primary substation existing network.

Substation Name	Site Type	Number of Customers Served (approximate)	2023-2024 Substation Maximum MVA
Aldershot BSP			
Aldershot	Primary Substation	7,900	11
Farnham	Primary Substation	8,500	14.86
Godalming	Primary Substation	11,400	16.93
Hindhead	Primary Substation	6,400	10.43
Laburnam Road	Primary Substation	11,200	19.84
Milford	Primary Substation	6,800	10.73
Normandy	Primary Substation	1,100	2.05
Tongham	Primary Substation	9,900	13.28
Alton BSP			
Alresford	Primary Substation	7,000	10.57
Alton Local	Primary Substation	14,900	23.93
Bordon	Primary Substation	13,000	17.26
Herriard	Primary Substation	700	6.33
Preston Candover	Primary Substation	2,100	5.68
Bracknell BSP			
Ascot	Primary Substation	6,700	12.79
Bagshot	Primary Substation	8,100	11.79
Bracknell	Primary Substation	13,200	31.17
Chobham	Primary Substation	5,300	9.25
Easthampstead	Primary Substation	14,100	15.79
M V E E	Primary Substation	1,100	3.85
Sunninghill	Primary Substation	4,900	9.86
Warfield	Primary Substation	9,500	19.02
Burghfield BSP			
Courages	Primary Substation	2,000	13.3
Goring	Primary Substation	2,200	5.49
Green Park	Primary Substation	50	8.65
Kentwood Hill	Primary Substation	15,900	17.08
Mortimer	Primary Substation	5,000	7.16

Padworth	Primary Substation	800	2.96
Pangbourne	Primary Substation	3,800	8.74
Southcote	Primary Substation	6,300	7.21
Theale	Primary Substation	1,900	7.85
Trash Green	Primary Substation	4,000	9.61
Whiteley Wood	Primary Substation	8,800	14.08
Wilson Road	Primary Substation	10,900	13.35
Woodcote	Primary Substation	1,600	3.81
Camberley BSP			
Camberley	Primary Substation	9,800	20.67
Cove	Primary Substation	6,300	7.66
Crowthorne	Primary Substation	12,100	19.31
Farnborough	Primary Substation	10,500	13.61
Frimley	Primary Substation	10,900	17.46
Kings Ride	Primary Substation	6,800	11.58
Queensmead	Primary Substation	4,000	6.39
Sandhurst	Primary Substation	13,700	18.25
Coxmoor Wood BSP			
Coxmoor Wood	Primary Substation	3,700	6.64
Hawley	Primary Substation	8,600	9.64
Hitches Lane	Primary Substation	12,000	21.39
Hook	Primary Substation	7,000	12.38
Wrecclesham	Primary Substation	7,300	12.34
Fernhurst BSP			
Five Oaks	Primary Substation	3,600	7.96
Haslemere	Primary Substation	9,700	15.73
Haslingbourne	Primary Substation	3,700	5.93
Langley Court	Primary Substation	4,300	8.94
Midhurst	Primary Substation	7,100	10.34
Petersfield	Primary Substation	11,200	18.11
Plaistow	Primary Substation	2,400	4.96
Maidenhead BSP			
Braywick Road	Primary Substation	7,900	18.69

Cordwallis	Primary Substation	9,900	16.13
Knowl Hill	Primary Substation	1,400	3.28
Maidenhead	Primary Substation	12,600	19.49
Temple Farm	Primary Substation	600	2.77
Pyestock BSP			
Crookham (Church)	Primary Substation	7,900	10.11
Farnborough Airfield	Primary Substation	1,000	9.58
Reading BSP			
Reading	Primary Substation	15,300	22.94
Henley	Primary Substation	8,900	15.39
Kidmore End	Primary Substation	4,600	7.22
Little Hungerford	Primary Substation	16,000	22.57
Northumberland Avenue	Primary Substation	5,800	13.03
Silver Street	Primary Substation	11,000	15.71
Twyford	Primary Substation	7,200	12.73
Reading Town BSP			
Caversham	Primary Substation	10,300	12.16
Reading Town	Primary Substation	11,100	26.43
The Mall	Primary Substation	6,100	14.2
Wokingham BSP			
Elms Road	Primary Substation	10,200	14.35
Peacock Farm	Primary Substation	2,600	4.45
Wokingham	Primary Substation	6,200	8.29

Table 10 - Customer number breakdown and substation peak demand readings (2023-2024) for the primary substations currently fed from Fleet GSP.

Appendix B: DFES 2024 Projections

DFES 2024 Scenarios

NESO publishes the FES framework annually, and this is adopted for the DFES. The 2024 edition outlines three new pathways (Holistic Transition, Electric Engagement, and Hydrogen Evolution) that achieve net zero by 2050 against a Counterfactual. The scenario framework is shown below in Figure 21.

The following charts show the latest DFES 2024 projections similar to those in Section 5 with the updated pathways.

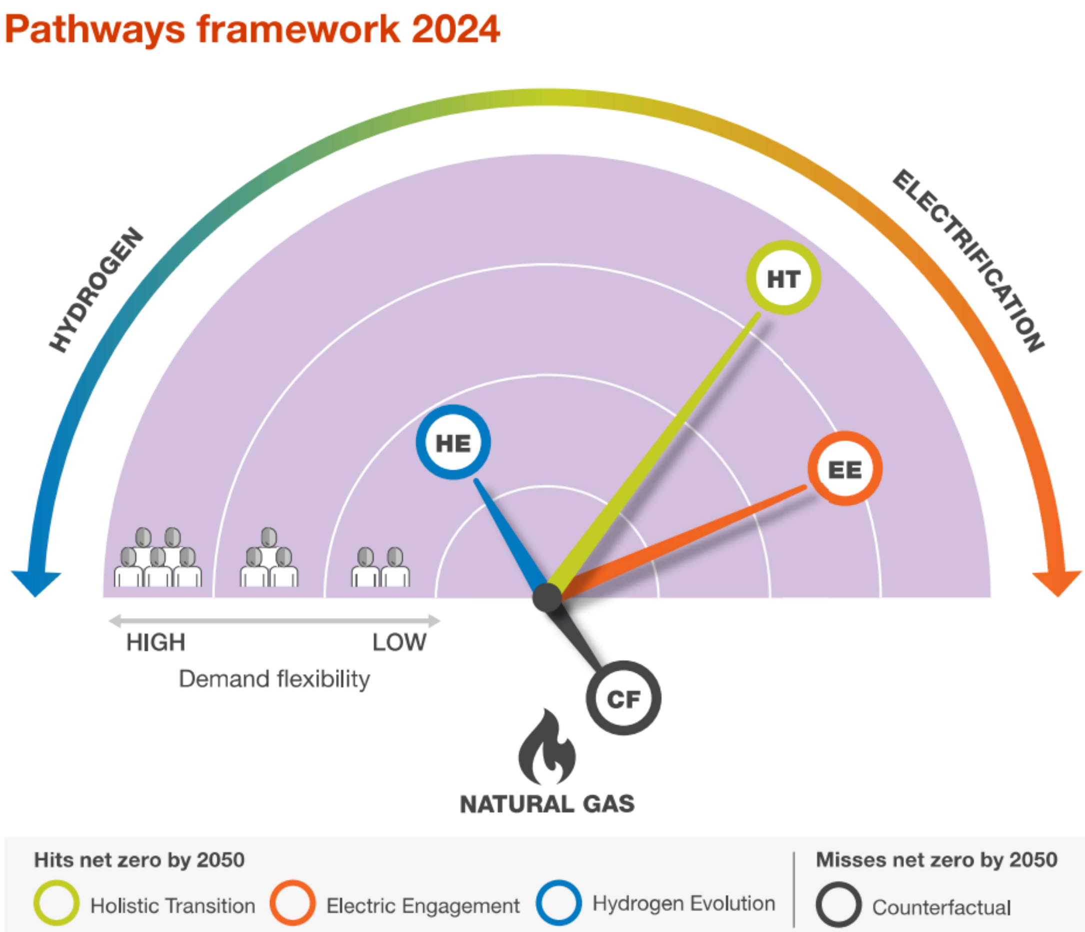


Figure 21 - The FES 2024 scenario framework (source: NESO)

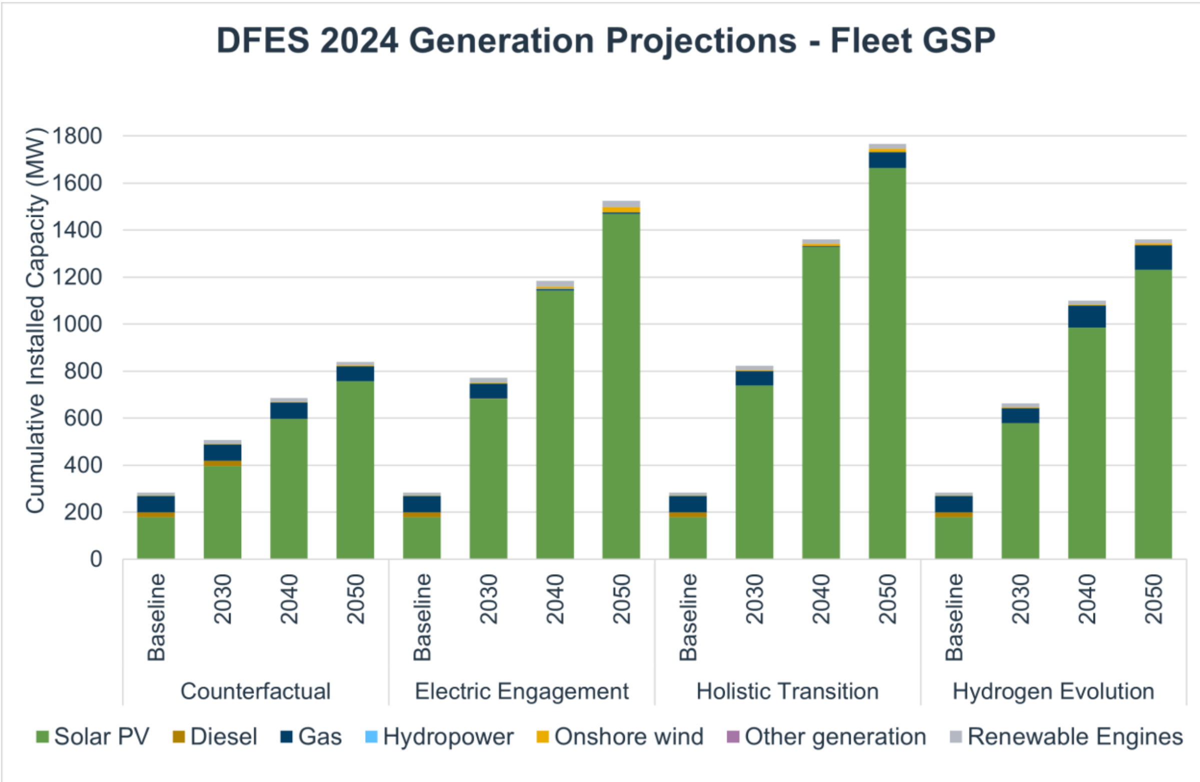


Figure 232 - Projected cumulative distributed generation capacity across Fleet GSP (MW). Source: SSEN DFES 2024

