



Document 11
Asset Category – Services and Terminations
SPN

Asset Stewardship Report
2014

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Document History

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Preface

UK Power Networks uses Asset Stewardship Reports ('ASR') to describe the optimum asset management strategy and proposals for different groups of assets. This optimised asset management strategy and plan details the levels of investment required and the targeted interventions and outputs needed. Separate ASRs define the most efficient maintenance and inspection regimes needed and all documents detail the new forms of innovation which are required to maximise value, service and safety for all customers and staff throughout the ED1 regulatory period. Outline proposals for the ED2 period are also included.

Each DNO has a suite of approximately 20 ASR's. Although asset policy and strategy is similar for the same assets in each DNO the detailed plans and investment proposals are different for each DNO. There are also local issues which must be taken into account. Accordingly each DNO has its own complete set of ASR documents.

A complete list of titles of the ASR's, a summary of capex and opex investment is included in '**Document 20: Asset Stewardship Report: Capex/Opex Overview**'. This document also defines how costs and outputs in the various ASR's build up UK Power Networks 'NAMP' (Network Asset Management Plan) and how the NAMP aligns with Ofgem's ED1 RIGs tables and row numbers.

Where 'HI' or asset 'Health Index' information is included please note predicted ED1 profiles are before any benefits from 'Load driven investment.'

This ASR has also been updated to reflect the feedback from Ofgem on our July 2013 ED1 business plan submission. Accordingly to aid the reader three additional appendices have been added. They are;

1. **Appendix 8 - Output NAMP/ED1 RIGS reconciliation:** This section explains the 'line of sight' between the UKPN Network Asset Management Plan (NAMP) replacement volumes contained in the Ofgem RIGS tables. The NAMP is the UKPN ten year rolling asset management investment plan. It is used as the overarching plan to drive both direct and indirect Capex and Opex interventions volumes and costs. The volume and cost data used in this ASR to explain our investment plan is taken from the UK Power Networks NAMP. Appendix 8 explains how the NAMP outputs are translated into the Ofgem RIGS tables. The translation of costs from the NAMP to the ED1 RIGS tables is more complex and it is not possible to explain this in a simple table. This is because the costs of a project in the 'NAMP' are allocated to a wide variety of tables and rows in the RIGS. For example the costs of a typical switchgear replacement project will be allocated to a range of different Ofgem ED1 RIGS tables and rows such as CV3 (Replacement), CV5 (Refurbishment) CV6 (Civil works) and CV105 (Operational IT Technology and Telecoms). However guidance notes of the destination RIGS tables for NAMP expenditure are included in the table in the Section 1.1 of the Executive Summary of each ASR.

2. **Appendix 10 – Material changes since the June 2013 ED1 submission:** This section shows the differences between the ASR submitted in July 2013 and the ASR submitted for the re-submission in March 2014. It aims to inform the reader the changes made to volumes and costs as a result of reviewing the plans submitted in July 2013. Generally the number of changes made is very small, as we believe the original plan submitted in July 2013 meets the requirements of a well justified plan. However there are areas where we have identified further efficiencies and improvements or recent events have driven us to amend our plans to protect customer safety and service.

We have sought to avoid duplication in other ED1 documents, such as 'Scheme Justification Papers', by referring the reader to key issues of asset policy and asset engineering which are included in the appropriate ASR documents.

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1.0 Executive Summary SPN Services and Terminations

1.1 Scope

This document details SPN's non-load related expenditure (NLRE) replacement proposals for services (including risers and lateral services) and service terminations for the ED1 period. This covers £27.8m worth of investments in ED1.

There are 2.25 million connected customers (including 67,500 multi-occupancy premises with risers and laterals) in the SPN Licence area fed from:

- c1.7 million underground services and
- c100,000 overhead services

The 1.7 million underground services have an estimated Modern Equivalent Asset Valuation (MEAV) of £2.3bn. The proposed investment in ED1 for underground services is 0.02% of its MEAV per annum.

The 100,000 overhead services in the SPN region have an estimated MEAV of £58m. The proposed investment for overhead services is 0.15% of its MEAV per annum.

There are 2.3 million cutouts in SPN with an estimated MEAV of £751m. The proposed ED1 investment is 0.05% of its MEAV per annum.

Replacement costs for these assets are held in the Networks Asset Management Plan (NAMP) and in sections of the RIGS tables identified in Table 1.

