

West London Electrical Capacity Constraints

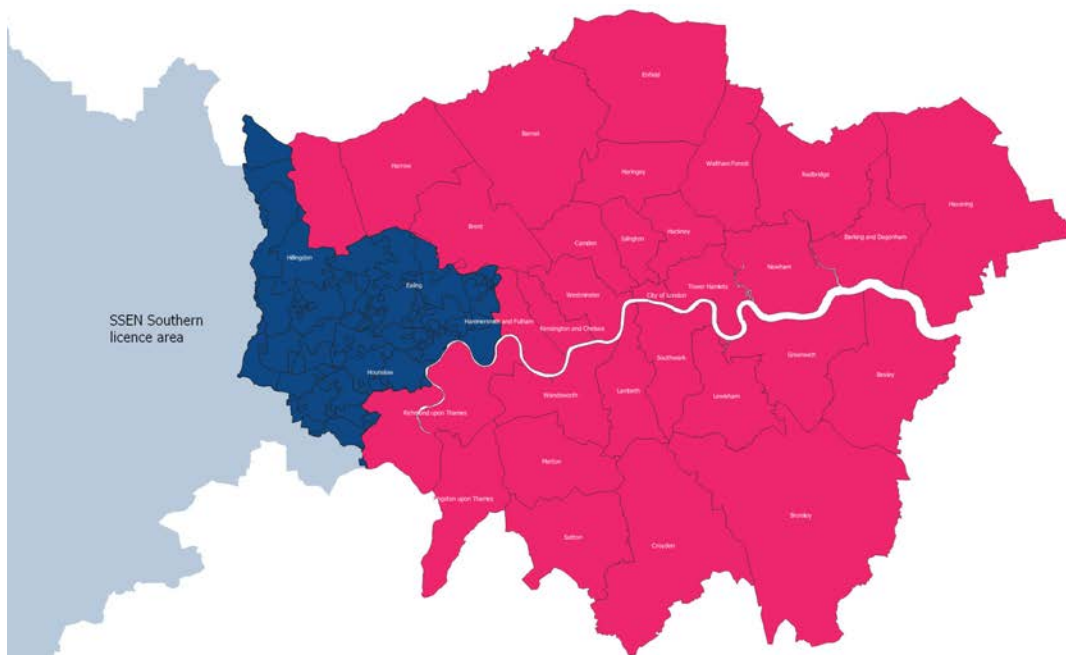
Background

Scottish and Southern Electricity Networks (SSEN) own and operate the electricity distribution network that transports electricity via wires and cables to homes, businesses, and the community across the West London boroughs of Ealing, Hillingdon, and Hounslow (highlighted in blue). This network forms part of a wider regional network that extends west outside of London.

SSEN's network is connected to the National Electricity Transmission System (NETS) owned by National Grid Electricity Transmission (NGET) and operated by National Grid Electricity System Operator (NGESO). Electricity substations managed by NGET (known as Grid Supply Points) convert the high voltage electricity transported along the transmission network to lower levels so that it can be distributed to homes and businesses safely and reliably by Distribution Network Operators (DNO) such as SSEN.

Most homes and businesses in London receive their electricity supply via connections to electricity distribution networks. This includes housing developments, commercial premises, and industrial activities. Increasingly, distribution networks are servicing new demands for electricity including electric vehicles, electrified heating, and data centres. Small-scale generation is also connected to distribution networks, including solar PV arrays and batteries.

Recently, there has been a rapid influx of requests for new electricity connections throughout West London from data centre operators who have sought to co-locate adjacent to fibre optic cables that pass through the region along the M4 corridor, and then crossing the Atlantic. Data centres use large quantities of electricity, the equivalent of towns or small cities, to power servers and ensure resilience in service.



The scale of electricity demanded by these data centres has created capacity constraints on both the distribution and transmission networks in the region, absorbing remaining electricity capacity in SSEN's West London region for the remainder of the decade.

The GLA has been notified that major new applicants to the distribution network (over circa 1MVA), including housing developments, commercial premises and

industrial activities will have to wait several years to receive new electricity connections. However smaller scale connections may still proceed, including developments less than 25 residential units, electric vehicle charge points, or heat pump installations, verified on a case-by-case basis.

SSEN and NGET are investigating potential solutions to resolve this issue.

