NOA Stability Pathfinder Phase 3

Regions of Need and Network Diagram Details

Note: This document should be used in conjunction with the following documents:

- Stability Pathfinder Phase 3 Detailed Site Data Tool with Sizing Guidance
- Stability Phase 3 Connection Approach document
- NGET Connection Feasibility Report

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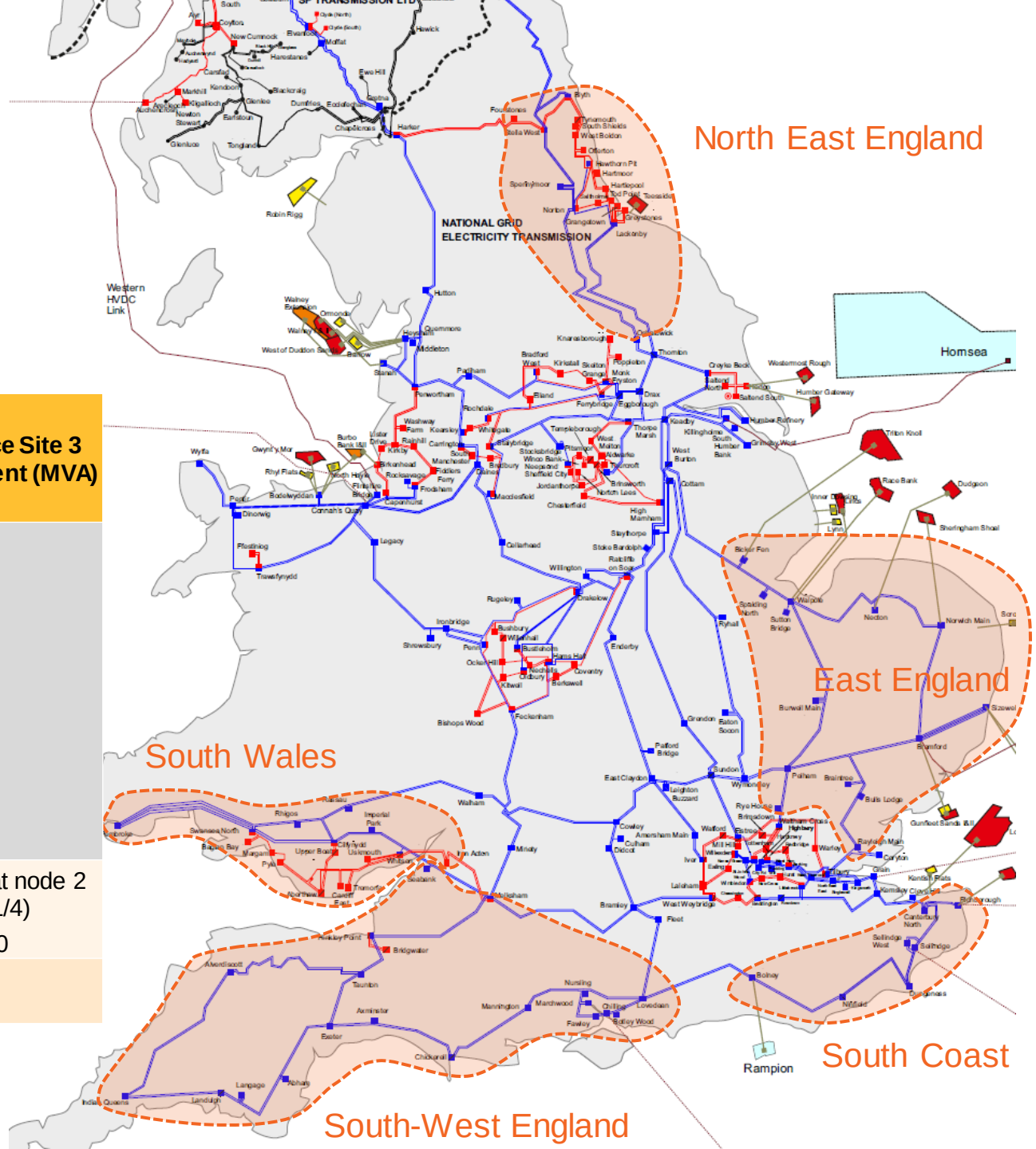
Regions of need overview

The size of the Short Circuit Level (SCL) requirement by each region and reference sites are shown in the table below.

