



**Document 20**  
**Asset Category – CAPEX/OPEX Overview**  
**EPN**

Asset Stewardship Report  
2013

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**Document History**

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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 EPN Capex Opex overview

### 1.1 Scope

This document summarises UK Power Networks' proposals for EPN 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 EPN Capex Opex High-Level Plan

£1.1 billion is required for non-load related plans in EPN, in RIIO-ED1. This consists of £556m for Operational expenditure (OPEX) and £586m 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	16,045	15,444	15,550	15,455	15,393	15,644	15,597	15,595	124,724
	CV14 Tree Cutting	15,965	16,263	16,641	16,830	17,037	17,037	17,037	17,040	133,850
	CV15a – Faults (Troublecall)	28,410	28,646	28,517	28,403	27,723	28,288	28,412	28,776	227,174
	CV15b – Faults (ONIs)	9,468	8,942	8,762	8,584	8,453	8,453	8,835	8,835	70,333
	CV2 - ESQCR Clearances	6,190	6,020	5,847	5,697	5,536	5,384	5,237	5,095	45,007
CAPEX	CV3 – Asset Replacement	48,730	52,351	60,166	65,806	63,587	58,867	58,390	52,602	460,499
	CV5 - Refurbishment	4,819	3,697	3,405	3,614	3,908	4,025	4,439	4,664	32,571
	CV8 – Legal and safety	7,940	8,159	5,506	5,426	5,725	5,457	5,169	4,787	48,169
	Grand Total (£k)	137,568	139,521	144,394	149,814	147,362	143,156	143,117	137,395	1,142,327

N.B. CV15a and CV3 are both net of cost recoveries

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

### 3.0 EPN Capex Opex Plan: ED1 Proposals

Table 1 provides a more detailed breakdown of the OPEX and CAPEX investment proposals for RIIO-ED1.

RIGS Tables	NAM P line (GWP ID)	NAMP line description	2016	2017	2018	2019	2020	2021	2022	2023	Grand Total
	1.13	ESQC Regs Fixed Project Work	596	596	596	596	596	596	596	596	4,771
	1.19	HV Asset Replacement	117	117	117	117	117	117	117	117	938
	1.20	Safety	383	0	0	0	0	0	0	0	383
	1.44	LV Asset Replacement	22	22	22	22	22	22	22	22	175
	1.47	Civil Replacement	0	0	0	0	0	0	0	0	0
	1.51	EHV Transformer Change	27	27	27	27	23	17	0	0	147
	2.03	Maintenance: EHV Transformers	13	15	15	15	15	15	15	15	119
	2.04	Defect Repair: EHV Transformers	96	97	98	99	100	101	102	103	793
	2.05	Inspection: Pressurised Cables	117	117	117	117	117	117	25	25	749
	2.06	Maintenance: Pressurised Cables	284	286	286	286	286	286	286	286	2,286
	2.07	Inspection: Solid Dielectric Cables	5	5	5	5	5	5	5	5	39
	2.08	Maintenance: Solid Dielectric Cables	26	26	26	26	26	26	26	26	208
	2.14	Defect Repair: Wood Pole Overhead Line	179	179	179	179	179	180	180	180	1,434
	2.16	Maintenance: EHV Switchgear	10	10	10	10	10	10	10	10	80
	2.17	Defect Repair: EHV Switchgear	92	93	94	95	96	96	98	99	763
	2.20	Defect Repair: 11kV Circuit Breakers	19	19	19	19	19	19	20	20	155
CV13: Inspection and Maintenance	2.21	Inspection: Distribution Substation Equipment	18	18	18	18	18	18	18	18	146
	2.22	Maintenance: Distribution Substation Equipment	358	442	530	608	608	608	608	608	4,369
	2.23	Defect Repair: Secondary G/M Substation Equipment	22	20	14	19	22	22	22	23	163
	2.25	Maintenance: Protection Equipment	533	533	533	533	533	533	533	533	4,261
	2.26	Defect Repair: Protection Equipment	5	5	5	5	5	5	5	5	40
	2.28	Maintenance: Scada Equipment	587	596	604	610	593	549	526	511	4,574
	2.30	Inspection: Buildings & Associated Civil Works	719	718	718	718	718	718	683	682	5,673
	2.32	Maintenance: Buildings & Associated Civil Works	2,601	2,602	2,602	2,602	2,600	2,600	2,600	2,606	20,813
	2.33	Defect Repair: Substation Civils	1,451	1,483	1,488	1,489	1,501	1,507	1,515	1,522	11,956
	2.34	Other Operational Responsibilities	64	64	64	64	64	64	64	64	516
	2.35	I & M of Unmetered Supplies	93	93	93	93	93	93	93	93	748
	2.36	Idle / Redundant Services	81	81	81	81	81	81	81	81	644
	2.45	Strategic Spares (I&M)	16	16	16	16	16	16	16	16	125
	4.02	Maintenance Power Transformers	943	969	967	993	913	937	1,019	994	7,736
	4.04	EHV Switchgear Maintenance	403	421	414	424	426	436	428	391	3,343
	4.05	Grid & Primary S/S Inspection	2,762	2,370	2,370	2,372	2,370	2,370	2,370	2,372	19,354
	4.06	Grid/Primary CB Maintenance	39	48	46	37	52	48	43	54	367