West London Electricity Capacity Mapping (National Grid & SSEN)

The GLA Infrastructure Coordination Service has worked with NGET and SSEN to produce two maps showing a snapshot of current network capacity (June 2022), which are to be read alongside each other.

The NGET map shows the NGET assets that are 'upstream' of SSEN's network in West London. The NGET substations (and associated Grid Supply Point areas) have been colour-coded based on current headroom availability, following a meeting with NGET at which the current levels of headroom, planned reinforcements and constraints within each GSP were discussed, as well as GSP interconnectivity (see annotations within Appendix 2).

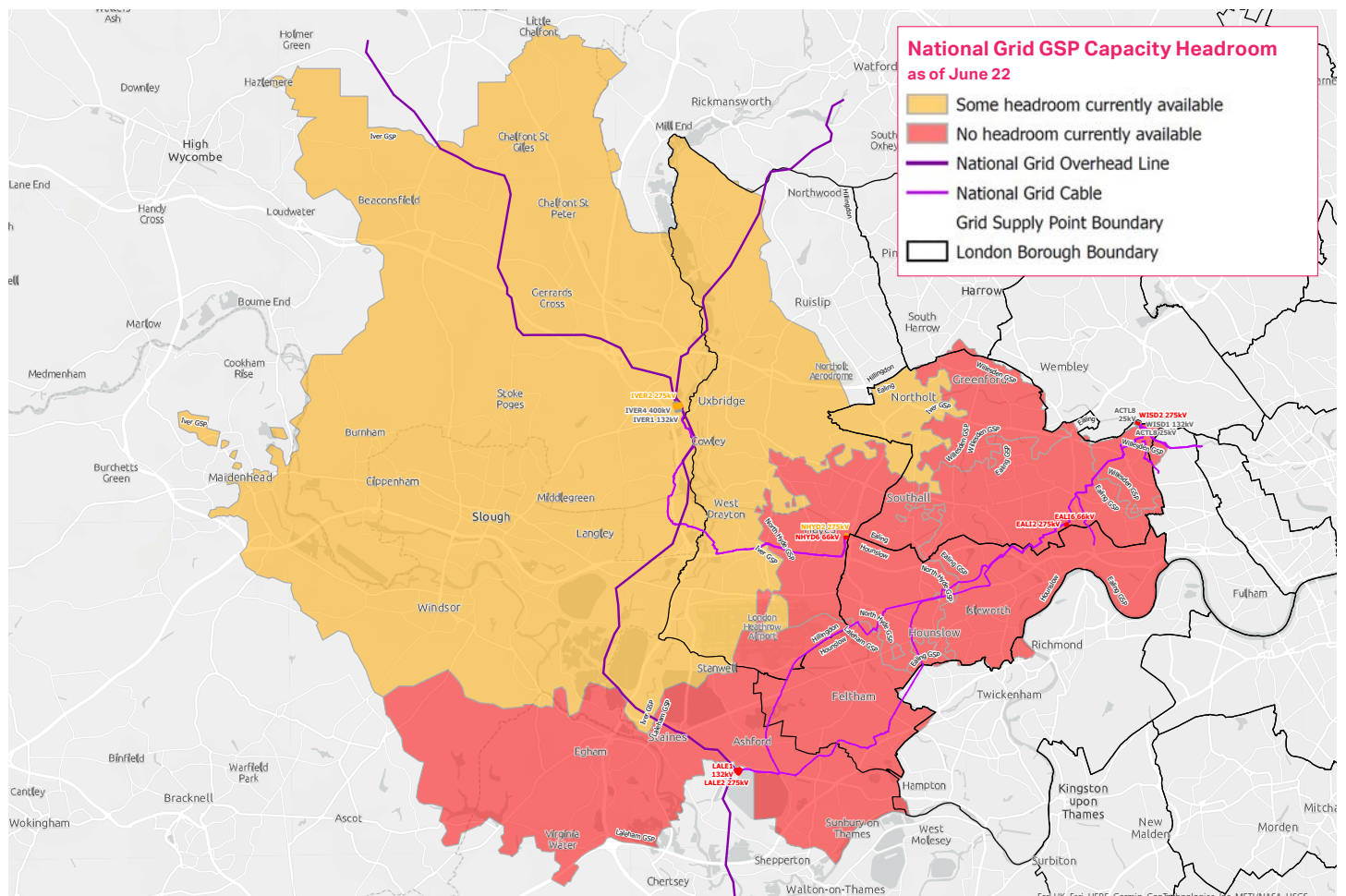
The SSEN map shows peak demand as a percentage of total rated capacity of primary substations throughout SSEN's network in West London. The polygons represent the areas served by primary substations. These in turn are fed by key NGET substations (known as Grid Supply Points mentioned above).