A full list of abbreviations is included in Section 6.0 of Document 20: CAPEX OPEX overview.

INVESTMENT TYPE	ED1 INVESTMENT	NAMP LINE	RIGS REFERENCES
Risers and Laterals	£12.3m	1.46.04.6674 Replacement of Risers (£1.6m)	Volumes & Costs - RIGS Table CV110 Row 57
		1.46.04.8519 Replacement of Laterals (£10.7m)	Volumes & Costs - RIGS Table CV110 Row 58
Asset Replacement (Underground services)	£4.1m	1.46.01.6671 Replace Metered Services (£3.2m)	Volumes - RIGS Table CV3: Additions Row 13 – LV Service (UG) Removals Row 141– LV Service (UG) Costs - RIGS Table CV3: Row 13 – LV Service (UG)
		1.46.06.9455 UMS Service Replacement (SWA Only) - Non Chargeable Connections Work (£0.9m)	
Asset Replacement (Overhead services)	£8.6m	1.46.03.6673 Replace Overhead Services - Ad Hoc Replacements & ESQC Response (£2.5m)	Volumes - RIGS CV3 Additions Row 7 - LV Service (OHL) Removals Row 135 - LV Service (OHL) Costs – RIGS Table CV3: Row 7 - Underground
		1.46.05.6672 Replacement of Mural Services (£6m)	
Asset replacement (Cut-outs)	£2.8m	1.17.01.6532 Cut Outs Replaced (BAU)	Volumes - RIGS Table CV3: Additions Row 20 – LV Cutout (Metered) Removals Row 148 – LV Cutout (Metered) Costs - RIGS Table CV3: Row 20 – LV Cutout (Metered)

Table 1 – Investment Summary (Source: 19th February 2014 NAMP Table J Less Indirect)

1.2 Investment strategy

The investment strategy for services and terminations in SPN is to ensure that sufficient provisions are made available to:

- Comply with Electricity Supply Quality and Continuity Regulations (ESQCR) and keep public risk to a minimum
- Keep Customer Interruptions (CIs) and Customer Minutes Lost (CMLs) to a minimum

This will be achieved by:

- Replacing ESQCR non-compliant services and terminations
- Replacing services and terminations identified to be in poor condition

1.3 ED1 Proposals

Table 2 shows the investment profile for services and service terminations in SPN throughout ED1. Inspections costs for risers and laterals are held in “Document 14 - I&M, Faults and Trees”.

NAMP Line(s)	Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	ED1 Total
Risers and laterals										
1.46.04	Replacement of Risers	202	202	202	202	202	202	202	202	1,613
1.46.04	Replacement of Laterals	1,337	1,337	1,337	1,337	1,337	1,337	1,337	1,337	10,694
Underground Services										
1.46.01	Replace Metered Services	448	448	448	422	374	374	374	374	3,260
1.46.06	UMS Service Replacement (SWA Only) - Non Chargeable Connections Work	107	107	107	107	107	107	107	107	854
Overhead services										
1.46.03	Replace Overhead Services - Ad Hoc Replacements & ESQC Response	316	316	316	316	316	316	316	316	2,531
1.46.05	Replacement of Mural Services	753.1	753.1	753.1	753.1	753.1	753.1	753.1	753.1	6,024.4
Cutouts										
1.17.01	Cut Outs Replaced (BAU)	668	446	223	223	223	460	273	273	2,788
	Total (£k)	3,831	3,609	3,386	3,360	3,312	3,549	3,362	3,362	27,764

Table 2 – ED1 Investment Proposals (Source: 19th February NAMP Table J Less Indirect)

1.4 Innovation

UK Power Networks has adopted a new approach to inspect, maintain and replace risers and laterals located within multi-occupancy premises. A ten-year cycle of inspections is underway to confirm ownership and the condition of these risers and laterals.

Based on sample inspections and testing of R&Ls carried out between 2011 and 2012 it was established that there are issues with the breakdown of insulation in VIR cables and rods. For this reason a proactive program of replacements will be carried out for risers and laterals with VIR to reduce the risk to third-parties and UK Power network staff working on R&Ls.

