AMERSHAM GRID SUPPLY POINT: STRATEGIC DEVELOPMENT PLAN

Our network serving communities across South Buckinghamshire

Final following consultation

February 2026

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 from today out to 2050 and translate these requirements into strategic spatial plans of 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. The focus area of this SDP is the area that is supplied by Amersham Grid Supply Point (GSP), shown below in Figure 1.

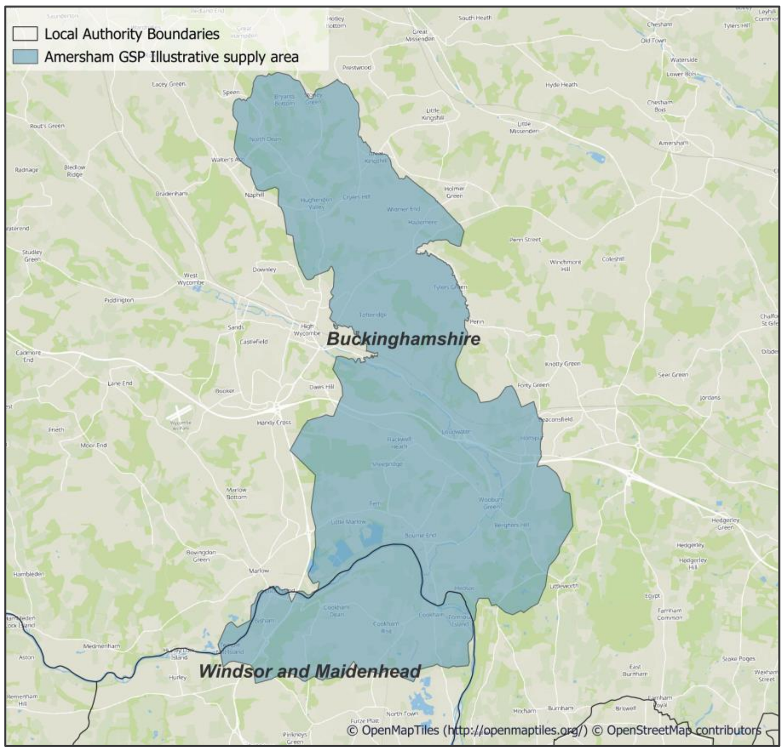

Figure 1 Area of focus for this SDP.

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 across Buckinghamshire and Windsor and Maidenhead have been considered in preparation for this plan.
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 that pathway to develop the network in an efficient and stakeholder-led way.

2. INTRODUCTION

The aim of this report is to demonstrate how local, regional, and national targets align with stakeholder ambitions in the area to provide a robust evidence base for load growth out to 2050 across the area served by Amersham Grid Supply Point (GSP). A GSP is an interface point with the national transmission system where SSEN Distribution then takes 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 commissions 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 incorporating 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 under different scenarios as we move towards the national 2050 net zero target. These scenarios are summarised in Figure 2. SSEN uses Holistic Transition as the central case scenario, reviewing this position annually. Any more recent unforeseen demand changes, for example customer connection requests, are also considered in our forecasts to ensure that the projected load more accurately reflects what we expect to see in the future.

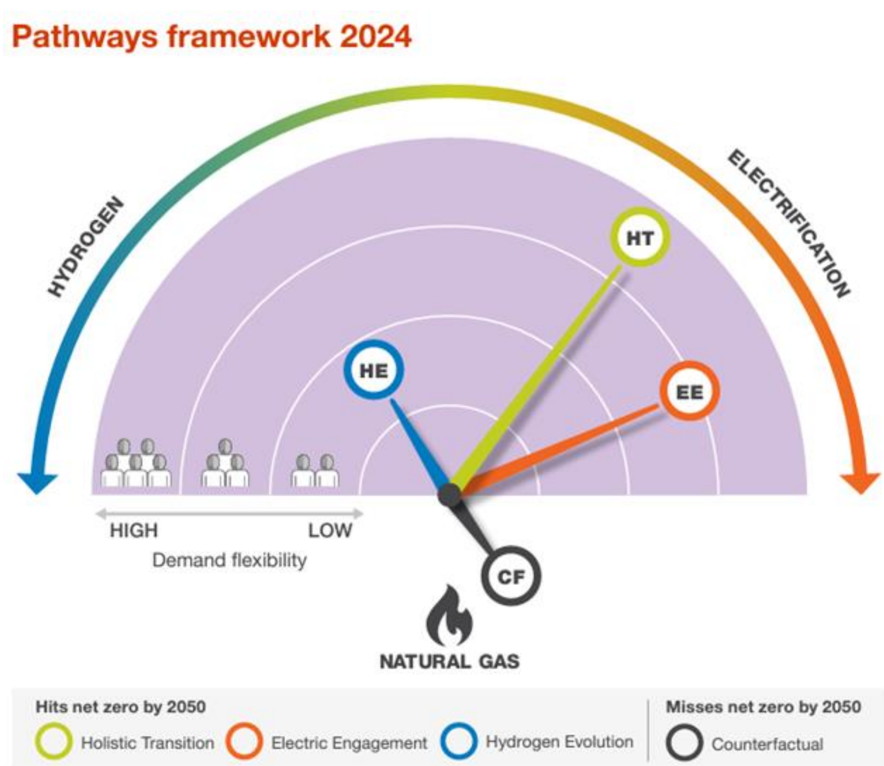

Figure 2 The FES Scenario framework (source: NESO)

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 scenarios, and the projected 2050 load. System needs are identified through power system analysis. We also model across the other scenarios to understand when these needs arise and what network capacity should be planned for in the event each scenario is realised.

The DNOA process provides more detailed optioneering for each of these system needs, improving stakeholder visibility of the strategic planning process. Opportunities for the procurement of flexibility are also highlighted in the DNOA to cultivate the flexibility markets.

Further information on the FES framework can be found in the DFES 2024 introductory report.

3. STAKEHOLDER ENGAGEMENT AND WHOLE SYSTEM CONSIDERATIONS

3.1. Local Authorities and Local Area Energy Planning

The local authorities that are supplied by Amersham GSP include Buckinghamshire and Windsor and Maidenhead as shown in Figure 3. 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.

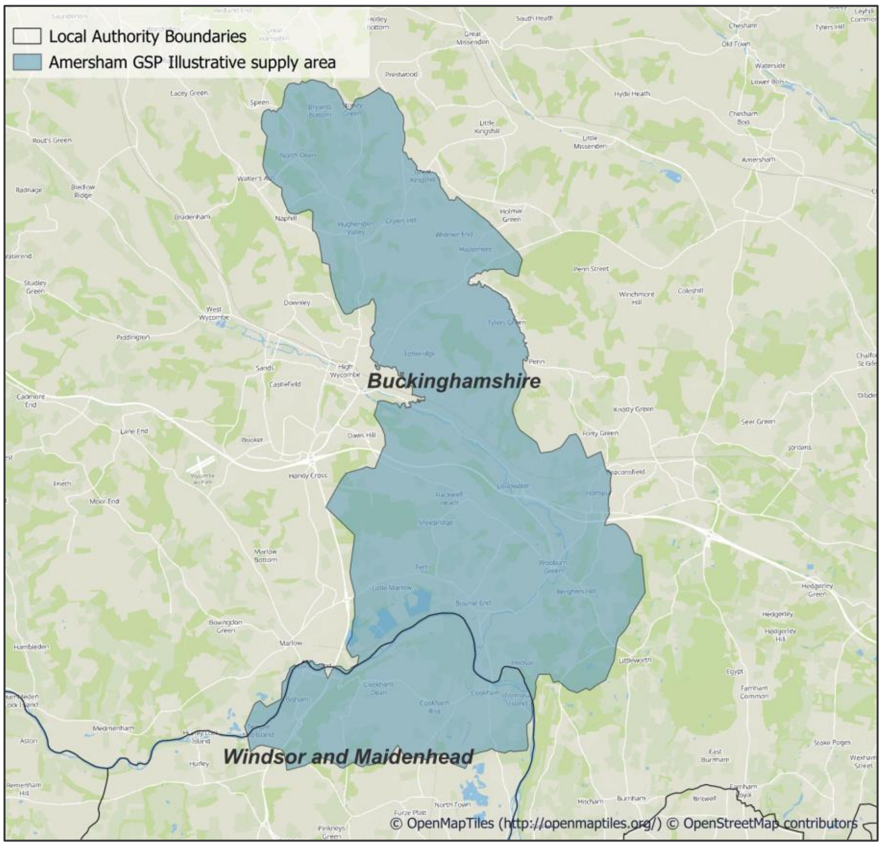

Figure 3 Amersham GSP supply area and local authority boundaries.

3.1.1. Buckinghamshire

Buckinghamshire Council has seen population growth of 9.5% from around 505,300 in 2011 to around 553,100 in 2021[1]. The Council was formed in 2020, combining the four local councils of Aylesbury Vale, Chiltern, South Bucks, and Wycombe. It is currently developing its first Local Plan and has produced the Council's Climate Change and Air Quality Strategy, which aims to reduce 75% of council emissions by 2030 and meet the national net zero target by 2050 as a minimum with ambitions to reach this target earlier[2]. In March 2024, the council was successful in securing £1.9 million of government Local Electric Vehicle Infrastructure (LEVI) funding to install

1 Census 2021, January 2023, How life has changed in Buckinghamshire: Census 2021.

2 Climate Change and Air Quality Strategy | Buckinghamshire Council

hundreds of publicly accessible EV chargers[3], supporting its target of 1000 EV chargers by 2027. The council has also started a new home energy efficiency grant scheme for grants up to £30,000 to be used for energy efficiency improvements in home across the county[4], making these houses more suitable for the installation of heat pumps. Furthermore, in April 2024, the council released their Housing Strategy for 2024 to 2029[5], where energy efficiency is placed front and centre.

3.1.2. Windsor and Maidenhead

The 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 organized 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 chargepoints in all council car parks by 2028 and by 2035, 70% of homes without driveways are within a 5-minute walk of a public chargepoint.

3.2. Whole System Considerations

3.2.1. Transmission interactions

In the area, there are large-scale new developments that have recently been diverted to a new connection node on the transmission network. The location of this new connection node is yet to be confirmed by NGET. SSEN are working closely with NGET to understand whether underlying distribution demand growth will be required to connect under different GSPs or remain at Amersham.

3 Electric vehicles | Buckinghamshire Council

4 Domestic Building Envelope Energy Efficiency Grant (DBEEE) | Buckinghamshire Council

5 Housing strategy and policy | Buckinghamshire Council

3.3. 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.[6,7]

SSEN regularly recruits new Flexibility Services providers and increases the procured Flexibility Services with the latest bidding round for long term requirements held in May 2025 and recruitment through the Mini-Competition process most recently opening in mid-July 2025.[2]

Areas across Amersham GSP where flexibility has been procured is shown below in Figure 4. This map shows all Flexibility Services procured, which covers requirements beyond those identified for managing the deferral of reinforcement.

