



Title: Hurst / Littlebrook

SPN Regional Development Plan

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Hurst / Littlebrook

All of the cost numbers displayed in this document are before the application of on-going efficiencies and real price effects.

Document History

Version	Date	Revision Class	Originator	Section Update	Details
1.0	23/06/2013		S. Green		First Draft for review
1.1	25/06/2013		S. Green		PA Consulting comments incorporated
1.2	06/03/2014	Major	Z. Musanhi	1.1	NAMP costs summary table update
1.2	06/03/2014	Major	Z. Musanhi	2.3	NAMP costs table update
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1

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Introduction

1.1 Executive Summary

This development plan reviews the SPN EHV network supplied by the Littlebrook 132kV and Hurst 132kV Grid Supply Points (GSP). The Littlebrook and Hurst GSP's supply sites on both the LPN and SPN networks. The LPN sites are covered under the Beddington Hurst and Dartford Regional Development Plans. There is interconnection between the two GSP's of Hurst and Beddington, and Littlebrook and Northfleet, however these remain split to avoid pre and post fault through flows affecting the UKPN network.

The aggregated group demand of the four SPN only sites supplied by Littlebrook GSP is 23MW and 19MW in winter and summer respectively. There are two SPN sites fed from Hurst with a total aggregated group demand of 44MW and 30MW in winter and summer respectively.

Major works currently under construction or approved and scheduled to start in DPCR5 include: 132kV Littlebrook switchgear replacement, installation of a new circuit between Bromley and Ruxley, retrofit of Ruxley substation and replacement of the 33kV Cable between Dartford and Ruxley.

No major developments are planned in the area, although the local councils have regeneration plans, these are not at a stage to impact our planned projects.

1.2 ED1 Proposed Projects >£1M

Substation	Driver	Commissioning Year	Scope of works	Expenditure
Bromley / Orpington cct 2	Asset Health	2017	Replace 33kV FFC	£1.2m

1.3 Costs profile

Table J less indirects 19th February 2014

Table 1. Total Project Expenditure

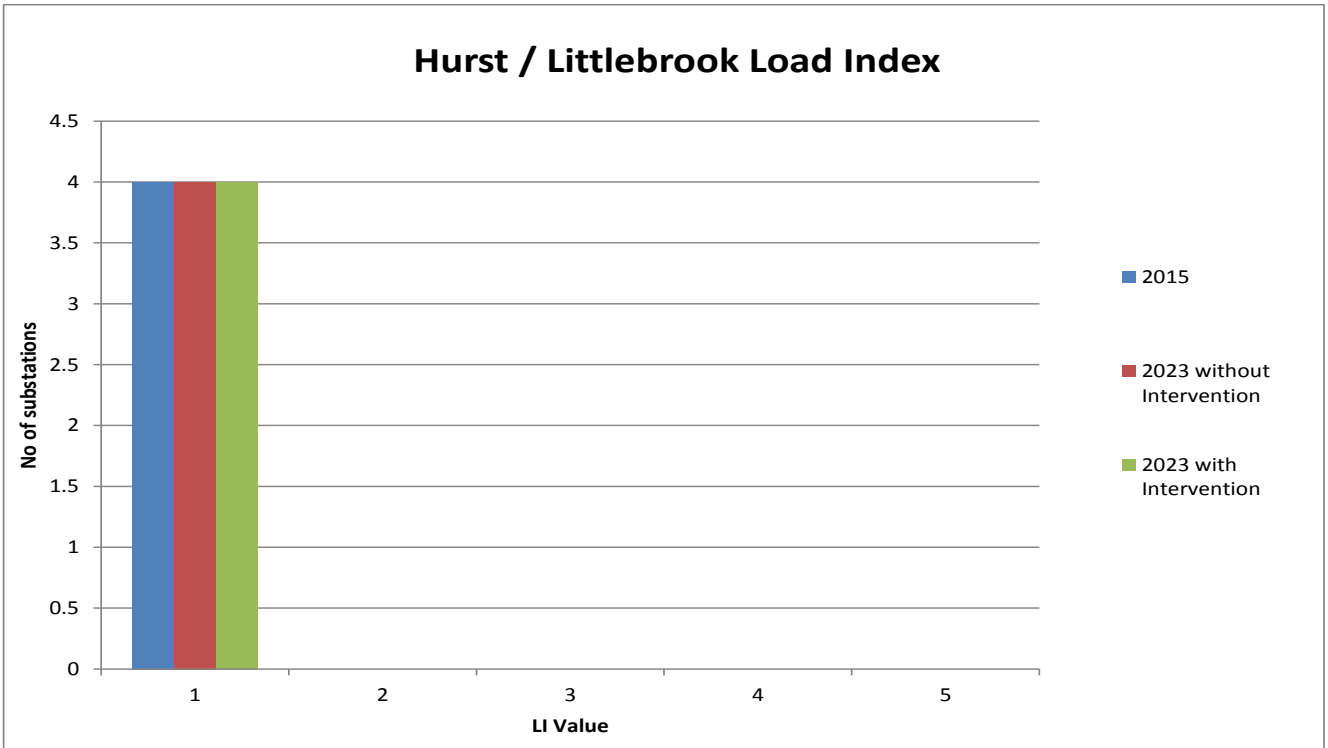
Cat.	Reference	Description	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
A&H		Total Asset Replacement	0	0	603	603	0	0	57	30	0	259
R		Total Reinforcement	0	0	0	0	0	0	0	0	0	0
		Grand Total	0	0	603	603	0	0	57	30	0	259

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1.4 Output Measures Load Index

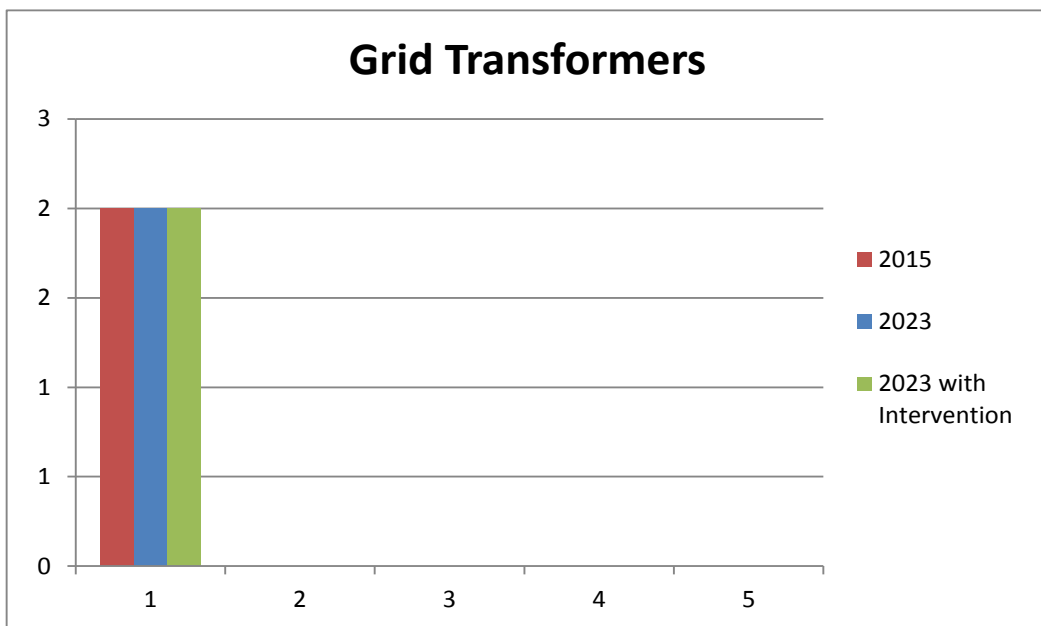
Load Index of substations within the Hurst / Littlebrook Grid networks.



