



Needs Case

Expansion of National Grid Minety Substation

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1. Introduction

The Minety development proposal comprises of an extension of the existing substation comprising installation of 400/132kV 240MVA SuperGrid Transformer, 3 number 400/33kV 150MVA SuperGrid Transformers, circuit breakers, construction of retaining wall and 33kV switch room, formation of access road, culverting of watercourse, erection of fencing and associated works.

National Grid (referred to as “NGET” hereafter) has a statutory duty to offer a customer a connection and to be economic and efficient in developing and operating the transmission system whilst also having regard to the preservation of amenity when developing the network. In developing the scheme at Minety, National Grid has sought to balance these requirements and meet its statutory duties.

The works are required to facilitate connection of 450MVA of battery energy storage system (BESS) / solar generation, achieve greater reliability of the existing substation to enable the increase in embedded generation within the local Distribution Network Operator (DNO) and 240MVA of additional capacity for the DNO to enable meet increased energy demand in the wider region.

This increased generation will play a key role in delivering the UK Government’s net zero ambitions and delivering up to 50GW of offshore wind connected by 2030. To facilitate these ambitions, electricity network infrastructure is needed to ensure that energy can be transported from where it is generated to where it is used.

2. Licence Obligations

National Grid holds the Transmission Licence for England and Wales and is thus obligated to develop and maintain an efficient, co-ordinated and economical system of electricity transmission and to facilitate competition in the generation and supply of electricity, as set out in the Electricity Act 1989 (the Electricity Act). National Grid is regulated by Ofgem, which sets price controls and monitors how the company develops and operates the network on behalf of consumers.

NGET have a regulatory obligation to provide a connection to the system for customer led projects when one is requested. Our role in the customer journey is to identify, design, develop and deliver an economic and efficient solution to facilitate access to the National Electricity Transmission System.

This is defined in Condition C8: Requirement to offer terms and D4A: Obligations in relation to offers for connection etc of the Transmission Licence ([Link to Ofgem site and Licence](#)) Standard Conditions.

As a licence holder National Grid has specific duties to uphold in relation to the desirability of preserving amenity of certain aspects of the environment and to mitigate the effects of its activities on the environment under Section 38 and Schedule 9 of the Electricity Act 1985.

National Grid is also required, under Section 38 of the Electricity Act, to comply with the provisions of Schedule 9 of the Act. Schedule 9 requires licence holders, in the formulation of proposals to transmit electricity, to preserve amenity by:

- Schedule 9(1)(a) ‘...have regard to the desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features of special interest and of protecting sites, buildings and objects of architectural, historic or archaeological interest;’ and
- Schedule 9(1)(b) ‘...do what [it] reasonably can to mitigate any effect which the proposals would have on the natural beauty of the countryside or on any such flora, fauna, features, sites, buildings or objects’

3. Existing site

The existing Minety substation uses air insulated switchgear (AIS) to establish a 400kV four switch mesh arrangement. This allows the connection of the four, 400kV overhead lines and the four existing 400/132kV 240MVA SuperGrid Transformers (SGT). The SGTs connect to the 132kV AIS substation which is owned and operated by Southern Electric Power Distribution plc (SEPD).

SEPD are the Distribution Network Operator (DNO) for the region and supply power from the existing SGTs into the DNO network supplying the necessary demand for commercial, industry and homes. The SEPD region is shown in Figure 1 below, with Minety providing demand connections in the northwest of this region.

The capacity provided by the existing four SGTs is fully allocated to SEPD as firm connections as defined within the Security and Quality of Supply Standard (SQSS).