A full list of substations and their respective effectiveness against this (Detailed Site Data Tool with Sizing Guidance document) has also been published with the invitation to tender.

Region	Total (MVA)	Main Reference Site Requirement (MVA)	Reference Site 2 Requirement (MVA)	Reference Site 3 Requirement (MVA)
North-East England	500	Hawthorn Pit 400kV 500		
East of England	2000	Norwich Main 400kV 1500	Bicker Fen 400kV 500	
South Coast	2000	Canterbury 400kV 2000		
South-West England	500	Exeter 400kV 500		
South Wales	2500	Rhigos 400kV 1500	Upper Boat node 1 (MC2/3) 500	Upper Boat node 2 (MC1/4) 500
Total Inertia across these regions	15 GW.s			



Defining the regions of need

The Stability Phase 3 tender defines five 'regions of need', namely: North-East England, East of England, South Coast, South-West England, and South Wales. The reason for defined regions of need, rather than one large region with many reference points, is due to the need for Phase 3 to procure Short Circuit Level (SCL), which is highly locational in nature, with effectiveness dropping sharply as the electrical distance from the reference site increases. NGESO has seen from prior Pathfinders that SCL solutions can also bring a level of inertia at a low additional cost. Using data from prior NGESO experience, the overall ratio of SCL : inertia within the Phase 3 requirement is supportive of being able to meet our wider inertia requirement through the highly locational SCL solutions alone. Therefore, there is no need for NGESO, at this stage, to procure inertia outside of the regions of need.

The requirement for 'regions of need' means NGESO had to create a hard threshold for what substations were inside/outside the region of need. NGESO has decided upon an MVA effectiveness of 35%, relative to the reference site within NGESO's model, being the threshold. Therefore, a substation that demonstrates an MVA effectiveness of ≥35% in relation to the main reference site within a region will be included within a region of need. 35% has been chosen as the threshold because it strikes the balance between limiting the overlap of regions, focusing the tender on the most effective sites and allowing sufficient competition.

Our current models indicate that there is likely going to be additional requirements for stability services beyond the Stability Phase 3 requirement. As such, NGESO will likely be procuring stability services in the future, which the market will have the opportunity to bid for. NGESO is currently working hard on the design of a potential future stability market. This work might spawn future opportunities to bid for stability services, which could emerge as a future Stability Pathfinder or more of a market-based approach. More information on the project is available at https://www.nationalgrideso.com/future-energy/projects/stability-market-design.

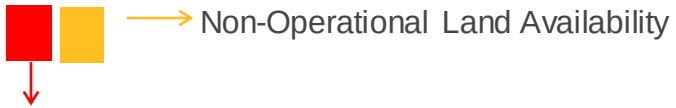
Legend

Prior to publishing the pre-tender consultation, NGESO requested NGET to complete a high-level analysis to confirm which substations within each region of need could accommodate a new connection. This was done through a red-amber-green (RAG) assessment of the availability of connection bay and non-operational land.

RAG definition

RAG	Connections Assessment RAG	Non-Operational land RAG
Red	No existing spare bays and no option to extend due to major interactions with live connection works.	Non-op land identified for other connection works, future requirements or aware of significant planning or environmental constraints
Amber	Option to create spare bay into vacant land and/or interactions with live connection works	Aware of applications that may constrain ability to have non-operational land
Green	Existing spare bays with no prior allocations	No applications for land or cable easement. No significant constraints
Grey	Not Applicable (N/A)	NGET do not own non-operational land

The output of the high-level RAG assessment for each substation considered is illustrated using the following key:



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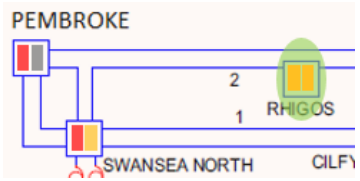

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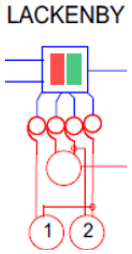

Additional key to help understand details from the geographic and network map

Reference site(s) with the highest SCL effectiveness in targeted region

Site(s) with reserved bays based on the findings of the RAG assessment (refer to Connection Approach document for more details)

Sites which are within the boundary are in scope for the Stability Phase 3 tender based on their effectiveness

Sites close to the boundary but not in scope due to low effectiveness

Tenderers should note that following the high-level RAG analysis, NGET have completed a feasibility study and produced the Connection Feasibility Study Report. This includes details from an Estate Review of the non-operational land, where available, at the substations with reserved bays. Tenderers are encouraged to review this document in conjunction with the NGET Connection Feasibility Review and the Connection Approach document.