1.5 Risks and Opportunities

	Description of similarly likely opportunities or risks arising in ED1 period	Uncertainties
Risk/Opportunity	UKPN to confirm ownership of R&Ls through a program of inspections because there is still uncertainty about the number of properties we are responsible for. The program of inspections may result in an increase or decrease in required expenditure to ED1	Probable outcome is +/- 5% of the investment in ED1
Risk/Opportunity	The smart metering program may result in a much higher or lower number of cutouts and service replacements allowed for in ED1	Probable outcome is +/-5% of the investment in ED1

Table 3 – Risks and Opportunities

2.0 Description of Services and Terminations

2.1 Risers and Laterals

Risers and laterals (R&Ls) are cables or busbars that form part of the equipment installed within multi-occupancy premises to distribute electricity to more than one dwelling or unit. In SPN riser and lateral systems that are of an adoptable standard, or would have been at the time of construction, are owned by UK Power Networks.

Analysis of the Postcode Address File (PAF) and the Meter Point Registration System (MPRS) data identified 157,000 premises in SPN containing a riser and lateral system that could be owned by UK Power Networks.

A program of inspections has commenced to confirm ownership and the condition of R&Ls in SPN. Initially a random sample from the identified list of 157,000 was inspected to verify the procedure. One of the learning points from this trial was that the productivity of the inspectors was severely reduced due to the geographical separation of the locations for inspection.

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

Hence, post code areas were selected for inspection to include urban and non-urban locations from across the entire licence area. This ensured that the sample was still representative whilst also using the resources in a productive and efficient manner.

The inspection of a 5% sample of SPN R&L assets was completed in 2012 and the results concerning ownership are shown in the following pie chart. 31% of properties were positively identified as containing a riser and lateral system owned by UKPN with 40% of properties identified as not containing UKPN owned R&Ls. 2% of properties containing R&L's were unable to be located. UKPN believe they no longer exist.

Distributing the 26% for which there was no access to the property proportionally between properties with and without UKPN owned R&Ls indicates that UKPN will be responsible for 43% of the 157,000 properties identified in the initial analysis. This equates to some 67,500 properties.

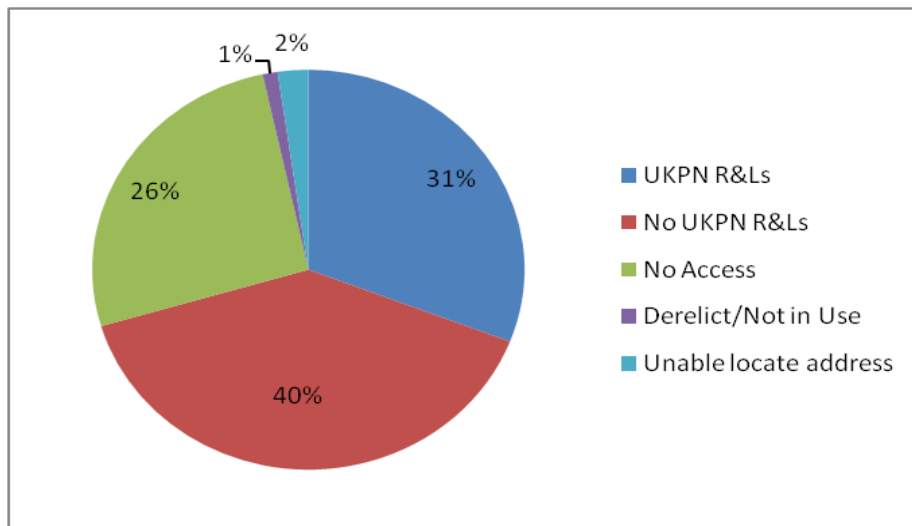


Figure 1 – Ownership of Riser and Laterals – (Source: 5% representative sample UKPN inspection data 2012)

The latest available inspection results show that the majority of cables inspected (77%) are PVC insulated, with the next most common cable type being Mineral Insulated (MICC). 3% of premises inspected contained Vulcanised India Rubber (VIR) cables. These VIR cables will all be targeted for replacement in ED1 because of the ESQC risks and deliverability constraints mean it is not practicable to remove them all any sooner