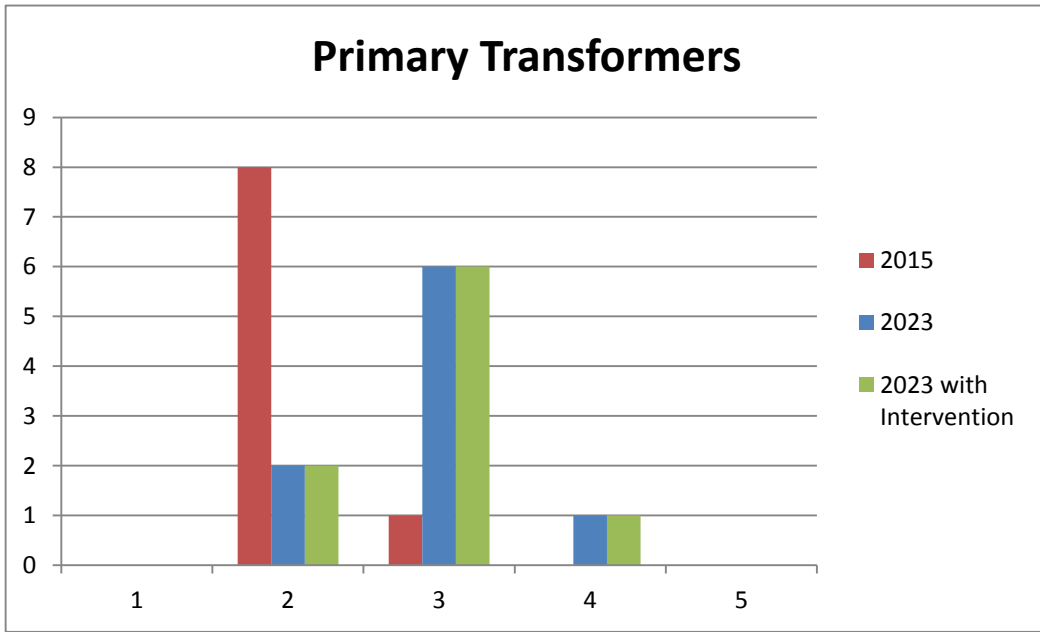
Graph 1. Load Index With and Without Investment

1.5 Output Measures Health Index

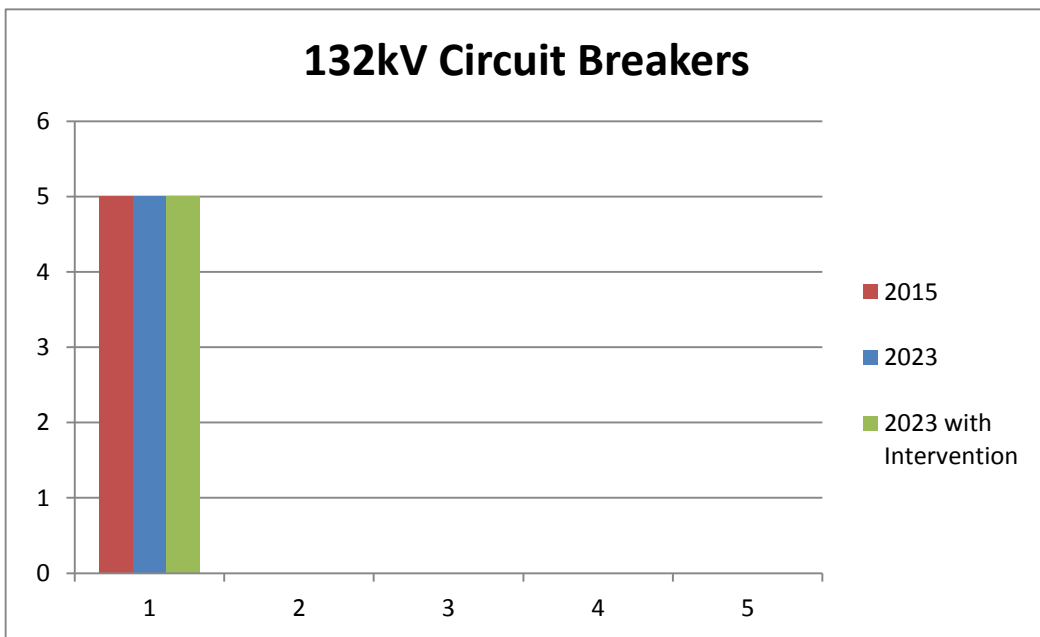
Health of Assets within the Hurst / Littlebrook Grid networks.



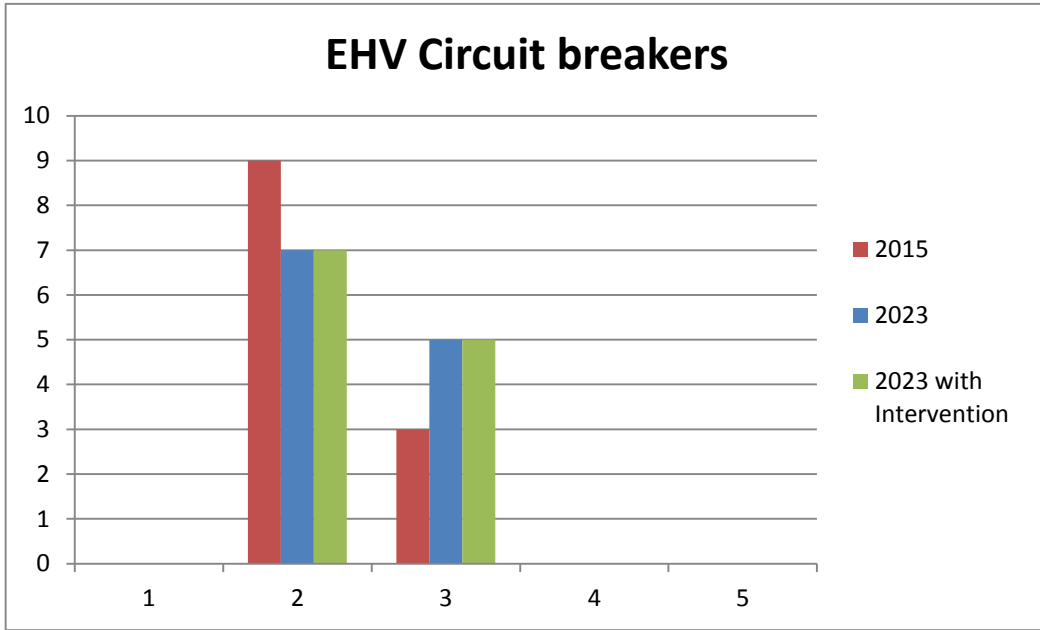
Graph 2. Grid Transformers With and Without Intervention