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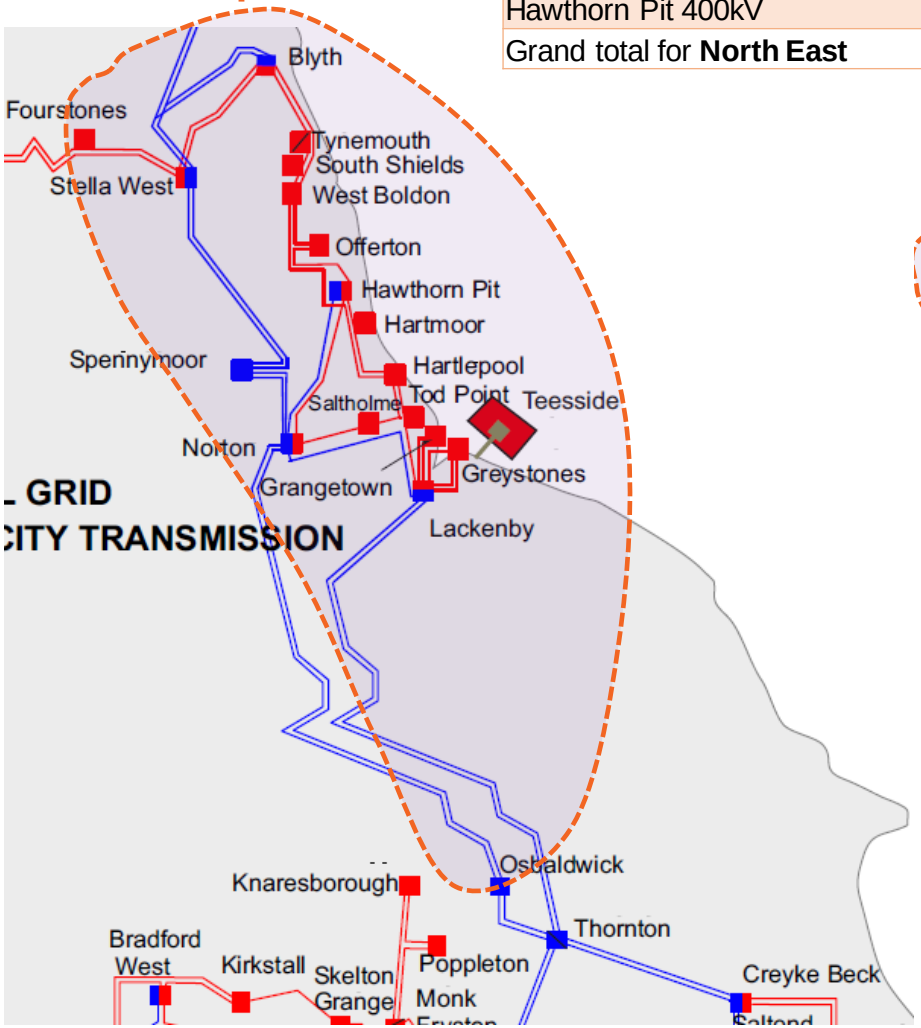
North-East England Region

