



Document 20
Asset Category – CAPEX/OPEX Overview
LPN

Asset Stewardship Report
2013

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Document History

Version	Date	Details	Originator	Revision Class	Section Update
1.0	28.02.14	Tables updated to align to current NAMP	Chino Atako	Minor	Sections 2,3 and 5
2.0	2.03.14	Cost and mapping tables updated to show direct mapping to RIGS tables	Chino Atako	Minor	Sections 2 and 3

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1.0 Executive Summary LPN Capex Opex overview

1.1 Scope

This document summarises UK Power Networks' proposals for LPN for non-load replacement expenditure, faults, inspection and maintenance, and tree cutting. It also details the relationship between UK Power Networks' Networks Asset Management Plan (NAMP) and Ofgem's regulatory reporting tables, along with the subsidiary documents containing the supporting information for the ED1 proposals.

1.2 Document Structure

Section 2 summarises expenditure by seven principal work categories for the eight-year ED1 regulatory period.

Section 3 provides an expanded breakdown of each of these seven work categories.

Section 4 contains the mapping expenditure of UK Power Network's NAMP (Network Asset Management Plan) to Ofgem's regulatory categories. Details of the document title where detailed supporting information and outputs can be found is included.

Section 5 includes a list of the titles of the document commentaries that describe the ED1 proposals in detail. With the exception of this document and *Document Commentary: Inspection, Maintenance and Faults*, all the document commentaries are in a similar format:

- 1.0 Short executive summary
- 2.0 Description of the assets/scope of the document
- 3.0 Investment drivers
- 4.0 Asset assessment
- 5.0 Intervention policies
- 6.0 Innovation
- 7.0 ED1 expenditure requirements. Asset volumes and expenditures are in sub-section 7.4
- 8.0 Deliverability.

Where sections are not appropriate they are left blank so the order and location of the content is in the same numbered section in each document.

2.0 LPN Capex Opex High-Level Plan

£676m is re required for non-load related plans in LPN, in RIIO-ED1. This consists of £306m for Operational expenditure (OPEX) and £370m for Capital expenditure (CAPEX). Table 1 shows the investment proposals by expenditure category and RIGS table.

Expenditure category	RIGS Tables	2016	2017	2018	2019	2020	2021	2022	2023	Grand Total (£k)
OPEX	CV13 – Inspection and Maintenance	15,447	15,702	15,746	16,010	15,992	15,997	14,211	13,885	122,990
	CV14 Tree Cutting	17	17	17	17	17	17	17	17	139
	CV15a – Faults (Troublecall)*	17,701	17,592	17,398	17,236	17,083	17,002	17,019	17,276	138,308
	CV15b – Faults (ONIs)	6,020	5,696	5,553	5,410	5,305	5,305	5,494	5,500	44,283
CAPEX	CV3 – Asset Replacement	44,278	45,664	36,614	36,434	39,461	40,523	36,745	34,778	314,496
	CV5 - Refurbishment	1,518	1,372	1,353	1,703	2,298	1,689	2,472	2,314	14,720
	CV8 – Legal and safety	9,248	8,133	5,239	5,451	5,288	5,042	1,282	1,064	40,747
	Grand Total (£k)	94,230	94,177	81,921	82,260	85,443	85,575	77,242	74,834	675,683

Table 1 – LPN Summary of non-load related investment proposals (in £k) (Source: 19th February NAMP, Table J Less Indirect, 21st February 2014 Business Plan submission)

*net of cost recoveries

3.0 LPN Capex Opex Plan: ED1 Proposals

Table 2 provides a more detailed breakdown of the OPEX and CAPEX investment proposals for RIIO-ED1.

RIGS Tables	NAMP line (GWP ID)	NAMP line description	2016	2017	2018	2019	2020	2021	2022	2023	Grand Total
	1.19	HV Asset Replacement	17	17	17	17	17	17	17	17	135
	1.44	LV Asset Replacement	149	149	149	149	149	149	149	142	1,185
	1.51	EHV Transformer Change	8	8	8	8	8	8	8	8	68
	2.02	Inspection: EHV Transformers	5	5	5	5	5	5	5	5	37
	2.03	Maintenance: EHV Transformers	306	306	306	306	306	306	306	306	2,449
	2.04	Defect Repair: EHV Transformers	260	265	265	270	271	276	277	281	2,165
	2.05	Inspection: Pressurised Cables	1,963	1,963	1,963	1,963	1,963	1,963	852	852	13,481
	2.06	Maintenance: Pressurised Cables	697	697	697	697	697	697	697	697	5,573
	2.07	Inspection: Solid Dielectric Cables	81	81	81	81	81	81	81	76	646
	2.08	Maintenance: Solid Dielectric Cables	472	473	474	475	476	477	478	454	3,779
	2.15	Inspection: EHV Switchgear	1	0	0	0	0	0	0	0	2
	2.16	Maintenance: EHV Switchgear	4	4	4	4	4	4	4	4	30
	2.17	Defect Repair: EHV Switchgear	61	62	62	65	64	65	65	66	509
	2.20	Defect Repair: 11kV Circuit Breakers	121	122	123	124	126	127	128	129	1,003
	2.21	Inspection: Distribution Substation Equipment	306	306	306	306	306	306	306	284	2,424
	2.22	Maintenance: Distribution Substation Equipment	44	44	44	44	44	44	44	44	351
CV13: Inspection and Maintenance	2.23	Defect Repair: Secondary G/M Substation Equipment	32	48	48	48	48	48	48	47	368
	2.25	Maintenance: Protection Equipment	592	592	592	592	592	592	592	592	4,735
	2.26	Defect Repair: Protection Equipment	16	16	16	16	16	16	16	16	127
	2.27	Inspection: Scada Equipment	18	18	18	18	17	17	17	16	140
	2.28	Maintenance: Scada Equipment	798	798	797	797	797	797	796	769	6,349
	2.30	Inspection: Buildings & Associated Civil Works	1,445	1,502	1,502	1,502	1,502	1,502	963	963	10,882
	2.32	Maintenance: Buildings & Associated Civil Works	2,036	2,039	2,039	2,039	2,039	2,039	2,039	2,039	16,311
	2.33	Defect Repair: Substation Civils	1,214	1,222	1,231	1,239	1,246	1,255	1,264	1,275	9,945
	2.34	Other Operational Responsibilities	14	14	14	14	14	14	14	13	109
	2.35	I & M of Unmetered Supplies	502	502	502	502	502	502	502	468	3,981
	2.36	Idle / Redundant Services	692	692	692	692	692	692	692	645	5,487
	2.41	Refurbish Plant	462	472	476	486	489	499	502	503	3,888
	2.45	Strategic Spares (I&M)	14	14	14	14	14	14	14	14	113
	4.02	Maintenance Power Transformers	436	557	522	769	593	653	593	584	4,707
	4.04	EHV Switchgear Maintenance	327	351	335	370	408	355	348	309	2,802
	4.05	Grid & Primary S/S Inspection	222	222	222	222	222	222	222	222	1,775
	4.06	Grid/Primary CB Maintenance	281	265	295	304	382	351	305	280	2,462