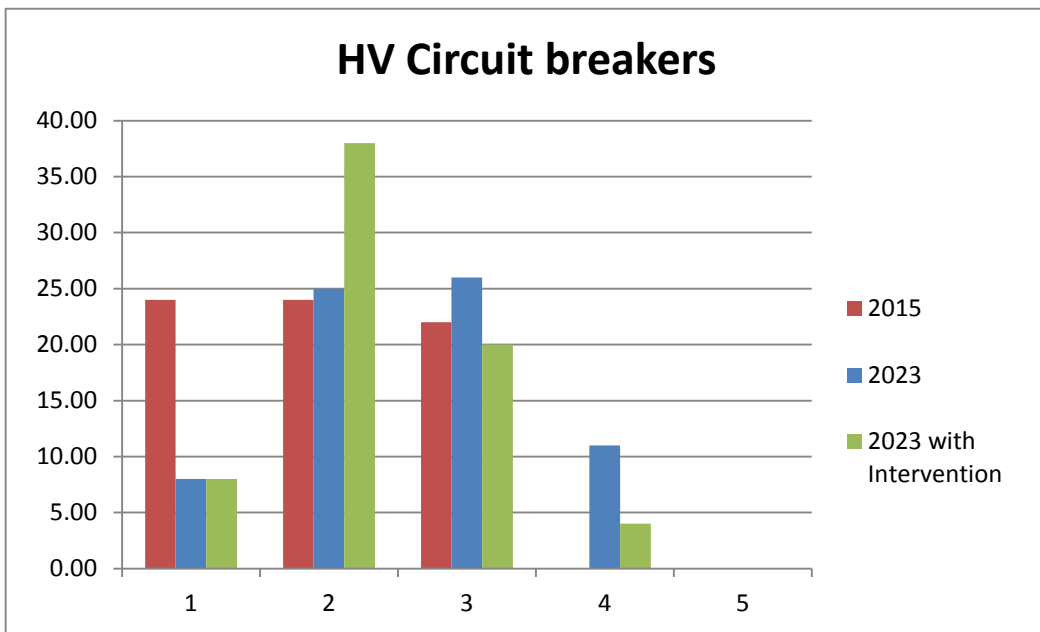
Graph 3. Primary Transformers With and Without Intervention



Graph 4. 132kV and 66kV Switchgear With and Without Intervention



Graph 5. EHV Switchgear With and Without Intervention



Graph 6. HV Switchgear With and Without Intervention

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1.6 Scenario Considered

The Scenario considered is based on the SPN Planning Load Estimates of February 2013 using Element Energy Load Growth assessment and the Asset Risk Prioritisation model of July 2013.

1.7 Principle Risks and Dependencies

The schemes covered in this RDP have been planned based on the planning load estimates 2013 with the 2011/12 maximum demand. The load forecasts are based on the element energy model. If the economic situation improves there is a risk that there will be shortfall of reinforcement schemes in the plan.

The load forecasts also include an assumed level of embedded generation being connected to the network. Should this generation not materialise, then a larger than forecast load growth could be realised.

Where Demand Side Response has been included at a substation, this is based on an assumption that customers will be willing to accept the scheme. In most cases these customers have not as yet been identified.

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2 Network configuration

2.1 Existing Network

This Regional Development Plan reviews the SPN EHV network supplied from Littlebrook 132kV GSP and the Hurst 132kV GSP.

Littlebrook GSP

Littlebrook 132kV substation comprises of 3x240MVA 400/132 kV super grid transformers (SGT'S), with a firm capacity of 553MW and 488MW in the winter and summer respectively. Under normal running conditions, the site is run split on the bus couplers for fault level consideration, with a reactor tie between main and reserve busbars. The site shares supplies to the UKPN LPN network.

Littlebrook Park 11kV

The site consists of two 132/11kV 30/60MVA double-wound transformers connected to a double-busbar 11kV switchboard.

Dartford Grid A, 132/33kV - (LPN Network).

Dartford Grid A is an LPN Grid Substation, which supplies the following SPN Primary substations:

- Stone – 1 x 10MVA 33/11kV substation
- APCM Swanscombe – 2 x 5MVA 33/3kV substation
- Swanscombe – 2 x 10MVA 33/11kV substation
- Ruxley – 2 x 15MVA 33/11kV substation

Hurst GSP (LPN network)

Hurst GSP is supplied by 3 x 240MVA 275/132kV Super Grid Transformers. The SPN sites are connected to the Hurst network at Bromley 132kV substation. Bromley 132kV and associated LPN substations are not included in the scope of this RDP.

Orpington 11kV

Orpington 11kV is supplied by 2 x 12/24MVA 33/11kV transformers and 1 x 16/20MVA 33/11kV transformer.

Petts Wood 11kV

The site is supplied by 2 x 16/20MVA transformers.

See Appendix A for Geographical Map and Appendix B for Single Line Diagrams.

2.2 Embedded Generation

In accordance with ER P2/6 distributed generation can be off set against substation capacity if the aggregated capacity (excluding Diesel and PV) exceeds 5% of the connected load. Table 3 details the generating plants used in the analysis for the Hurst / Littlebrook Networks.

Table 2. Output of generating plants on this network

Generation Plants	Type	DNC (MVA)	F (%)	pf	DG Output = F*DNC		
					MVA	MW	MVA _r
SOUTHERN GAS NETWORKS LTD	Gas	0.350	63	1	0.221	0.221	0
BRITISH TELECOMMUNICATIONS PLC	Diesel	2.400	0	1	0	0	0
TESCO STORES LTD	Diesel	0.140	0	1	0	0	0
TESCO STORES LTD	CHP	0.417	53	1	0.221	0.221	0

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2.3 Projects in progress

NAMP table J (less indirect costs) 19th February 2014

Table 3. Extract from Network Asset Management Plan 19th February 2014

Cat.	Reference	Description	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
H	1.29.01.3345	Dartford - Ruxley 33kV FFC Replacement	2,649	1,986	0	0	0	0	0	0	0	0
A	1.48.01.3213	Littlebrook - Replace 132kV Switchgear (SPN)	87	14	0	0	0	0	0	0	0	0

1.48.01.3213: Littlebrook - Replace 132kV Switchgear

This project is to install 2 new 132kV switchgear bays at Littlebrook supergrid site. The main driver for the switchgear replacement is severe ground subsidence which means that cavities can open up at any time. It is not considered safe for staff to carry out maintenance on the site especially where the use of mobile access platforms is required. The subsidence may also have had a detrimental effect on the integrity of the substation earthing system.

The HG6MA circuit breakers are reaching the end of their useful life and UKPN must accept an increased level of unreliability. The circuit breakers are no longer supported by the manufacturers and any spare parts required have to be manufactured. The circuit breaker bushings are prone to failure due to moisture ingress and the bushings on the breakers at Littlebrook have suffered from oil leaks from the cement seal between the bushing and its turret. Repairs to these have been made to these using the Furmanite process.

The multicore cables between the circuit breakers, control panels and protection panels use VIR insulated conductors. The VIR insulation is crumbling away inside on the termination boards resulting in potential spurious alarms, trips and battery earth faults.

The concrete support structures are showing signs of spalling and there have been a number of failures of the aerial conductor support insulator string mountings due to corrosion. These have resulted in extensive loss of supplies and some very difficult repair procedures due to the subsidence problem.

New GIS CBs will serve Littlebrook Grid 132/11kV substation and provide interconnection to Northfleet East.

The project is expected to be completed in 2015 and is linked to NAMP line 1.48.01.2601.

1.29.01.3345: Dartford to Ruxley 33kV FFC Replacement

Replacement of 33 kV Fluid Filled Cables to comply with Asset Health requirements.

The Dartford – Ruxley circuits have a history of leaking continuously. The above cables have been condition assessed and classified as condition 4. Therefore this project recommends these circuits be abandoned and new circuits installed from Bromley Grid to Ruxley. The project is expected to be completed at the end of 2014.