Reserved site/bay

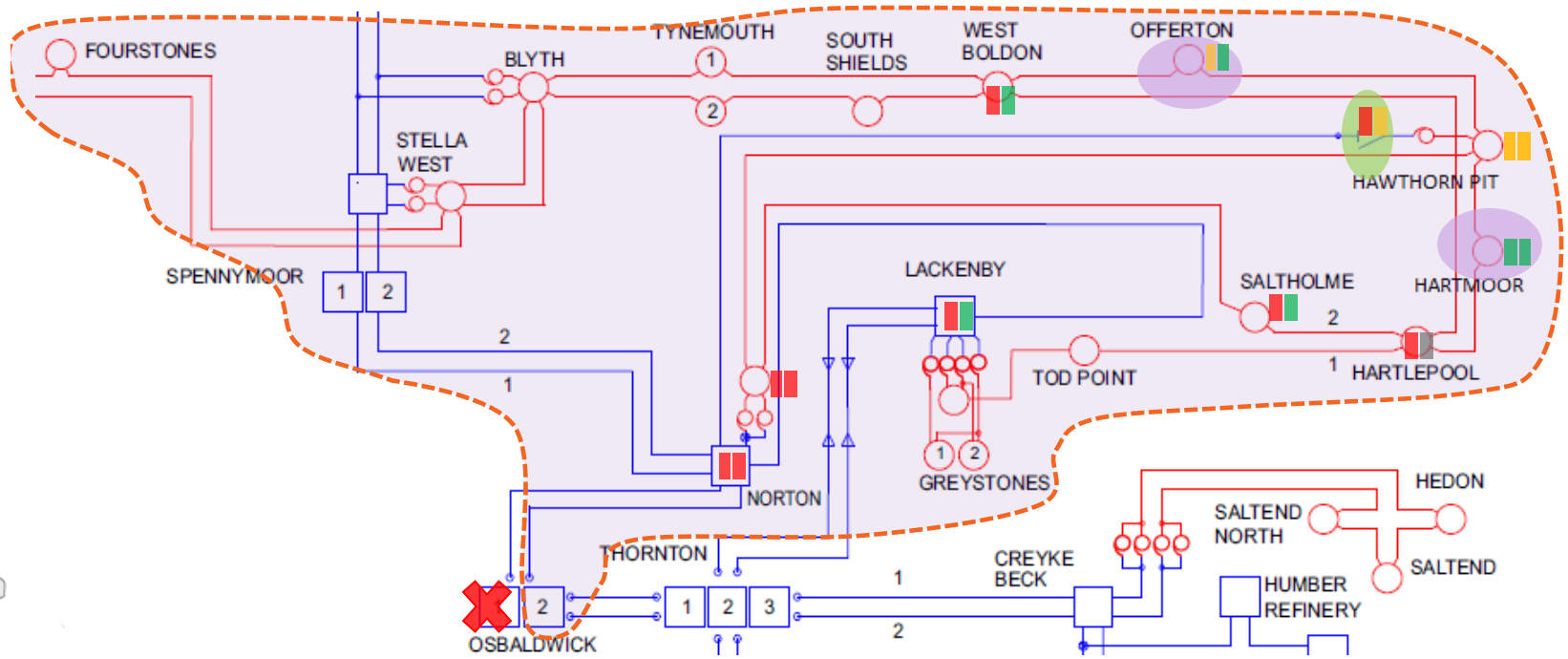
Site	Region	No. of connection points (bays) secured	Assumed SCL (MVA)	Assumed MW	Assumed MVAr
Hartmoor 275kV	North East	2	2x1650	±100 per bay	± 100 per bay
Offerton 275kV	North East	1	1x1675		

Map View

SCL requirement	MVA
Hawthorn Pit 400kV	500
Grand total for **North East**	500



Network View



Note:

- Only Node 2 of Osbaldwick 400kV in the region

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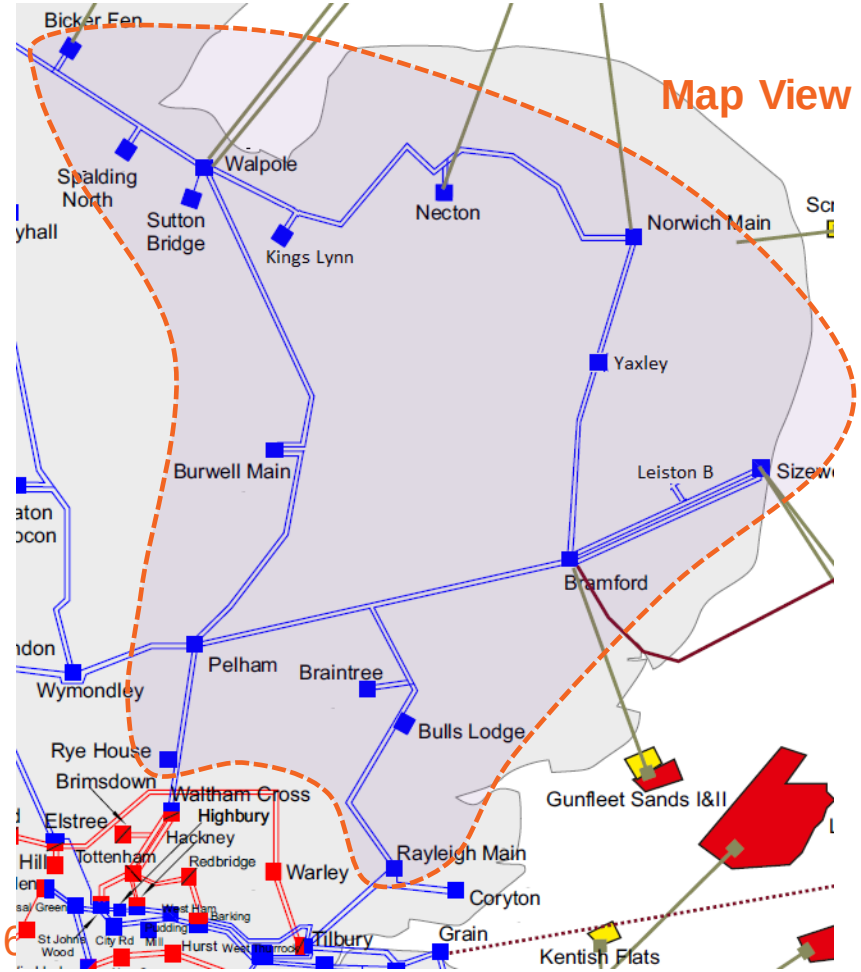
East of England Region