	4.07	Secondary S/S Inspection	1,133	1,133	1,145	1,133	1,133	1,133	1,133	1,075	9,018
	4.08	Secondary S/S maintenance	660	681	714	670	683	708	676	628	5,421
	4.21	Overhead Line Inspection	5	6	5	4	6	5	5	5	38
	4.24	Grid/Primary 11/6.6kV tx/bus-sections/couplers & interconnector CB Maintenance	53	55	62	64	76	57	51	56	475
	4.25	FFC Inspection	3	3	3	3	3	3	3	3	21
CV13 Total			15,447	15,702	15,746	16,010	15,992	15,997	14,211	13,885	122,990
CV14: Tree cutting	2.43	Tree Management	17	17	17	17	17	17	17	17	139
CV14 Total			17	17	17	17	17	17	17	17	139
CV15a: Faults (Troublecall)	2.01	Emergency Asset Repair	16,994	16,868	16,661	16,480	16,314	16,221	16,220	16,459	132,217
	2.50	Emergency Asset Replacement (Services)	140	140	140	140	140	140	140	140	1,117
	3.01	Cable Damage	567	585	598	616	629	642	660	677	4,974
CV15a Total			17,701	17,592	17,398	17,236	17,083	17,002	17,019	17,276	138,308
CV15b: Faults (ONIs)	2.01	Emergency Asset Repair	4,010	4,016	4,022	4,025	4,025	4,025	4,025	4,027	32,175
	2.41	Refurbish Plant	2	2	2	2	2	2	2	2	14
	2.50	Emergency Asset Replacement (Services)	540	360	360	360	360	360	549	553	3,441
	3.02	Street Lighting	891	884	878	874	874	874	874	875	7,024
	3.05	South East NTR Miscellaneous	578	435	292	149	44	44	44	44	1,629
CV15b Total			6,020	5,696	5,553	5,410	5,305	5,305	5,494	5,500	44,283
CV3: Asset replacement	1.01	Battery Replacements	383	417	666	757	810	588	710	945	5,276
	1.02	Tower Line Refurbishment	0	0	289	681	46	77	0	0	1,093
	1.03	Transformer Noise Reduction	0	0	0	0	0	0	0	0	1
	1.07	EHV Cable Replacement other than Fluid Filled	12,853	8,013	2,685	4,125	3,882	952	952	940	34,400
	1.17	Service Terminations	1,063	709	355	355	355	425	711	711	4,682
	1.18	HV / LV Cable Replacements	1,137	1,137	1,137	1,137	1,137	1,137	1,137	1,137	9,093
	1.19	HV Asset Replacement	1,266	1,266	1,266	1,266	1,266	1,266	1,266	1,266	10,127
	1.26	Protection Asset Replacement	151	174	205	205	205	205	205	205	1,557
	1.29	Fluid Filled Cable Replacement	3,218	10,326	3,479	4,010	8,353	17,819	11,775	14,804	73,784
	1.31	Fluid Filled Cable Refurbishment & Enhanced Repair	390	390	390	390	390	390	360	239	2,938
	1.44	LV Asset Replacement	6,698	6,698	6,698	6,698	6,698	6,698	6,698	6,698	53,584
	1.46	Service Replacement	57	57	57	55	47	47	47	47	415
	1.48	EHV Switchgear Change	1,809	5,235	9,799	2,392	163	715	251	395	20,760
	1.49	Distribution Switchgear Replacement	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	24,000
	1.50	11kV Switchboard Replacement	1,717	2,078	2,556	2,091	1,358	2,140	1,494	1,667	15,101
	1.51	EHV Transformer Change	9,847	5,473	3,345	8,584	11,063	4,375	7,452	2,038	52,178
	1.55	Miscellaneous EHV Asset Replacement	82	82	81	80	80	80	80	80	646
2.36	Idle / Redundant Services	12	12	12	12	12	12	12	12	93	
2.50	Emergency Asset Replacement (Services)	596	596	596	596	596	596	596	596	4,769	
CV3 Total			44,278	45,664	36,614	36,434	39,461	40,523	36,745	34,778	314,496
CV5:	1.05	Enhance Protection	74	83	92	92	92	91	76	43	643