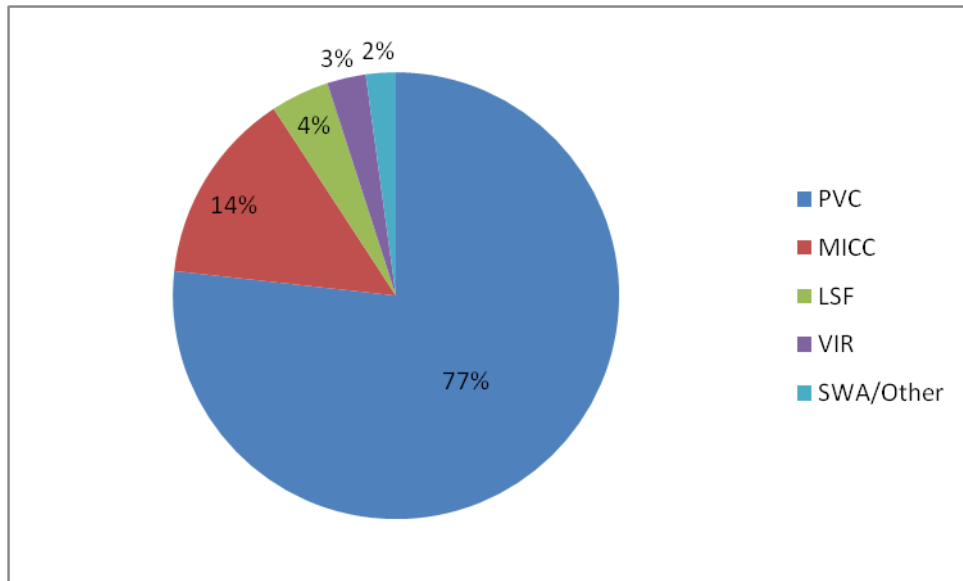


Figure 2 – Types of Cable Installations – (Source: Ellipse data extract 27 Feb 2013)

2.1.1 Risers and Lateral Statistical Age Profile

The age of R&L assets is difficult to determine even from an on-site inspection by an experienced inspector. In order to produce an age profile for risers and laterals, the type of cables installed has been used to determine an age profile for the known population using the following rules:

1: Expected installation dates for different cable types have been determined. The riser and lateral population has been smoothed evenly over the entire date range for that type.

Cable asset types and date ranges used:

Lead covered	1920 – 1945
VIR	1935 – 1955
VIR covered rods	1935 – 1955
MICC concentric	1945 – 1978
Mineral Insulated	1945 – 1978
Busbar System	1950 - 1978
PVC concentric	1970 – 2000
PVC covered rods	1955 – 1980
PVC	1955 – 2000
Steel wire armoured	1955 – 2000
XLPE	1990 – Present
LSF (Low smoke)	1990 - Present
Other	Smooth across date range

2: The oldest quartile of the cable type recorded in a particular riser and lateral installation will be used to determine in which date range the asset is replaced.

2.2 Underground services

A service is an electrical line which connects either street furniture requiring supply, or no more than four consumer installations in adjacent buildings, to a distribution main. There are 1.7 million underground services in the SPN licence area. Figure 3 shows the age profiles for these services. The majority of the overhead line services in SPN were installed in the 1970s and 1980s. The average age of the oldest 10% of Underground Services is 91 years.

Figure 3 shows that there was a peak of installation of underground services in the 1960s. It is important to note that there is a sizeable population of underground service cables installed pre-1920, the 1930s and 1940s. 31% of the underground service cables in SPN will be 70 years or older at the start of RIIO-ED1 rising to 42% at the end of ED1 (without investment).