SCL requirement	MVA
Bicker Fen 400kV	500
Norwich Main 400kV	1500
Grand total for **East England**	2000

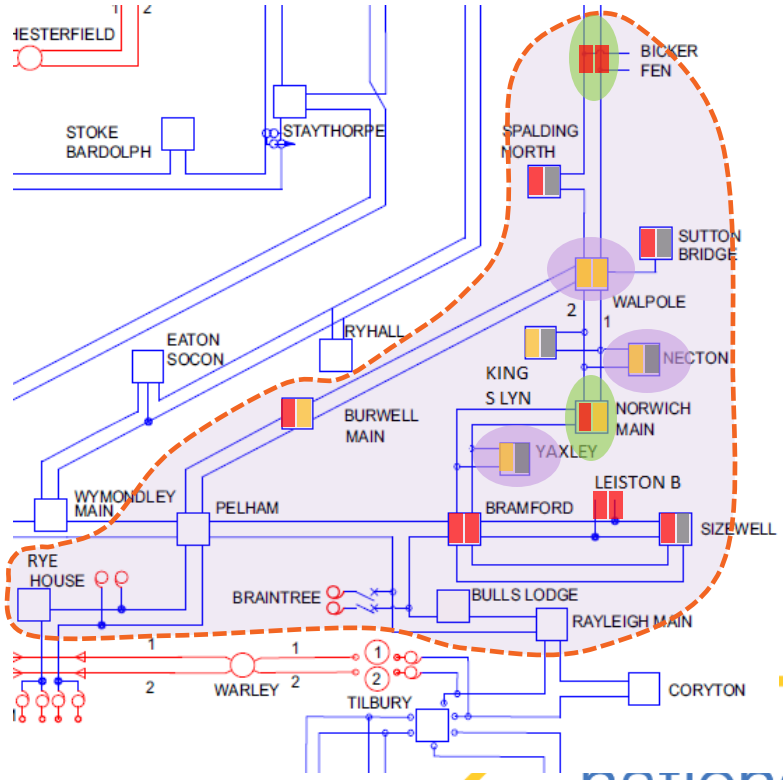
Map View



Reserved site/bay

Site	Region	No. of connection points (bays) secured	Assumed SCL (MVA)	Assumed MW	Assumed MVAr
Yaxley 400kV	East England	2	2x2555	± 100 per bay	± 100 per bay
Walpole 400kV	East England	1	1x7000		
Necton 400kV	East England	1	1x2640		