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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



	4.07	Secondary S/S Inspection	493	513	542	493	512	542	493	513	4,100
	4.08	Secondary S/S maintenance	610	578	568	408	396	630	714	734	4,638
	4.21	Overhead Line Inspection	1,939	1,939	1,939	1,939	1,939	1,939	1,939	1,946	15,521
	4.22	Overhead line Maintenance	281	281	281	281	281	281	281	281	2,249
	4.24	Grid/Primary 11/6.6kV tx/bus-sections/couplers & interconnector CB Maintenance	43	44	43	37	39	39	42	44	333
	4.25	FFC Inspection	2	2	2	2	2	2	2	2	16
<b>CV13 Total</b>			<b>16,045</b>	<b>15,444</b>	<b>15,550</b>	<b>15,455</b>	<b>15,393</b>	<b>15,644</b>	<b>15,597</b>	<b>15,595</b>	<b>124,724</b>
<b>CV14: Tree cutting</b>	2.43	Tree Management	15,965	16,263	16,641	16,830	17,037	17,037	17,037	17,040	133,850
<b>CV14 Total</b>			<b>15,965</b>	<b>16,263</b>	<b>16,641</b>	<b>16,830</b>	<b>17,037</b>	<b>17,037</b>	<b>17,037</b>	<b>17,040</b>	<b>133,850</b>
<b>CV15a: Faults (Troublecall)</b>	2.01	Emergency Asset Repair	25,434	25,344	25,198	25,038	24,903	24,865	24,957	25,290	201,029
	2.50	Emergency Asset Replacement (Services)	1,564	1,563	1,563	1,563	1,563	1,563	1,563	1,563	12,508
	3.01	Cable Damage	1,411	1,738	1,755	1,802	1,257	1,859	1,891	1,923	13,637
<b>CV15a Total</b>			<b>28,410</b>	<b>28,646</b>	<b>28,517</b>	<b>28,403</b>	<b>27,723</b>	<b>28,288</b>	<b>28,412</b>	<b>28,776</b>	<b>227,174</b>
<b>CV15b: Faults (ONIs)</b>	2.01	Emergency Asset Repair	6,729	6,729	6,729	6,729	6,729	6,729	6,729	6,729	53,831
	2.50	Emergency Asset Replacement (Services)	1,038	692	692	692	692	692	1,075	1,075	6,649
	3.02	Street Lighting	973	973	973	973	973	973	973	973	7,788
	3.05	South East NTR Miscellaneous	728	547	368	189	58	58	58	58	2,064
<b>CV15b Total</b>			<b>9,468</b>	<b>8,942</b>	<b>8,762</b>	<b>8,584</b>	<b>8,453</b>	<b>8,453</b>	<b>8,835</b>	<b>8,835</b>	<b>70,333</b>
<b>CV2: ESQCR 43-8 Safety Clearance</b>	1.13	ESQC Regs Fixed Project Work	5,935	5,771	5,605	5,462	5,307	5,162	5,022	4,887	43,151
	1.41	LV OHL refurbishment	256	249	242	235	229	222	215	209	1,856
<b>CV2 Total</b>			<b>6,190</b>	<b>6,020</b>	<b>5,847</b>	<b>5,697</b>	<b>5,536</b>	<b>5,384</b>	<b>5,237</b>	<b>5,095</b>	<b>45,007</b>
	1.01	Battery Replacements	724	589	630	441	411	614	1,535	1,524	6,468
	1.02	Tower Line Refurbishment	3,970	6,159	8,314	8,857	7,103	5,596	7,013	5,437	52,449
	1.03	Transformer Noise Reduction	28	28	28	28	28	28	28	28	226
	1.07	EHV Cable Replacement other than Fluid Filled	1,187	1,187	1,187	1,187	1,187	1,187	1,187	1,185	9,496
	1.09	33kV Wood Pole OHL Refurbishment	737	1,923	3,479	3,410	2,901	1,297	1,536	2,214	17,496
	1.17	Service Terminations	1,079	720	360	360	360	432	440	440	4,190
	1.18	HV / LV Cable Replacements	916	916	916	916	916	916	916	916	7,331
	1.19	HV Asset Replacement	3,107	3,107	3,107	3,107	3,107	3,107	3,107	3,107	24,854
	1.20	Safety	98	98	98	98	98	98	98	98	782
	1.26	Protection Asset Replacement	340	430	368	302	340	184	184	184	2,332
<b>CV3: Asset replacement</b>	1.29	Fluid Filled Cable Replacement	1,212	403	990	945	3,117	2,423	3,775	2,831	15,696
	1.31	Fluid Filled Cable Refurbishment & Enhanced Repair	691	691	691	691	691	691	691	691	5,525
	1.32	HV OHL Refurbishment	5,819	5,819	5,819	5,819	5,819	5,819	5,819	5,819	46,555
	1.40	Remote control and automation	7	0	0	0	0	0	0	0	7
	1.41	LV OHL refurbishment	2,024	2,024	2,024	2,024	2,024	2,024	2,024	2,024	16,192
	1.44	LV Asset Replacement	6,504	6,504	6,504	6,504	6,504	6,504	6,504	6,504	52,031
	1.46	Service Replacement	1,864	1,789	1,563	1,488	1,262	1,262	1,262	1,262	11,752
	1.48	EHV Switchgear Change	6,386	4,683	8,122	12,299	8,406	8,671	5,573	3,000	57,140
	1.49	Distribution Switchgear Replacement	5,724	5,724	5,722	5,722	5,722	5,722	5,722	5,722	45,782
	1.50	11kV Switchboard Replacement	2,211	3,138	5,613	5,471	6,689	5,215	3,736	4,743	36,817
	1.51	EHV Transformer Change	3,712	6,029	4,239	5,747	6,512	6,687	6,848	4,484	44,256