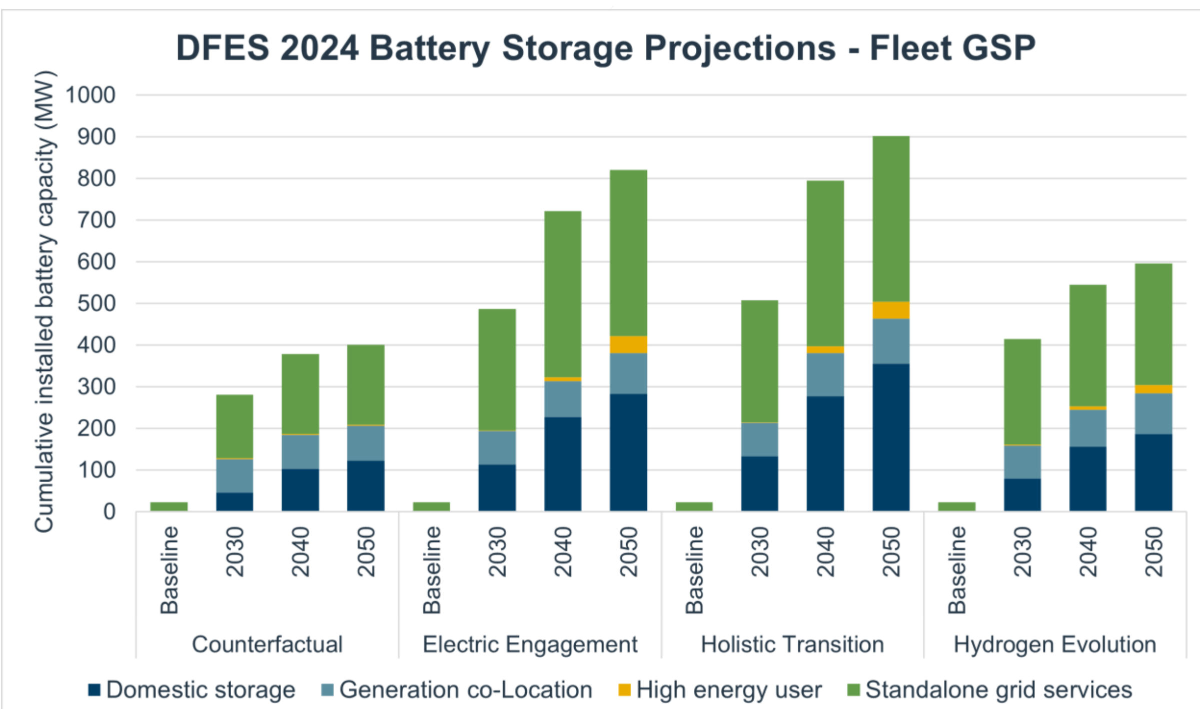


Figure 233 - Projected cumulative battery storage capacity across Fleet GSP (MW). Source: SSEN DFES 2024

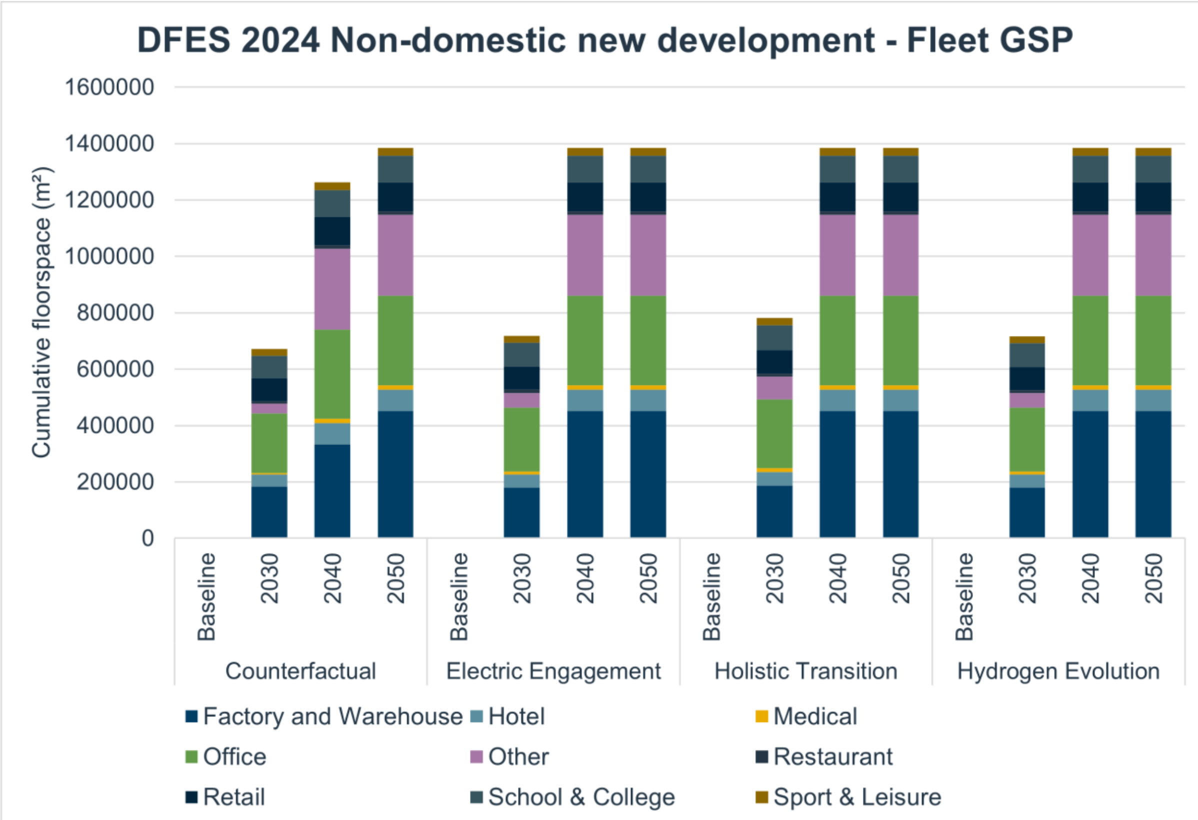


Figure 254 - Projected non-domestic development across Fleet GSP (m^2). Source: SSEN DFES 2024

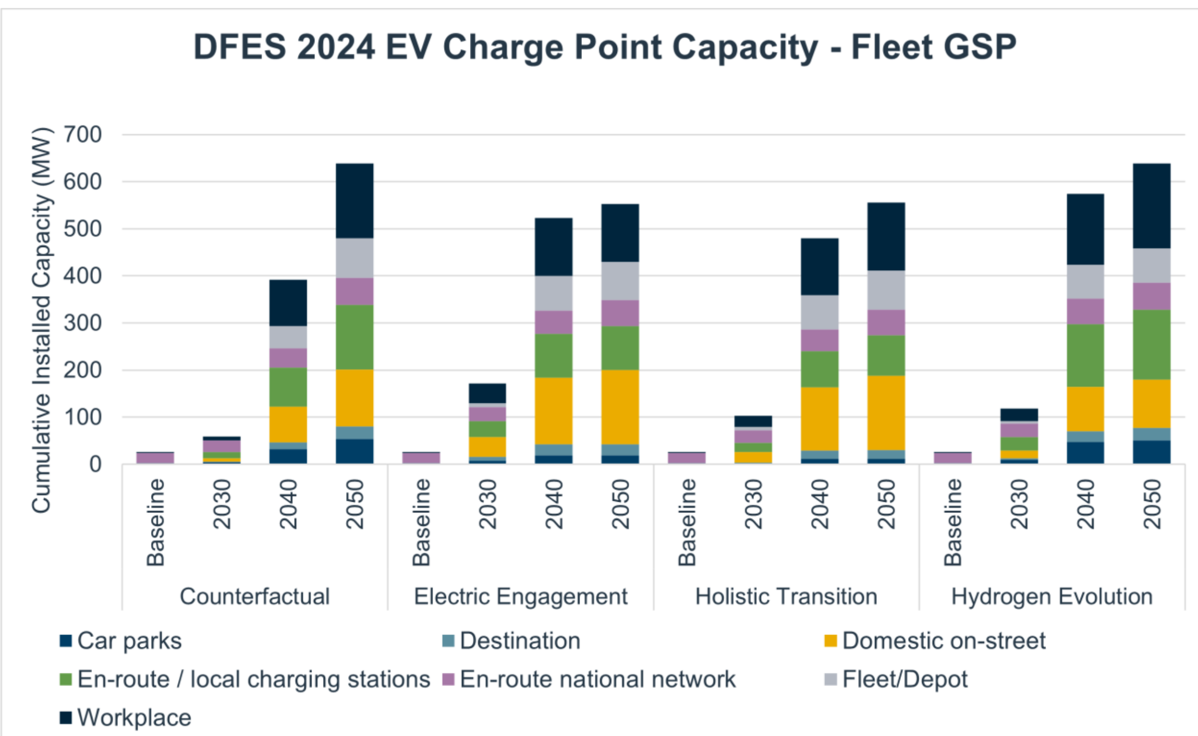


Figure 245 - Projected cumulative installed EV charge point capacity across Fleet GSP (MW). Source: SSEN DFES 2024

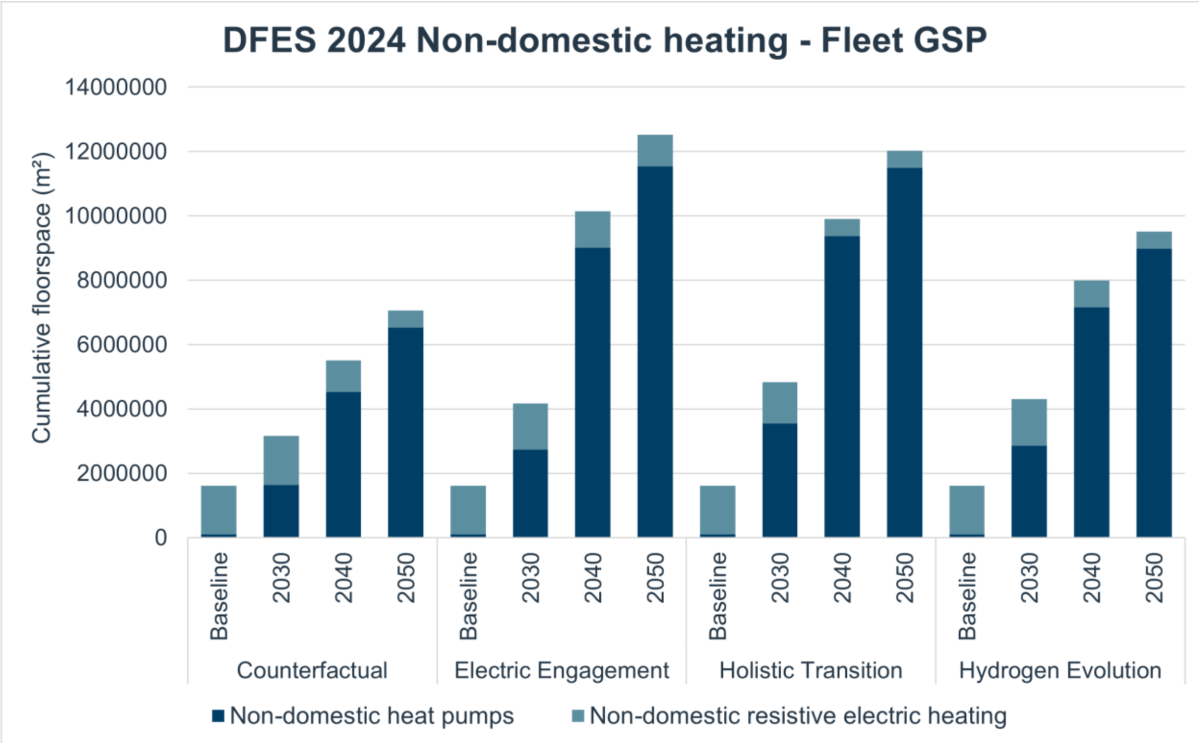


Figure 276 - Projected number of non-domestic heating technologies across Fleet GSP. Source: SSEN DFES 2024

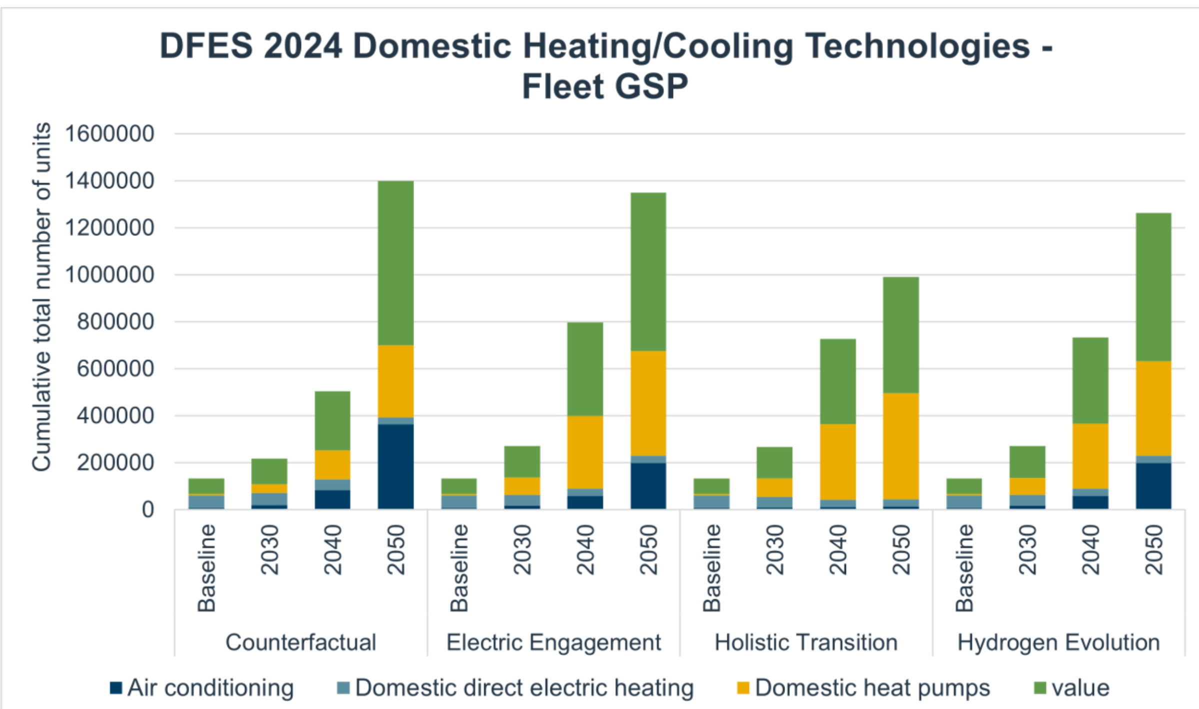


Figure 26 - Projected number of domestic heating/cooling technologies across Fleet GSP. Source: SSEN DFES 2024