Network View



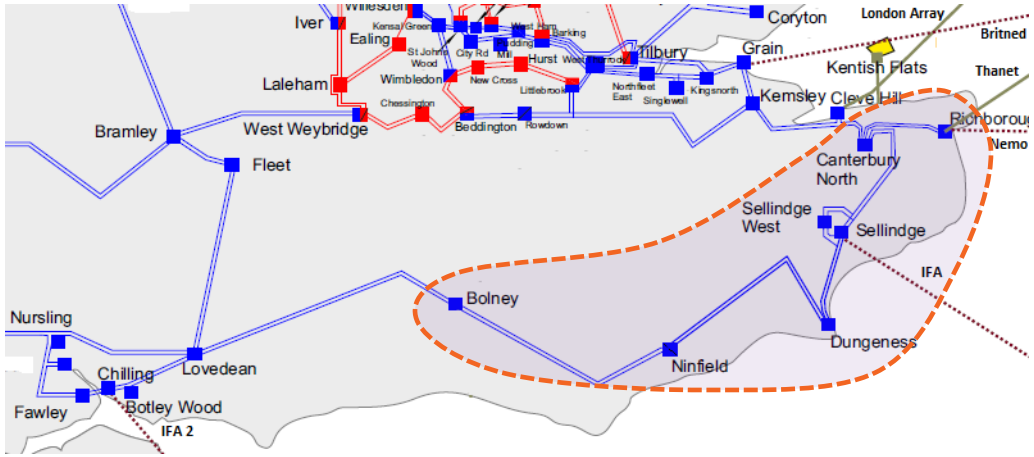
South Coast Region

SCL requirement	MVA
Canterbury 400kV	2000
Grand total for **South Coast**	2000

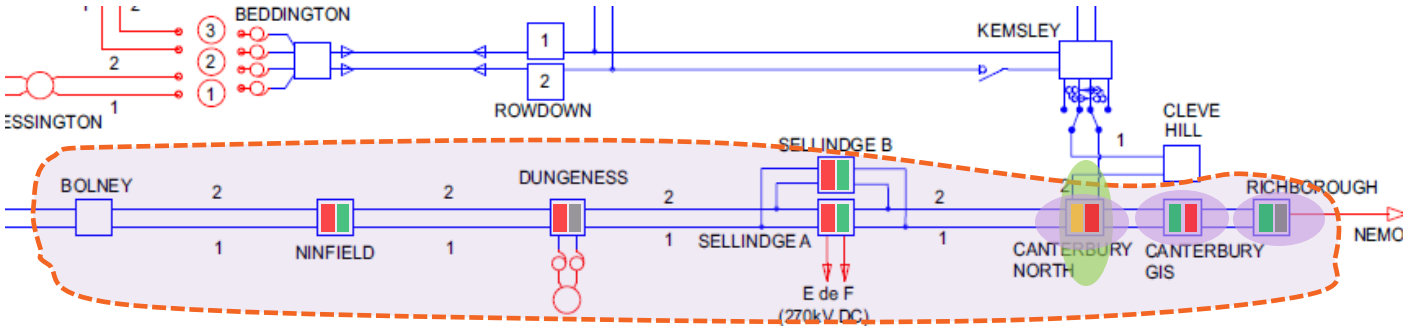
Reserved site/bay

Site	Region	No. of connection points (bays) secured	Assumed SCL (MVA)	Assumed MW	Assumed MVAr
Canterbury 400kV	South Coast	2	2x1110	± 100 per bay	± 100 per bay
Richborough 400kV	South Coast	1	1x2220		