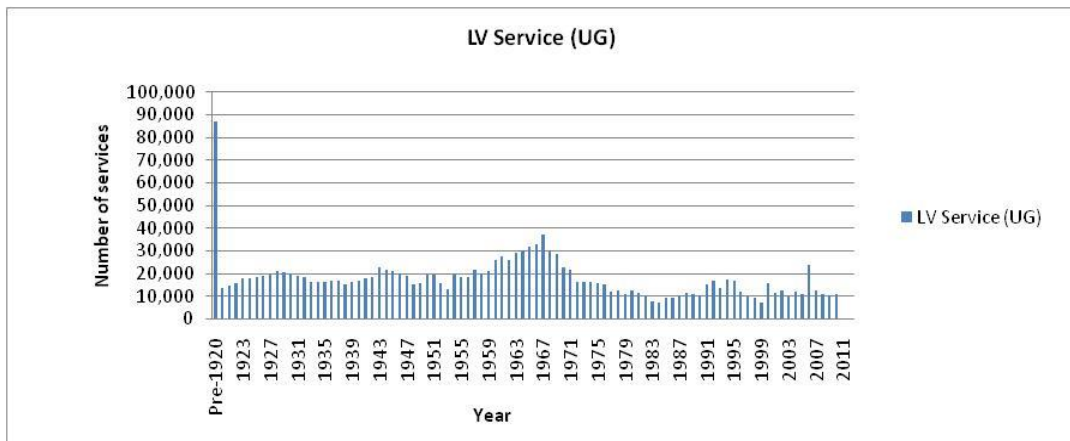


Figure 3 – LV Service (UG) Age Profile (Source – RIGS 2012 CV3 Table V5)

2.3 Overhead services

There are 100,000 overhead services in the SPN licence area. Figure 4 shows the age profiles for these services. The majority of the overhead line services in SPN were installed in the 1970s and 1980s. 2% of the LV overhead line services will be 70 years or older at the start of ED1 and will rise to 6% at the end of ED1 without investment.

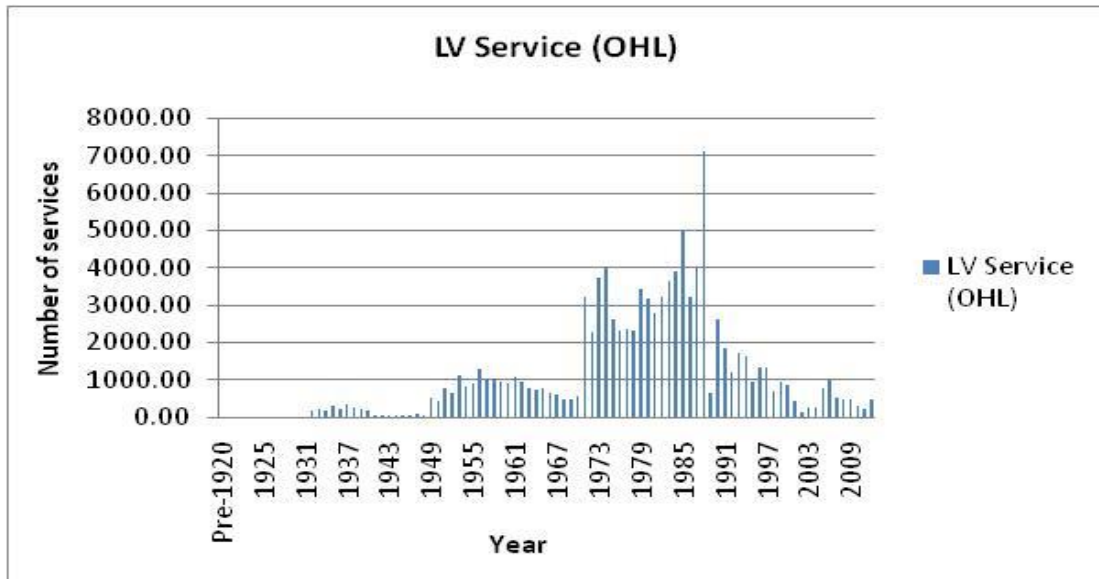


Figure 4 – LV Service OHL Age Profile (Source – RIGS 2012 CV3 Table V5)

2.4 Terminations (Cutouts)

UK Power Network does not record information on the age profile of cutouts. We do not have a routine inspection regime for cutouts hence do not have age profile information for them. Cutouts are inspected by meter operators as part of their routine meter inspections. They report the condition of cutouts by exception (i.e. only those in poor condition).



Figure 5 – Photos of Cut Outs

Typically, less than 0.2% of cutouts are replaced each year. Figure 6 shows the replacement rate per year for cutouts in SPN.