Refurbishment	1.26	Protection Asset Replacement	962	1,084	1,171	1,236	1,440	1,440	1,440	1,410	10,182
	1.48	EHV Switchgear Change	0	0	0	0	0	0	0	184	184
	1.50	11kV Switchboard Replacement	318	79	90	376	647	90	323	463	2,385
	1.51	EHV Transformer Change	165	125	0	0	120	69	163	214	856
	1.55	Miscellaneous EHV Asset Replacement	0	0	0	0	0	0	471	0	471
CV5 Total			1,518	1,372	1,353	1,703	2,298	1,689	2,472	2,314	14,720
	1.08	Substation Security	4,350	3,202	332	332	332	332	332	332	9,547
	1.13	ESQC Regs Fixed Project Work	27	27	27	27	27	27	27	27	215
	1.18	HV / LV Cable Replacements	425	425	425	425	425	425	7	7	2,564
	1.20	Safety HV Reinforcement - Primary Substations	654	651	651	651	651	592	416	374	4,641
	1.33		70	101	111	58	30	74	39	80	563
CV8: Legal and Safety	1.35	EHV Reinforcement - Substations	105	39	21	45	80	107	112	33	541
	1.47	Civil Replacement	3,293	3,293	3,293	3,293	3,293	3,293	0	0	19,760
	1.48	EHV Switchgear Change	12	35	47	10	0	0	0	11	114
	1.50	11kV Switchboard Replacement	56	74	85	62	39	30	57	67	470
	1.51	EHV Transformer Change	174	204	165	466	329	80	211	66	1,694
	2.33	Defect Repair: Substation Civils Customer Ops Miscellaneous CAPEX	27	27	27	27	27	27	27	27	212
	2.51		55	55	55	55	55	55	55	41	426
CV8 Total			9,248	8,133	5,239	5,451	5,288	5,042	1,282	1,064	40,747
Grand Total			94,230	94,177	81,921	82,260	85,443	85,575	77,242	74,834	675,683

Table 2 – Investment proposals (in £k) on LPN non-load related NAMP lines (Sources: 19th February NAMP - Table J Less Indirect; 21st February 2014 Business Plan submission)

4.0 LPN Capex Opex Plan: NAMP and RIGS Mapping and ED1 Commentary Document Mapping

Work category	GWP description	Commentary document name	Asset Stewardship Report	RIGs
Asset replacement CV3	1.01 – battery replacements	Batteries	21	CV3 Additions Row 51 - HV - Batteries at GM HV Substations Row 85 - EHV - Batteries at 33kV Substations Row 86 - EHV - Batteries at 66kV Substations Row 102 - 132kV - Batteries at 132kV Substations Removals Row 179 - HV - Batteries at GM HV Substations Row 213 - EHV - Batteries at 33kV Substations Row 214 - EHV - Batteries at 66kV Substations Row 230 - 132kV - Batteries at 132kV Substations
	1.02 – tower line refurbishment	Towers and conductors	1	CV3 Additions Row 59 - EHV - 66kV OHL Conductor Row 60 - EHV - 66kV Tower Row 61 - EHV - 66kV Fittings Row 89 - 132kV - 132kV OHL (Tower Line) Conductor Row 90 - 132kV - 132kV Tower Row 91 - 132kV - 132kV Fittings Removals Row 187 - EHV - 66kV OHL Conductor Row 188 - EHV - 66kV Tower Row 189 - EHV - 66kV Fittings Row 217 - 132kV - 132kV OHL (Tower Line) Conductor Row 218 - 132kV - 132kV Tower Row 219 - 132kV - 132kV Fittings
	1.07 – EHV cable replacement other than fluid-filled	Cables	3	CV3 Additions Row 62 - EHV - 33kV UG Cable (Non Pressurised) Row 65 - EHV - 66kV UG Cable (Non Pressurised) Removals Row 190 - EHV - 33kV UG Cable (Non Pressurised) Row 193 - EHV - 66kV UG Cable (Non Pressurised)
	1.17 – service terminations	Service terminations, cut-outs, R&Ls	11	CV3 Additions Row 20 - LV - Cut Out (Metered) Removals Row 148 - LV - Cut Out (Metered)
	1.18 – HV/LV cable replacements	Cables	3	CV3 Additions Row 9 - LV - LV Main (UG Consac) Row 10 - LV - LV Main (UG Plastic) Row 11 - LV - LV Main (UG Paper) Row 29 - HV - 6.6/11kV UG Cable Row 30 - HV - 20kV UG Cable Removals Row 137 - LV - LV Main (UG Consac) Row 138 - LV - LV Main (UG Plastic) Row 139 - LV - LV Main (UG Paper) Row 157 - HV - 6.6/11kV UG Cable Row 158 - HV - 20kV UG Cable