Appendix C: 33kV existing network schematics

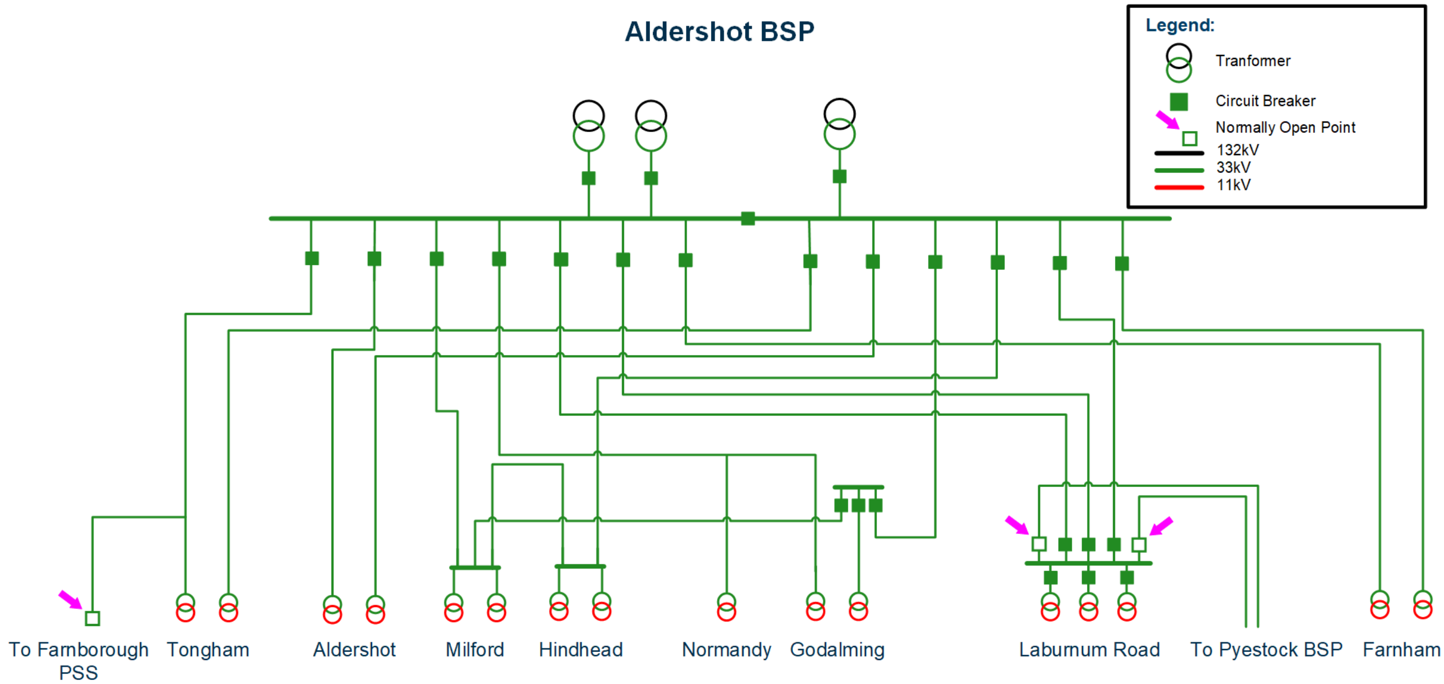


Figure 28 - Aldershot BSP - Existing network schematic

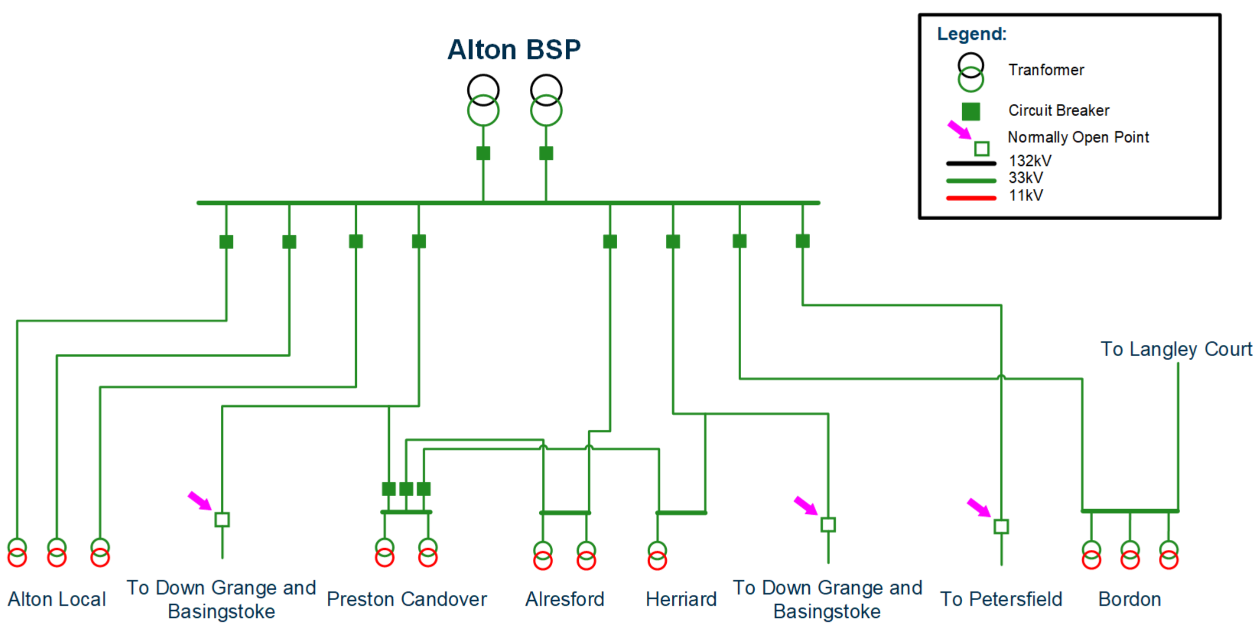


Figure 29 - Alton BSP - Existing network schematic

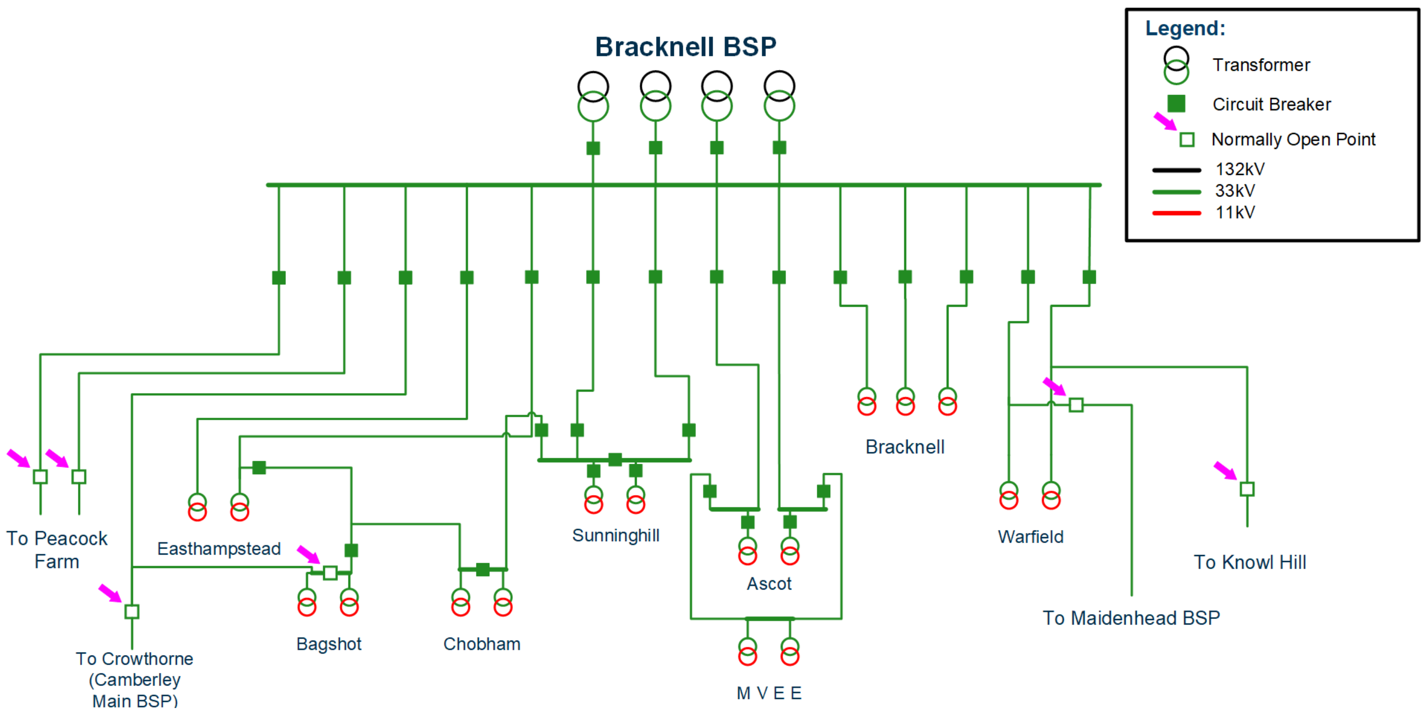


Figure 30 - Bracknell BSP - Existing network schematic

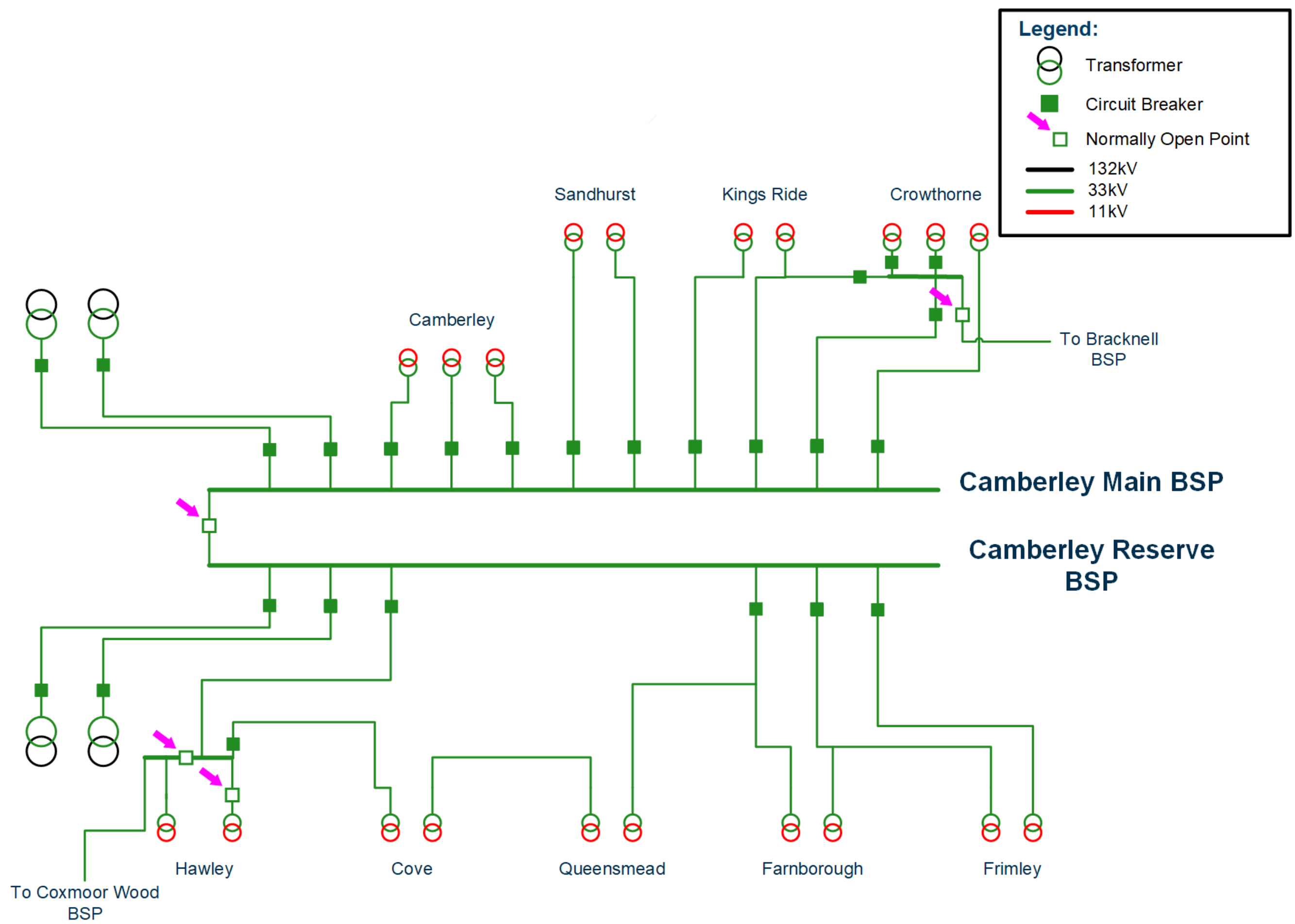


Figure 31 - Camberley Main BSP and Camberley Reserve BSP - Existing network schematic