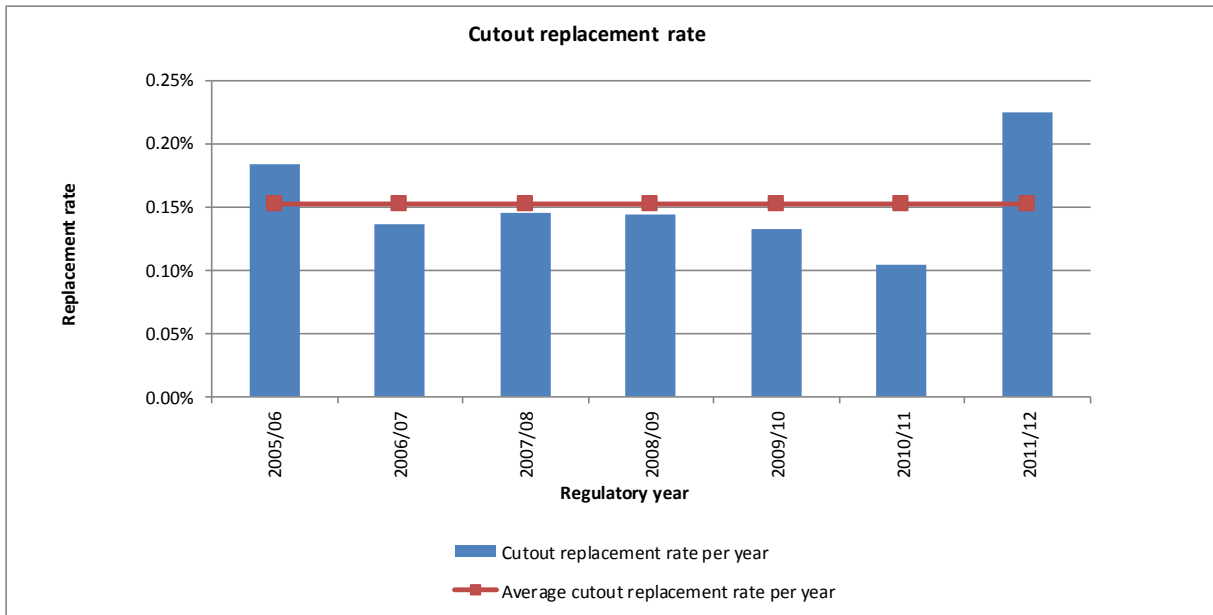


Figure 6 – Cutout replacement rate (Source – DPCR5 FBPQ and CV3 RIGS table 19th February 2014)

3.0 Investment Drivers and Condition Measurement

3.1 Investment drivers

3.1.1 Risers and Laterals

The main drivers for the replacement of R&Ls are the following:

- Electricity Supply Quality and Continuity Regulations (ESQCR)
- Condition of assets with known failure modes (e.g. VIR Cables)
- Security and quality of supply to customers
- Reduction in Customer Interruptions (CIs) and Customer Minutes Lost (CMLs)

3.1.2 Services and terminations

The Investment drivers for the replacement of services (underground and overhead) and service terminations (cutouts) include:

- Electricity Supply Quality and Continuity Regulations
- Security and quality of supply to customers
- Condition (including defects) of services and terminations
- Reduction in Customer Interruptions (CIs) and Customer Minutes Lost (CMLs)

These drivers will be supported by:

- ESQCR risk assessments
- Asset condition*
- Asset and network performance.
- Analysis of current and future work costs.
- Historic, current and emerging equipment and diagnostic technologies.
- Stakeholder options**

* *Specific information is obtained from UKPN staff carrying out work at premises or third parties (i.e. meter operators and household occupants).*

** *In setting investment levels for ED1, consideration has been given to the impact of the smart meter roll out programme between 2014 and 2019*

3.2 Condition Measurements

3.2.1 Inspection of Risers and Laterals

A methodology has been developed using UKPN's Meter Point Registration System (MPRS) to identify addresses where multiple occupancy or multiple supply points are located. The methodology involved searching for postal addresses where more than one electricity supply point was located. Key words were used such as Flat, House, Mansion, Court etc.

This analysis was supplemented by the analysis of the Postcode Access Files (PAF) and identified 157,000 potential multi occupancy premises in SPN.

A 10 year program of inspections has been commenced to verify ownership and condition of R&Ls identified from the MPRS/PAF analysis.

As part of the inspection process condition points and defects are recorded using a hand held devices (HHD). This ensures that good quality data is captured and recorded in the asset register in a timely manner hand at the point of inspection. When an inspection HHD script is run the user answers set questions, specific to each asset type, about the condition and allows defects to be recorded, reviewed and cleared.

Key condition points collected during the inspection process include:

- Overall condition of the riser(s).
- Overall condition of the lateral(s).
- Overall condition of the distribution board(s)/cut-out(s)

These are assessed on a condition rating (CR) scale from 1 to 4 where a CR1 indicates an asset is new and CR4 indicates it is in poor condition. Table 4 shows all the condition rating descriptions.