3 Network Development Considerations

3.1 Development areas

The local councils in Bromley and Dartford have core strategic plans to improve the green areas, increase the number of properties and increase the public amenities. At this stage none of those plans are in the development stage and as such no provision in the Infrastructure plan has been included. Any such plans would be subject to the connections process. The existing load and predicted load growth on the substations covered by this RDP is such that it is unlikely any EHV reinforcement would be necessary to accept the potential increase in demand.

3.2 Asset Health

The Asset Replacement programme has been developed using outputs from the Asset Risk Prioritisation (A.R.P.) model, version July 2013. The forecast HI figures for all asset groups **without investment** are shown in the following tables for years 2015 and 2023.

It should be noted that HIs presented in the RDP will not align with the RIGS. The HI's presented in the RDP are the outcome of our ARP models on an asset by asset basis. Different rules are applied for RIGs reporting, as agreed with Ofgem, where assets may be grouped and all assets in the group take the same HI.

The 2015 HI figures include any projects that are currently in progress (see section 2.3 for details) and are due to be completed by the end of DPCR5.

Table 4. HV Circuit Breakers

Substation	2015					2023				
	No. HI1	No. HI2	No. HI3	No. HI4	No. HI5	No. HI1	No. HI2	No. HI3	No. HI4	No. HI5
DARTFORD 11KV (LPN)		2					2			
LITTLEBROOK PARK 11KV	20					4	16			
LITTLEBROOK PARK 132KV	4					4				
ORPINGTON 33/11KV		11	6					13	4	
PETTS WOOD 33KV		3	6					6	3	
RUXLEY 33/11KV		1	10					7	4	
SWANSCOMBE 33/11 KV		7					7			

Table 5. EHV Circuit Breakers

Substation	2015					2023				
	No. HI1	No. HI2	No. HI3	No. HI4	No. HI5	No. HI1	No. HI2	No. HI3	No. HI4	No. HI5
BROMLEY GRID (LPN)		2	3					5		
DARTFORD GRID (LPN)		5					5			
ORPINGTON 33KV		2					2			

Table 6. 132 Circuit Breakers

Substation	2015					2023				
	No. HI1	No. HI2	No. HI3	No. HI4	No. HI5	No. HI1	No. HI2	No. HI3	No. HI4	No. HI5
LITTLEBROOK 132 KV	3					3				
LITTLEBROOK 132KV GIS	2					2				

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Table 7. Primary Transformers

Substation	2015					2023				
	No. HI1	No. HI2	No. HI3	No. HI4	No. HI5	No. HI1	No. HI2	No. HI3	No. HI4	No. HI5
ORPINGTON 33/11KV		2	1					2	1	
PETTS WOOD 33KV		2					1	1		
RUXLEY 33/11KV		2						2		
SWANSCOMBE 33/11 KV		2					1	1		

Table 8. Grid Transformers

Substation	2015					2023				
	No. HI1	No. HI2	No. HI3	No. HI4	No. HI5	No. HI1	No. HI2	No. HI3	No. HI4	No. HI5
LITTLEBROOK PARK 132KV	2					2				

3.3 Security of supply and Load Index analysis

Table 9 shows the forecast load growth on the SPN Littlebrook Substations. Highlighted in orange are any loads that exceed the substation firm capacity plus any post fault transfer capability.

Table 9. P2/6 Assessment Table Littlebrook SPN

Sub-station	P2/6	Type of Substation	Secondary Voltage	Firm Capacity (MW)	Transfer (MW)	P. F.	Winter 12/13 Summer 2012 (M W)	Winter 13/14 Summer 2013 (M W)	Winter 14/15 Summer 2014 (M W)	Winter 15/16 Summer 2015 (M W)	Winter 16/17 Summer 2016 (M W)	Winter 17/18 Summer 2017 (M W)	Winter 18/19 Summer 2018 (M W)	Winter 19/20 Summer 2019 (M W)	Winter 20/21 Summer 2020 (M W)	Winter 21/22 Summer 2021 (M W)	Winter 22/23 Summer 2022 (M W)
Littlebrook Park 132/11	YES		11kV	69.12	0.00	0.96	3.00	6.00	9.00	12.00	15.00	18.00	21.00	21.00	21.00	21.00	21.00
Littlebrook Park 132/11	YES		11kV	57.60	0.00	0.96	3.00	6.00	9.00	12.00	15.00	18.00	21.00	21.00	21.00	21.00	21.00
Littlebrook SGT	YES		400kV	553.00	0.00	0.96	3.00	6.00	9.00	12.00	15.00	18.00	21.00	21.00	21.00	21.00	21.00
Littlebrook SGT	YES		400kV	488.40	0.00	0.96	3.00	6.00	9.00	12.00	15.00	18.00	21.00	21.00	21.00	21.00	21.00
Littlebrook Site Supplies East 132/11	YES		11kV	0.00	0.00	0.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Littlebrook Site Supplies East 132/11	YES		11kV	0.00	0.00	0.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 10 shows the forecast load growth on the SPN Hurst Substations. Highlighted in orange are any loads that exceed the substation firm capacity plus any post fault transfer capability.

Table 10. P2/6 Assessment Table Hurst SPN

Sub-station	P2/6	Type of substation	Secondary Voltage	Firm Capacity (MW)	Transfer (MW)	P. F.	Winter 12/13 Summer 2012 (M W)	Winter 13/14 Summer 2013 (M W)	Winter 14/15 Summer 2014 (M W)	Winter 15/16 Summer 2015 (M W)	Winter 16/17 Summer 2016 (M W)	Winter 17/18 Summer 2017 (M W)	Winter 18/19 Summer 2018 (M W)	Winter 19/20 Summer 2019 (M W)	Winter 20/21 Summer 2020 (M W)	Winter 21/22 Summer 2021 (M W)	Winter 22/23 Summer 2022 (M W)
HURST 132kV	YES		132kV	461.20		0.96	275.08	276.35	278.75	281.49	284.02	302.61	305.32	308.12	311.02	316.16	319.37
HURST 132kV	YES		132kV	446.00		0.96	193.25	194.06	195.66	197.49	199.19	211.74	213.56	215.44	217.38	220.17	223.00
Orpington (SPN)	YES	SPN	11kV	45.26		0.99	32.54	32.44	32.41	32.44	32.52	32.57	32.64	32.72	32.81	33.11	33.39
Orpington (SPN)	YES	SPN	11kV	35.60		0.99	22.71	22.61	22.58	22.60	22.65	22.69	22.73	22.79	22.85	23.04	23.23
Petts Wood (SPN)	YES	SPN	11kV	21.90		0.96	11.24	11.24	11.32	11.42	11.53	11.57	11.63	11.68	11.75	11.92	12.09
Petts Wood (SPN)	YES	SPN	11kV	17.30		0.96	6.69	6.69	6.73	6.79	6.86	6.88	6.91	6.95	6.98	7.08	7.16

All the substations on both the Littlebrook and Hurst SPN networks remain compliant with Engineering Recommendation P2/6 throughout the ED1 period, based on load growth rates forecast in the Planning Load Estimates February 2013.

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Table 11. Load Indices without Investment

Substation	Voltage kV	Load Index	
		2015	2023
Orpington	11	1.00	1.00
Petts Wood	11	1.00	1.00
Ruxley	11	1.00	1.00
Swanscombe	11	1.00	1.00

The Load Indices have been calculated taking into account planned load transfers. These are not viewed as reinforcement.

3.4 Operational and technical restrictions

No operational or technical constraints have been identified on these networks.

3.5 National Grid

There are no works planned in ED1 that require coordination with National Grid.