1.19 – HV asset replacement	HV switchgear and LV plant wood pole distribution transformers	8 9	<p>CV3 Additions</p> <p>Row 48 - HV - 6.6/11kV Transformer (GM) Row 50 - HV - 20kV Transformer (GM)</p> <p>Removals</p> <p>Row 176 - HV - 6.6/11kV Transformer (GM) Row 178 - HV - 20kV Transformer (GM)</p>
1.31 – fluid-filled cable refurbishment and enhanced repair	Cables	3	<p>CV3 Additions</p> <p>Row 63 - EHV - 33kV UG Cable (Oil) Row 64 - EHV - 33kV UG Cable (Gas) Row 66 - EHV - 66kV UG Cable (Oil) Row 67 - EHV - 66kV UG Cable (Gas) Row 93 - 132kV - 132kV UG Cable (Oil) Row 94 - 132kV - 132kV UG Cable (Gas)</p> <p>Removals</p> <p>Row 191 - EHV - 33kV UG Cable (Oil) Row 192 - EHV - 33kV UG Cable (Gas) Row 194 - EHV - 66kV UG Cable (Oil) Row 195 - EHV - 66kV UG Cable (Gas) Row 221 - 132kV - 132kV UG Cable (Oil) Row 222 - 132kV - 132kV UG Cable (Gas)</p>
1.44 – LV asset replacement switches	HV switchgear and LV plant	8	<p>CV3 Additions</p> <p>Row 15 - LV - LV Circuit Breaker Row 16 - LV - LV Pillar (ID) Row 17 - LV - LV Pillar (OD at Substation) Row 18 - LV - LV Board (WM) Row 19 - LV - LV UGB & LV Pillars (OD not at Substation)</p> <p>Removals</p> <p>Row 143 - LV - LV Circuit Breaker Row 144 - LV - LV Pillar (ID) Row 145 - LV - LV Pillar (OD at Substation) Row 146 - LV - LV Board (WM) Row 147 - LV - LV UGB & LV Pillars (OD not at Substation)</p>
1.46 – service replacement	Service terminations, cut-outs, R&Ls	11	<p>CV3 Additions</p> <p>Row 13 - LV - LV Service (UG) Row 14 - LV - LV Service associated with RLM</p> <p>Removals</p> <p>Row 141 - LV - LV Service (UG) Row 142 - LV - LV Service associated with RLM</p>
1.48 – EHV switchgear change	EHV and 132kV switchgear	5,6	<p>CV3 Additions</p> <p>Row 69 - EHV - 33kV CB (Air Insulated Bus bars)(ID) (GM) Row 70 - EHV - 33kV CB (Air Insulated Busbars)(OD) (GM) Row 71 - EHV - 33kV CB (Gas Insulated Busbars)(ID) (GM) Row 72 - EHV - 33kV CB (Gas Insulated Busbars)(OD) (GM) Row 73 - EHV - 33kV Switch (GM) Row 74 - EHV - 33kV Switchgear - Other Row 76 - EHV - 33kV RMU Row 77 - EHV - 66kV CB (Air Insulated Busbars)(ID) (GM) Row 78 - EHV - 66kV CB (Air Insulated Busbars)(OD) (GM) Row 79 - EHV - 66kV CB (Gas Insulated Busbars)(ID) (GM) Row 80 - EHV - 66kV CB (Gas Insulated Busbars)(OD) (GM) Row 81 - EHV - 66kV Switchgear - Other Row 96 132kV Switchgear 132kV CB (Air Insulated Busbars)(ID) (GM) Row 97 132kV Switchgear 132kV CB (Air Insulated</p>

			<p>Busbars)(OD) (GM) Row 98 132kV Switchgear 132kV CB (Gas Insulated Busbars)(ID) (GM) Row 99 132kV Switchgear 132kV CB (Gas Insulated Busbars)(OD) (GM) Row 100 132kV Switchgear 132kV Switchgear - Other</p> <p>Removals Row 197 - EHV - 33kV CB (Air Insulated Busbars)(ID) (GM) Row 198 - EHV - 33kV CB (Air Insulated Busbars)(OD) (GM) Row 199 - EHV - 33kV CB (Gas Insulated Busbars)(ID) (GM) Row 200 - EHV - 33kV CB (Gas Insulated Busbars)(OD) (GM) Row 201 - EHV - 33kV Switch (GM) Row 202 - EHV - 33kV Switchgear - Other Row 204 - EHV - 33kV RMU Row 205 - EHV - 66kV CB (Air Insulated Busbars)(ID) (GM) Row 206 - EHV - 66kV CB (Air Insulated Busbars)(OD) (GM) Row 207 - EHV - 66kV CB (Gas Insulated Busbars)(ID) (GM) Row 208 - EHV - 66kV CB (Gas Insulated Busbars)(OD) (GM) Row 209 - EHV - 66kV Switchgear - Other Row 224 132kV Switchgear 132kV CB (Air Insulated Busbars)(ID) (GM) Row 225 132kV Switchgear 132kV CB (Air Insulated Busbars)(OD) (GM) Row 226 132kV Switchgear 132kV CB (Gas Insulated Busbars)(ID) (GM) Row 227 132kV Switchgear 132kV CB (Gas Insulated Busbars)(OD) (GM) Row 228 132kV Switchgear 132kV Switchgear - Other</p>
1.49 – distribution switchgear replacement	HV switchgear and LV	8	<p>CV3 Additions Row 34 - HV - 6.6/11kV CB (GM) Secondary Row 37 - HV - 6.6/11kV Switch (GM) Row 38 - HV - 6.6/11kV RMU Row 39 - HV - 6.6/11kV X-type RMU</p> <p>Removals Row 162 - HV - 6.6/11kV CB (GM) Secondary Row 163 - HV - 6.6/11kV Switch (GM) Row 166 - HV - 6.6/11kV RMU Row 167 - HV - 6.6/11kV X-type RMU</p>
1.50 – 11kV switchboard replacement	11kV switchgear	7	<p>CV3 Additions Row 33 - HV - 6.6/11kV CB (GM) Primary</p> <p>Removals Row 161 - HV - 6.6/11kV CB (GM) Primary</p>
1.51 – EHV transformer change	G&P transformers	4	<p>CV3 Additions Row 83 - EHV - 33kV Transformer (GM) Row 84 - EHV - 66kV Transformer Row 101 - 132kV - 132kV Transformer</p> <p>Removals Row 211 - EHV - 33kV Transformer (GM) Row 212 - EHV - 66kV Transformer Row 229 - 132kV - 132kV Transformer</p>
1.55 – miscellaneous EHV asset replacement	As applicable	As applicable	<p>CV3 Additions Row 69 - EHV - 33kV CB (Air Insulated Busbars)(ID) (GM) Row 70 - EHV - 33kV CB (Air Insulated Busbars)(OD) (GM) Row 71 - EHV - 33kV CB (Gas Insulated Busbars)(ID) (GM) Row 72 - EHV - 33kV CB (Gas Insulated Busbars)(OD) (GM) Row 73 - EHV - 33kV Switch (GM) Row 74 - EHV - 33kV Switchgear - Other Row 76 - EHV - 33kV RMU Row 77 - EHV - 66kV CB (Air Insulated Busbars)(ID) (GM) Row 78 - EHV - 66kV CB (Air Insulated Busbars)(OD) (GM) Row 79 - EHV - 66kV CB (Gas Insulated Busbars)(ID) (GM) Row 80 - EHV - 66kV CB (Gas Insulated Busbars)(OD) (GM) Row 81 - EHV - 66kV Switchgear - Other Row 83 - EHV - 33kV Transformer (GM) Row 84 - EHV - 66kV Transformer</p>