Current constraints are most acute in the London boroughs of Ealing and Hounslow; however, these constraints will change over time as further new connections are made to the network, Releasing this capacity is contingent on both upgrades to SSEN's network and 'upstream' National Grid assets.

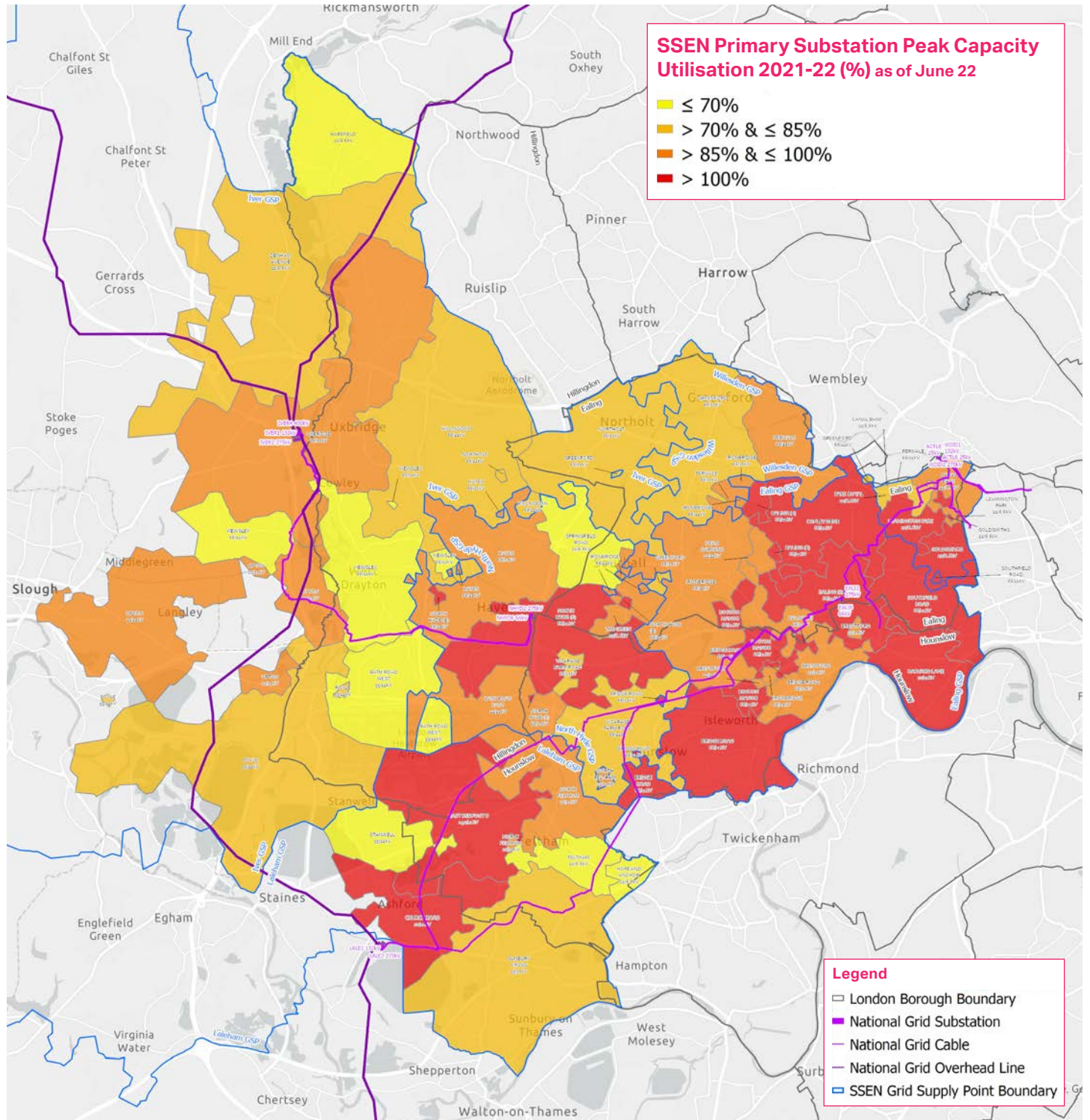
A detailed breakdown of the current capacity loading of these West London primary substation polygons, and NGET GSPs is attached in Appendix 1. An annotated version of these maps, with information collated is attached in Appendix 2.