3.6 Network Constraints

No cable bridges or pinch points have been identified on the Hurst / Littlebrook SPN networks.

4 Recommended strategy

4.1 Asset Replacement / Refurbishment

4.1.1 Switchgear

Bromley Grid (LPN) - Replace 33kV switchgear

The condition assessment of the 1965 - 67 Reyrolle L42T Oil Switchgear installed at Bromley Grid (LPN) has shown that the probability of failure due to degradation will become unacceptable. It is not possible to keep these assets in use without compromising operational requirements, therefore this project recommends its replacement. Completion of the project will see 5 circuit breakers replaced with 5 new circuit breakers.

This project will be carried out in conjunction with the replacement of the LPN switchboard, NAMP line 1.48.02.7783.

Orpington 33/11kV - Retrofit 11kV Switchgear

The condition assessment of the 1974 Brush VSI oil switchgear installed at ORPINGTON 33/11kV has shown that the probability of failure due to degradation will become unacceptable. It is not possible to keep these assets in use without compromising operational requirements, therefore this project recommends its refurbishment. Completion of the project will see 13 circuit breakers replaced with 13 new circuit breakers.

Petts Wood 33kV - Retrofit 11kV Switchgear

The condition assessment of the 1966 Reyrolle LMT Oil Switchgear installed at Petts Wood 33kV has shown that the probability of failure due to degradation will become unacceptable. It is not possible to keep these assets in use without compromising operational requirements, therefore this project recommends its refurbishment. Completion of the project will see 6 circuit breakers replaced with 6 new circuit breakers.

4.1.2 Fluid Filled Cables

Bromley Grid to Orpington (Circuit 2-1,Circuit 2-2,Circuit 2-3) - 33kV FFC replacement

The condition assessment of the Bromley Grid to Orpington 33kV fluid filled cable has shown that the probability of failure due to degradation will become unacceptable. It is not possible to keep these assets in use without compromising CI and CML performance, therefore this project recommends their replacement. Completion of the project will see 0.6 km of 33kV Fluid filled cable replaced.

4.2 Reinforcement

No reinforcement schemes are planned for the Hurst and Littlebrook networks in the ED1 period.

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4.3 Summary of proposed interventions

The following table shows a summary of proposed interventions:

Table 12. Planned Reinforcement / Replacement Projects

Substation	Driver	Commissioning Year	Scope of works	Existing Firm Capacity	New Firm capacity
Bromley Grid	Asset Health	2023	Replace 33kV Switchgear	198MW (w) 166MW (s)	No change
Orpington	Asset Health	2023	Retrofit 11kV Switchgear	45MW (w) 36MW (s)	No change
Petts Wood	Asset Health	2021	Retrofit 11kV Switchgear	22MW (w) 17MW (s)	No change
Bromley / Orpington cct 2	Asset Health	2017	Replace 33kV FFC	N/A	N/A

4.4 Costs and phasing

The following table shows the planned expenditure and phasing for the asset replacement and reinforcement schemes in ED1.

Table 13. Summary of Proposed Interventions

Cat.	Reference	Description	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
A	1.48.11.7810	Bromley Grid (Leb) - Replace 33kV Switchgear	0	0	0	0	0	0	0	0	0	150
A	1.50.01.7934	Orpington 33/11kV - Retrofit 11kV Switchgear	0	0	0	0	0	0	0	0	0	109
A	1.50.01.7838	Petts Wood 33kV - Retrofit 11kV Switchgear	0	0	0	0	0	0	57	30	0	0
H	1.29.01.7969	Bromley Grid to Orpington (Circuit 2-1,Circuit 2-2,Circuit 2-3) - 33kV FFC Replacement	0	0	603	603	0	0	0	0	0	0

4.5 HI / LI Improvement

A summary of the forecast HI and LI profiles post intervention are detailed below. It should be noted that when switchgear is refurbished, only the circuit breaker element is replaced. However, the HI is calculated taking the whole panel into account.

Table 14. Health Indices of HV Circuit Breakers with Investment

Substation	2015					2023				
	No. HI1	No. HI2	No. HI3	No. HI4	No. HI5	No. HI1	No. HI2	No. HI3	No. HI4	No. HI5
DARTFORD 11KV (LPN)	2					2				
LITTLEBROOK PARK 11KV	20					4 16				
LITTLEBROOK PARK 132KV	4					4				
ORPINGTON 33/11KV	11 6					7 10				
PETTS WOOD 33KV	3 6					6 3				
RUXLEY 33/11KV	1 10					7 4				
SWANSCOMBE 33/11 KV	7					7				

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Table 15. Health Indices of EHV Circuit Breakers with Investment

Substation	2015					2023				
	No. HI1	No. HI2	No. HI3	No. HI4	No. HI5	No. HI1	No. HI2	No. HI3	No. HI4	No. HI5
BROMLEY GRID (LPN)		2	3					5		
DARTFORD GRID (LPN)		5					5			
ORPINGTON 33KV		2					2			

Table 16. Health Indices of 132kV Circuit Breakers with Investment

Substation	2015					2023				
	No. HI1	No. HI2	No. HI3	No. HI4	No. HI5	No. HI1	No. HI2	No. HI3	No. HI4	No. HI5
LITTLEBROOK 132 KV	3					3				
LITTLEBROOK 132KV GIS	2					2				

Table 17. Health Indices of Primary Transformers with Investment

Substation	2015					2023				
	No. HI1	No. HI2	No. HI3	No. HI4	No. HI5	No. HI1	No. HI2	No. HI3	No. HI4	No. HI5
ORPINGTON 33/11KV		2	1					2	1	
PETTS WOOD 33KV		2					1	1		
RUXLEY 33/11KV		2						2		
SWANSCOMBE 33/11 KV		2					1	1		

Table 18. Health Indices of Grid Transformers with Investment

Substation	2015					2023				
	No. HI1	No. HI2	No. HI3	No. HI4	No. HI5	No. HI1	No. HI2	No. HI3	No. HI4	No. HI5
LITTLEBROOK PARK 132KV	2					2				

Table 19. Load Indices With and Without Investment

Substation	Voltage kV	2023 Load Index	
		Without Investment	With Investment
Orpington	11	1.00	1.00
Petts Wood	11	1.00	1.00
Ruxley	11	1.00	1.00
Swanscombe	11	1.00	1.00

5 Alternatives considered

Rejected Strategy 1 - Ruxley Primary Substation: Increased Transformer Capacity

The load at Ruxley Primary Substation was estimated to be approaching firm capacity by the end of ED1. By replacing the existing 15MVA transformers with 20/40MVA rated units, replacing the existing 11kV switchboard and overlaying the 33kV circuits the firm capacity could be increased by approximately 25MW. The project costs would be approximately £1.8m.

This option has been rejected as the load is no longer expected to grow by any significant amount in this area and therefore, the site will not reach firm capacity during ED1.

6 References

References	Description
Reference 1	Planning Load Estimates SPN Area 2011 – 2023 (27 February 2013)
Reference 2	NAMP LPN Table J Less Ind 19 th February 2014
Reference 3	A.R.P. Model July 2013
Reference 4	Engineering Recommendation P2/6
Reference 5	SPN 132kV System Diagram
Reference 6	SPN LTDS Network Schematics

6.1 Appendices

Appendix	Description
Appendix A	Geographical diagram
Appendix B	Single Line Diagram – Existing Network
Appendix C	Single Line Diagram – Recommended Strategy

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All of the cost numbers displayed in this document are before the application of on-going efficiencies and real price effects.