				Row 101 - 132kV - 132kV Transformer Removals Row 197 - EHV - 33kV CB (Air Insulated Busbars)(ID) (GM) Row 198 - EHV - 33kV CB (Air Insulated Busbars)(OD) (GM) Row 199 - EHV - 33kV CB (Gas Insulated Busbars)(ID) (GM) Row 200 - EHV - 33kV CB (Gas Insulated Busbars)(OD) (GM) Row 201 - EHV - 33kV Switch (GM) Row 202 - EHV - 33kV Switchgear - Other Row 204 - EHV - 33kV RMU Row 205 - EHV - 66kV CB (Air Insulated Busbars)(ID) (GM) Row 206 - EHV - 66kV CB (Air Insulated Busbars)(OD) (GM) Row 207 - EHV - 66kV CB (Gas Insulated Busbars)(ID) (GM) Row 208 - EHV - 66kV CB (Gas Insulated Busbars)(OD) (GM) Row 209 - EHV - 66kV Switchgear - Other Row 210 - EHV - 33kV Transformer (GM) Row 212 - EHV - 66kV Transformer Row 229 - 132kV - 132kV Transformer
	2.50 – emergency asset replacement (services)	All	8	CV3 Additions CV3 Row - 19; Switchgear - LV UGB & LV Pillars (OD not at Substation) Removals CV3 Row - 147; Switchgear - LV UGB & LV Pillars (OD not at Substation)
Asset replacement CV3	1.29 – fluid-filled cable replacement	Cables	3	Additions Row 63 - EHV - 33kV UG Cable (Oil) Row 64 - EHV - 33kV UG Cable (Gas) Row 66 - EHV - 66kV UG Cable (Oil) Row 67 - EHV - 66kV UG Cable (Gas) Row 93 - 132kV - 132kV UG Cable (Oil) Row 94 - 132kV - 132kV UG Cable (Gas) Removals Row 191 - EHV - 33kV UG Cable (Oil) Row 192 - EHV - 33kV UG Cable (Gas) Row 194 - EHV - 66kV UG Cable (Oil) Row 195 - EHV - 66kV UG Cable (Gas) Row 221 - 132kV - 132kV UG Cable (Oil) Row 222 - 132kV - 132kV UG Cable (Gas)
ESQC CV2/CV8	1.13 – ESQC regs fixed project work	ESQCR	12	CV8 Row - 14 Other - Provision of Warning Signs
Faults CV15a/CV15b	2.01 – emergency asset repair	I&M and faults (electrical assets)	14	Various row CV15a and CV15b
	2.50 – emergency asset replacement (services)	I&M and faults (electrical assets)		
	3.05 – South East NTR miscellaneous	I&M and faults (electrical assets)		
Inspection and Maintenance CV13	2.02 – inspect EHV transformers	I&M and faults (electrical assets)	14	CV13 Row - 72; Inspections - Substation (132 kV)
	2.04 - Defect Repair: EHV Transformers			CV13 Row - 48; Repair & Maintenance - Transformers (33 kV) Row - 76; Repair & Maintenance - Transformers (132 kV)
	2.05 – inspect pressurised cables			CV13 Row 42 - 33 kV - Inspections Row 56 - 66 kV - Inspections Row 70 - 132 kV - Inspections
	2.07 – inspect solid dielectric cables			CV13 Row 16 - LV - Inspections Row 21 - HV - Inspections Row 42 - 33 kV - Inspections Row 56 - 66 kV - Inspections Row 70 - 132 kV - Inspections
	2.15 – inspect EHV switchgear			CV13 Row - 44; Inspections - Substation (33 kV) Row - 72; Inspections - Substation (132 kV)
	2.21 – inspect distribution substation equipment			CV13 Row 23 - HV - Inspections Row 24 - HV - Inspections
	2.27 – inspect Scada equipment			N/A
	2.30 – inspect buildings and associated civil works			CV13 Row - 21; Inspections - Underground Cable (HV) Row - 44; Inspections - Substation (33 kV) Row - 70; Inspections - Underground Cable (132 kV)