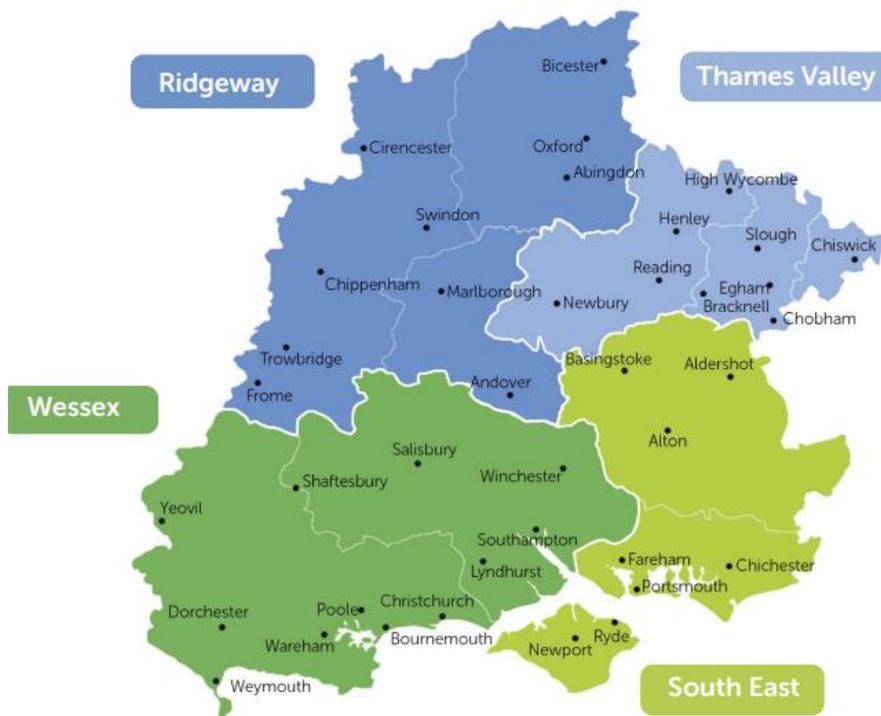


Figure 1 - SEPD region

4. Site Layout

It was agreed that developing at the existing site would have a lesser overall sustainability impact than a new greenfield substation – an extension also has the benefit of siting electrical equipment in the same location where this type of infrastructure already exists. Once it was determined that the connections would be facilitated through a substation extension, layout options were explored on alternative areas of the existing substation site. The alternative layout options would have a similar impact on the surrounding woodland.

Figure 2 below shows the site layout and, at a high level, identifies the works being completed in the different areas.

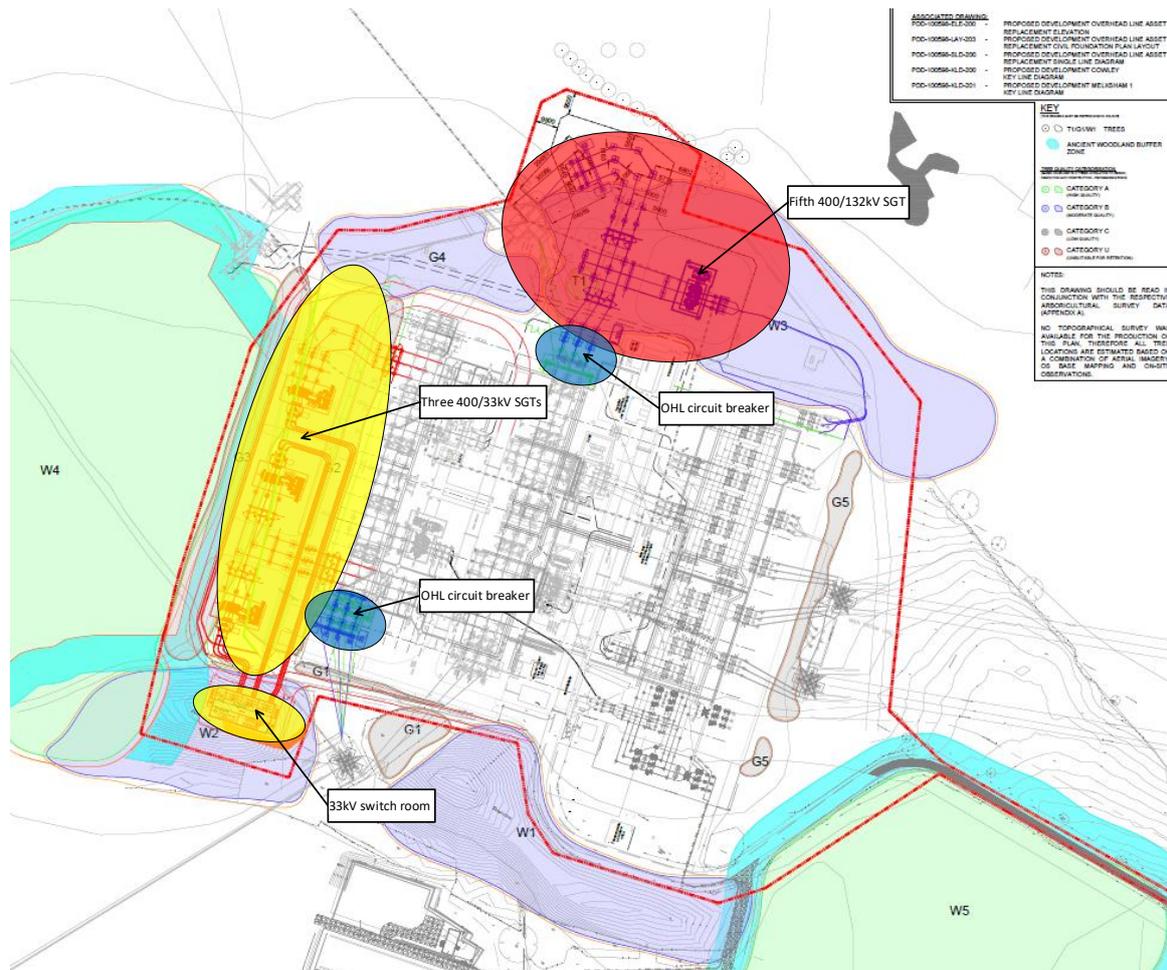


Figure 2 - Site layout showing areas

The areas highlighted yellow are for the installation of three 400/33kV 150MVA SGTs and the associated 33kV switch room. These items are discussed further in Section 5 BESS/ Solar generation.