The GLA is working with SSEN and National Grid to create additional maps that show how this capacity will change over time based on current forecasts of demand and future network upgrades.

West London Electricity Capacity Mapping (National Grid)



West London Electricity Capacity Mapping (SSEN)



Maximum demand and firm capacity data derived from SSEN "Demand Heat Map Update" spreadsheet June 2022

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What does this mean?

The GLA understands that recent applicants to the SSEN distribution network are receiving quotes, setting out that there is currently not sufficient electrical capacity for a new connection, for several years (most recently, up to 2035).

SSEN and NGET will upgrade their networks to support the increased electricity demanded in the region in order to accommodate new connections requests for other uses, including housing and commercial developments, and cumulative impacts of low carbon technologies such as heat pumps and electric vehicles. Additional connections may also be provided to more data centres, dependent on their positioning in connections queues.

Upgrades to the distribution and transmission networks will, however, take many years to complete, due to project complexity, planning horizons and technical feasibility (linked to the voltage of the upgrades, and the need to plan outages). Most of the upgrades are focused on the transmission network, including NGET substations such as Iver, Willesden, Laleham and North Hyde. SSEN will programme its distribution network upgrades to coincide with upgrades on the transmission network.

Going Forward

Having been alerted to the West London Capacity constraints by housing developers, the GLA are coordinating between SSEN, NGET, National Grid Electricity System Operator (NGESO), Ofgem, UK Power Networks (UKPN), affected London boroughs, data centres and developers.

In the short-term, our collective aim is to help find innovative solutions to mitigate the immediate constraints, unblocking developments that may otherwise be delayed or stopped in their entirety, whilst ensuring that economic development is not adversely affected.

SSEN and NGET are exploring options to maximise opportunities for new connections over the next decade whilst constraints are being addressed. Options being explored include:

There are no current contractual constraints at Ealing GSP, therefore, no wider works are currently being triggered. This means there is available capacity to enable new connections. SSEN are currently reviewing the future load growth around Ealing GSP through their Distribution Future Energy Scenarios to understand when available capacity may be exceeded. As part of this review, they may consider applying for additional capacity through a Modification Application to meet forecasted demand requirements.

SSEN operates a queuing system for new connections, with connections prioritised based on placement in the queue on a first come, first serve basis. This is an established regulatory process, as aligned to DNO Licence Conditions that are set by Ofgem. Developers are strongly encouraged to contact SSEN early in their planning processes to understand the implications of the constraints and reserve their place in the queue to ensure the earliest possible connection date. NGESO also operates a similar queuing system for new transmission connections.

- **Improved queue management (reviewing customer connection needs, contractual agreements and assessing existing available capacity to enable connections)**
- **Better understanding the phased electrical requirements of already contracted parties**
- **Measures to incentivise more even spread of electricity demand throughout the day, through active demand management or flexibility contracts**
- **Investigating options to review regulatory rules to potentially enable additional connections in contractually constrained areas**

The GLA has engaged with UKPN which operates the distribution network that borders SSEN's West London network (highlighted in pink). The GLA understands that this network is not subject to the same levels of constraint, and could provide opportunities for connections via this distribution network to be facilitated subject to feasibility. It is worth noting that such connections will be more expensive and disruptive given longer distances to install cables to connect.

Next Steps

We understand that many parties have applied to SSEN to receive a quote for electricity in the coming years. The responses to these requests have in majority reflected the timelines set out in this document. Whilst these quotes are logged by SSEN, until they are 'accepted' by the applicant, they are not considered in the queuing process and allowed for in the asset upgrade plans. We appreciate that 'accepting' quotes incur a financial cost and lengthy timescale that may not align with project ambitions (design, construction & commercials).

Contact

If you have any immediate questions please contact:

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Appendices

Appendix 1: Detailed electrical capacity data breakdown for all of SSEN's West London Electricity Supply Points and NGEN's West London Grid Supply points.

Appendix 2: Locations refer to the detailed map, which is a snapshot representation of the current capacity constraints, as of June 2022, incorporating both SSEN & NG information.

Appendix 3: Excel questionnaire, attached to email

We are also advocating for medium & long-term solutions to ensure investment in London's electricity capacity can be proactively managed, not only for new development but also to meet the Mayor's Net Zero targets.