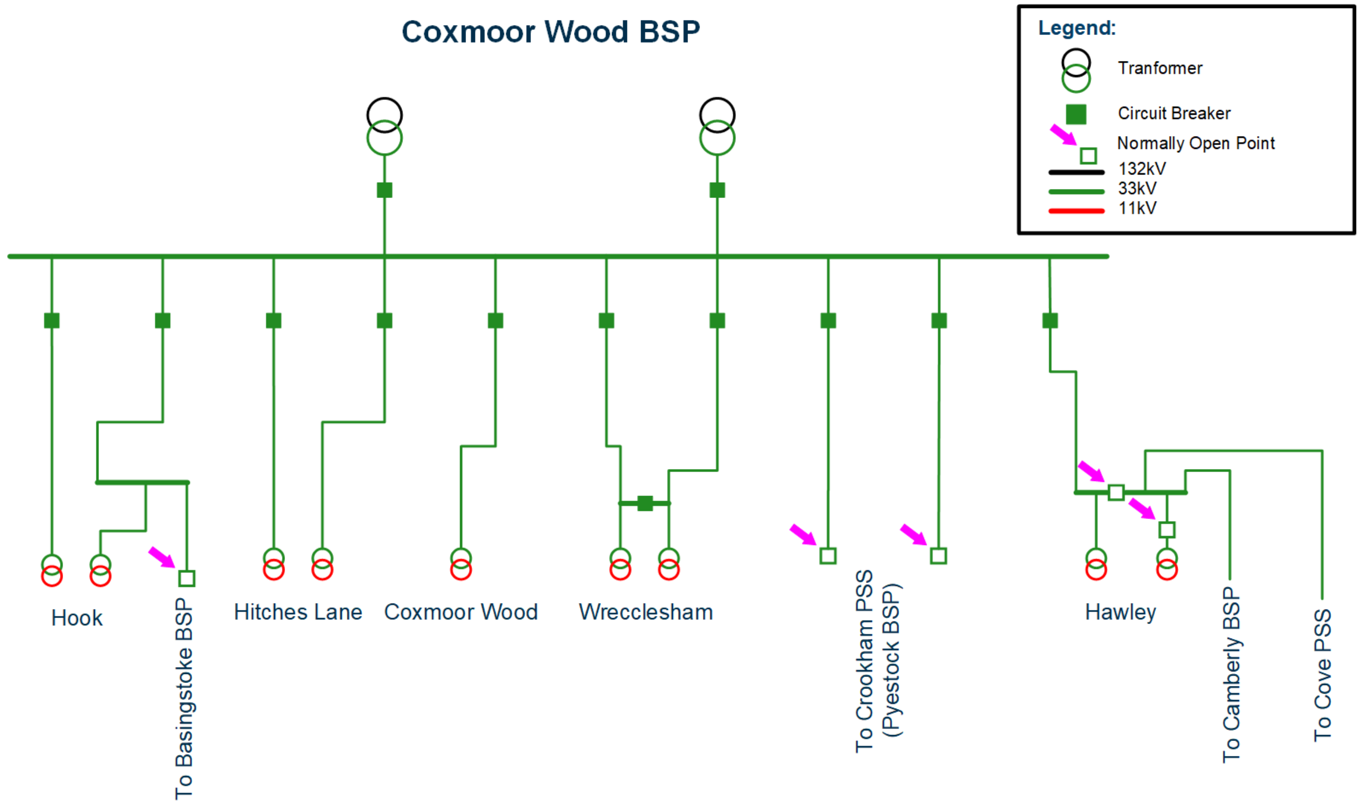


Figure 33 - Coxmoor Wood BSP - Existing network schematic

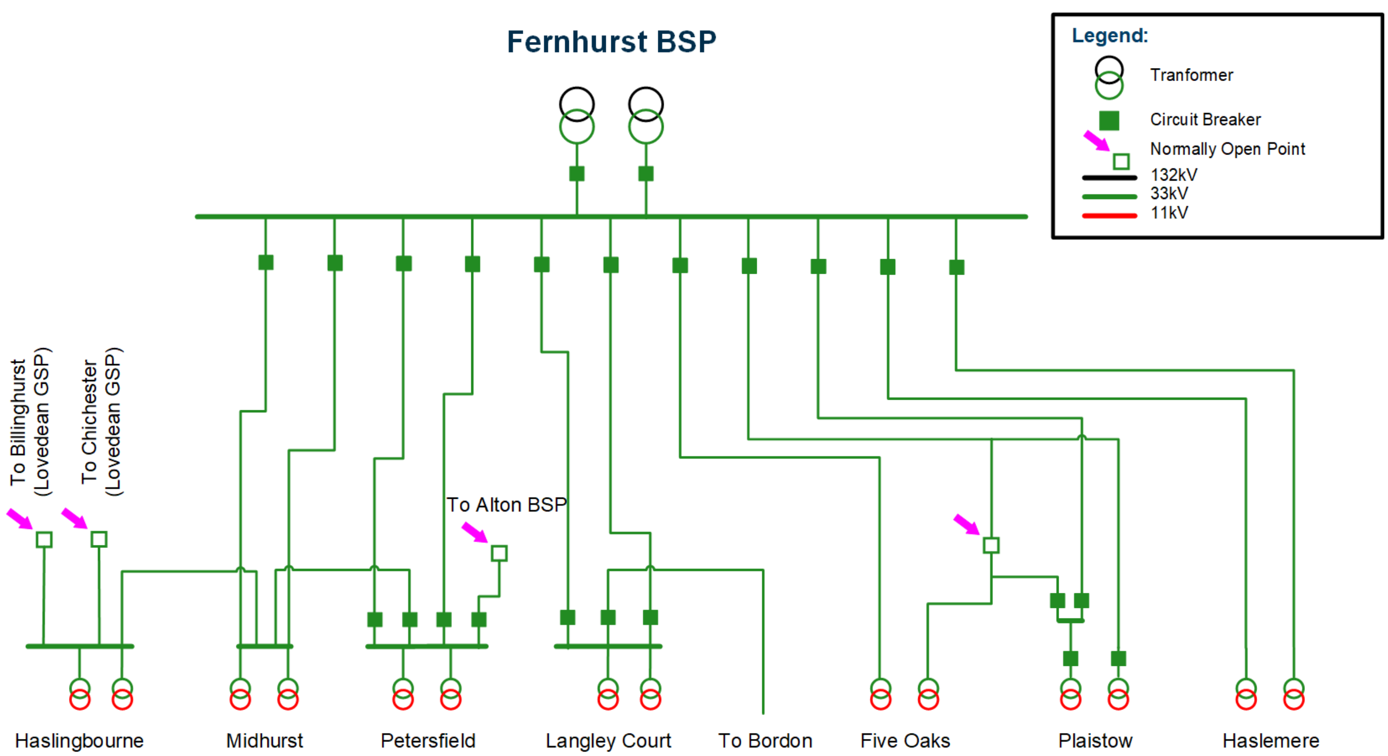


Figure 32 - Fernhurst BSP - Existing network schematic

Appendix D: 33kV works in progress network schematics

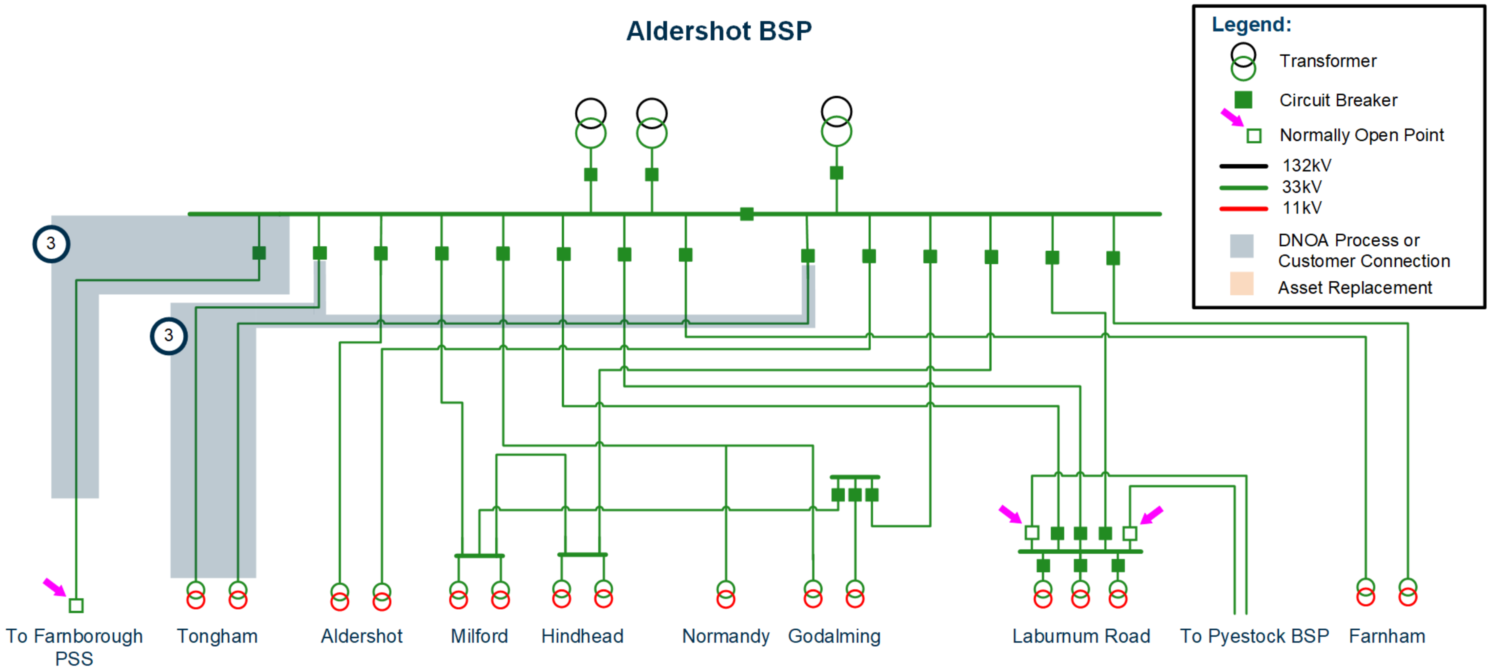


Figure 34 - Aldershot BSP - Future network schematic