		Row - 72; Inspections - Substation (132 kV) Row - 78; Inspections - Cable Tunnel (All voltages) Row - 79; Repair & Maintenance - Cable Tunnel (All voltages) Row - 80; Inspections - Cable Bridge (All voltages)
	2.34 – other operational responsibilities	CV13 Row - 23; Inspections - Substations - GM Indoor & Outdoor (HV) Row - 70; Inspections - Underground Cable (132 kV) Row - 72; Inspections - Substation (132 kV)
	4.05 – grid and primary substation inspection	CV13 Row 72 - 132 kV - Inspections Row 58 - 66 kV - Inspections Row 44 - 33 kV - Inspections
	4.07 – secondary substation inspection	CV13 Row 23 - HV - Inspections Row 24 - HV - Inspections
	4.21 – overhead line inspection	CV13 Row 50 - 66kV - Inspections - Helicopter Row 51 - 66kV - Inspections - Foot Patrol Row 53 - 66kV - Inspections - Helicopter Row 54 - 66 kV - Inspections Row 64 - 132 kV - Inspections - Helicopter Row 65 - 132 kV - Inspections - Foot Patrol Row 67 - 132 kV - Inspections - Helicopter Row 68 - 132 kV - Inspections - Foot Patrol
	4.25 – FFC inspection	CV13 Row 42 - 33 kV - Inspections Row 56 - 66 kV - Inspections Row 70 - 132 kV - Inspections
	4.27 – rising and laterals Inspection	CV13 Row 89 - LV - Mains Inspected
Inspection and Maintenance CV13	2.03 – maintenance EHV transformers	CV13 Row 48 - 33 kV - Repair & Maintenance Row 62 - 66 kV - Repair & Maintenance
	2.04 – defect rep EHV transformers	CV13 Row 48 - 33 kV - Repair & Maintenance Row 62 - 66 kV - Repair & Maintenance
	2.06 – maintenance pressurised cables	CV13 Row 43 - 33 kV - Repair & Maintenance Row 57 - 66 kV - Repair & Maintenance Row 71 - 132 kV - Repair & Maintenance
	2.08 – maintenance solid dielectric cables	CV13 Row 17 - LV - Repair & Maintenance Row 22 - HV - Repair & Maintenance Row 43 - 33 kV - Repair & Maintenance Row 57 - 66 kV - Repair & Maintenance Row 71 - 132 kV - Repair & Maintenance
	2.1 – maintenance overhead lines on steel supports	CV13 Row 55 - 66 kV - Repair & Maintenance Row 69 - 132 kV - Repair & Maintenance

2.14 – defect rep wood pole overhead line	CV13 Row 52 - 66 kV - Repair & Maintenance Row 66 - 132 kV - Repair & Maintenance
2.16 – maintenance EHV switchgear	CV13 Row 46 - 33 kV - Repair & Maintenance Row 60 - 66 kV - Repair & Maintenance
2.17 – defect rep EHV switchgear	CV13 Row 46 - 33 kV - Repair & Maintenance Row 60 - 66 kV - Repair & Maintenance
2.2 – defect rep 11kV circuit breakers	CV13 Row 30 - HV - Repair & Maintenance
2.22 – maintenance distribution substation equipment	CV13 Row 30 - HV - Repair & Maintenance Row 32 - HV - Repair & Maintenance Row 33 - HV - Repair & Maintenance Row 27 - HV - Repair & Maintenance Row 28 - HV - Repair & Maintenance
2.23 – defect rep secondary G/M substation equipment	Row 25 - HV - Repair & Maintenance (Civil Works) Row 26 - HV - Repair & Maintenance (Civil Works)
2.25 – maintenance protection equipment	Row 31 - HV - Repair & Maintenance Row 47 - 33 kV - Repair & Maintenance Row 61 - 66 kV - Repair & Maintenance Row 75 - 132 kV - Repair & Maintenance
2.26 – defect rep protection equipment	Row 31 - HV - Repair & Maintenance Row 47 - 33 kV - Repair & Maintenance Row 61 - 66 kV - Repair & Maintenance Row 75 - 132 kV - Repair & Maintenance
2.28 – maintenance Scada equipment	
2.32 – maintenance buildings and associated civil works	Row 25 - HV - Repair & Maintenance (Civil Works) Row 26 - HV - Repair & Maintenance (Civil Works) Row 45 - 33 kV - Repair & Maintenance (Civil Works) Row 59 - 66 kV - Repair & Maintenance (Civil Works) Row 73 - 132 kV - Repair & Maintenance (Civil Works)
2.33 – defect rep substation civils	Row 25 - HV - Repair & Maintenance (Civil Works) Row 26 - HV - Repair & Maintenance (Civil Works) Row 45 - 33 kV - Repair & Maintenance (Civil Works) Row 59 - 66 kV - Repair & Maintenance (Civil Works) Row 73 - 132 kV - Repair & Maintenance (Civil Works)
4.02 – maintenance power transformers	Row 76 - 132 kV - Repair & Maintenance
4.04 – EHV switchgear maintenance	Row 46 - 33 kV - Repair & Maintenance Row 60 - 66 kV - Repair & Maintenance
4.06 – grid/primary CB maintenance	Row 74 - 132 kV - Repair & Maintenance Row 60 - 66 kV - Repair & Maintenance Row 46 - 33 kV - Repair & Maintenance
4.08 – secondary substation maintenance	Row 25 - HV - Repair & Maintenance (Civil Works) Row 26 - HV - Repair & Maintenance (Civil Works)

	4.22 – overhead line maintenance			CV13 Row 52 - 66 kV - Repair & Maintenance Row 55 - 66 kV - Repair & Maintenance Row 66 - 132 kV - Repair & Maintenance Row 69 - 132 kV - Repair & Maintenance
	4.24 – grid/primary 11/6.6kV tx/bus-sections/ couplers and interconnector CB maintenance			CV13 Row 74 - 132 kV - Repair & Maintenance Row 60 - 66 kV - Repair & Maintenance Row 46 - 33 kV - Repair & Maintenance Row 30 - HV - Repair & Maintenance
Tree management	2.43 – tree management	Trees	22	CV14 Various rows

Table 3 – NAMP to RIGS mapping

5.0 LPN: List of Titles of Document Commentaries

Table 4 provides the list of asset stewardship reports which contain the supporting commentaries for the RIIO-ED1 investment proposals.