The area highlighted red is for the installation of the fifth 400/132kV 240MVA SGT. This is discussed further in Section 6 DNO connections.

The areas highlighted blue are for the installation of Overhead Line (OHL) circuit breakers. These items are not discussed further within this paper but are associated with the Section 6 DNO connections works.

5. BESS / Solar generation

National Grid has made connection offers under its statutory license duty to nine BESS / solar developers. These offers are detailed in the TEC register published by National Grid ESO ([Link to ESO TEC Register](#)) and a summary for the Minety site is detailed in Table 1 below:

Project Name	Customer Name	Cumulative Total Capacity (MW)	Agreement Type	Plant Type
Dog Trap Lane	HD381GRE Limited	47.5	Directly Connected	Energy Storage System
Fairholme BESS	HB411MIN Limited	47.5	Directly Connected	Energy Storage System
Minety	HB411MIN Limited	47.5	Directly Connected	Energy Storage System
Minety Tertiary (2)	JBM SOLAR PROJECTS 14 LIMITED	47.5	Directly Connected	PV Array (Photo Voltaic/solar)
Pond Hill Farm 1	PD688IRO LTD	47.5	Directly Connected	Energy Storage System
Pond Hill Farm 2 BESS	PD688IRO LTD	47.5	Directly Connected	Energy Storage System
Somerford	PD813ETY LTD	47.5	Directly Connected	Energy Storage System; PV Array (Photo Voltaic/solar)
Southfields	PD503HAN LTD	47.5	Directly Connected	Energy Storage System; PV Array (Photo Voltaic/solar)
Southfields Farm	PD300RON Ltd	47.5	Directly Connected	Energy Storage System

Table 1 - Minety TEC Register entries

Each connection is rated at a capacity of 47.5MW and must be capable of operating at ± 0.95 power factor. Therefore, each connection requires 50MVA to be allocated. The connections are grouped in sets of three, with each set requiring a 400/33kV 150MVA SGT.

As the existing capacity is fully allocated to SEPD, these customers drive the requirement for an additional three SGTs and associated works. These SGTs are allocated in the extension to the west of the site and connect to the developers via the new 33kV switch room to the south of the site.

6. DNO connections

In June 2021, SEPD submitted a 'Project Progression' (a type of connection application used for DNO connections) for an additional 100.9MW of developer capacity. National Grid analysed this additional capacity and determined it was not possible to provide a SQSS compliant without installing a fifth 400/132kV 240MW SGT. This fifth SGT is to be located to the north of the existing site. This capacity increase is driven by embedded generation within SEPD's network. The specific sites requesting this increase are shown in Table 2 below:

Generator Name	Embedded Small Power Station Reference Number	Technology Type	Registered Capacity	BSP - Bulk Supply Point
Stonehill - BATTERY	EQG524	Battery	49.9	EHB411 (EQG524)
Land on North Side (PSSe =EQT906, Charlton Park)	EQT906	PV	30	EQT906
Windmill Farm	EPZ835	PV	13	CIRE31
The Barn - PV	EQP861	PV	3	CIRE31
Mannington 5MW increase	ERX733	Battery	5 MW increase	TOOT31

Table 2 - SEPD June 2021 additional demand

In total, SEPD have 912MW of embedded generation connected or contracted to connect into their network and back to Minety substation. This exceeds the capabilities of the existing SGTs at the Minety substation which as per SQSS provide a firm capacity of 720MVA hence requiring the fifth SGT to provide a firm capacity of 960MVA. Full details of the SEPD embedded connections are shown in the appendix A.

7. Next Steps

National Grid has applied for planning permission for the works detailed and awaits the decision of the planning authority. In the event planning permission were to be refused, National Grid would make an appeal to the Secretary of State against the decision, under section 78 of the Town and Country Planning Act 1990.

If all options for planning permission at the existing site were to be exhausted, National Grid still has a licence obligation to offer a customer connection, therefore the signed customer connection offers would trigger the need for a new greenfield substation.