Condition	Description
1	Generally in 'as new' or very good condition
2	Acceptable or satisfactory condition
3	Indication that either minor work is required or the condition indicates that future repair or replacement is required
4	This category indicates that significant/urgent repair or replacement is required

Table 4 - Condition rating descriptions

3.2.2 Inspection of underground services

UK Power Networks does not have a routine inspection regime for underground service cables. They are managed via a reactive work programme as the frequency of failures is quite small and there is no reliable cost effective way of inspecting service cables underground.

Underground services include metered and un-metered supplies to street lighting columns, residential and business properties.

Third parties usually report failures and these are recorded in the ENMAC (Electricity Network Management and Control) tool. The locations of all underground services owned by SPN are held in a network-mapping tool, NETMAP shown in Figure 7. There are processes in place to ensure that NETMAP records are updated whenever services are replaced.

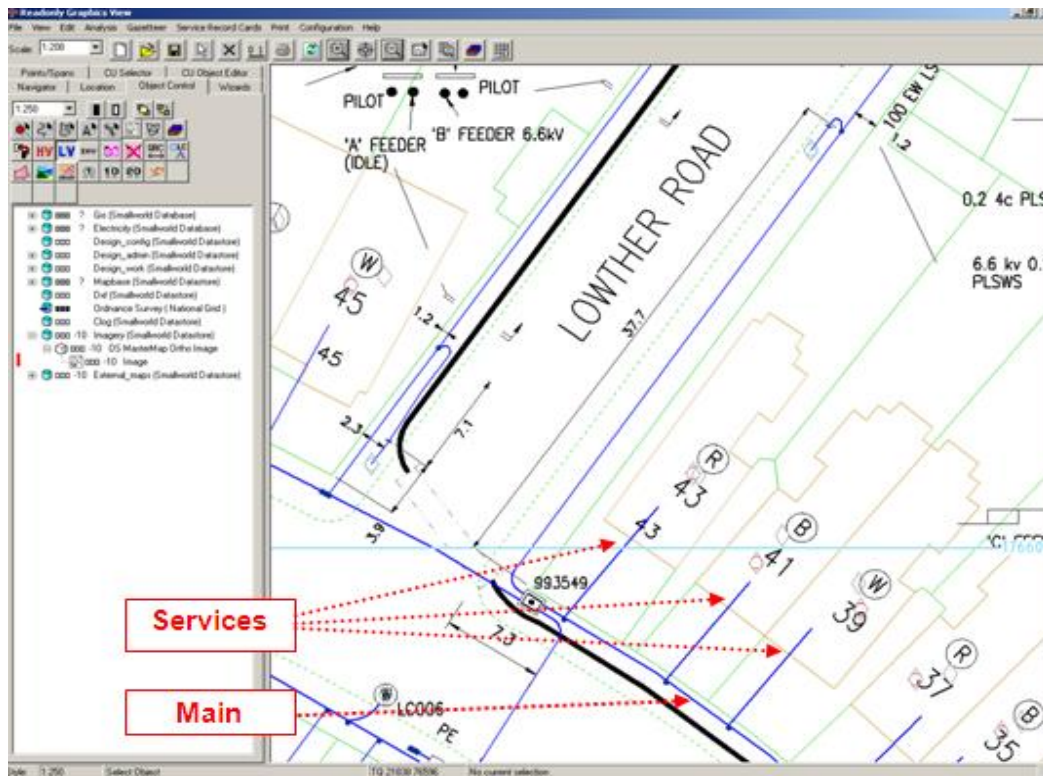


Figure 7 - NETMAP view of services and mains

3.2.3 Inspection of overhead services

Individual overhead line services are inspected on a four year cycle as part of routine full patrols and safety patrols for low voltage mains overhead lines. Hands held devices (HHDs) are used on site at the point of inspection to record condition, defects, ESQC ratings and ESQC compliance. The information collected is used to create and prioritise replacement or other remedial work programmes. In addition historical fault rates are examined to set budgets.

3.2.4 Inspection of Cut-outs

Condition assessment of these assets is mainly through exception reporting by metering service companies as required by the Meter Operation Code of Practice Agreement (MOCOPA) agreement.