7 Document sign off

Sign-off of this Mandate certifies that the Sponsor has ratified the above and approval is sought to proceed to the development of the necessary PG&C Gate B documentation.

Recommended by:

Name	Role	Signature	Date
Sharon Green	Infrastructure Planner		
Tendai Matiringe	IDP Coordinator (SPN)		
Chris Winch	Planning Manager (South)		

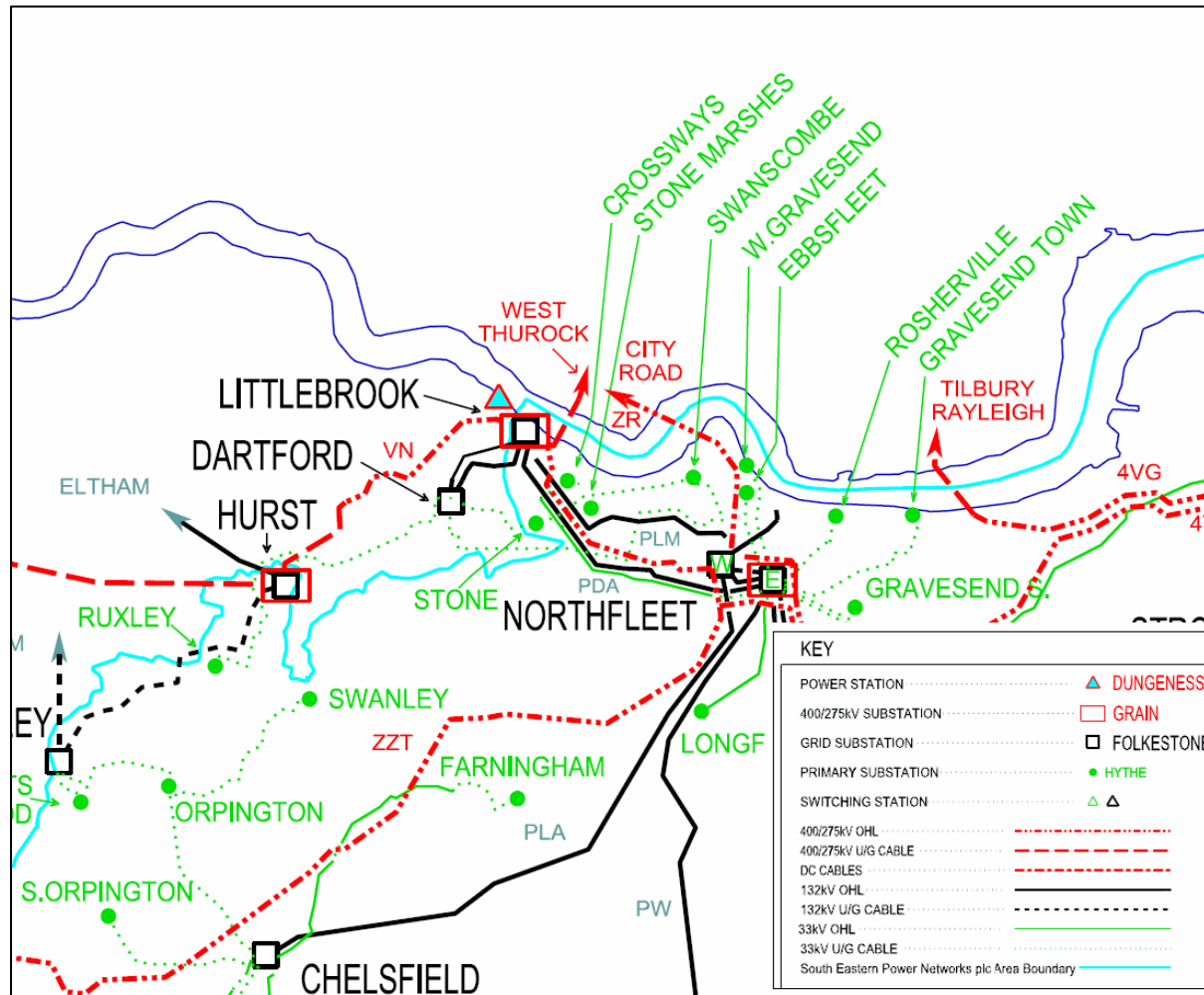
Approval by:

Name	Role	Signature	Date
Robert Kemp	Head of System Development	Robert Kemp	
Barry Hatton	Director of Asset Management	Barry Hatton	

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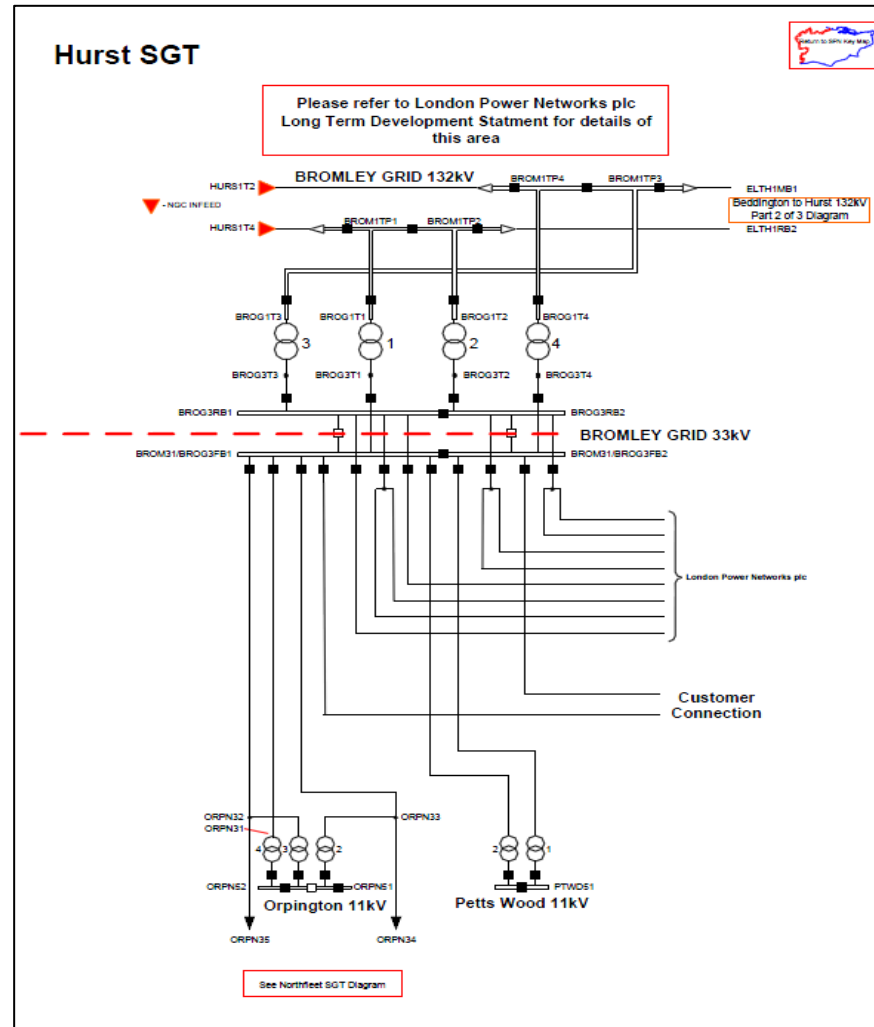
APPENDIX A: GEOGRAPHICAL DIAGRAM