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

	1.55	Miscellaneous EHV Asset Replacement	74	74	74	74	74	74	74	74	592
	2.36	Idle / Redundant Services	16	16	16	16	16	16	16	16	127
	2.50	Emergency Asset Replacement (Services)	300	300	300	300	300	300	300	300	2,403
<b>CV3 Total</b>			<b>48,730</b>	<b>52,351</b>	<b>60,166</b>	<b>65,806</b>	<b>63,587</b>	<b>58,867</b>	<b>58,390</b>	<b>52,602</b>	<b>460,499</b>
	1.02	Tower Line Refurbishment	1,332	531	539	555	545	574	531	531	5,137
	1.05	Enhance Protection 33kV Wood Pole OHL Refurbishment	172	82	90	87	80	72	46	44	674
	1.09	Refurbishment	57	57	57	57	57	56	56	56	452
<b>CV5: Refurbishment</b>	1.13	ESQC Regs Fixed Project Work	916	443	312	311	312	312	312	312	3,229
	1.26	Protection Asset Replacement	1,271	1,398	1,479	1,362	1,362	1,362	1,436	1,563	11,231
	1.32	HV OHL Refurbishment	112	0	0	0	0	0	0	0	112
	1.50	11kV Switchboard Replacement	27	49	82	221	139	252	627	704	2,102
	1.51	EHV Transformer Change	529	653	285	219	612	595	629	653	4,175
	2.10	Maintenance: Overhead Lines on Steel Supports	403	484	562	802	802	802	802	802	5,458
<b>CV5 Total</b>			<b>4,819</b>	<b>3,697</b>	<b>3,405</b>	<b>3,614</b>	<b>3,908</b>	<b>4,025</b>	<b>4,439</b>	<b>4,664</b>	<b>32,571</b>
	1.06	Earthing improvements at Grid and Primary substations	38	22	22	22	22	22	22	22	192
	1.08	Substation Security	3,786	4,149	1,471	1,471	1,462	1,471	1,458	1,466	16,734
	1.13	ESQC Regs Fixed Project Work	2,437	1,842	1,842	1,842	1,842	1,842	1,842	1,842	15,331
	1.18	HV / LV Cable Replacements	35	35	35	35	35	35	2	2	217
	1.20	Safety	351	339	339	339	339	339	339	281	2,666
<b>CV8: Legal and Safety</b>	1.33	HV Reinforcement - Primary Substations	360	562	475	313	342	220	491	240	3,004
	1.35	EHV Reinforcement - Substations	59	36	52	34	52	62	5	52	352
	1.47	Civil Replacement	283	283	283	283	283	283	0	0	1,696
	1.48	EHV Switchgear Change	2	18	64	81	59	27	11	0	262
	1.50	11kV Switchboard Replacement	200	291	458	431	618	464	325	389	3,177
	1.51	EHV Transformer Change	278	471	355	465	559	583	564	382	3,659
	2.33	Defect Repair: Substation Civils	8	8	8	8	8	8	8	8	63
	2.51	Customer Ops Miscellaneous CAPEX	102	102	102	102	102	102	102	102	816
<b>CV8 Total</b>			<b>7,940</b>	<b>8,159</b>	<b>5,506</b>	<b>5,426</b>	<b>5,725</b>	<b>5,457</b>	<b>5,169</b>	<b>4,787</b>	<b>48,169</b>