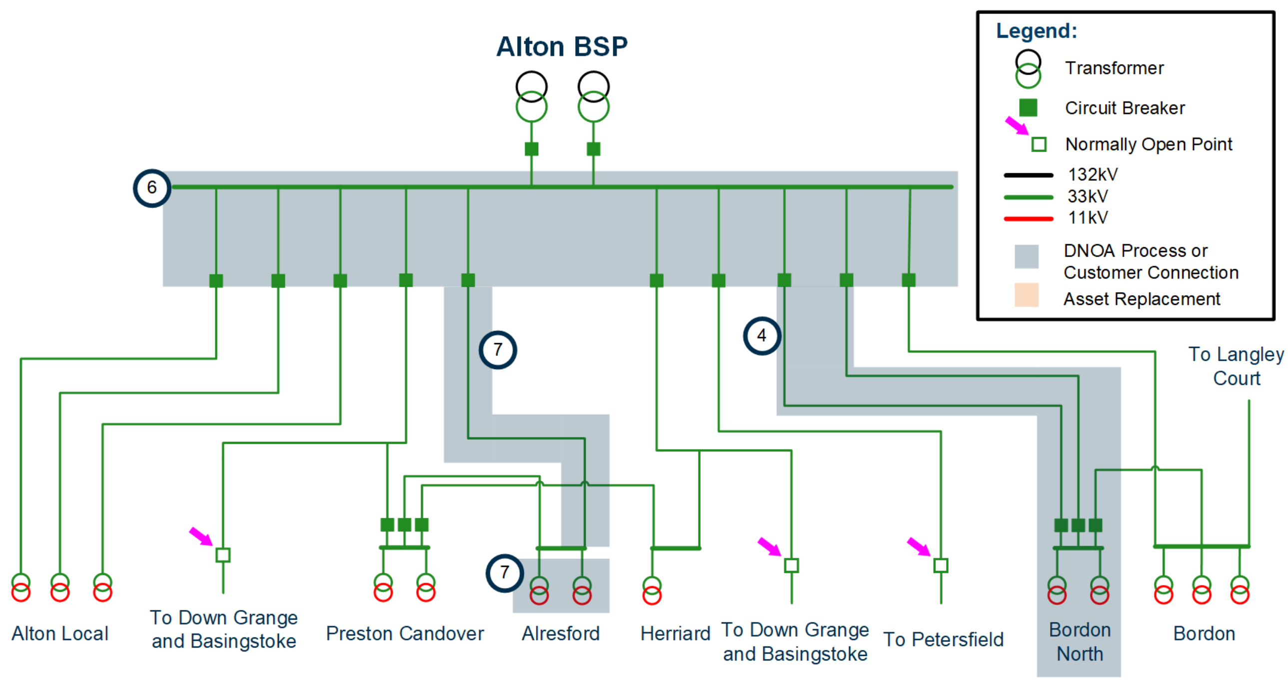


Figure 35 - Alton BSP - Future network schematic

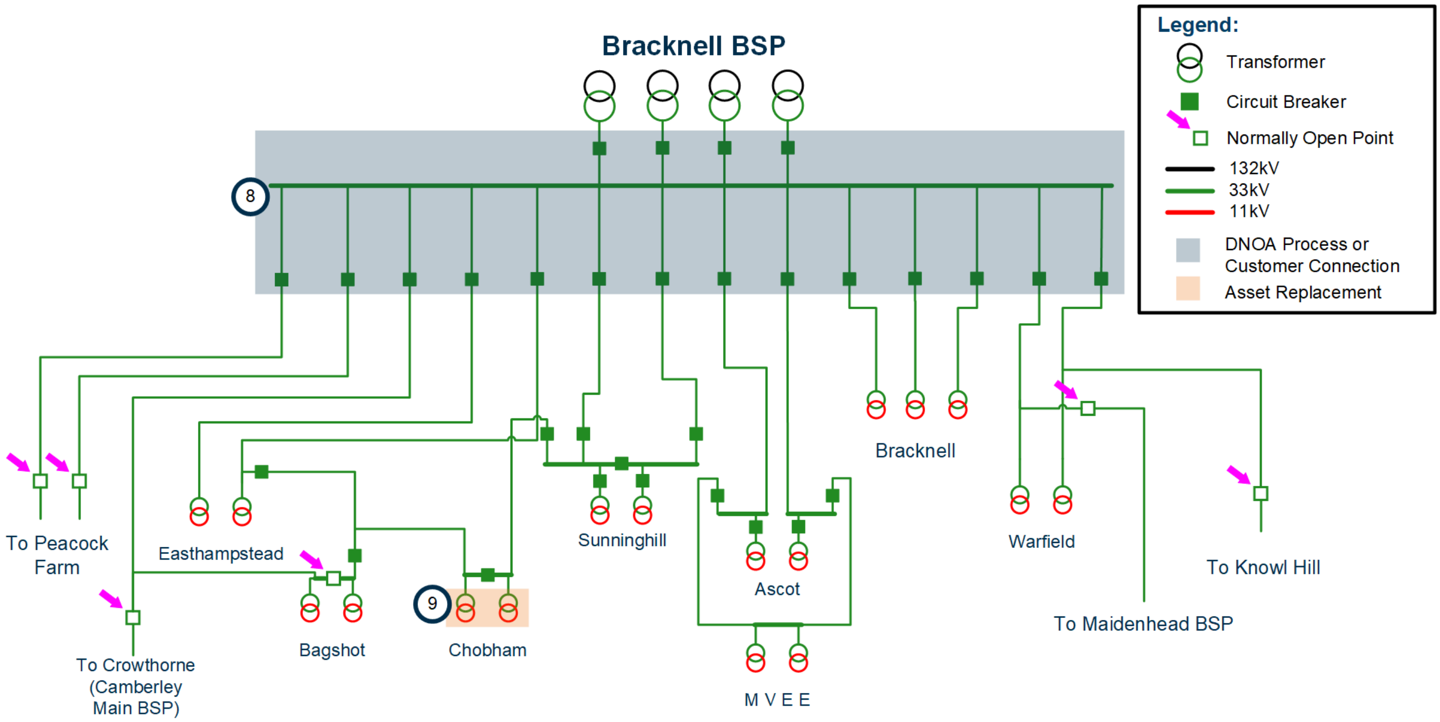


Figure 37 - Bracknell BSP - Future network schematic

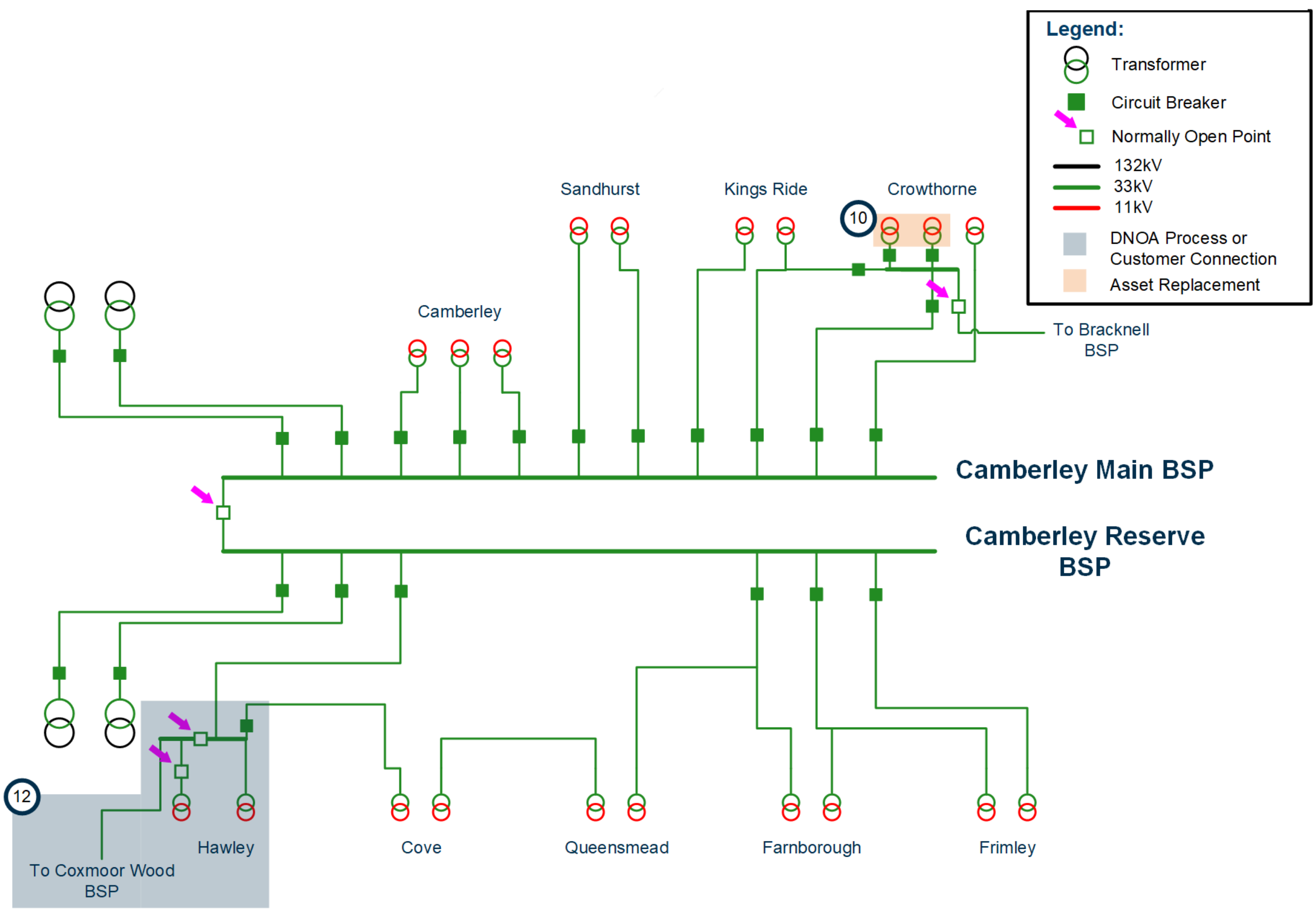


Figure 36 – Camberley Main BSP and Camberley Reserve BSP – Future network schematic