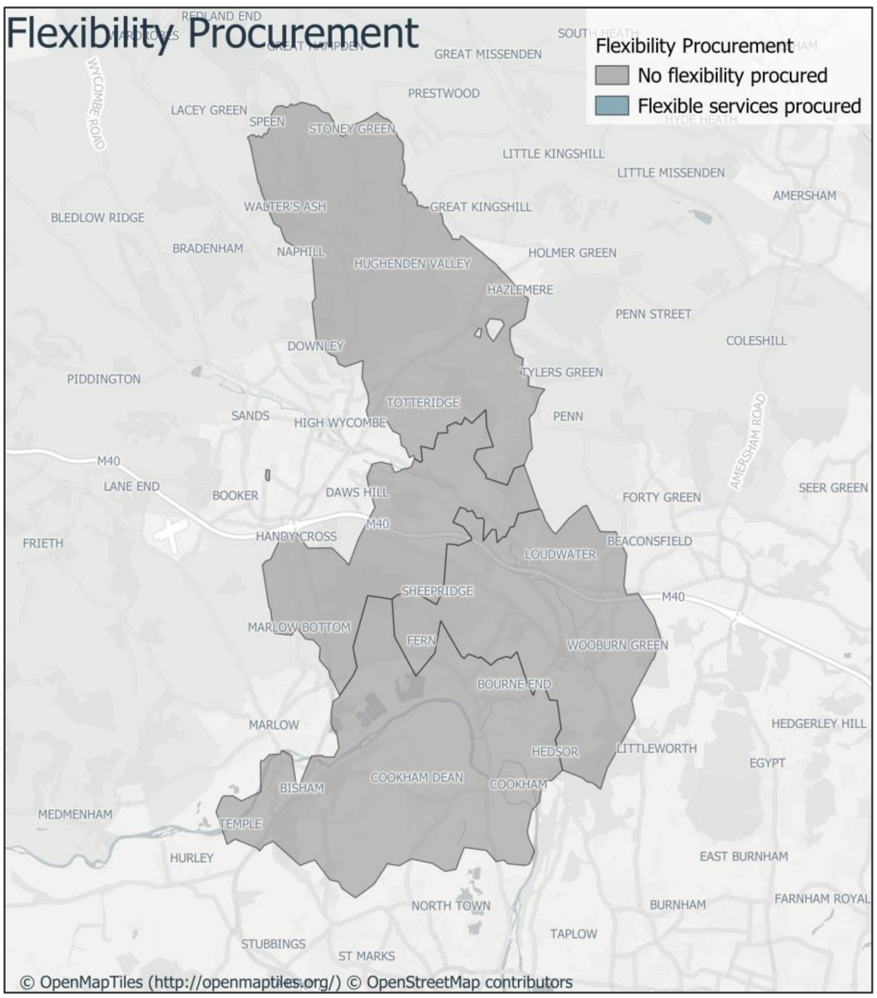

Figure 4 Flexibility procurement across Amersham GSP

6 SSEN, Flexibility Services Procurement (Flexibility Services Procurement - SSEN)

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

4. EXISTING NETWORK INFRASTRUCTURE

4.1. Amersham Grid Supply Point Context

The Amersham GSP network is made up of 132kV, 33kV, 22kV, 11kV, 6.6kV, and LV circuits. It supplies the east of High Wycombe and a more rural/suburban area to the northeast and southeast of High Wycombe town centre. In total, the GSP serves approximately 36,000 customers. Table 1 shows the values for the GSP, and the primary substations supplied by the GSP (noting that some sites for single customers are not shown here). 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 all primary substations to sum to that at the GSP).

Substation Name	Site Type	Number of Customers Served (approximate)	2024/25 Substation Maximum demand in MVA (Season)
Amersham	Grid Supply Point	36,100	54.07
Loudwater	Bulk Supply Point	36,100	48.87
Bowerdean	Primary Substation	14,600	18.81
Flackwell Heath	Primary Substation	7,400	10.74
Well End	Primary Substation	7,000	14.60
Wycombe Marsh	Primary Substation	7,000	8.36

Table 1 Customer number breakdown and substation peak demand readings (2024-2025) for Amersham GSP.

4.2. Current Network Topology

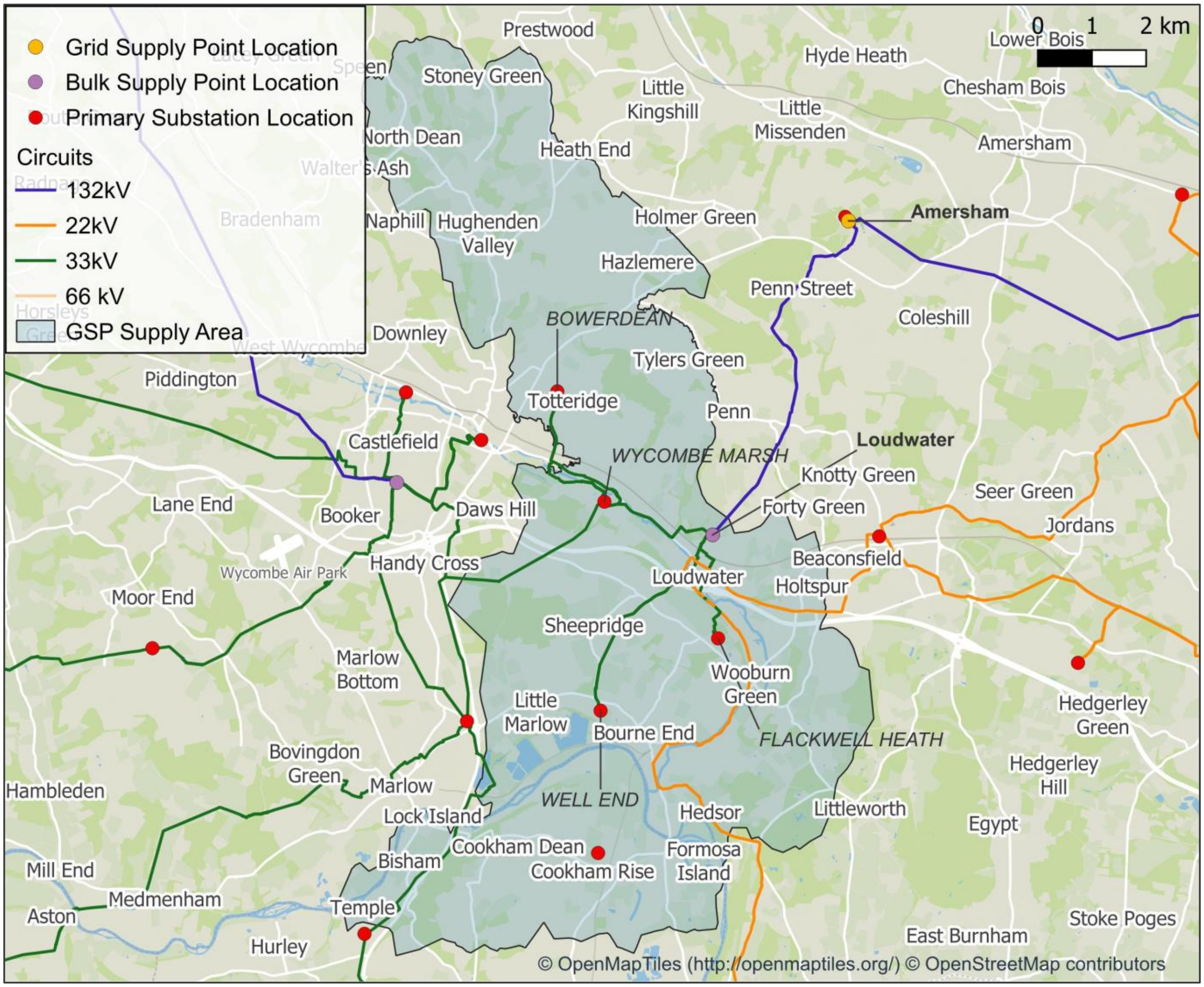

Figure 5 Current network topology of Amersham GSP.

4.3. Current Network Schematic

The existing network at Amersham GSP is shown below in Figure 6.

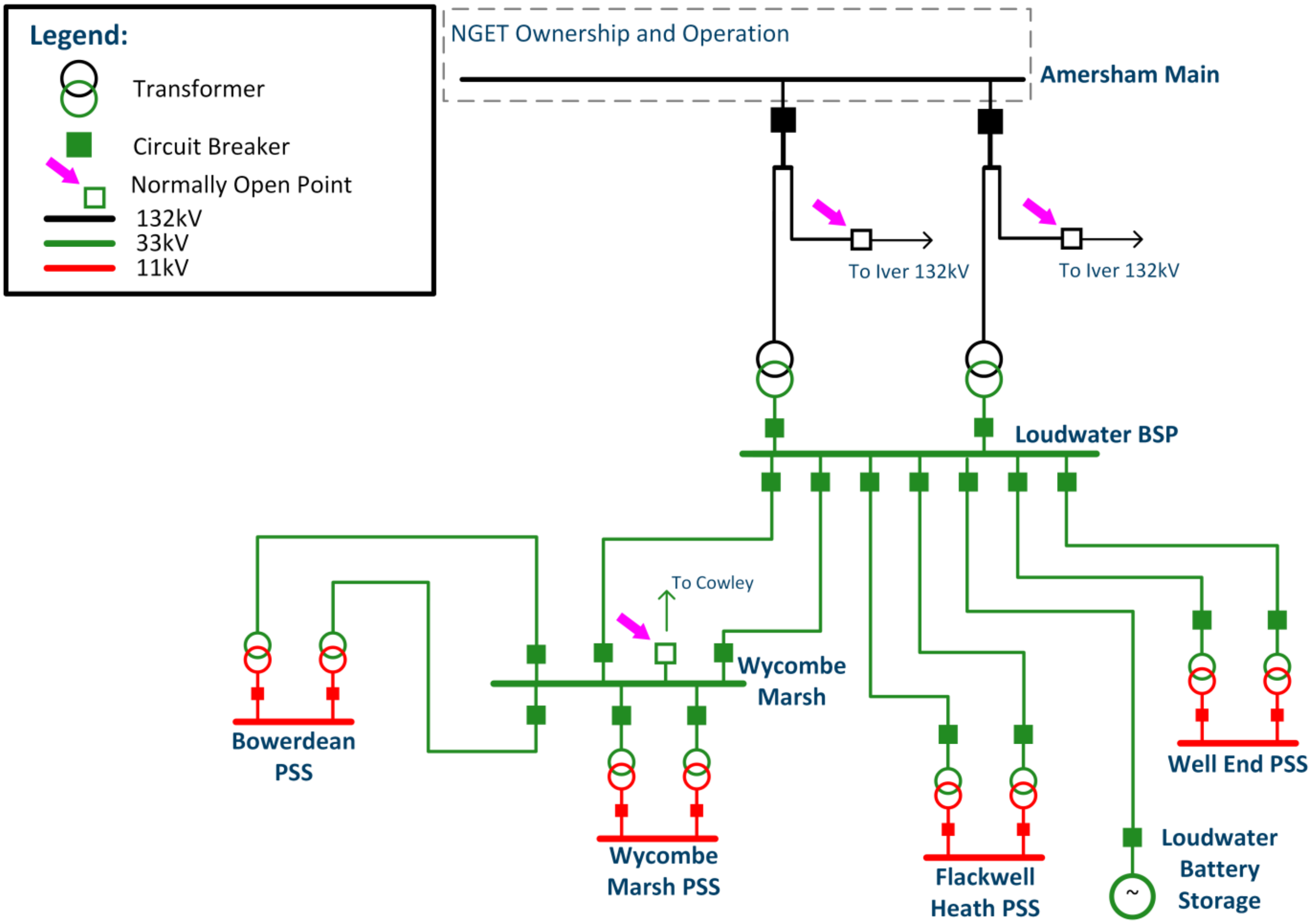

Figure 6 Existing network supplied by Amersham GSP

5. FUTURE ELECTRICITY LOAD AT AMERSHAM GSP

The following section details load growth across the technologies projected in the Distribution Future Energy Scenarios. There are important notes on the values presented here:

- 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 1 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 represent the coincident maximum demand of the entire system rather than the total sum of all demands.
- For projections specific to individual primary substations or local authorities, please refer to our online dashboard.[8]

8 SSEN DFES Technology Projections - Microsoft Power BI

5.1. Generation and Storage

DFES Scenario	Generation capacity				Electricity storage capacity			
	Baseline	**2030**	**2040**	**2050**	**Baseline**	**2030**	**2040**	**2050**
Holistic Transition	3MW	26MW	43MW	58MW	0MW	181MW	193MW	199MW
Electric Engagement		27MW	40MW	53MW		180MW	188MW	194MW
Hydrogen Evolution		18MW	28MW	36MW		54MW	58MW	61MW
Counterfactual		13MW	21MW	26MW		50MW	54MW	56MW

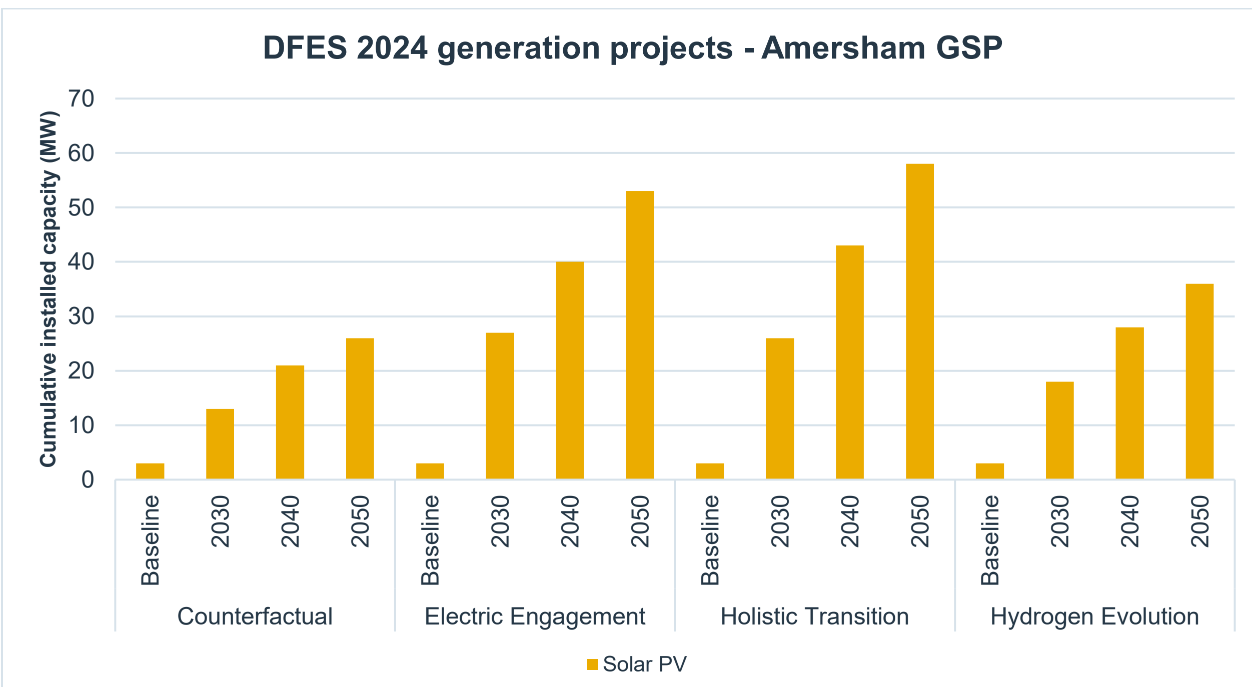

Figure 7 Projected cumulative distributed generation capacity Amersham GSP (MW). *Source: SSEN DFES 2024*

5.2. Transport Electrification

DFES Scenario	Domestic EV chargers – off-street (number of units)				Non-domestic EV chargers & domestic on-street EV chargers (MW)			
	Baseline	2030	2040	2050	Baseline	2030	2040	2050
Holistic Transition	3,027	10,170	28,604	29,944	1MW	3MW	20MW	25MW
Electric Engagement		15,802	28,364	29,519		6MW	23MW	25MW
Hydrogen Evolution		10,188	28,697	29,870		1MW	20MW	22MW
Counterfactual		8,538	27,727	29,923		1MW	11MW	25MW

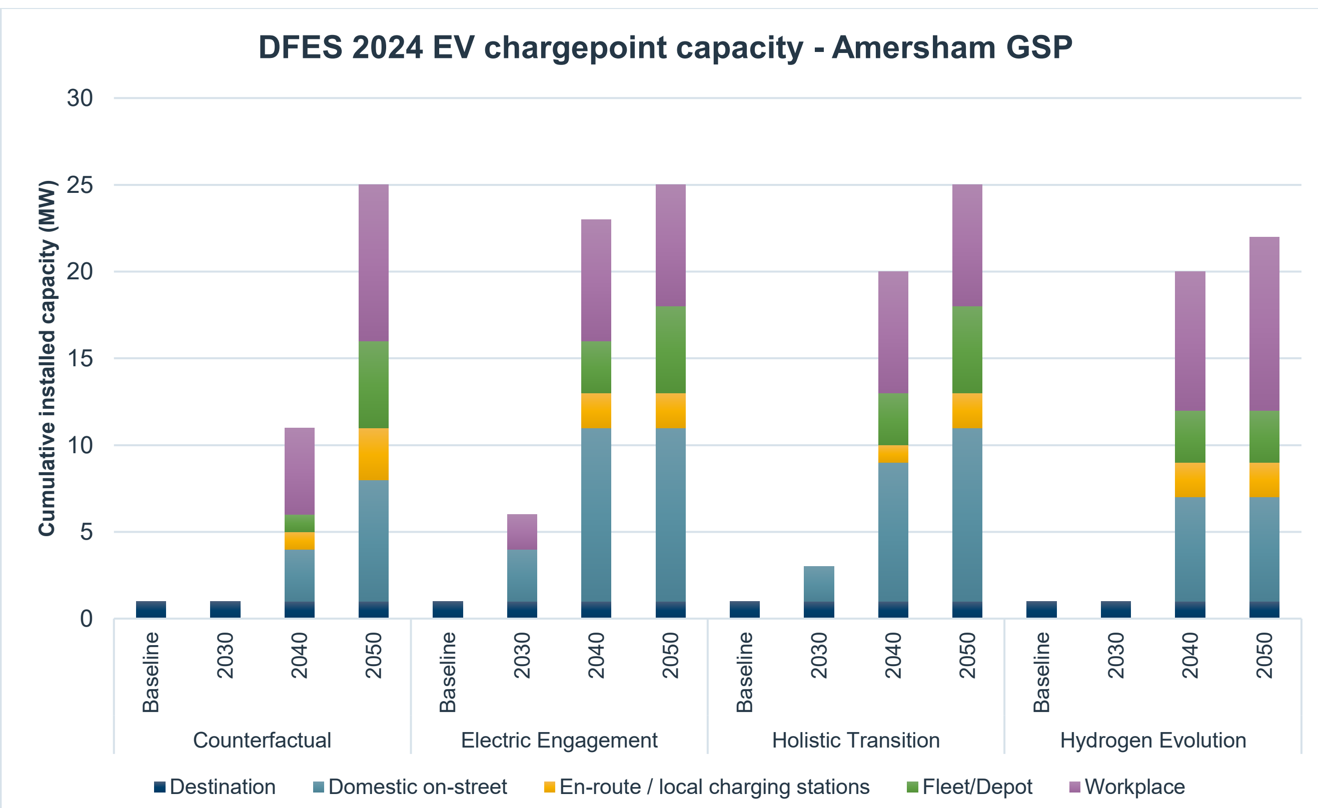

Figure 8 Projected EV charge point capacity across Amersham GSP. *Source: SSEN DFES 2024*

5.3. Electrification of Heat

DFES Scenario	Non-domestic heat pumps and resistive electric heating (m² of floorspace)				Domestic heat pumps (number of units)			
	Baseline	2030	2040	2050	Baseline	2030	2040	2050
Holistic Transition	64,954m²	171,436m²	319,693m²	383,698m²	241	5,658	23,637	33,486
Electric Engagement		147,405m²	333,052m²	410,420m²		5,281	22,372	33,330
Hydrogen Evolution		146,061m²	252,790m²	298,371m²		5,234	20,041	29,811
Counterfactual		109,102m²	177,438m²	231,525m²		2,816	8,420	22,031