Map View



Network View



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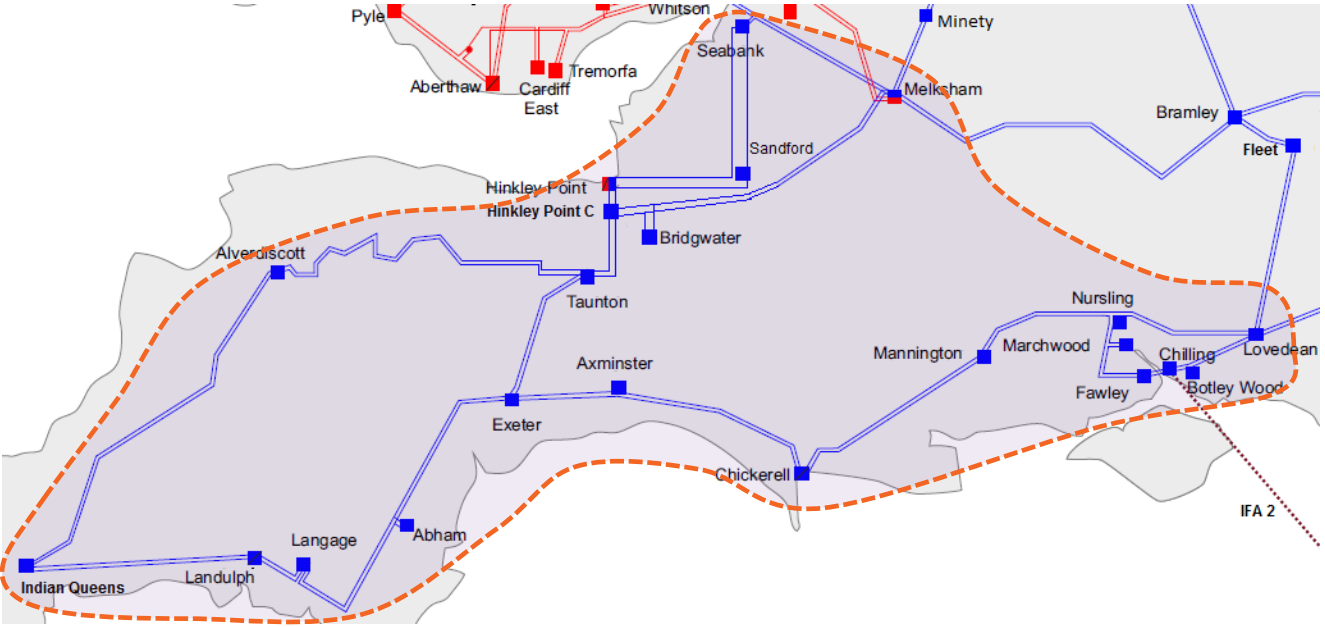
South-West England Region

SCL requirement	MVA
Exeter 400kV	500
Grand total for **South West**	500

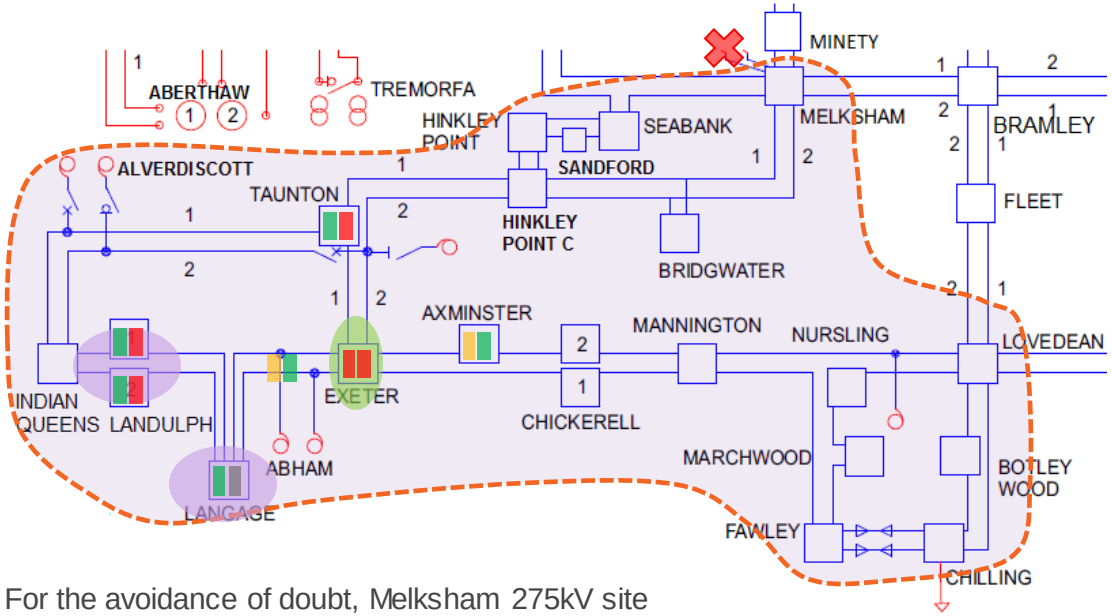
Reserved site/bay

Site	Region	No. of connection points (bays) secured	Assumed SCL (MVA)	Assumed MW	Assumed MVAr
Langage 400kV	South West	2	2x715	± 100 per bay	± 100 per bay
Landulph 400kV	South West	1	1x770		