8. Conclusions

The above details the need to install three 400/33kV 150MVA SGTs and associated 33kV switch room to enable the connection of nine BESS / solar generators connecting directly to the National Grid substation. A further increase in embedded generation of 100.9MW of SEPD DNO developer capacity details the need to install an additional 400/132kV 240MVA SGT.

Appendix A – SEPD embedded generation (existing and additional)

Generator Name	Embedded Small Power Station Reference Number	Technology Type	Registered Capacity	BSP - Bulk Supply Point
Chapel Farm, Swindon	EBU633	LANDFILL GAS	4.0	SWIN31
Westmill Windfarm	N/A	WIND	2.8	STRA31
Iceland's Food	N/A	LANDFILL GAS	2.0	TOOT31
Rodbourn Sewage diesel + CHP	N/A	MIXED	1.7	SWIN31
Biffa Waste Studley Grange	EBS277	WTE	2.0	SWIN31
Allied Dunbar		LANDFILL GAS	2.0	SWIN31
Honda PV	DTW764	PV	4.5	STRA32
Westmill PV	DSQ735	PV	5.0	STRA31
Pentylands PV Farm	DWF391	PV	15.0	STRA31
Castle Eaton Farm PV, Swindon	DWH006	PV	15.0	SWIN31
Crucis PV	DYU219	PV	15.0	CIRE31
Spittleborough PV	DYL525	PV	8.0	SWIN31
Roves PV	DZU601	PV	9.0	STRA32
Orta Port PV	DZR151	PV	28.6	STRA32
Lynt Farm PV	DYN614	PV	22.6	STRA32
Bentham PV	DYF061	PV	8.7	CIRE31
Goldborough PV	DYL711	PV	5.0	SWIN31
Nationwide Generation	DYD689	MIXED	1.8	SWIN31
Wroughton Air Field PV	DYW852	PV	48.5	TOOT31
Lower Bassett Down PV	DYY358	PV	9.0	TOOT31
Chapel Farm PV	EBS983 / EKA081	PV	5.0	SWIN31
Stanton Waters	DYX779	PV	4.0	STRA31
Park Grounds AD Farm	EHE040	PV	6.0	SWIN31
Braydon PV	DYX152	PV	7.0	CIRE31
Wickfield PV 0	DXX353	PV	4.0	SWIN31
Stanton Fitzwarren PV	EBD218	PV	3.5	STRA31+K31:K36
Common Farm PV	EJT887	PV	6.8	TOOT31
Lyneham College PV	ECS589	PV	49.9	LYDIARD31

Generator Name	Embedded Small Power Station Reference Number	Technology Type	Registered Capacity	BSP - Bulk Supply Point
Cheney Manor Spark		CHP	2.2	SWIN31
Cap Gemini Merlin Data Centre Diesel	EDP367	DIESEL	2.5	STRA31
B&Q Swindon DC	EED543	PV	1.71	STRA31
Catsbrain Farm	EGZ181	BATTERY	20	STRA32
Minety Energy Storage	EHB411 (EQG524)	BATTERY	99.9	EHB411 (EQG524)
Mannington Depot	EJC395	BATTERY	30	TOOT31
Barnfield Landfill	EJJ081	BATTERY	1.2	SWIN31
Brookfield Farm	EHJ133	PV & Battery	1	
Park Farm Battery	EJE299	BATTERY	10	GALI51
Barnfield PV	ELK669	PV	2.5	SWIN31
UNIT A, G PARK, SWINDON	EJQ026	BATTERY	1.36	STRA32
Minety Combined Generation (Minety Battery Storage on PSSe)	EGP231	Battery	99.99	MITY12
WOOTTON BASSETT FLEXIBLE GAS	ENT048	Gas	6.5	SWIN31
The Common Battery	EJR230	BATTERY	49	EJR230
Brindley Close Battery	ELR112	BATTERY	12	SWIN31
CIRENCESTER PV	ENC913	PV & Battery	10	CIRE31
CORNER COPSE SOLAR	ELG049/ESP764	PV	50	ELG049
Cirencester Solar Park	EMS642	PV	50	
CIRENCESTER SOLAR PARK, ESTATE OFFICE	EPU169	PV	25	
Welsh Way - SOLAR PV	EPF322	PV	10	
Siddington - PV	ERH219	PV	23	
Vodafone Swindon - PV	EPU629	PV	7	
Stonehill - BATTERY	EQG524	Battery	49.9	EHB411 (EQG524)
Land on North Side (PSSe =EQT906, Charlton Park)	EQT906	PV	30	EQT906
Windmill Farm	EPZ835	PV	13	CIRE31
The Barn - PV	EQP861	PV	3	CIRE31
Mannington 5MW increase	ERX733	Battery	5 MW increase	TOOT31

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