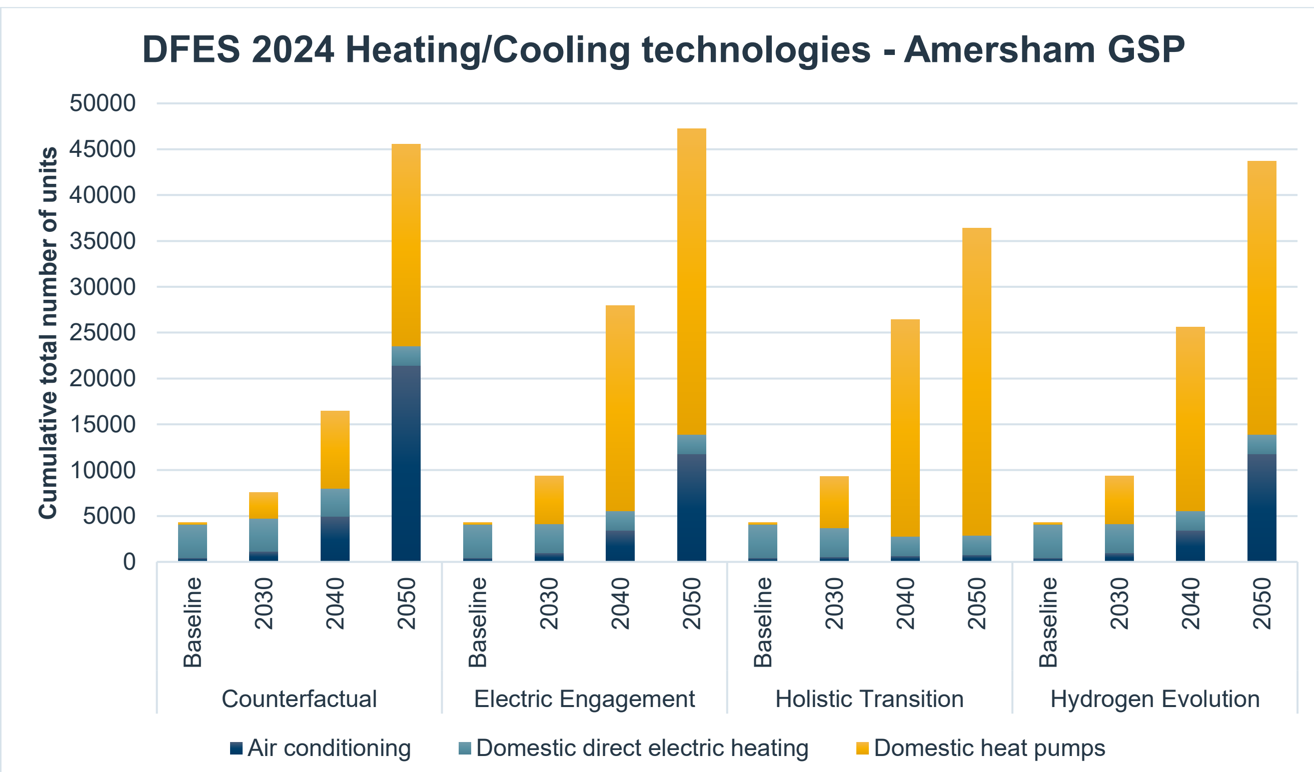

Figure 9 Projected number of heating/cooling technologies across Amersham GSP. *Source: SSEN DFES 2024*

5.4. New Building Developments

Through engagement with local authorities, we have developed an understanding of new development across our licence areas. This has allowed us to gauge an insight into future electricity demand for new developments ahead of a formal connection application. Below we investigate the non-domestic new developments across the study area for this SDP.

DFES Scenario	New domestic development (number of homes)			New non-domestic development (m^2)		
	2030	2040	2050	2030	2040	2050
Holistic Transition	2,277	3,133	3,871	9,334m^2	9,334m^2	9,334m^2
Electric Engagement	2,276	3,041	3,684	9,334m^2	9,334m^2	9,334m^2
Hydrogen Evolution	2,275	3,028	3,671	9,334m^2	9,334m^2	9,334m^2
Counterfactual	2,238	2,955	3,525	9,334m^2	9,334m^2	9,334m^2

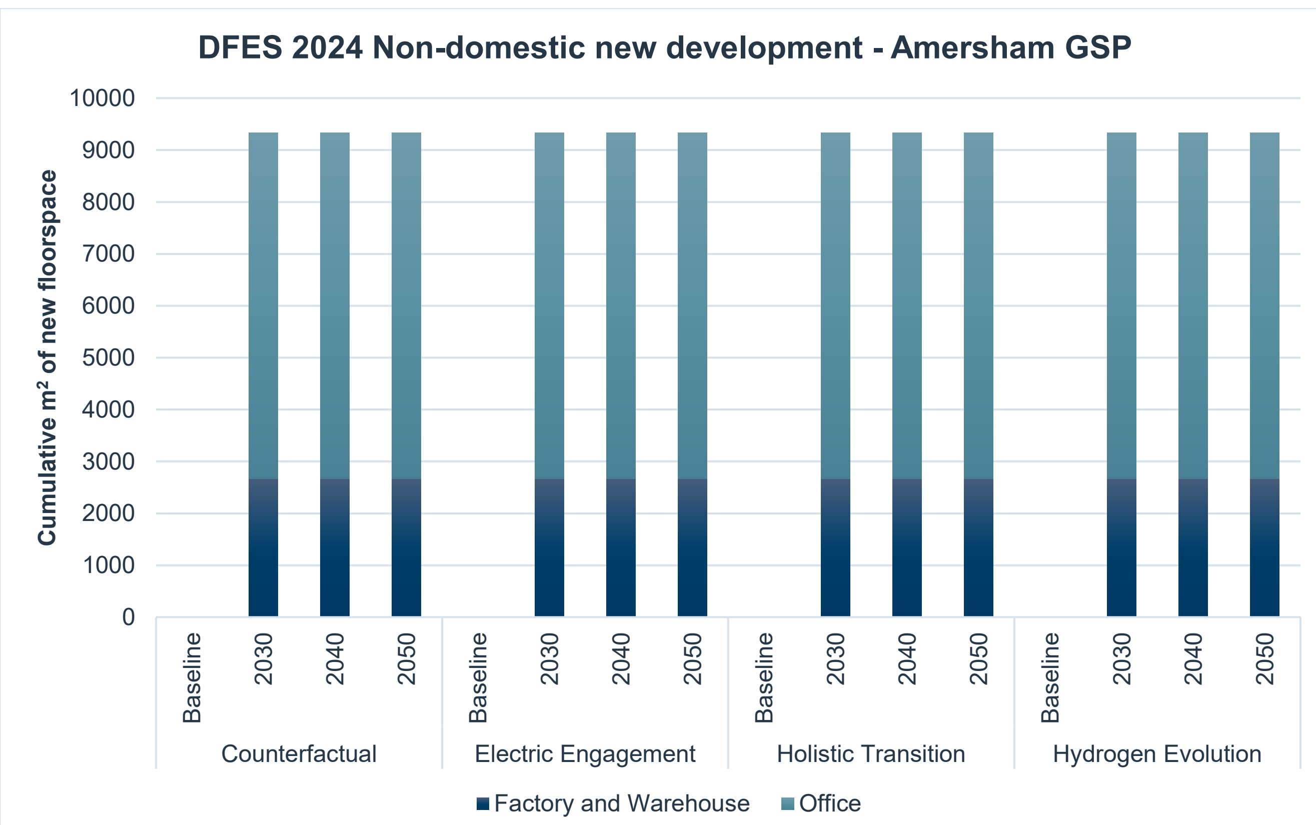

Figure 10 Non-domestic new development under Amersham GSP. *Source: SSEN DFES 2024*

5.5. Commercial and Industrial Electrification

Further to the non-domestic floorspace and the domestic new developments introduced in the section above, there is also data centre demand projected to potentially connect in the Amersham area. It should be noted that there are potential capacity constraints at the Grid Supply Point (GSP), meaning we would likely anticipate these to connect at neighbouring or new GSPs that maybe planned in the area.

6. WORK 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 Amersham GSP there are not any currently triggered EHV works. There is work that has been triggered through customer connection applications that have not yet been accepted, therefore this work that has not yet 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.[9]

9 DSO Service Statement 2025

7. SPATIAL PLAN OF FUTURE NEEDS

7.1. Extra High Voltage / High Voltage Spatial Plans

The EHV/HV spatial plan shown below in Figure 11 shows the projected headroom or capacity shortfall due to demand increases at primary substations across the Amersham SDP study area. Darker 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 B.

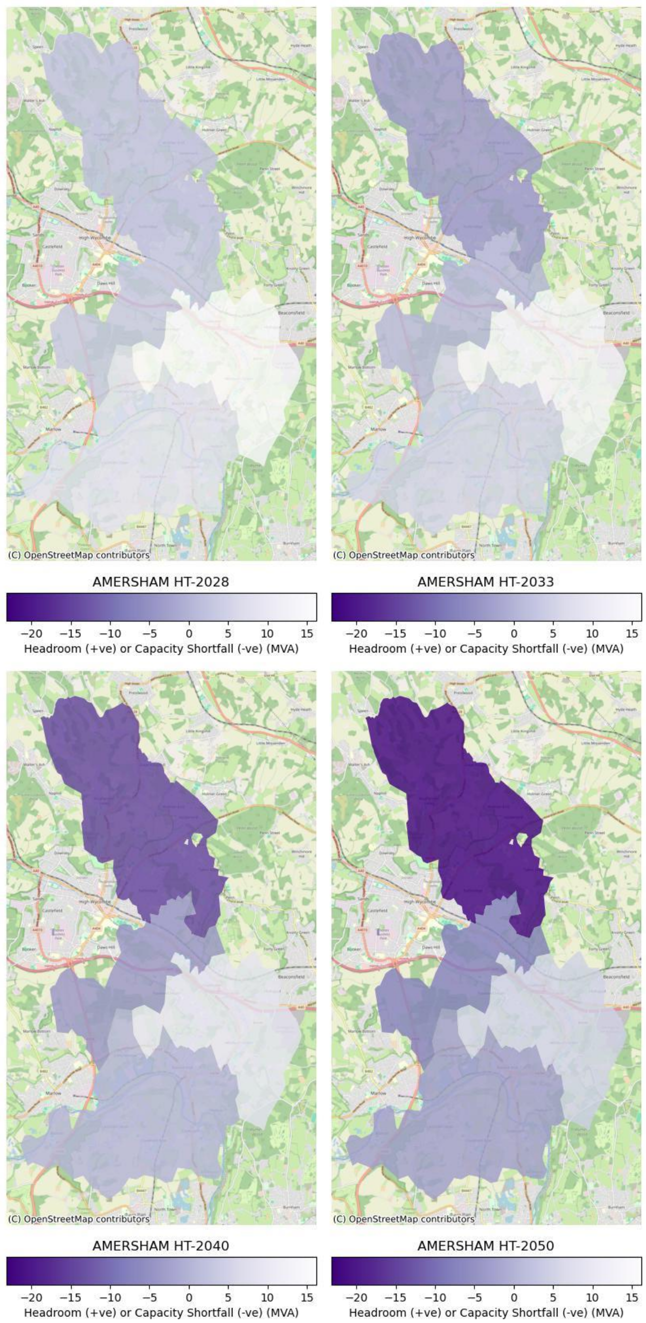

Figure 11 Amersham GSP - EHV/HV Spatial Plans – Holistic Transition

7.2. HV/LV Spatial Plans

The HV/LV spatial plans shown below in Figure 12 show the point locations of secondary transformers supplied by Amersham 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 2024 scenarios are available in Appendix C.