Map View



Network View



- For the avoidance of doubt, Melksham 275kV site not in the region

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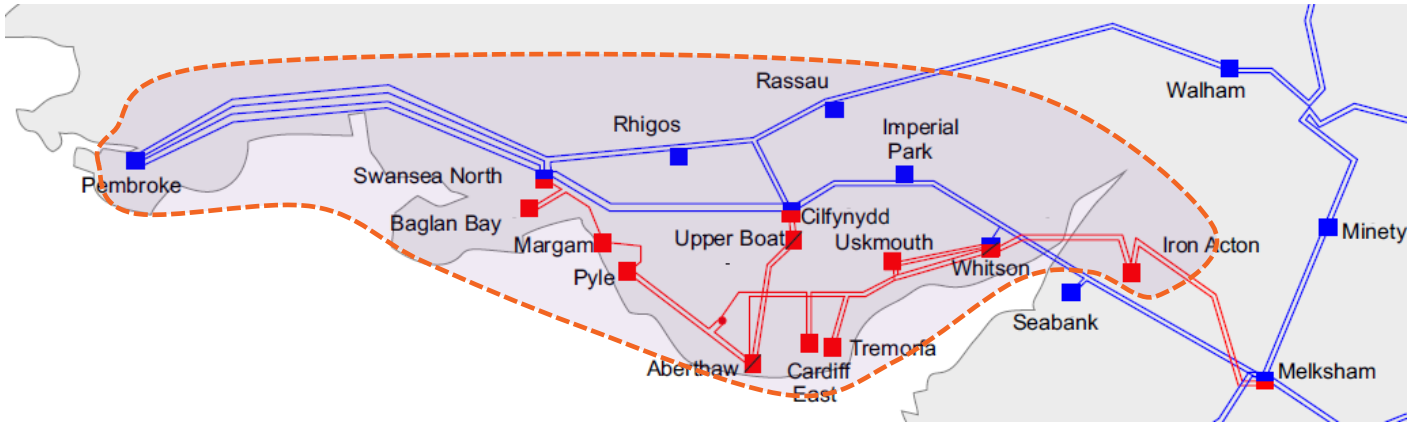
South Wales Region

SCL requirement	MVA
Rhigos 400kV	1500
Upper Boat node 1 (MC2/3)	500
Upper Boat node 2 (MC1/4)	500
Grand total for **South Wales**	2500

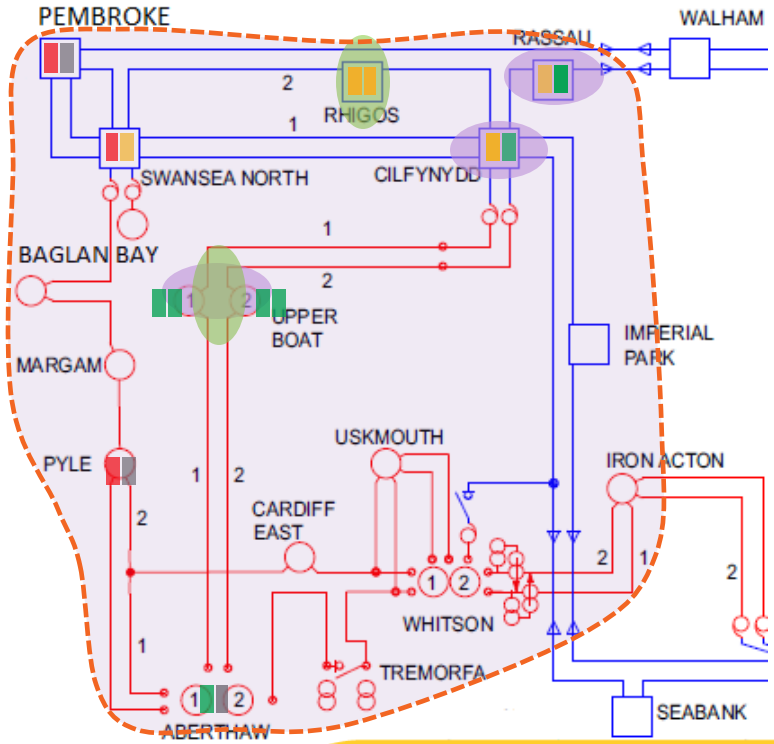
Reserved site/bay

Site	Region	No. of connection points (bays) secured	Assumed SCL (MVA)	Assumed MW	Assumed MVAr
Cilfynydd 400kV	South Wales	1	1x1900	± 100 per bay	± 100 per bay
Upper Boat 275kV MC1/4	South Wales	2	2x1900		
Rassau 400kV	South Wales	1	1x2950		

Map View



Network View



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