Document	Asset category	Asset lead	Asset lead Manager	Asset Management Project Manager	Asset Man. SMT
1	Towers and Conductors	Nick Xydas	Paul Elliott	Jon Bendall	Richard Wakelen
2	Wood poles and conductors	Rob Lafferty	Ian Butler	Jon Bendall	Richard Wakelen
3	Cables	Faisal Khazada	Paul Elliott	Jon Bendall	Richard Wakelen
4	G&P Transformers	Andrew Stephen	Paul Elliott	Jon Bendall	Richard Wakelen
5	132 kV Switchgear	Richard Gould	Paul Elliott	Jon Bendall	Richard Wakelen
6	EHV Switchgear	Richard Gould	Paul Elliott	Jon Bendall	Richard Wakelen
7	11KV Switchgear	Brian Matthews	Paul Elliott	Jon Bendall	Richard Wakelen
8	HV Switchgear & LV Plant	Zoe Cornish	Ian Butler	Jon Bendall	Richard Wakelen
9	Distribution Transformers	Chino Atako	Ian Butler	Jon Bendall	Richard Wakelen
10	Civils (CAPEX & OPEX)	Helen Amare	Mark Dunk	Steve Mockford	Steve Mockford
11	Service Terminations, Cut-outs, R&L's	Chino Atako	Ian Butler	Jon Bendall	Richard Wakelen
12	ESQCR	Manjula Singh	Chino Atako	Jon Bendall	Richard Wakelen
13	Protection and control (CAPEX & OPEX)	David Jeyakumar	Kevin Burt	Steve Mockford	Steve Mockford
14	I&M and Faults (electrical assets)	Adedoja Olatunji	Chino Atako	Jon Bendall	Richard Wakelen

14a	Central London Plan	Chino Atako	Chino Atako	Jon Bendall	Richard Wakelen
15	Model Overview	Ian Butler	Ian Butler	Jon Bendall	Richard Wakelen
16	Cable Pits	Jeremy Wright	Jeremy Wright	Jon Bendall	Richard Wakelen
17	BT21 (CAPEX & OPEX)	David Jeyakumar	Kevin Burt	Steve Mockford	Steve Mockford
18	Black Start (CAPEX & OPEX)	David Jeyakumar	Kevin Burt	Steve Mockford	Steve Mockford
19	RTU	James Ford	Kevin Burt	Steve Mockford	Steve Mockford
20	CAPEX - OPEX overview	Chino Atako	Chino Atako	Jon Bendall	Richard Wakelen
21	Batteries	Brian Matthews	Paul Elliott	Jon Bendall	Richard Wakelen
22	Tree Cutting	Ian Draper	Chino Atako	Jon Bendall	Richard Wakelen

Table 4 - List of commentaries supporting the RIIO-ED1 submission

6.0 Glossary

Acronym	Definition
ABC	Aerial Bundled Conductor
ABSD	Air Break Switch Disconnectors
ACB	Air Circuit Breaker
AP	Authorised Person
ARP	Asset Risk and Prioritisation
ASC	Arc Suppression Coil
BSP	Bulk Supply Point
BT	British Telecom. The company that supplies most of the existing rented SCADA circuits
BT21CN	BT's project to upgrade the UK's telephone and data network
CAPEX	Capital Expenditure
CAT	Completeness, Accuracy and Timeliness
CB	Circuit Breaker
CCTV	Closed Circuit Television
CDL	Central Document Library
CDM	Construction Design Management
CDP	Common Development Plan
CCC	Compact Covered Conductor
CI's	Customer Interruptions – A measure of network performance
CML	Customer Minutes Lost – A measure of network performance
CNE	Combined Neutral Earth
CoF	Consequence of Failure
CR	Condition Rating
DEBUT	Design Estimation Based Units and Time, Network I.T. System (LV Planning tool)
DGA	Dissolved Gas Analysis
DINIS	Distribution Network Information System, Network I.T. System (HV & EHV Planning tool)
DNO	Distribution Network Operator
DNP3	SCADA Protocol
DPCR	Distribution Price Control Review
DR5	Distribution Review Period 5 (2010/11 to 2014/15)