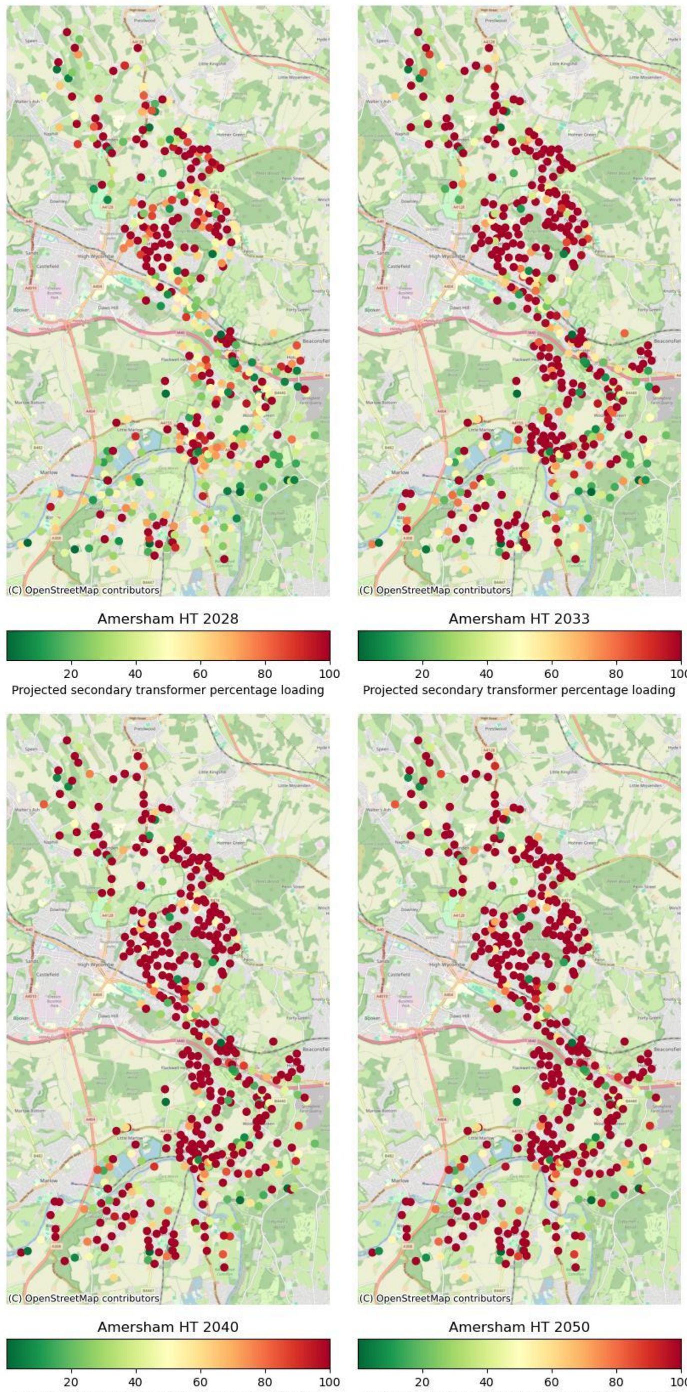

Figure 12 Amersham GSP - HV/LV Spatial Plans – Holistic Transition

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 also propose some initial options to resolve the needs forecasted. If required during the next ten years, these will be further developed through the DNOA process.

The section consists of three sets of results:

- Future EHV system needs to 2035 – these needs are more certain and therefore we have more clearly defined options to meet the requirements, and 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 beyond this period 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 outlined 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 several 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: The additional distribution work detailed below assumes that there is sufficient capacity at Amersham GSP for the organic load growth presented here.

Risks: If there is no sufficient capacity for growth at Amersham and there are not further expansion plan then transfer of existing distribution substations to neighbouring or future GSPs maybe required.

Mitigation: SSEN continue to collaborate with NGET through workshops to understand potential development of new GSPs in the area and the underlying distribution demand growth.

8.2. Future EHV System Needs

The following tables details the distribution network system needs that have been identified through power system analysis. While asset solutions are described in the table below it is important to note that the use of flexibility will be evaluated for all schemes to ensure the best possible solution is progressed.
For the projects shown in Table 2 we recommend that these are progressed through the DNOA process so that there is sufficient time for solutions to be designed and delivered. The interactions between possible options have been considered to identify potential synergies and efficiencies. As such, constraints have been grouped electrically to be considered alongside each other and any additional interactions between constraints referenced.

8.2.1. System needs to 2035

ID	Location of proposed intervention	HT Year	EE Year	HE Year	CF Year	Network State	Comments and potential options to resolve the system need
132kV Network							
1	Loudwater 132/33kV transformers.	Ahead of 2030	Ahead of 2030	Ahead of 2030	Ahead of 2030	N-1: Loss of either 132/33kV Transformer at Loudwater.	• Reinforcement of the two existing 90MVA 132/33kV transformers with 120MVA rated units will provide additional capacity at Loudwater BSP in the near-term. • Beyond this there will likely be further capacity requirements, potentially requiring a new Bulk Supply Point to be constructed in the area. It is likely that this would need to connect downstream of a new NGET substation.
33kV Network							
2	Loudwater to Wycombe Marsh 33kV circuit 1.	Ahead of 2030	Ahead of 2030	Ahead of 2030	Ahead of 2030	N-1: Loss of the Loudwater to Wycombe Marsh 33kV circuit 2.	• Construct new 33kV circuits from Loudwater BSP to Bowerdean PSS and remove the existing circuits from Wycombe Marsh PSS to Bowerdean PSS. This will remove the demand of Bowerdean from the overloaded circuits and mitigate the system need flagged here.
3	Bowerdean 33/11kV transformers.	Ahead of 2030	Ahead of 2030	Ahead of 2030	Ahead of 2030	N-1: Loss of either 33/11kV transformer at Bowerdean PSS.	• Reinforcement of the two existing 33/11kV units with 20/40MVA units will provide sufficient capacity until the late 2040s, at which point it may be possible to resolve the projected capacity shortfall through HV load transfers.
4	Loudwater to Wycombe Marsh 33kV circuit 2.	Ahead of 2030	Ahead of 2030	Ahead of 2030	Ahead of 2030	N-1: Loss of the Loudwater to Wycombe Marsh 33kV circuit 1.	• As listed above in **ID 2**, construct new 33kV circuits from Loudwater BSP to Bowerdean PSS and remove the existing circuits from Wycombe Marsh PSS to Bowerdean PSS. This will remove the demand of Bowerdean from the overloaded circuits and mitigate the system need flagged here.
5	Wycombe Marsh to Bowerdean 33kV circuits.	2032	2031	2032	2035	N-1: Loss of either Wycombe Marsh to Bowerdean 33kV circuit.	• The reinforcement listed in **ID 2** would also resolve this projected system need.

Table 2 Summary of system needs identified in this strategy through to 2035 along with indicative solutions.

8.2.2. System needs to 2050

ID	Location of proposed intervention	HT Year	EE Year	HE Year	CF Year	Network State	Comments and potential options to resolve the system need
132kV Network							
6	Amersham to Loudwater 132kV circuit.	2036	2035	2037	2042	N-1: Loss of either 132kV circuit from Amersham to Loudwater.	• Reinforcement of the 132kV circuits from Amersham to Loudwater to a higher rating would provide capacity at the distribution level. • The lack of availability of 132kV circuit breakers at Amersham means an additional circuit is unlikely to be a suitable solution. • Upstream capacity of the transmission network will impact whether reinforcement of these circuits would release capacity for distribution customers.
33kV Network							
7	Well End 33/11kV transformers.	2039	2039	2040	2047	N-1: Loss of either 33/11kV transformer at Well End PSS.	• Reinforcement of the existing 33/11kV transformers to 30MVA units will provide sufficient capacity until beyond 2050 under all four DFES scenarios based on current projections.
8	Wycombe Marsh 33/11kV transformers.	2039	2039	2041	2048	N-1: Loss of either 33/11kV transformer at Wycombe Marsh PSS.	• Reinforcement of the existing 33/11kV transformers to 20/40MVA rated units will provide more than sufficient capacity at Wycombe Marsh until beyond 2050. This will enable load transfers through the HV network from Bowerdean in the late 2040s, meaning the option proposed in **ID 3** is suitable when considering 2050 projected demands.
9	Loudwater to Well End 33kV circuits.	2045	2046	-	2049	N-1: Loss of either 33kV circuit from Loudwater to Well End PSS.	• The underground cable section of these 33kV circuits is initially the limiting factor. Reinforcement of 3km of dual 33kV underground cable to match the rating of the existing overhead line section would be sufficient to match the rating of the transformers proposed under **ID 7**.

Table 3 Summary of system needs identified in this strategy through to 2050 along with indicative solutions.

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

Our HV/LV spatial plans have shown that there is no clear pattern to future demands on these lower voltage networks. We are therefore planning on a forecast volume basis, and this section provides further context on this work for both the Amersham GSP high voltage and low voltage network needs to 2050.

8.3.1. High Voltage Networks

HV Capacity needs

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.[10]

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 with the DFES to highlight the projected impact of LCTs on the network.

For the 4 primary substations supplied by Amersham 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 13 demonstrates how this percentage changes under each DFES scenario from now to 2050 where it is projected that without intervention, 56% of secondary transformers will be overloaded under the HT scenario by 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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10 SSEN Open Data Portal, 2023, SSEN Secondary Transformer – Asset Capacity and Low Carbon Technology Growth.

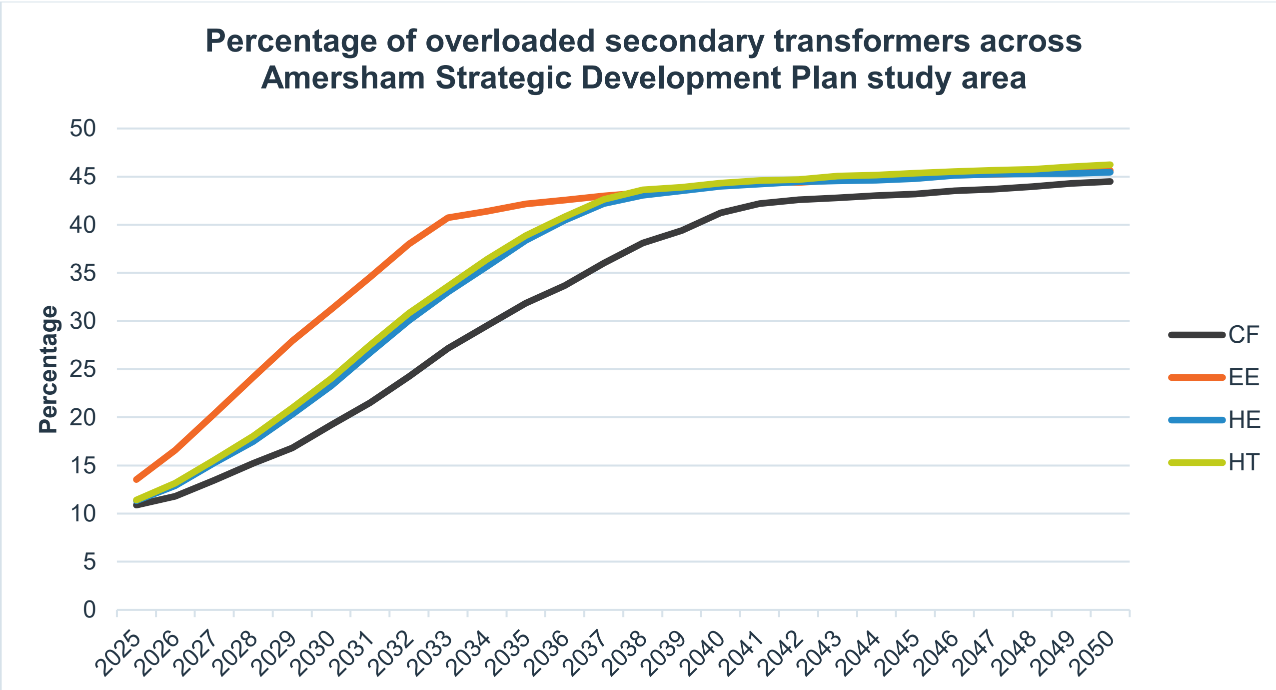

Figure 13 Amersham GSP Projected secondary transformer loading. *Source: SSEN Load Model*

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.[11] This work groups LSOAs[12] 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 4.