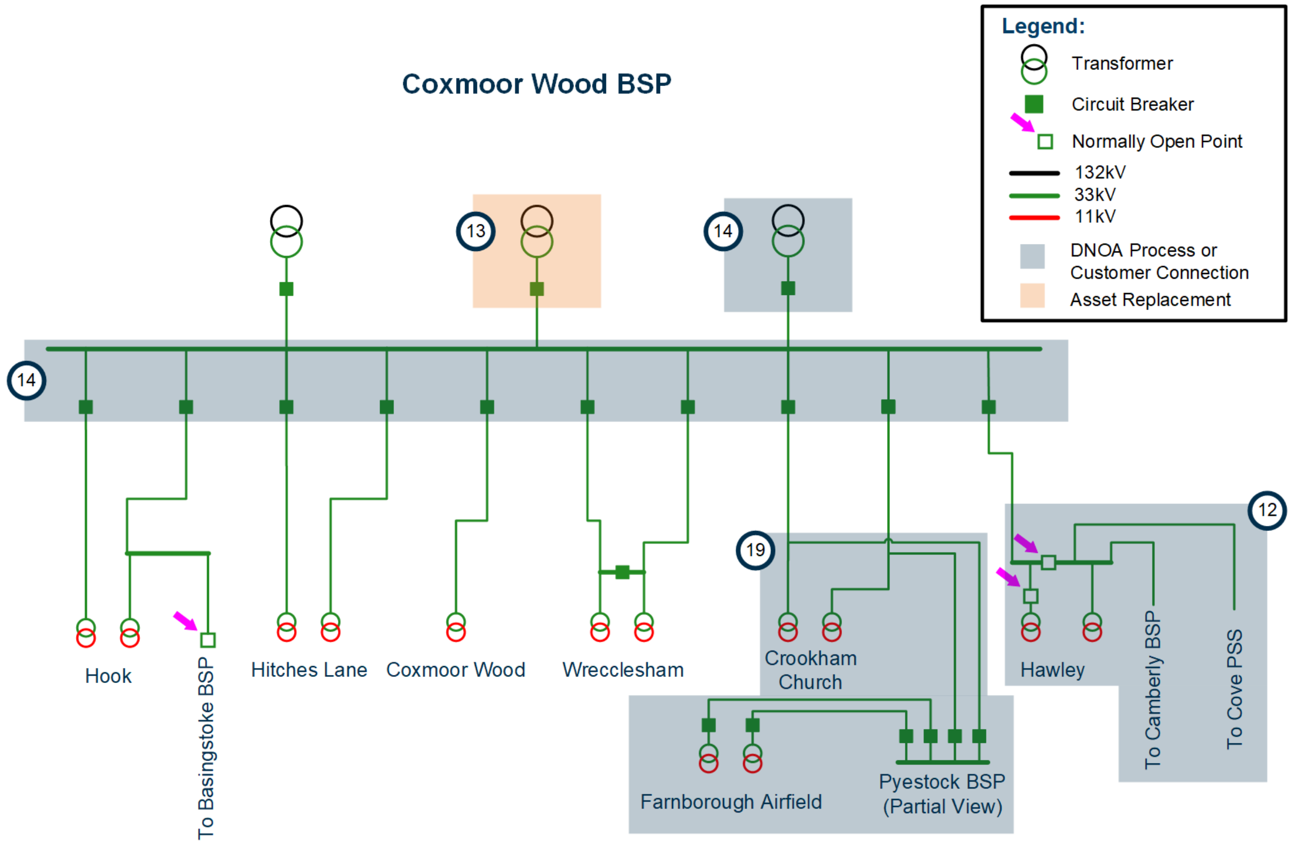


Figure 39 - Coxmoor Wood BSP - Future network schematic

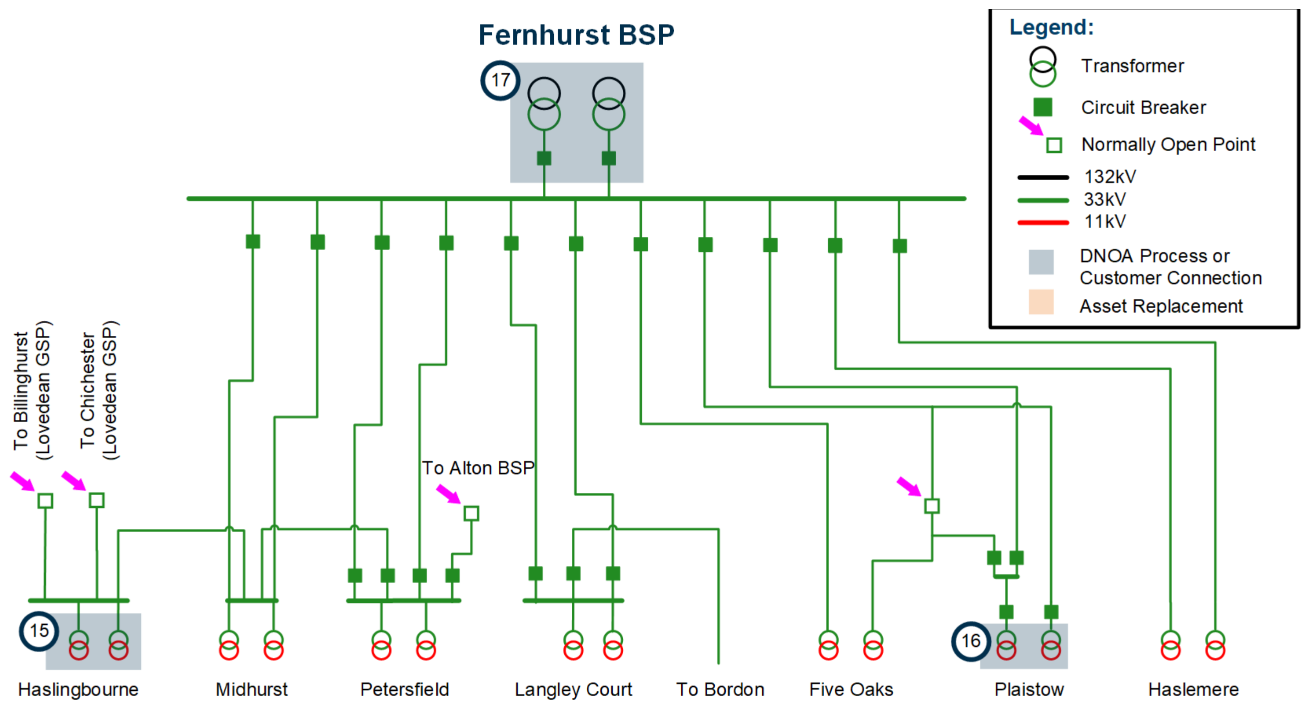


Figure 38 - Fernhurst Wood BSP - Future network schematic

Appendix E: EHV/HV plans for other DFES scenarios

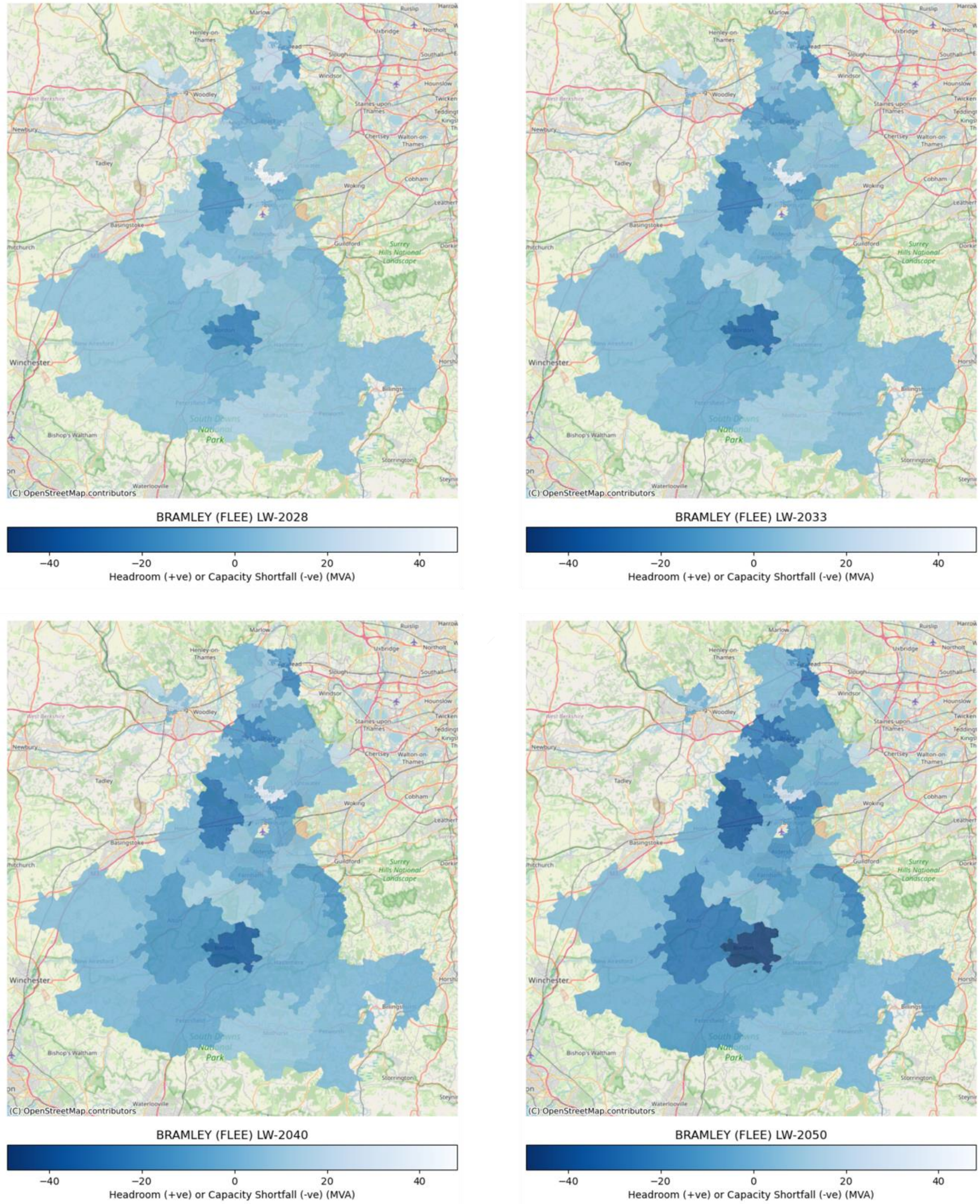


Figure 40 - Fleet GSP - EHV/HV Spatial Plan - Leading the Way

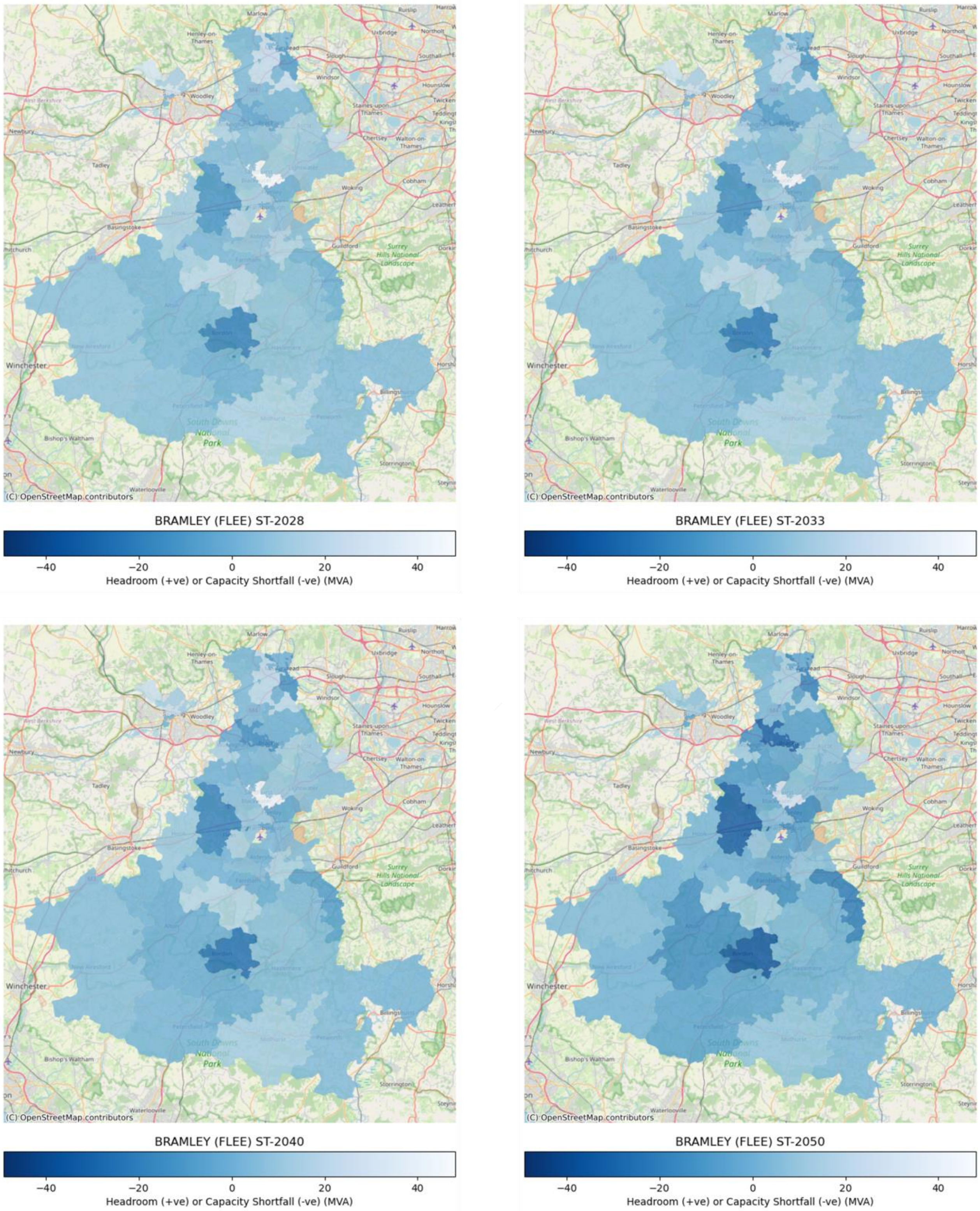


Figure 41 - Fleet GSP - EHV/HV Spatial Plan - System Transformation

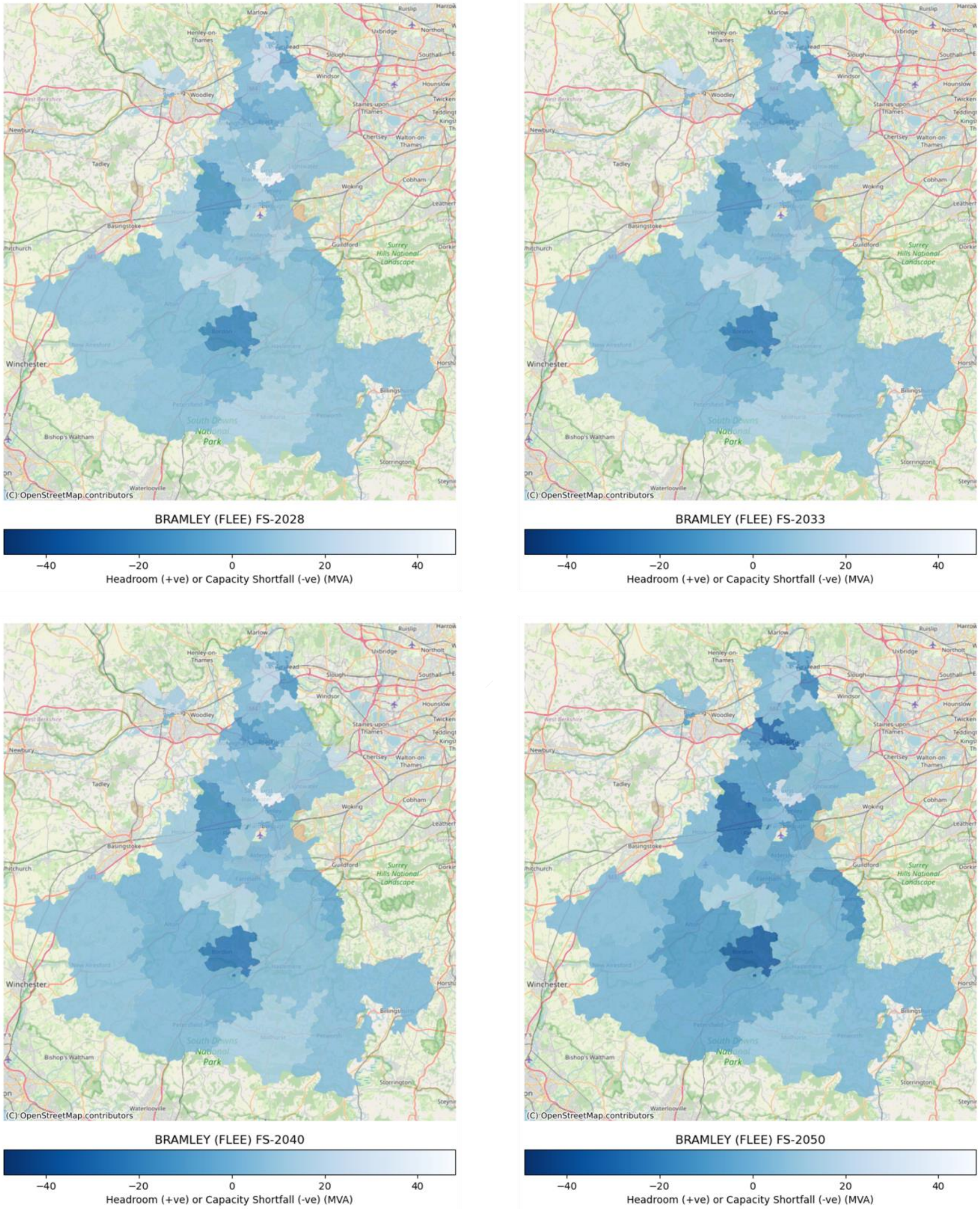


Figure 42 - Fleet GSP - EHV/HV Spatial Plan - Falling Short

Appendix F: HV/LV plans for other DFES scenarios

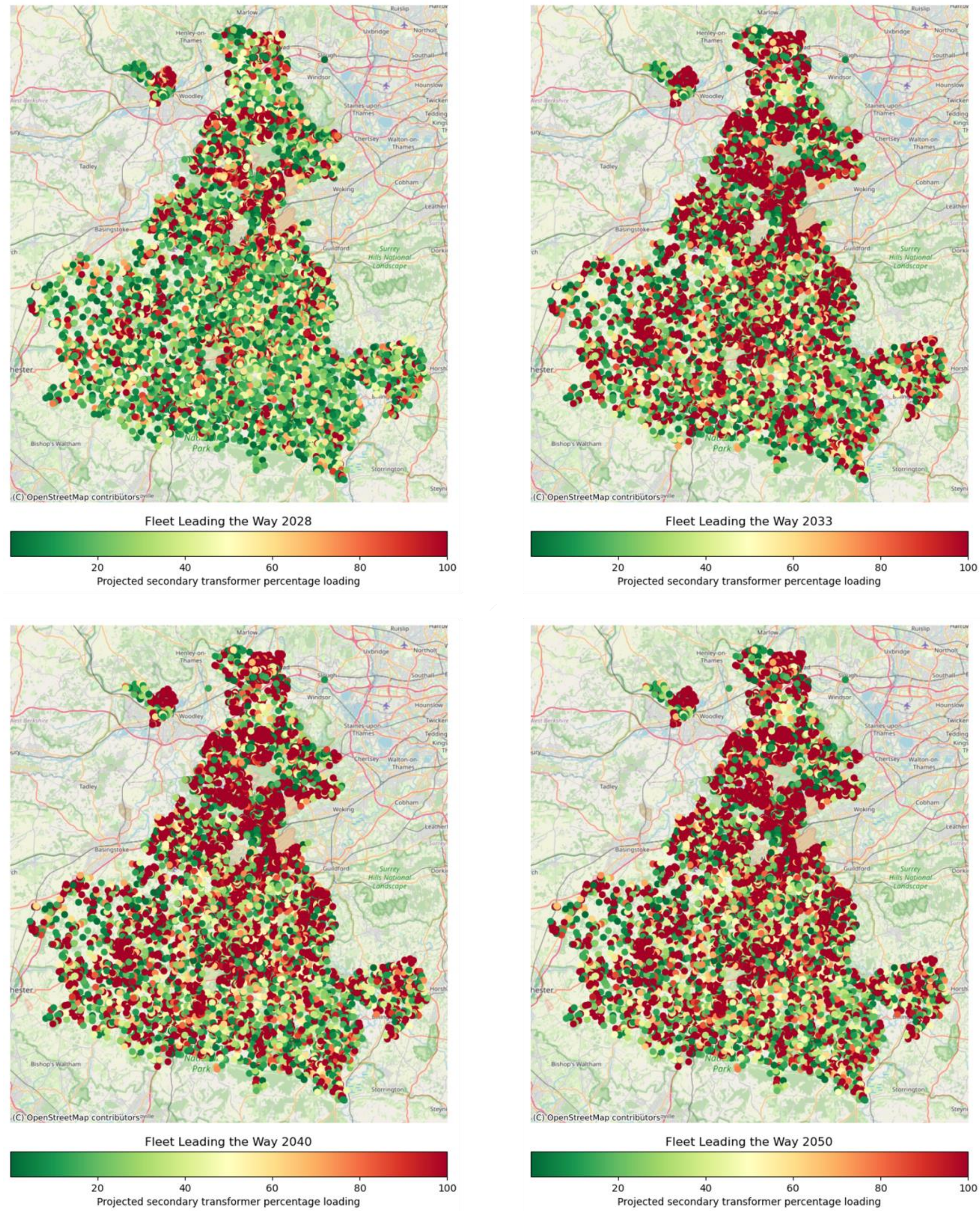


Figure 43 - Fleet GSP - HV/LV Spatial Plan - Leading the Way

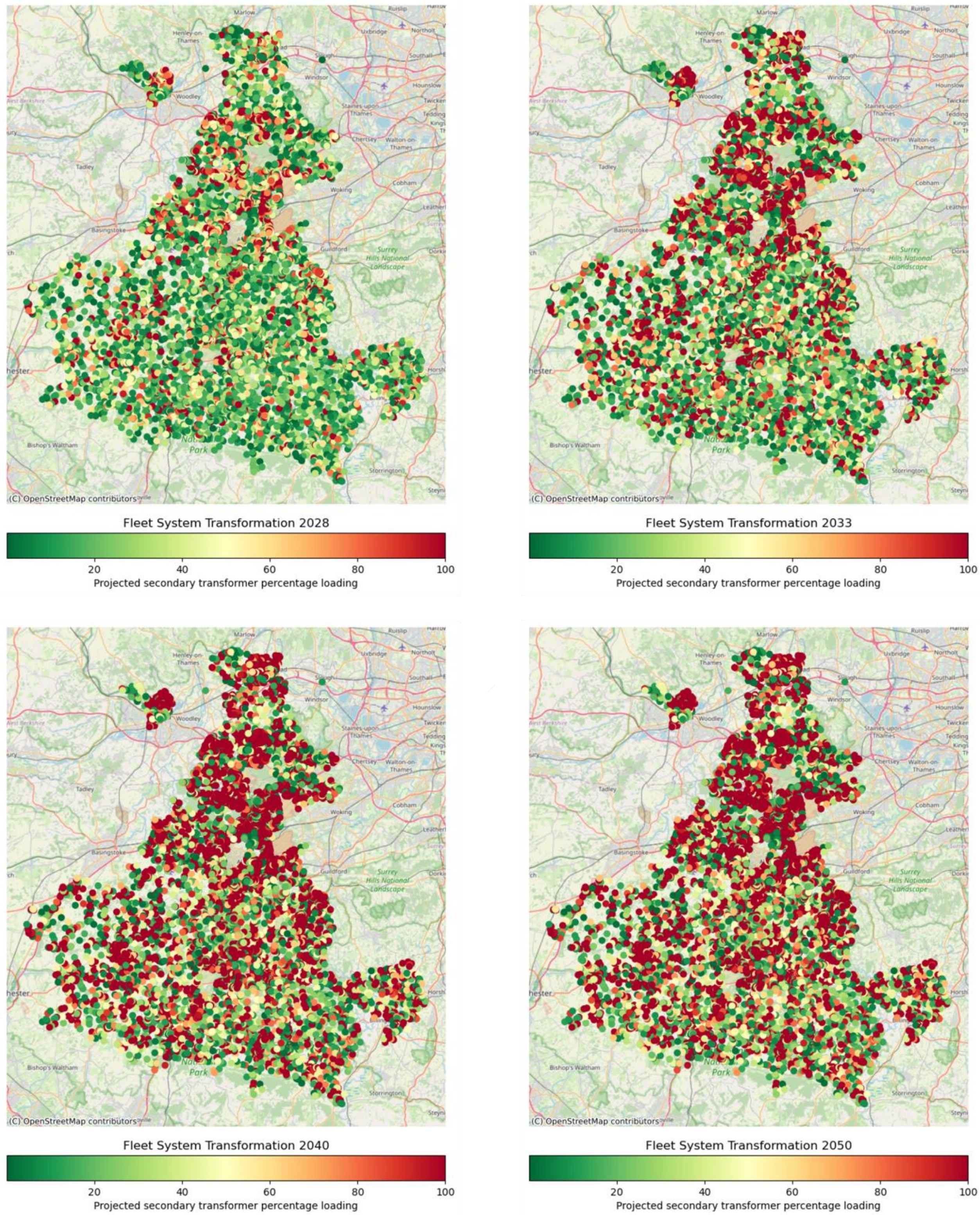


Figure 44 - Fleet GSP - HV/LV Spatial Plan - System Transformation

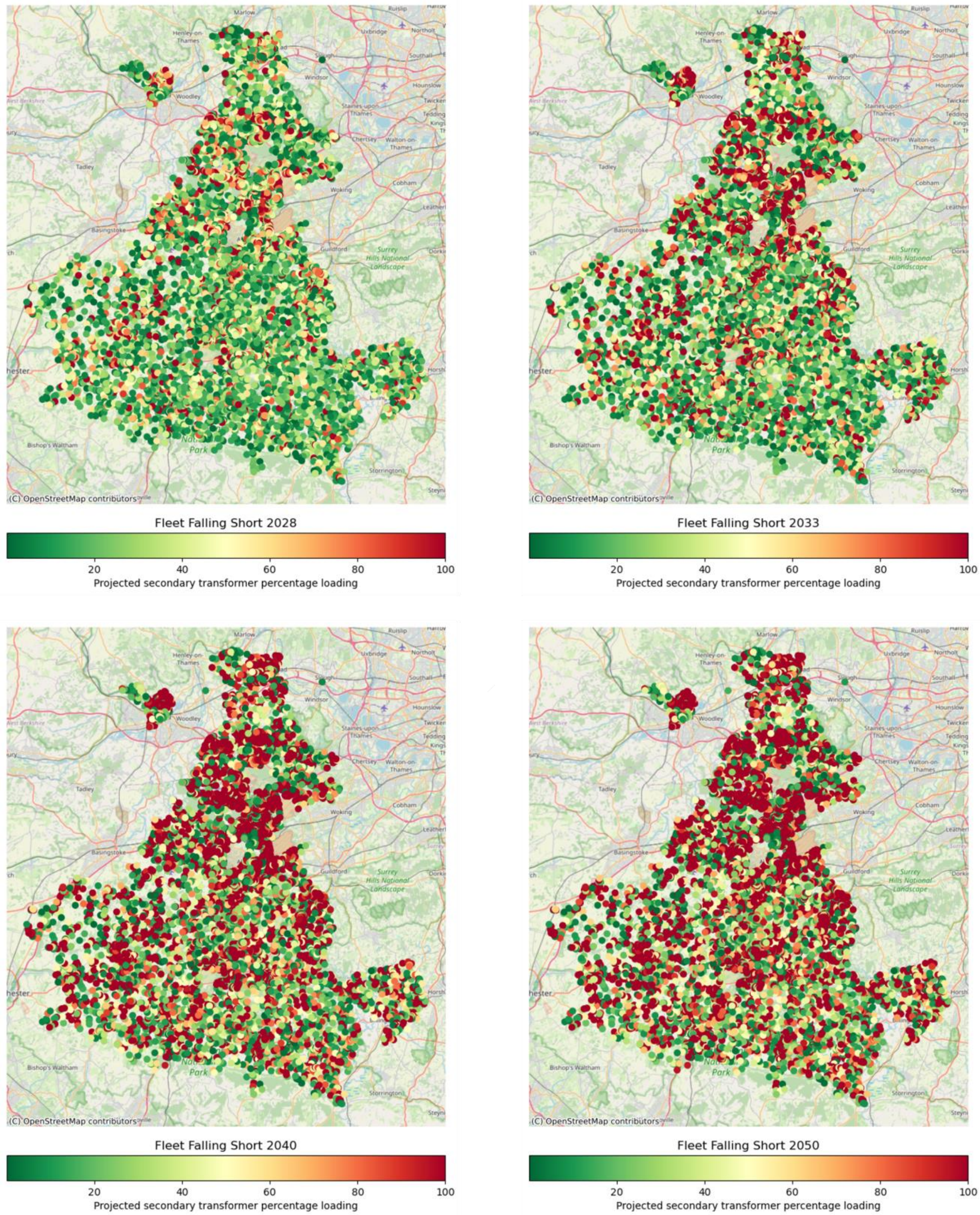


Figure 45 - GSP - HV/LV Spatial Plan - Falling Short

Appendix G: Relevant DNOA Outcome Reports

July 2024 DNOA Report

DNOA Outcome Report

Alresford (Alresford PSS)

Ref. 0724-16

Scheme description

- Alresford substation is located northeast of Winchester in Hampshire. Postcode(s): BH24, DT2, GU32, GU34, RG25, RG29, SO21, SO24, SO32, SO40.
- Load related – Thermal overloading on the primary transformers at Alresford Substation from 2024/25 and on the Alton - Alresford circuit from 2028/29.

Proposed option

- Utilise flexibility solutions to defer reinforcement of the 33/11kV transformers at Alresford primary substation by 1 year (Phase I).
- Reinforcement of the 33kV circuit from Alton bulk supply point to Alresford primary substation (Phase II).
- 6.1MVA of capacity is released by 2025/26 and a total of 11MVA released by 2027/28.

System need requirement

J	F	M	A	M	J	J	A	S	O	N	D

DNOA History

2024/25	2025/26	2026/27	2027/28	2028/29
Initial assessment				

Indicative flexibility price (if available):

- Availability: £150/MW/h
- Utilisation: £200/MWh

Reinforcement timeline

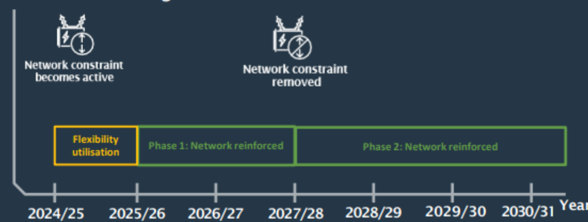
- Flexibility utilisation in 2024/25.
- Phase I reinforcement delivery by 2025/26.
- Phase 2 reinforcement delivery by 2027/28.

Estimated peak MW outside firm network capacity under each scenario

Grey text relates to estimated peak MW without reinforcement delivery

	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31
CT	0.58	- (1.54)	- (2.41)	- (3.18)	- (4.05)	- (5.89)	- (6.66)
ST	1.04	- (2.14)	- (3.06)	- (3.90)	- (4.72)	- (6.62)	- (7.40)
LTW	0.29	- (1.11)	- (1.89)	- (2.53)	- (3.20)	- (4.87)	- (5.31)
FS	0.17	- (0.97)	- (1.65)	- (2.21)	- (2.80)	- (4.33)	- (4.68)

Constraint management timeline



DNOA Outcome Report

Berkshire & Hampshire (Fleet – Bramley GSP) Ref. 0724-17

Scheme description

- The Fleet-Bramley GSP feeds a large area across Berkshire and Hampshire. Postcode(s): GU7-GU21, GU24-GU35, GU51-GU52, RG1-RG2, RG4-RG10, RG12, RG23-RG31, RG40-RG42, RG45, RH12-RH14, RH20, SL4-SL6, SO21, SO24.
- Load related – Fleet-Bramley GSP group thermal overload in FCO conditions due to forecasted demand growth in the area.