<b>Grand Total</b>			<b>137,568</b>	<b>139,521</b>	<b>144,394</b>	<b>149,814</b>	<b>147,362</b>	<b>143,156</b>	<b>143,117</b>	<b>137,395</b>	<b>1,142,327</b>

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



## 4.0 EPN 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	<p>CV3 Additions</p> <p>Row 51 - HV - Batteries at GM HV Substations</p> <p>Row 85 - EHV - Batteries at 33kV Substations</p> <p>Row 102 - 132kV - Batteries at 132kV Substations</p> <p>Removals</p> <p>Row 179 - HV - Batteries at GM HV Substations</p> <p>Row 213 - EHV - Batteries at 33kV Substations</p> <p>Row 230 - 132kV - Batteries at 132kV Substations</p>
	1.02 – tower line refurbishment	Towers and conductors	1	<p>Additions</p> <p>Row 56 - EHV - 33kV OHL (Tower line) Conductor</p> <p>Row 57 - EHV - 33kV Tower</p> <p>Row 58 - EHV - 33kV Fittings</p> <p>Row 89 - 132kV - 132kV OHL (Tower Line) Conductor</p> <p>Row 90 - 132kV - 132kV Tower</p> <p>Row 91 - 132kV - 132kV Fittings</p> <p>Removals</p> <p>Row 184 - EHV - 33kV OHL (Tower line) Conductor</p> <p>Row 185 - EHV - 33kV Tower</p> <p>Row 186 - EHV - 33kV Fittings</p> <p>Row 217 - 132kV - 132kV OHL (Tower Line) Conductor</p> <p>Row 218 - 132kV - 132kV Tower</p> <p>Row 219 - 132kV - 132kV Fittings</p>
	1.07 – EHV cable replacement other than fluid-filled	Cables	3	<p>CV3 Additions</p> <p>Row 62 - EHV - 33kV UG Cable (Non Pressurised)</p> <p>Removals</p> <p>Row 190 - EHV - 33kV UG Cable (Non Pressurised)</p>
	1.09 – 33kV wood pole OHL refurbishment	Wood poles and conductors	2	<p>CV3 Additions</p> <p>Row 53 - EHV - 33kV Pole</p> <p>Row 52 - EHV - 33kV OHL (Pole Line) Conductor</p> <p>Removals</p> <p>Row 180 - EHV - 33kV OHL (Pole Line) Conductor</p> <p>Row 181 - EHV - 33kV Pole</p>
	1.17 – service terminations	Service terminations, cut-outs, R&Ls	11	<p>CV3 Additions</p> <p>Row 20 - LV - Cut Out (Metered)</p> <p>Removals</p> <p>Row 148 - LV - Cut Out (Metered)</p>
	1.18 – HV/LV cable replacements	Cables	3	<p>CV3 Additions</p> <p>Row 9 - LV - LV Main (UG Consac)</p> <p>Row 10 - LV - LV Main (UG Plastic)</p> <p>Row 11 - LV - LV Main (UG Paper)</p> <p>Row 29 - HV - 6.6/11kV UG Cable</p> <p>Row 30 - HV - 20kV UG Cable</p> <p>Removals</p> <p>Row 137 - LV - LV Main (UG Consac)</p> <p>Row 138 - LV - LV Main (UG Plastic)</p> <p>Row 139 - LV - LV Main (UG Paper)</p> <p>Row 157 - HV - 6.6/11kV UG Cable</p> <p>Row 158 - HV - 20kV UG Cable</p>