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.
2 – High	Driven up by larger household sizes, reduced by lower elderly population levels.

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

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

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 4 VFES Groupings

As shown in Figure 14, there are a few Lower-layer Super Output Areas (LSOAs) that are class 1, meaning they have been identified as very high vulnerability. These are located in High Wycombe, just east of the town centre. From using the load model, we can identify secondary transformers that are projected to be over 100% loaded by 2028. Some of these are also identified as being located within the areas classed as highly vulnerable. These secondary transformers should be prioritised for load related reinforcement as it will reduce the likelihood of asset failure for load reasons and increase network resilience in these areas.

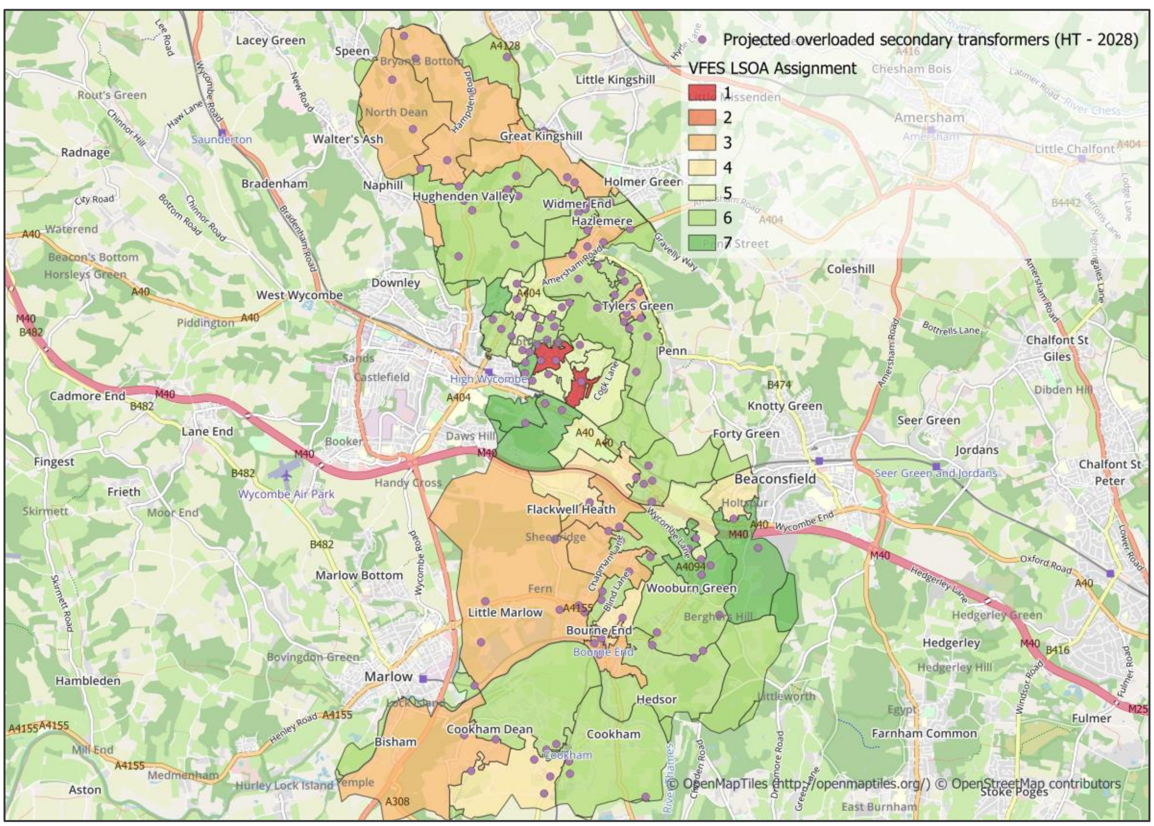

Figure 14 Amersham GSP VFES heat map with overloaded secondary transformers.

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.

Capacity driven needs – Thermal constraints tend to materialise in the sections of cable leading to the substation (transformer) where multiple customer loads join together. We are modelling requirements out to 2050 leveraging low voltage monitoring and metering equipment combined with analytical techniques. This will demonstrate how the magnitude of the system need of the LV network across Amersham changes across scenarios and years out to 2050.

Voltage driven needs – Generally, connection of Low Carbon Technologies and large loads such as heat pumps is limited by voltage constraints before thermal constraints when located more than around 150m from the local secondary transformer. Increased loading on our low voltage networks can reduce the voltages to consumer premises. This is a non-liner relationship and as such requires more complex analysis. We are currently undertaking analysis to better understand the extent of this future need.

Initial analysis indicates that across Amersham GSP 28% of low voltage feeders may need intervention by 2035 and 38% by 2050 under the HT scenario as shown in Figure 15. 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.

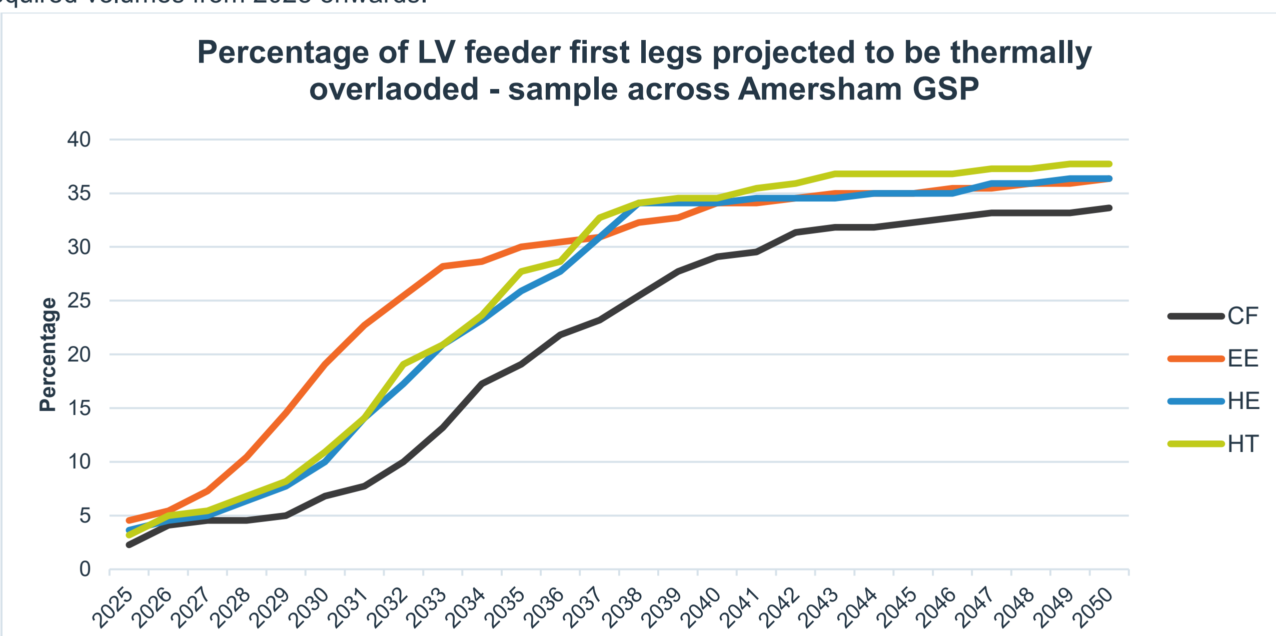

Figure 15 Percentage of LV feeders projected to be overloaded under Amersham GSP

9. RECOMMENDATIONS

The review of stakeholder engagement and the SSEN 2024 DFES analysis provides a robust evidence base for load growth across Amersham GSP group in both the near and longer term. Drivers for load growth across Amersham GSP arise from multiple sectors and technologies. These drivers impact not only the EHV network but will drive system needs across all voltage levels.

The findings from this report have provided evidence for 2 key recommendations:

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 2035:
    a. Loudwater 132/33kV transformers
    b. Loudwater to Wycombe Marsh 33kV circuits (1 and 2)
    c. Bowerdean 33/11kV transformers
    d. Wycombe Marsh to Bowerdean 33kV circuits

    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. Continued engagement with NGET to understand the future build of the transmission network in the area. Further development of Amersham GSP or development of a new transmission connection node in the area will impact the distribution options presented here.

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 EHV/HV spatial plans for other DFES scenarios