Proposed option

- Procure 3 years of flexibility solutions followed by asset solutions: will split the Fleet/Bramley GSP group into two GSP groups. including works at Bramley GSP, Burghfield Bulk Supply Point (BSP), Reading BSP, Wokingham BSP and on the Fleet-Burghfield Tee-Reading circuit.
- The option provides the economic benefit of reinforcement deferral, ensures network compliance, and sets up future works.

System need requirement

J	F	M	A	M	J	J	A	S	O	N	D

DNOA History

2024/25	2025/26	2026/27	2027/28	2028/29
Initial assessment				

Indicative flexibility price (if available):

- Availability: £150/MW/h
- Utilisation: £200/MWh

Reinforcement timeline

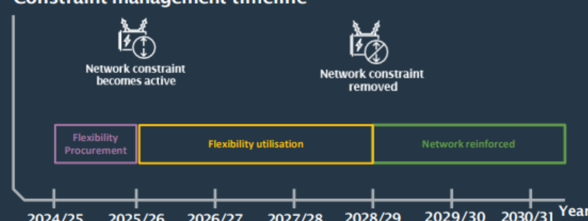
- Flexibility utilisation in 2025/26, 2026/27 and 2027/28.
- Reinforcement delivery by 2028/29.

Estimated peak MW outside firm network capacity under each scenario

Grey text relates to estimated peak MW without reinforcement delivery

	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31
CT	-	8.5	11.2	28.6	- (158.6)	- (218.6)	- (305.6)
ST	-	-	-	-	- (34.4)	- (59.8)	- (89.1)
LTW	6.9	52.4	67.8	90.2	- (237)	- (307.3)	- (387.1)
FS	-	-	-	-	- (14.1)	- (35.5)	- (62.9)

Constraint management timeline



DNOA Outcome Report

Aldershot (Tongham PSS)

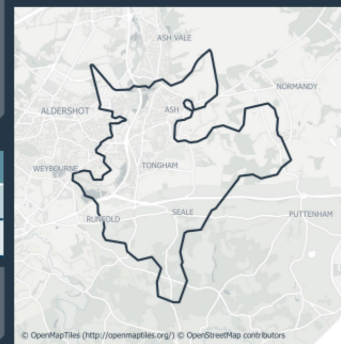
Ref. 0724-23

Scheme description

- Tongham primary substation supplies the area to the East of Aldershot town, covering parts of the Guildford, Waverley, and Rushmoor Borough Council areas. Postcode(s): GU3, GU10, GU11, GU12.
- Concerns over P2/8 security of supply standards are driving the upgrade, in certain outage situations.

Proposed option

- Asset solution: new 33kV underground circuits from Aldershot BSP to Tongham PSS with new circuit breaker to establish interconnector between the substations. Flexibility was deemed not to be viable due its availability falling short of the required amount.
- This option has a relatively low cost and creates optionality as demand grows.
- Capacity released: 16.4MVA



System need requirement

J	F	M	A	M	J	J	A	S	O	N	D

DNOA History

2024/25	2025/26	2026/27	2027/28	2028/29
Initial assessment				

Indicative flexibility price (if available):

- Availability: N/A
- Utilisation: N/A

Reinforcement timeline

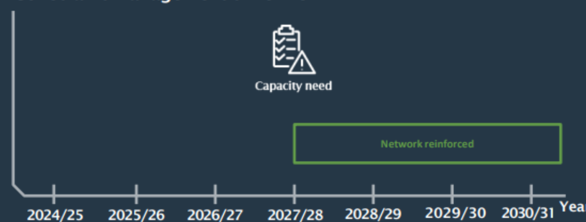
- Reinforcement delivery by 2027/28.

Estimated peak MW outside firm network capacity under each scenario

Grey text relates to estimated peak MW without reinforcement delivery

	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31
CT	-	-	-	-	-	-	-
ST	-	-	-	-	-	-	-
LTW	-	-	-	-	-	-	-
FS	-	-	-	-	-	-	-

Constraint management timeline



DNOA Outcome Report

Alton and Fernhurst (132kV Switching Station)

Scheme description

- The reconfiguration of the shared 132kV circuits utilised by Alton BSP and Fernhurst BSP will increase capacity in the Alton, Fernhurst and Winchester area. Postcode(s): GU8-35, RG21-29.
- Local authority: Basingstoke and Deane, Chichester, East Hampshire, Horsham, Test Valley, Waverley, Winchester