1.19 – HV asset replacement	HV switchgear and LV plant wood pole distribution transformers	8 2 9	<p>Additions</p> <p>Row 27 - HV - 6.6/11kV Poles Row 28 - HV - 20kV Poles Row 32 - HV - 6.6/11kV CB (PM) Row 40 - HV - 20kV CB (PM) Row 48 - HV - 6.6/11kV Transformer (GM) Row 50 - HV - 20kV Transformer (GM)</p> <p>Removals</p> <p>Row 155 - HV - 6.6/11kV Poles Row 156 - HV - 20kV Poles Row 160 - HV - 6.6/11kV CB (PM) Row 168 - HV - 20kV CB (PM) Row 176 - HV - 6.6/11kV Transformer (GM) Row 178 - HV - 20kV Transformer (GM)</p>
1.20.35 33KV ABSD	EHV switchgear	6	<p>Additions</p> <p>Row 74 - EHV - 33kV Switchgear - Other</p> <p>Removals</p> <p>Row 202 - EHV - 33kV Switchgear - Other</p>
1.20.37 11KV ABSD	HV switchgear and LV plant	8	<p>Additions</p> <p>Row 35 - 6.6/11kV Switch (PM)</p> <p>Removals</p> <p>Row 163 - 6.6/11kV Switch (PM)</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)</p> <p>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)</p> <p>Row 221 - 132kV - 132kV UG Cable (Oil) Row 222 - 132kV - 132kV UG Cable (Gas)</p>
1.32 – HV OHL refurbishment	Wood poles and conductors	2	<p>Additions</p> <p>Row 23 - HV - 6.6/11kV OHL (Conventional Conductor) Row 24 - HV - 6.6/11kV OHL (BLX or similar Conductor) Row 25 - HV - 20kV OHL (Conventional Conductor) Row 26 - HV - 20kV OHL (BLX or similar Conductor) Row 27 - HV - 6.6/11kV Poles</p> <p>Removals</p> <p>Row 151 - HV - 6.6/11kV OHL (Conventional Conductor) Row 152 - HV - 6.6/11kV OHL (BLX or similar Conductor) Row 153 - HV - 20kV OHL (Conventional Conductor) Row 154 - HV - 20kV OHL (BLX or similar Conductor) Row 155 - HV - 6.6/11kV Poles</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 &amp; 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 &amp; LV Pillars (OD not at Substation)</p>
1.46 – Service replacement	Service terminations, cut-outs, R&Ls	11	<p>Additions</p> <p>Row 7 - LV - LV Service (OHL) Row 13 - LV - LV Service (UG) Row 14 - LV - LV Service associated with RLM</p> <p>Removals</p> <p>Row 135 - LV - LV Service (OHL) 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 96 132kV Switchgear 132kV CB (Air Insulated Busbars)(ID) (GM)                  Row 97 132kV Switchgear 132kV CB (Air Insulated 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</p> <p>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</p> <p>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</p> <p>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</p> <p>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</p> <p>Row 33 - HV - 6.6/11kV CB (GM) Primary</p> <p>Removals</p> <p>Row 161 - HV - 6.6/11kV CB (GM) Primary</p>
1.51 – EHV transformer change	G&P transformers	4	<p>CV3 Additions</p> <p>Row 83 - EHV - 33kV Transformer (GM)                  Row 101 - 132kV - 132kV Transformer</p> <p>Removals</p> <p>Row 210 - EHV - 33kV Transformer (PM)                  Row 211 - EHV - 33kV Transformer (GM)</p> <p>Row 229 - 132kV - 132kV Transformer</p>
1.55 – miscellaneous EHV asset replacement	As applicable	As applicable	<p>CV3 Additions</p> <p>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</p>