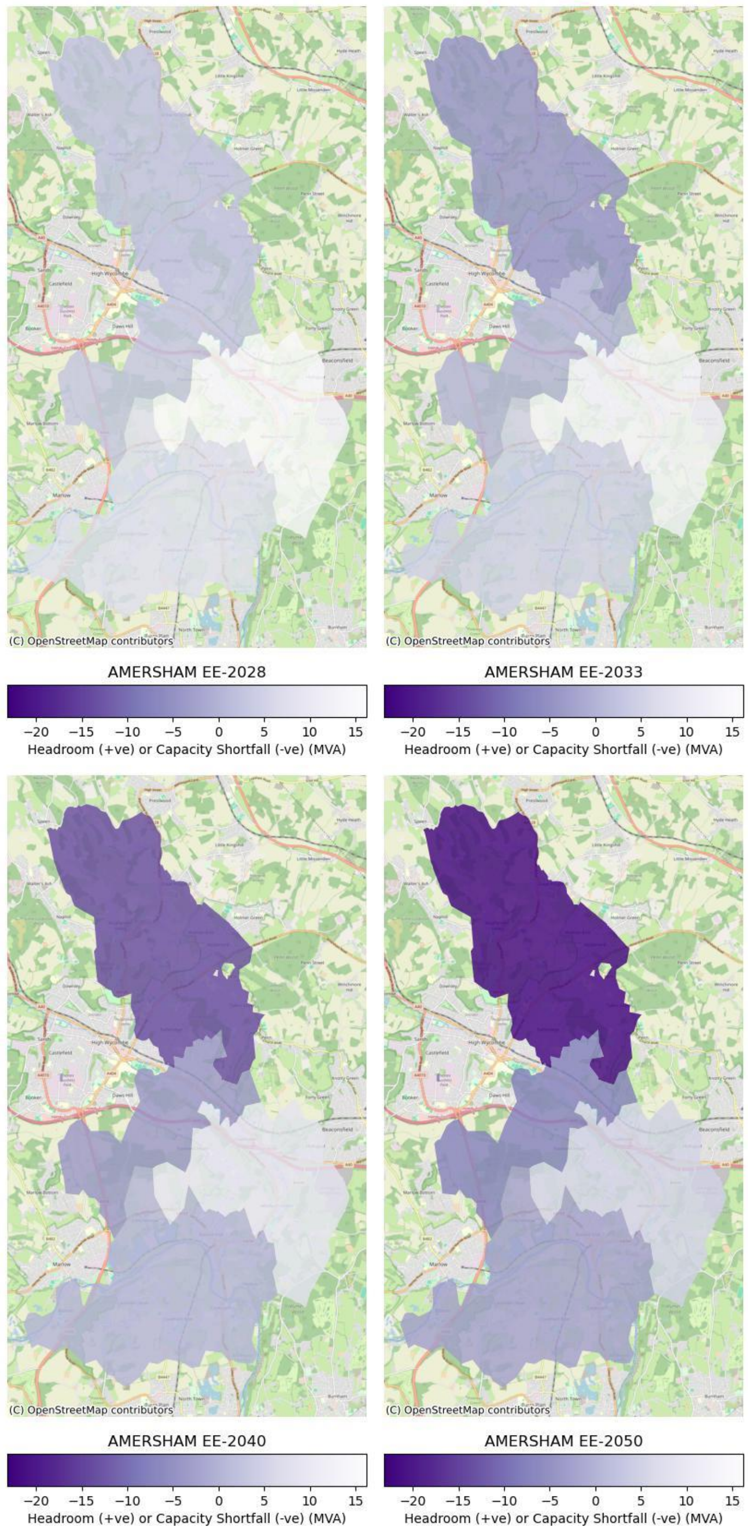

Figure 16 Amersham GSP - EHV/HV Spatial Plan - Electric Engagement

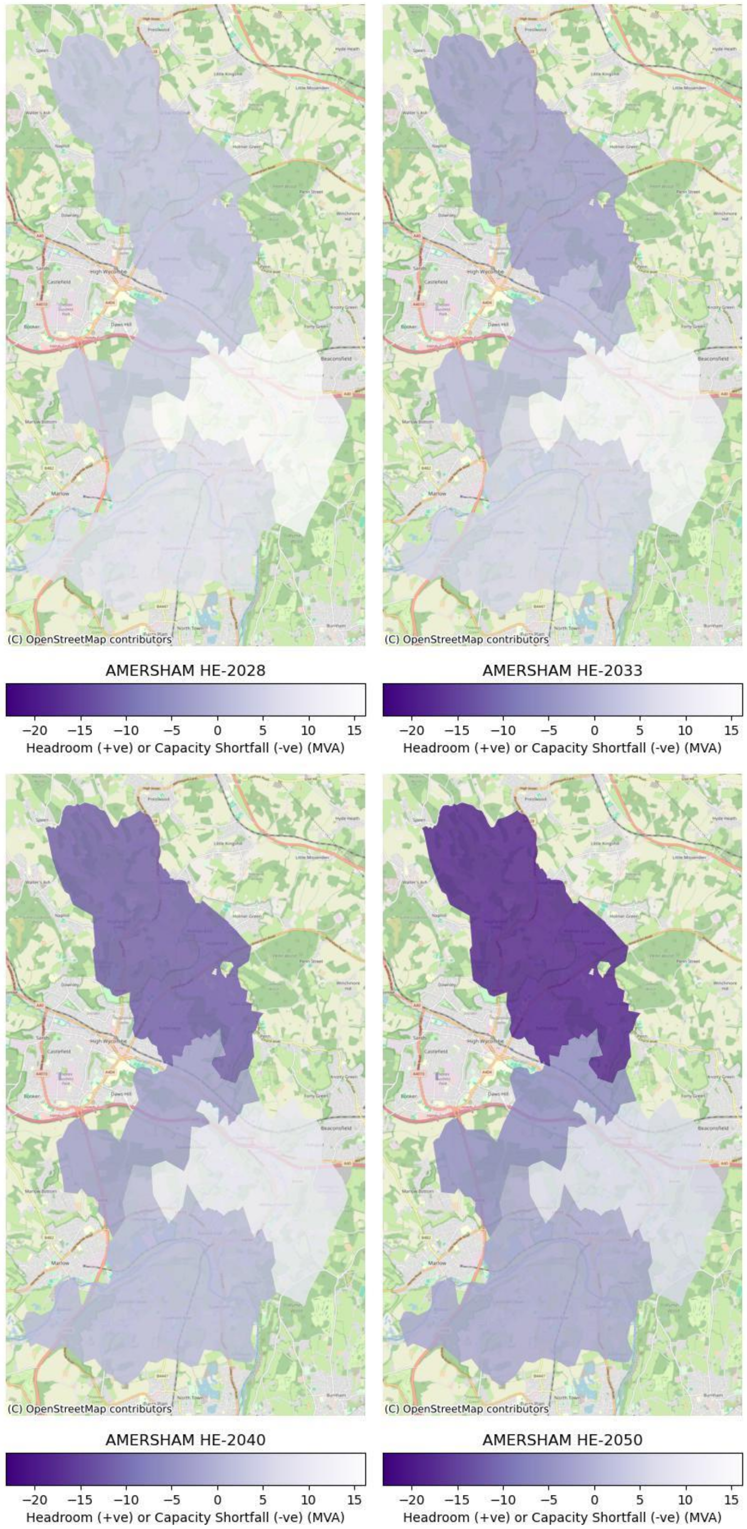

Figure 17 Amersham GSP - EHV/HV Spatial Plan – Hydrogen Evolution

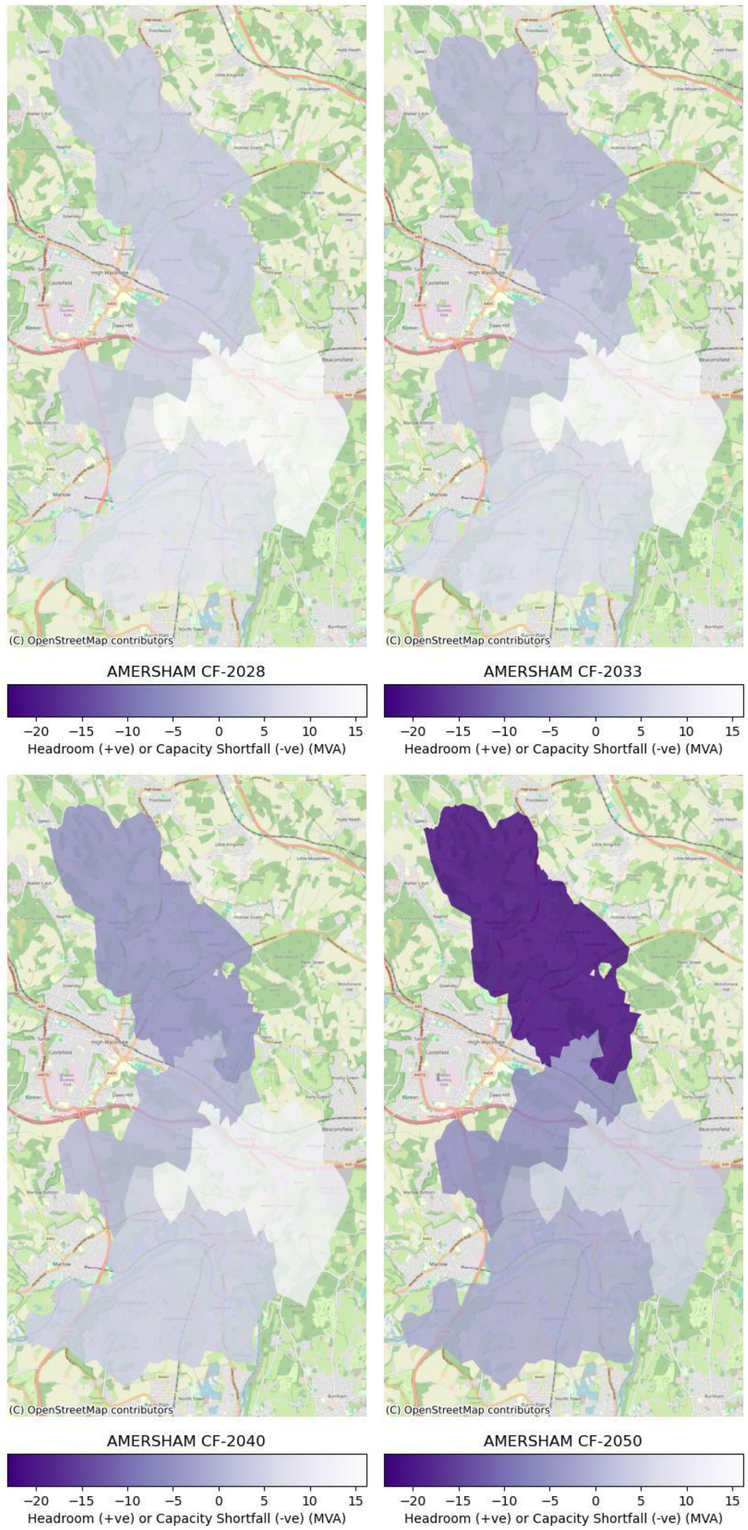

Figure 18 Amersham GSP - EHV/HV Spatial Plan – Counterfactual

Appendix B HV/LV spatial plans for other DFES scenarios

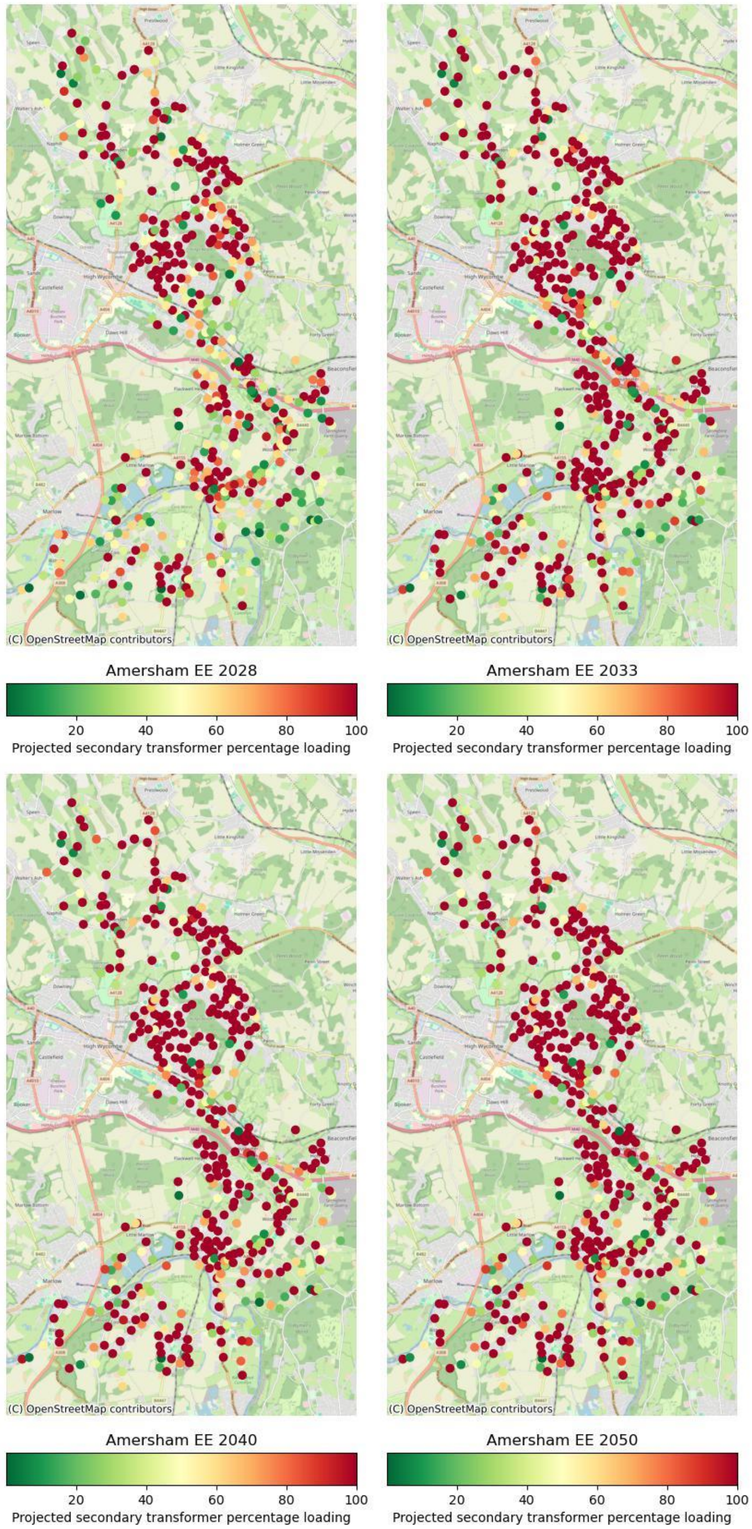

Figure 19 Amersham GSP - HV/LV Spatial Plan – Electric Engagement

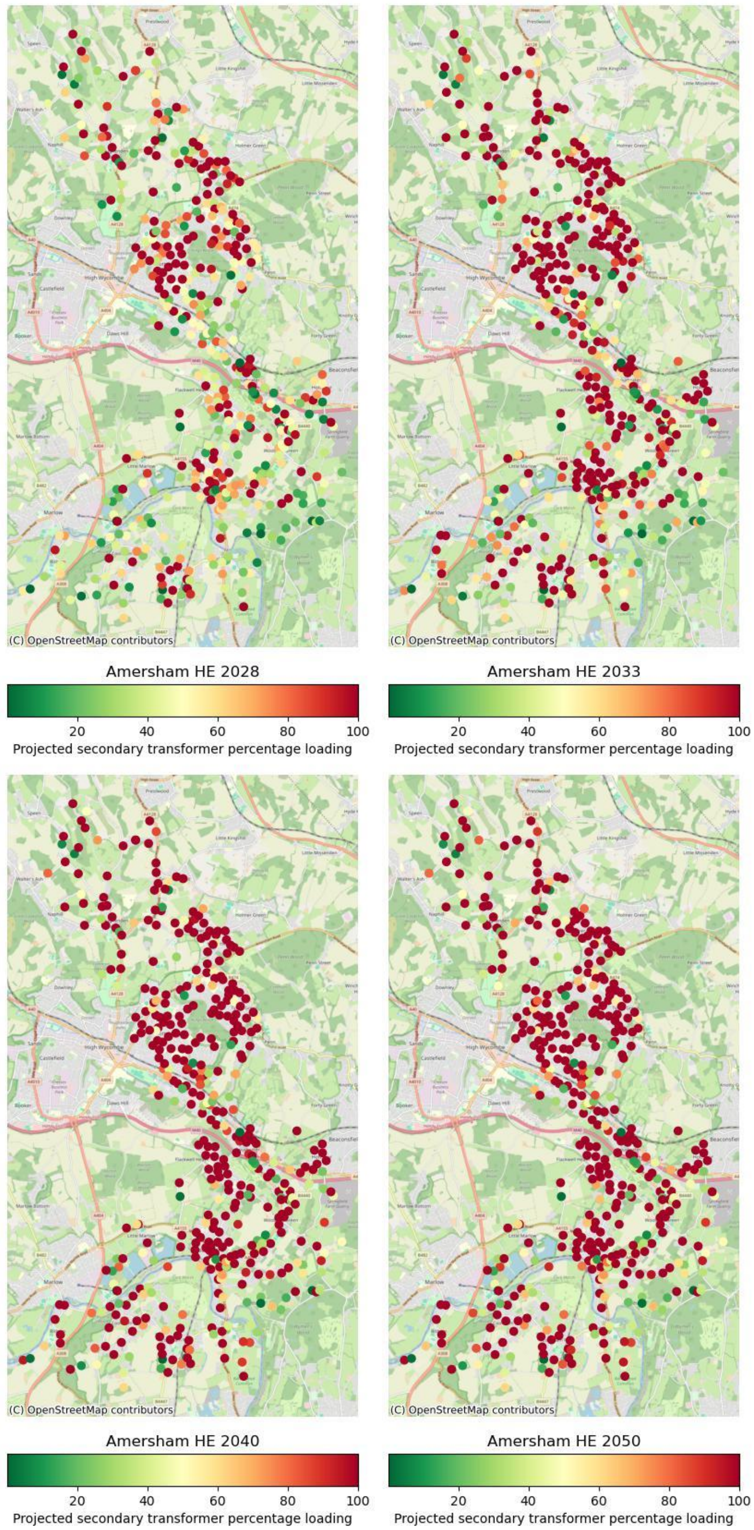

Figure 20 Amersham GSP - HV/LV Spatial Plan – Hydrogen Evolution

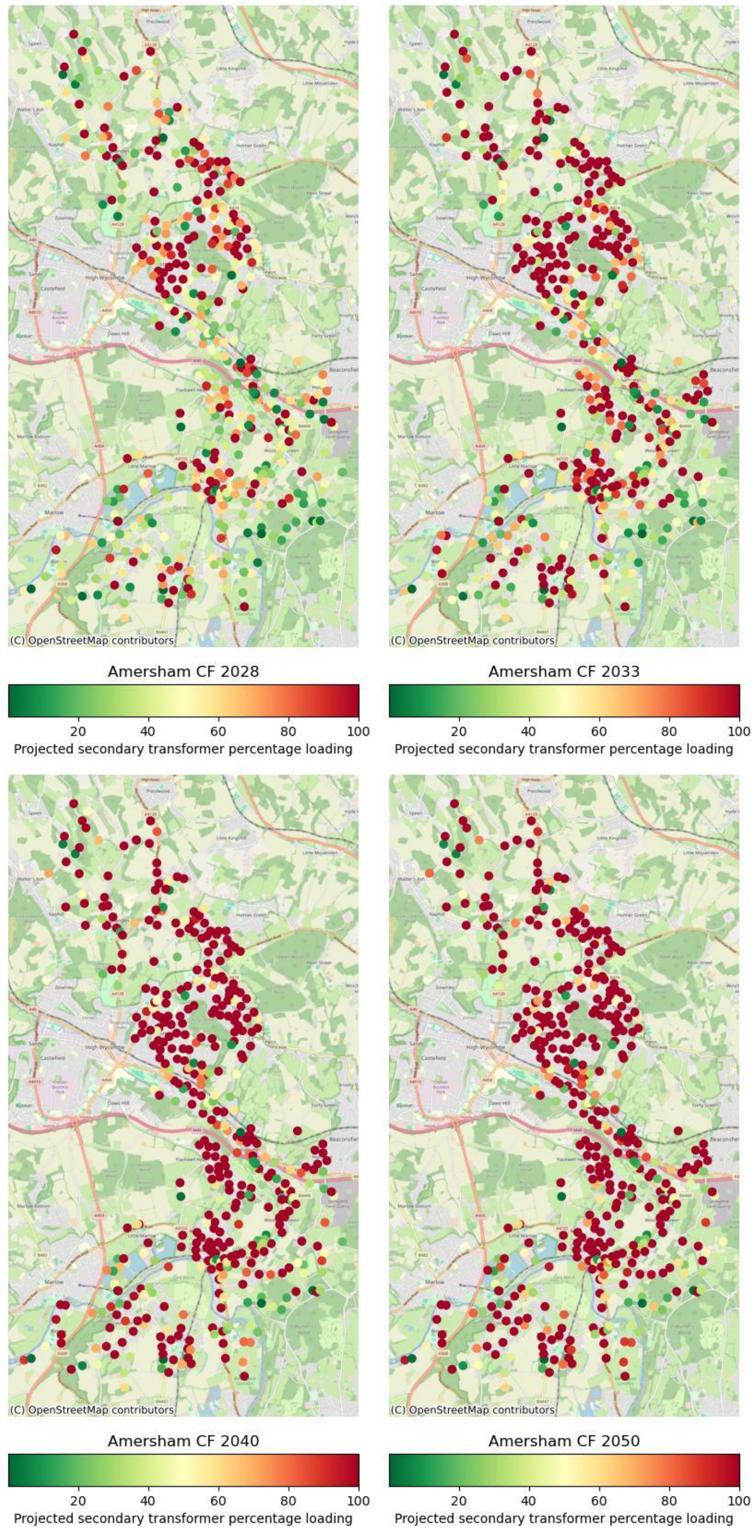

Figure 21 Amersham GSP - HV/LV Spatial Plan – Counterfactual

Appendix C Glossary

Acronym	Definition
AIS	Air Insulated Switchgear
ANM	Active Network Management
BAU	Business as Usual
BSP	Bulk Supply Point
CB	Circuit Breaker
CBA	Cost Benefit Analysis
CER	Consumer Energy Resources
CF	Counterfactual
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
EE	Electric Engagement
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
HE	Hydrogen Evolution
HT	Holistic Transition
HV	High Voltage
kV	Kilovolt
LAEP	Local Area Energy Planning
LCT	Low Carbon Technology
LENZA	Local Energy Net Zero Accelerator
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-ED1/2	Revenue = Incentives + Innovation + Outputs, Electricity Distribution 1 / 2 (regulatory price control periods)
SDP	Strategic Development Plan
SEPD	Southern Electric Power Distribution
SLC	Standard Licence Condition
SSEN	Scottish and Southern Electricity Networks
ST	System Transformation
UM	Uncertainty mechanism
VFES	Vulnerability Future Energy Scenarios

WSC	Worst Served Customers

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Scottish & Southern Electricity Networks