- Load related – operational restoration issues during SCO conditions due to forecasted demand growth.

Proposed option

- Smart/Asset Solution: Addition of 132kV Switching Station. This allows direct feeders to Fleet, Alton, Fernhurst and Winchester/Nursling BSPs.
- Flexibility was unable to be utilised as it is not suitable for resolving the restoration issues.
- This option addresses the forecasted overload under Fleet GSP out to 2036.
- Capacity released: 124.7MVA

System need requirement

J	F	M	A	M	J	J	A	S	O	N	D

DNOA History

2024/25	2025/26	2026/27	2027/28	2028/29
Initial assessment				

Indicative flexibility price (if available):

- Availability price: N/A
- Utilisation price: N/A

Reinforcement timeline

- Reinforcement delivery by the end of 2027/28.

Estimated peak MW outside firm network capacity under each scenario

Grey text relates to estimated peak MW without reinforcement delivery

	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31
CT	-	-	0.12	4.10	- (4.93)	- (6.91)	- (11.02)
ST	-	-	-	-	-	-	- (0.89)
LTW	-	-	1.54	5.91	- (6.04)	- (8.64)	- (12.60)
FS	-	-	-	-	-	-	-

Constraint management timeline

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Appendix H: Glossary

Acronym	Definition
AIS	Air Insulated Switchgear
ANM	Active Network Management
ARC	Advanced Research Computing
BAU	Business as Usual
BSP	Bulk Supply Point
CB	Circuit Breaker
CBA	Cost Benefit Analysis
CER	Consumer Energy Resources
CMZ	Constraint Managed Zone
CT	Consumer Transformation
DER	Distributed Energy Resources
DESNZ	Department for Energy Security and Net Zero
DFES	Distribution Future Energy Scenarios
DNO	Distribution Network Operator
DNOA	Distribution Network Options Assessment
DSO	Distribution System Operation
DSR	Demand Side Response
EHV	Extra High Voltage
EJP	Engineering Justification Paper
ER P2	Engineering Recommendation P2
NESO	National Energy System Operator
NGET	National Grid Electricity Transmission
ENA	Electricity Networks Association
EV	Electric Vehicle
FES	Future Energy Scenarios
FS	Falling Short
GIS	Gas Insulated Switchgear

GSPs	Grid Supply Point
HV	High Voltage
kV	Kilovolt
kWp	Peak power in kilowatts
LAEP	Local Area Energy Planning
LCT	Low Carbon Technology
LENZA	Local Energy Net Zero Accelerator
LEO	Local Energy Oxfordshire
LV	Low Voltage
LW	Leading the Way
OHL	Overhead Line
PSS	Primary Substation
PV	Photovoltaic
NSHR	Network Scenario Headroom Report (part of the Network Development Plan)
MW	Megawatt
MVA	Mega Volt Ampere
ODM	Operational Decision Making
RESOP	Regional Energy System Operation Planning
RIIO-ED2/3	Revenue = Incentives + Innovation + Outputs, Electricity Distribution 2 / 3 (Regulatory price control periods RIIO-ED2 and RIIO-ED3)
SDP	Strategic Development Plan
SEPD	Southern Electric Power Distribution
SLC	Standard Licence Condition
SSEN	Scottish and Southern Electricity Network
ST	System Transformation
UKPN	UK Power Networks
UM	Uncertainty mechanism
VFES	Vulnerability Future Energy Scenarios
WSC	Worst Served Customers
ZCOP	Zero Carbon Oxfordshire Partnership

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