More broadly, the GLA is undertaking a number of initiatives to improve energy planning throughout the region, including developing a subregional scale Local Area Energy Plan for West London to better forecast future energy demands, and create conditions for the establishment of a flexibility market that could better balance demand and supply across the region in the interim.

To gather a clearer understanding of the potential impact, SSEN together with the GLA have produced the attached excel questionnaire which requests outline information on project size, timeline, and electrical requirements as well as further detailed information.

We are asking that this document be circulated amongst your teams and anyone who you believe may be affected, at all stages of the project process – we ask that the document be filled out to the best of your (your teams') knowledge, with as much detail as possible, and issued to the GLA for collation by 05/08/22.

Please forward your filled out excel forms to:

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Appendix 1: West London Electricity Capacity Data (National Grid & SSEN)

Grid Supply Point	Primary Substation	SSEN Nameplate rating (MVA) - (total available capacity - allowing for safety buffer)	SSEN Maximum load (MVA) - (maximum usage that has been reached)	GLA Calc - Peak capacity utilisation 2021-22 (%) (percentage usage)	SSEN Comments on Applications to National Grid	Total Capacity Post Reinforcement
Ealing	Bridge Road	60.0	56.5	94.2	N/A	N/A
	Copley Dene	37.5	36.3	96.8	N/A	N/A
	Brentford	31.8	31.7	99.7	N/A	N/A
	Dean Gardens	6.0	5.2	86.7	N/A	N/A
	Harvard lane	25	25.4	101.6	N/A	N/A
	Ealing (E)	40.0	44.7	111.8	N/A	N/A
	Ironbridge	40	36.7	91.8	N/A	N/A
	Southfield Road	40.0	47.2	118.0	N/A	N/A
	Boston Manor	40	40.2	100.5	N/A	N/A

Grid Supply Point	Primary Substation	SSEN Nameplate rating (MVA) - (total available capacity - allowing for safety buffer)	SSEN Maximum load (MVA) - (maximum usage that has been reached)	GLA Calc - Peak capacity utilisation 2021-22 (%) (percentage usage)	SSEN Comments on Applications to National Grid	Total Capacity Post Reinforcement
Iver 66kV	National Grid Supply Point	-	-	-	80MVA upgrade recently accepted. Timeline TBC	275MVA
	Hillingdon	40	31.17410648	77.9	Upstream cable limitation. Timeline TBC	66MVA
	Northolt	38.0	26.7	70.2	Modification Application in progress. Timeline TBC	66MVA
	Uxbridge	56	50.47766423	90.1	Modification Application in progress. Timeline TBC	66MVA
	Yiewsley	60.0	38.1	63.5	Contracted for 2024/2025	57MVA
Iver 132kV	National Grid Supply Point				Larger transformers on order, first scheduled for delivery in 2024 and operation in 2026.	400MVA
Laleham	National Grid Supply Point	-	-	-	Capacity issues at transformers, zero headroom available - November 2028	TBC
	Church Road	12.5	14.1	112.8	Modification Application in progress. Timeline TBC	TBC
	Feltham	25	10.8	43.2	Modification Application in progress. Timeline TBC	TBC
	Hope and Anchor	7.0	2.8	40.0	Modification Application in progress. Timeline TBC	TBC
	North Feltham	23	22.8	99.1	Modification Application in progress. Timeline TBC	TBC
	Sungard	24.0	8.0	33.3	Modification Application in progress. Timeline TBC	TBC
	East Bedfont (B)	20	43.1	215.5	Modification Application in progress. Timeline TBC	132MVA

Grid Supply Point	Primary Substation	SSEN Nameplate rating (MVA) - (total available capacity - allowing for safety buffer)	SSEN Maximum load (MVA) - (maximum usage that has been reached)	GLA Calc - Peak capacity utilisation 2021-22 (%) (percentage usage)	SSEN Comments on Applications to National Grid	Total Capacity Post Reinforcement
North Hyde	National Grid Supply Point	-	-	-	80MVA recently accepted. Remainder TBC 2030	TBC
	Springfield Road	27.4	16.2	59.0	Modification Application in progress. Timeline TBC	22MVA
	The Green	12	10.68871003	89.1	Modification Application in progress. Timeline TBC	22MVA
	Bath Road East	13.0	12.3	94.7	Modification Application in progress. Timeline TBC	22MVA
	North Hyde E	76	80.7	106.2	Modification Application in progress. Timeline TBC	22MVA
	Hayes	60.0	51.7	86.2	Modification Application in progress. Timeline TBC	22MVA
	Vicarage Farm Road	38	28.93337925	76.1	Modification Application in progress. Timeline TBC	66MVA