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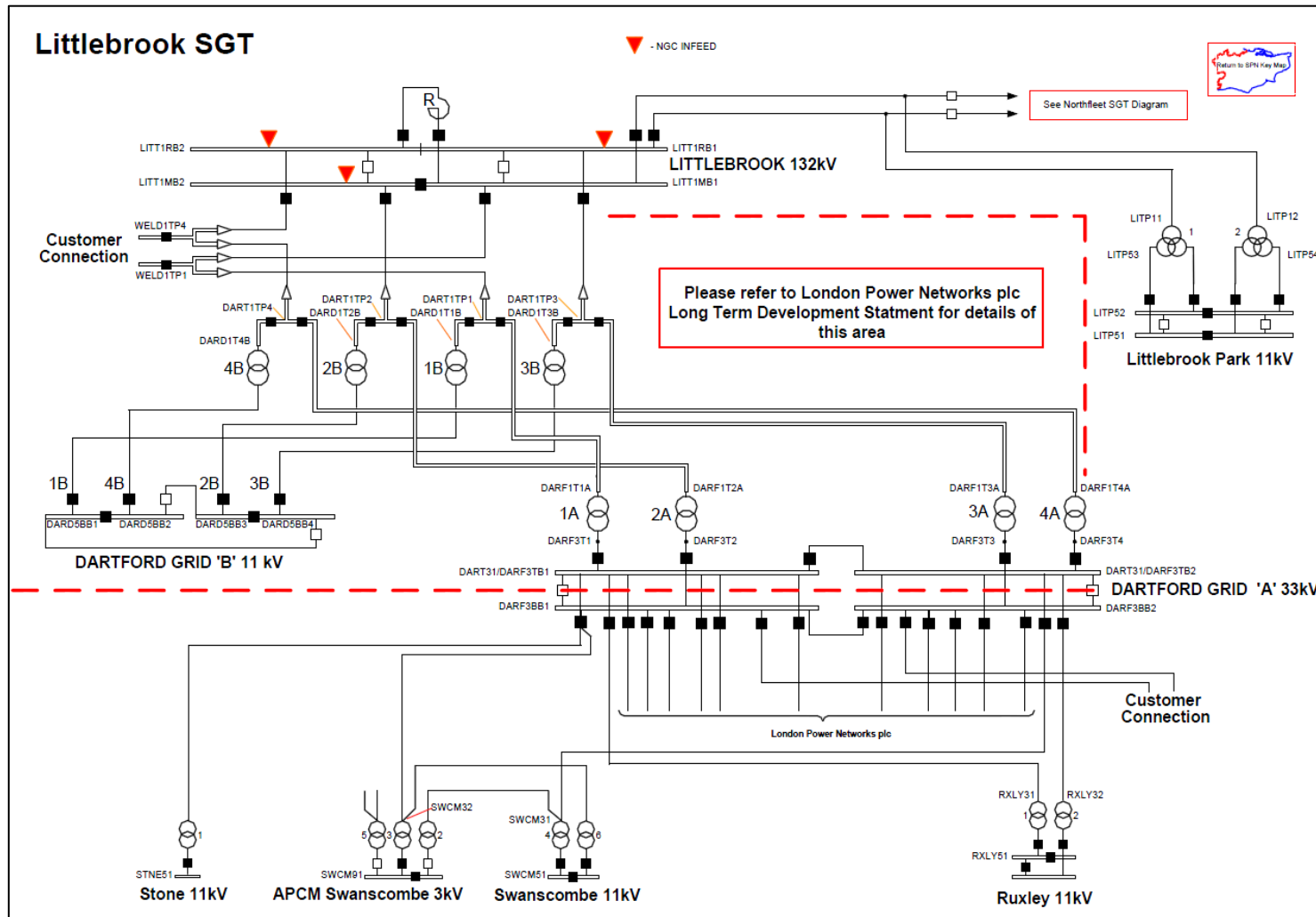
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APPENDIX B: SINGLE LINE DIAGRAM – EXISTING NETWORK