DSL	Digital Subscriber Line – Broadband communications delivered over copper circuits (pilot cables)
DSR	Distribution Safety Rules
E3C	Energy Emergencies Executive Committee
ED1/2	Ofgem review period (2015/16 to 2022/23) and (2023/24 to 2030/31)
EHV	Extra High Voltage
EFPI	Earth Fault Passage Indicator
ENA	Energy Networks Association
ENMAC	Electricity Network Management and Control (UKPN Integrated Network Management System)
EOI	Engineering Operating Instruction
EPN	Eastern Power Networks
EPR	Earth Potential Rise
ESQC or ESQCR	Electricity Safety, Quality and Continuity Regulations 2002
ETG	Electricity Task Group
EV	Electric Vehicle
FBPQ	Forecast business plan questionnaire
FFA	Furfuraldehyde
GCB	Gas Circuit-breaker
GIS	Gas Insulated Switchgear
GM	Ground Mounted
GPRS	General Packet Radio System – The replacement for GSM, GPRS offers faster communications
GRP	Glass Reinforced Plastic
HHD	Hand Held Devices
HI	Health Index
HSE	Health and Safety Executive
HSS	Health, Safety and Sustainability
HV	High Voltage (Greater than 1000V)
I&M	Inspections and Maintenance
IDMT	Inverse Definite Minimum Time
IDNOs	Independent Distribution Network Operators
IDP	Infrastructure Development Plan
IDT	Integrated Delivery Teams
IED	Intelligent Electronic Device – Substation electronic relays etc.
IFI	Innovation Funding Incentive (OFGEM R&D Allowance)
IP	Internet Protocol – Industry standard protocol used for packet switched communications networks
IT	Information Technology
LB	Link Box
LCU	Local Control Unit
LE	London Electricity
LI	Load Index
LOA	Limitation of Access
LPN	London Power Networks
LRE	Load Related Expenditure
LV	Low Voltage (1000V and below)
MDI	Maximum Demand Indicator
MEAV	Modern Equivalent Asset Value
MICCC	Mineral Insulated Copper Clad Cable
MOCOPA	Meter Operation Code of Practice Agreement
MPRS	Meter Point Registration System
MST	Maintenance Scheduled Task
NAFIRS	National Fault and Interruption Reports System
NAMP	Networks Asset Management Plan
NEDeRS	National Equipment Defect Report
NER	Neutral Earthing Resistor
NEX	Neutral Earthing Reactance
NLRE	Non Load Related Expenditure
NMS	Network Management System – The computer system used by the control engineers to monitor and control the power network
NRSWA	New Road and Street Works Act

O & M	Operations and Maintenance
OCB	Oil Circuit Breaker
OFGEM	Office of Gas and Electricity Markets. Our Regulator; Regulates the electricity and gas markets in Great Britain.
OHL	Overhead Line
OPEX	Operational Expenditure
PLE	Planning Load Estimates
OS	Oil Switch
PAF	Postcode Address File
PCB	Polychlorinated Biphenyls
PD	Partial Discharge
PFT	Perfluorocarbon Tracer
PILC	Paper Insulated Lead Covered
PLTU	Parasitic Load Trip Unit
PM	Pole Mounted
PME	Protective Multiple Earthing
PNB	Protective Neutral Bonding
PPE	Personal Protective Equipment
PTW	Permit To Work
PURL	Pole Ultrasound Root Locator
QoS	Quality of Supply
R&L's	Rising and Lateral Connections
RIGs	Regulatory Instructions and Guidance
RMU	Ring Main Unit
RIIO	Revenue = Incentives + Innovations + Outputs
RTU	Remote Terminal Unit
SAP	Senior Authorised Person / An accounting System
SARM	Statistical Asset Replacement Model
SAS	Single Asset Solution
SCADA	Supervisory Control and Data Acquisition – Computer system that controls and monitors the power network
SCAS	Screened Corrugated Aluminium Sheath
SF ₆	Sulphur Hexafluoride
SFT	Sanction For Test
SG	Switchgear
SHE	Safety, Health and Environment
SPN	South East Power Networks
TEV	Transient Earth Voltage
TX	Transformer
UKPN	UK Power Networks
VCB	Vacuum Circuit Breaker
VIR	Vulcanised India Rubber
XLPE	Cross linked polyethylene

Table 5 - Acronyms

Term	Definition
CIs - Customer Interruptions	A performance measure usually expressed as the number of customer interruptions per 100 customers. Transient, or short interruptions of less than three minutes, are excluded from this measure. The figures are usually published annually to allow the performance of different DNOs to be compared.
CMLs - Customer Minutes Lost	A performance measure usually expressed as the average customer minutes lost per connected customer in a year. That is the sum of all the customer minutes lost per customer for each customer interruption in a year divided by the total number of connected customers. The figures are usually published annually to allow the performance of different DNOs to be compared.
ESQCR -Electricity, Safety, Quality and Continuity Regulations 2002	The ESQCR specify safety standards to protect the general public and consumer from danger. In addition, the regulations specify power quality and supply continuity requirements to ensure efficient and economic electricity supply service to consumers.
Ellipse (The Asset Register)	The UK Power Networks' asset management database where all maintenance activity, defects and conditions on an asset is recorded.
EPN	The DNO licence area covering Essex, Suffolk, Norfolk, and parts of London, Cambridgeshire, Bedfordshire, Buckingham and Hertfordshire.
EHV - Extra High Voltage	Operating at 33kV and 66kV.
Grid/Primary Substation	A substation at which the operating voltage is up to 132kV.
HV - High Voltage	Operating at less than and equal to 22kv
LPN	The DNO licence area covering the centre of London and some of the London Boroughs.
LV	Operating at 415 volts or less
Point of Connection	An electrical point of connection between the National Grid Transmission System and the DNO or the electrical point of connection between a DNO and the customer.

Quality of Supply (now known as Quality of Service)	The term used to describe and measure disturbances which interrupt a continuous supply of electricity. These measures include the availability and security of supply and restoration rates.
Record	A record is the logging of an important piece of information (typically on Ellipse), such as any work carried out on an asset.
Refurbishment/replacement	A planned replacement or renewal of existing plant, equipment and cables as these assets reach the end of their useful lives.
Reinforcement	Work carried out on the distribution network to increase its capacity in order to meet load growth.
Security	A measure used to indicate how frequently a supply of interruption occurs. Security is often expressed as the annual number of supply interruptions for every 100 connected customers.
SPN	The DNO licence area covering Kent, Surrey, East Sussex, parts of West Sussex and some of The London Boroughs.
Sulphur Hexafluoride (SF ₆)	An insulating gas used in some circuit breakers, switchgear and other electrical equipment. It is one of the most potent greenhouse gases.

Table 6 – Glossary of terms