				Row 83 - EHV - 33kV Transformer (GM) 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 210 - EHV - 33kV Transformer (GM) 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 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 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 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 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 44 - 33 kV - Inspections
	4.07 – secondary substation inspection	CV13 Row 23 - HV - Inspections Row 24 - HV - Inspections
	4.21 – overhead line inspection	Row 7 - LV - Inspections Row 18 - HV - Inspections - Helicopter Row 19 - HV - Inspections - Foot Patrol Row 36 - 33 kV - Inspections - Helicopter Row 37 - 33 kV - Inspections - Foot Patrol Row 39 - 33 kV - Inspections - Helicopter Row 40 - 33 kV - Inspections - Foot Patrol 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 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
	2.04 – defect rep EHV transformers	CV13 Row 48 - 33 kV - Repair & Maintenance
	2.06 – maintenance pressurised cables	CV13 Row 43 - 33 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 71 - 132 kV - Repair & Maintenance
	2.1 – maintenance overhead lines on steel supports	CV13 Row 41 - 33 kV - Repair & Maintenance Row 69 - 132 kV - Repair & Maintenance
	2.14 – defect rep wood pole overhead line	CV13 Row 8 - LV - Repair & Maintenance Row 20 - HV - Repair & Maintenance Row 38 - 33 kV - Repair & Maintenance Row 66 - 132 kV - Repair & Maintenance
	2.16 – maintenance EHV switchgear	CV13 Row 46 - 33 kV - Repair & Maintenance

	2.17 – defect rep EHV switchgear			CV13 Row 46 - 33 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			CV13 Row 25 - HV - Repair & Maintenance (Civil Works) Row 26 - HV - Repair & Maintenance (Civil Works)
	2.25 – maintenance protection equipment			CV13 Row 31 - HV - Repair & Maintenance Row 47 - 33 kV - Repair & Maintenance Row 75 - 132 kV - Repair & Maintenance
	2.26 – defect rep protection equipment			CV13 Row 31 - HV - Repair & Maintenance Row 47 - 33 kV - Repair & Maintenance Row 75 - 132 kV - Repair & Maintenance
	2.32 – maintenance buildings and associated civil works			CV13 Row 25 - HV - Repair & Maintenance (Civil Works) Row 26 - HV - Repair & Maintenance (Civil Works) Row 45 - 33 kV - Repair & Maintenance (Civil Works) Row 73 - 132 kV - Repair & Maintenance (Civil Works)
	2.33 – defect rep substation civils			CV13 Row 25 - HV - Repair & Maintenance (Civil Works) Row 26 - HV - Repair & Maintenance (Civil Works) Row 45 - 33 kV - Repair & Maintenance (Civil Works) Row 73 - 132 kV - Repair & Maintenance (Civil Works)
	4.02 – maintenance power transformers			CV13 Row 76 - 132 kV - Repair & Maintenance
	4.04 – EHV switchgear maintenance			CV13 Row 46 - 33 kV - Repair & Maintenance
	4.06 – grid/primary CB maintenance			CV13 Row 74 - 132 kV - Repair & Maintenance Row 46 - 33 kV - Repair & Maintenance
	4.08 – secondary substation maintenance			CV13 Row 25 - HV - Repair & Maintenance (Civil Works) Row 26 - HV - Repair & Maintenance (Civil Works)
	4.22 – overhead line maintenance			CV13 Row 8 - LV - Repair & Maintenance Row 20 - HV - Repair & Maintenance Row 38 - 33 kV - Repair & Maintenance Row 41 - 33 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 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 EPN: 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 Khanzada	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)	Adedaja 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 <sub>6</sub>	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 <sub>6</sub> )	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