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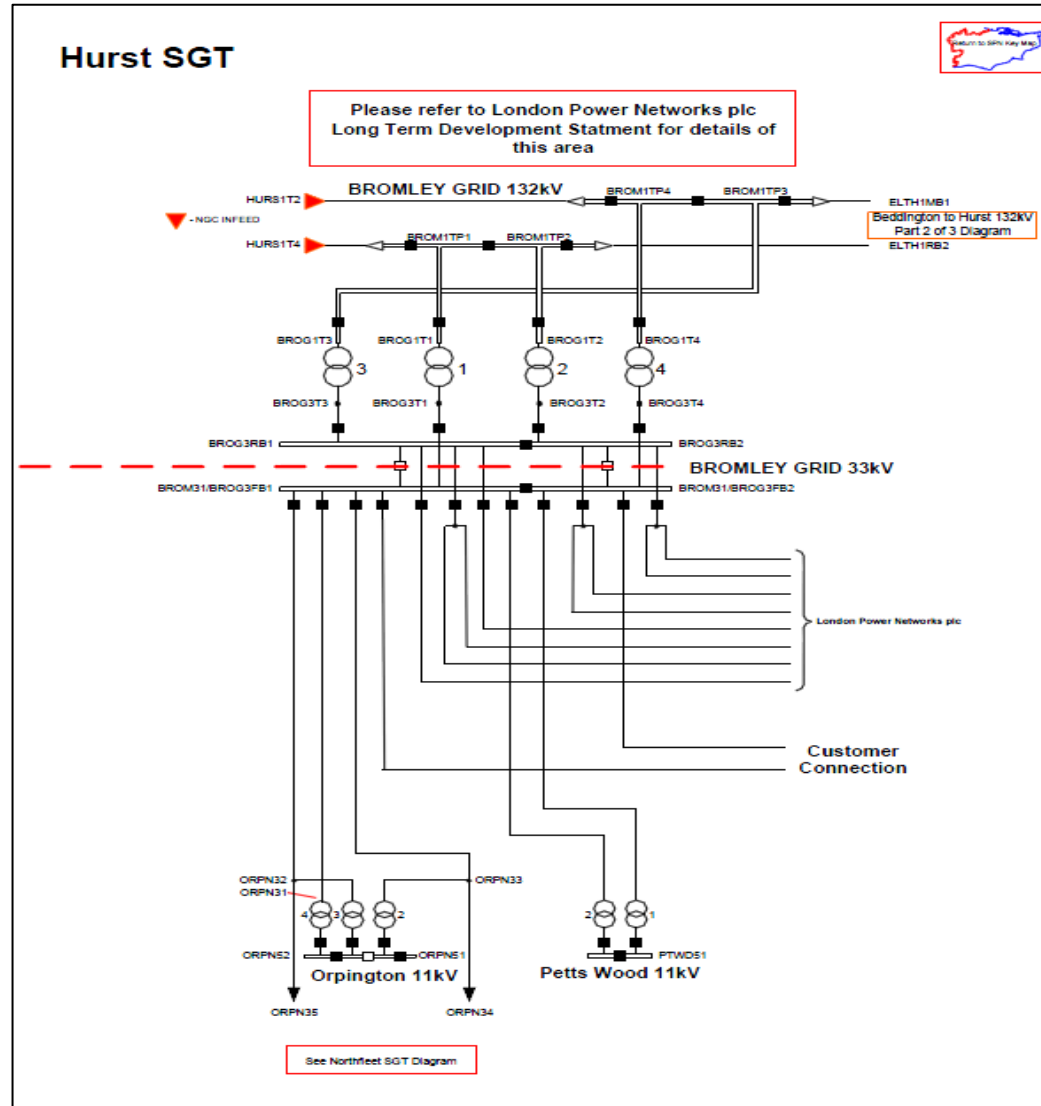
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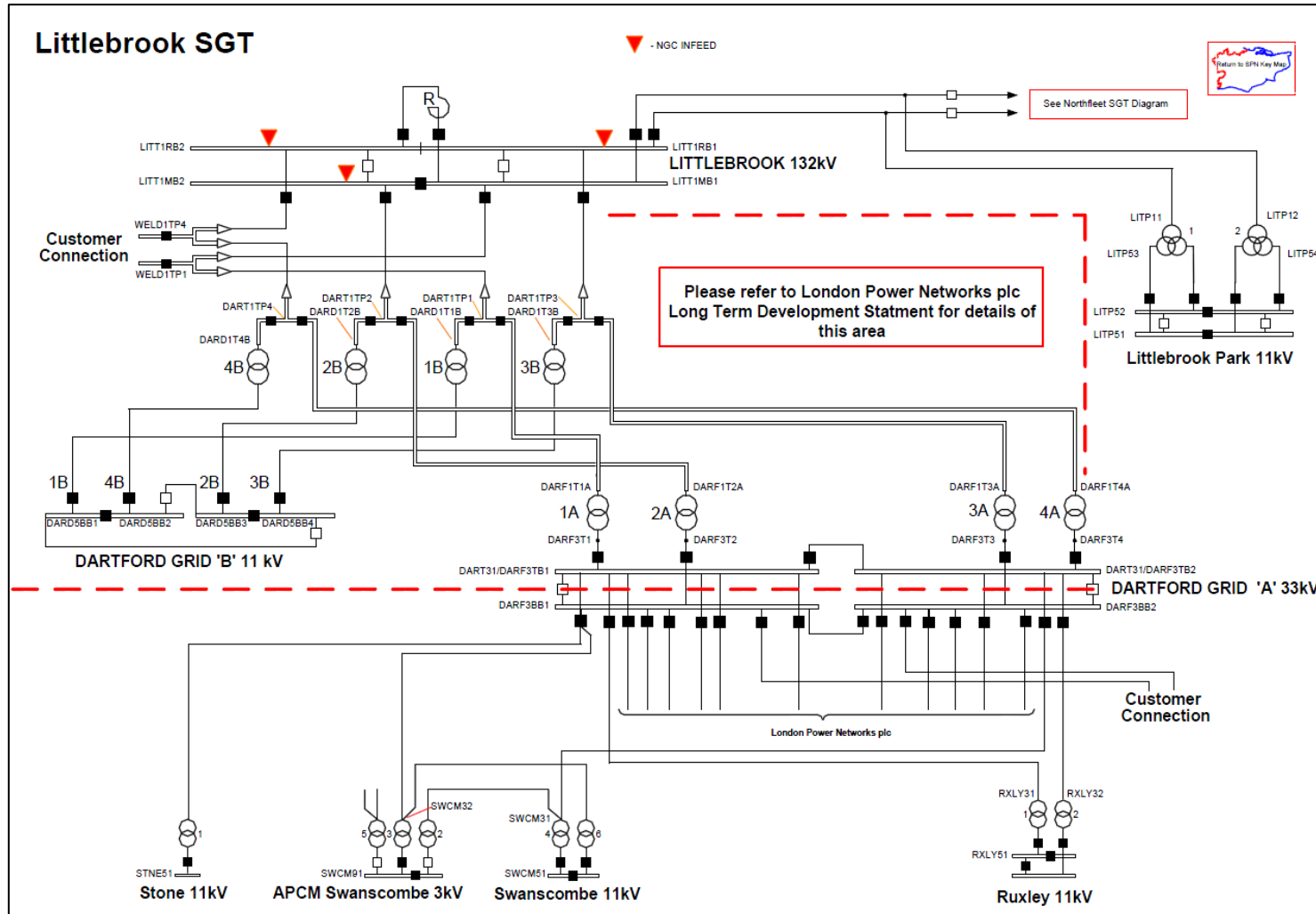
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APPENDIX C: SINGLE LINE DIAGRAM – RECOMMENDED STRATEGY



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APPENDIX D: P2/6 ASSESSMENT TABLES

Sub-station	P2/6	Type of Substation	Secondary Voltage	Firm Capacity (MW)	Transfer (MW)	P. F.	Winter 12/13 Summer 2012 (M W)	Winter 13/14 Summer 2013 (M W)	Winter 14/15 Summer 2014 (M W)	Winter 15/16 Summer 2015 (M W)	Winter 16/17 Summer 2016 (M W)	Winter 17/18 Summer 2017 (M W)	Winter 18/19 Summer 2018 (M W)	Winter 19/20 Summer 2019 (M W)	Winter 20/21 Summer 2020 (M W)	Winter 21/22 Summer 2021 (M W)	Winter 22/23 Summer 2022 (M W)
Littlebrook Park 132/11	YES		11kV	69.12	0.00	0.96	3.00	6.00	9.00	12.00	15.00	18.00	21.00	21.00	21.00	21.00	21.00
Littlebrook Park 132/11	YES		11kV	57.60	0.00	0.96	3.00	6.00	9.00	12.00	15.00	18.00	21.00	21.00	21.00	21.00	21.00
Littlebrook SGT	YES		400kV	553.00	0.00	0.96	3.00	6.00	9.00	12.00	15.00	18.00	21.00	21.00	21.00	21.00	21.00
Littlebrook SGT	YES		400kV	488.40	0.00	0.96	3.00	6.00	9.00	12.00	15.00	18.00	21.00	21.00	21.00	21.00	21.00
Littlebrook Site Supplies East 132/11	YES		11kV	0.00	0.00	0.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Littlebrook Site Supplies East 132/11	YES		11kV	0.00	0.00	0.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Sub-station	P2/6	Type of substation	Secondary Voltage	Firm Capacity (MW)	Transfer (MW)	P. F.	Winter 12/13 Summer 2012 (M W)	Winter 13/14 Summer 2013 (M W)	Winter 14/15 Summer 2014 (M W)	Winter 15/16 Summer 2015 (M W)	Winter 16/17 Summer 2016 (M W)	Winter 17/18 Summer 2017 (M W)	Winter 18/19 Summer 2018 (M W)	Winter 19/20 Summer 2019 (M W)	Winter 20/21 Summer 2020 (M W)	Winter 21/22 Summer 2021 (M W)	Winter 22/23 Summer 2022 (M W)
HURST 132kV	YES		132kV	461.20		0.96	275.08	276.35	278.75	281.49	284.02	302.61	305.32	308.12	311.02	315.16	319.37
HURST 132kV	YES		132kV	446.00		0.96	193.25	194.06	195.66	197.49	199.19	211.74	213.56	215.44	217.38	220.17	223.00
Orpington (SPN)	YES	SPN	11kV	45.26		0.99	32.54	32.44	32.41	32.44	32.52	32.57	32.64	32.72	32.81	33.11	33.39
Orpington (SPN)	YES	SPN	11kV	35.60		0.99	22.71	22.61	22.58	22.60	22.65	22.69	22.73	22.79	22.85	23.04	23.23
Petts Wood (SPN)	YES	SPN	11kV	21.90		0.96	11.24	11.24	11.32	11.42	11.53	11.57	11.63	11.68	11.75	11.92	12.09
Petts Wood (SPN)	YES	SPN	11kV	17.30		0.96	6.69	6.69	6.73	6.79	6.86	6.88	6.91	6.95	6.98	7.08	7.18