Grid Supply Point	Primary Substation	SSEN Nameplate rating (MVA) - (total available capacity - allowing for safety buffer)	SSEN Maximum load (MVA) - (maximum usage that has been reached)	GLA Calc - Peak capacity utilisation 2021-22 (%) (percentage usage)	SSEN Comments on Applications to National Grid	Total Capacity Post Reinforcement
Willesden	Canal Bank 6.6kV	14.9	9.1	61.1	To be made redundant and superseded by CANB 11kV (Feb '24)	
	Goldsmiths	11.5	12.2	106.1	Modification Application in progress. Timeline TBC	TBC
	Leamington Park	10.0	14.6	146.0	Modification Application in progress. Timeline TBC	TBC
	Park Royal	11.5	9.3	80.9	Modification Application in progress. Timeline TBC	TBC
	Greenford	60.0	50.8	84.7	Modification Application in progress. Timeline TBC	TBC
	Perivale	40	36.2	90.5	Modification Application in progress. Timeline TBC	TBC
	Canal bank 11kV	60.0	56.1	93.5	Modification Application in progress. Timeline TBC	TBC
	Volt Avenue	no data	no data	n/a	Modification Application in progress. Timeline TBC	TBC
	Wesley Avenue	no data	no data	n/a	TBC	TBC

Appendix 2 - National Grid & SSEN Capacity, West London

Iver 275/132kV & 275/66kV

NG comments:

275/132kV - Larger transformers on order, first scheduled for delivery in 2024 and operation in 2026.

275/66kV - no issues currently, headroom available. There are no local works that affect Iver 66kV at the moment. However, there is a pending Modification Application from SSEN for additional capacity that is being processed.

The new "Iver B" will be 400/132kV and will be in operation in 2026.

SSEN comments:

275/66kV - No available headroom, pending Modification Application with National Grid to increase FCO and SCO capacity. Timescale TBC by National Grid.

Cable limitation upstream of Hillingdon 66/11kV.

North Hyde 275/66kV

NG comments:

Radial spur - downstream from Iver. New data centre connection in late summer/early autumn 2022 - starting at 30MW and ramping up to 150MW as the need develops.






Existing two cables will need uprating - project now confirmed, due for completion in 2027.

Further works needed to rebuild the 66kV substation and indicative timescale is 2033.

SSEN comments:

No available headroom, Pending Modification Application with National Grid to increase FCO and SCO capacity. Timescale TBC by National Grid - Indicative 2030.

Legend

-  National Grid Overhead Line
-  National Grid Cable
-  National Grid Substation
-  SSEN Grid Supply Point Boundary
-  London Borough Boundary

SSEN Primary Substation Peak Capacity Utilisation 2021-22 (%)

-  ≤ 70%
-  > 70% & ≤ 85%
-  > 85% & ≤ 100%
-  > 100%

Willesden 275/66kV

NG comments:

No headroom available in immediate future. Will see an increase by 2026/27. Constraints are localised at transformers currently, rather than cables. Reinforcement works on 66kV substation for data centres.

SSEN comments:

Mod App made for Customer Connection, headroom to be confirmed by NG. Known physical constraint, National grid to resolve. Timeframe TBC by National Grid.

Meshed circuits causing constraint at Greenford 66/11kV.

Ealing 275/66kV

NG comments:

Ealing will have SGT constraints and therefore will need larger transformers in order to deliver additional capacity. Project and timescales not confirmed yet.

SSEN comments:

There are no current contractual constraints at Ealing GSP, therefore, no wider works are currently being triggered. This means there is available capacity to enable new connections.

Laleham 275/132kV

NG comments: Capacity issues at transformers, zero headroom available - October 2029 is the latest date for recent connection offers. All four transformers to be replaced in next 7/8 years.

Space limitations, little room to expand at substation - constraints at site include quarry, lake and marshland surrounding site.

Upstream reinforcements from GSP - overhead lines.

SSEN comments:

No available headroom, Recent Mod App for 200MVA. Awaiting National Grid response.

Subject to upstream constraint.