The Meter Operation Code of Practice Agreement (MOCOPA) is an Agreement between electricity distribution businesses and electricity meter operators in Great Britain.

Following the completion of the smart meter rollout there will be fewer visits to meters by the meter operators. Issues identified at the cutout are fed back to UK Power Networks by meter inspectors or household occupants. The frequency of meter readings varies by region but is typically at least once a year.

4.0 Asset Assessment

4.1 Asset Health

4.1.1 Risers and Laterals

There is currently no Health Index Framework for risers and laterals however an inspection programme which commenced in 2011 is capturing condition points associated with the lateral, the riser and the associated distribution boards. Condition Point 1 is 'As New' with Condition Point 4 being 'Poor Condition'.

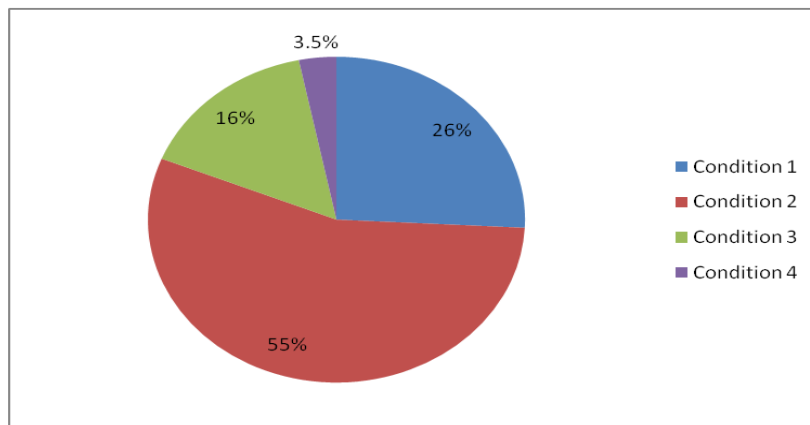


Figure 8 - Condition Rating of Risers and Laterals
(Source: Ellipse data extract 27 Feb 2013)

4.1.2 Services and Terminations (including cutouts)

There is no Health Index Framework for services and cutouts. However trends can be observed from fault rates and historical rates of replacement. All faults are recorded on the ENMAC (Electricity Network Management and Control) system. UK power Networks has developed a tool (fault cube) to extract and analyse fault data from ENMAC. Details of fault causes and trends can be extrapolated from the fault cube.

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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.

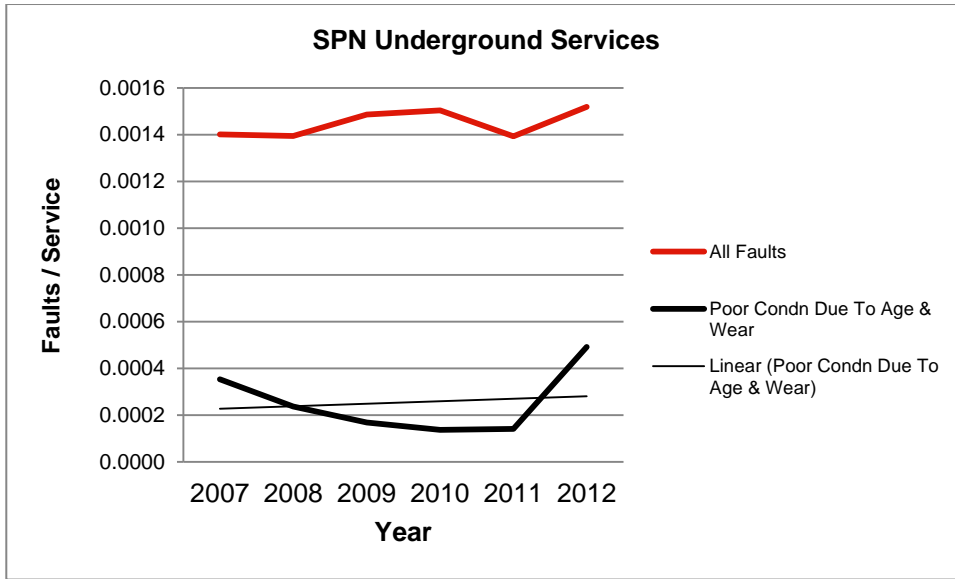


Figure 9 – Underground Services fault rates (Source - UKPN Fault Cube)

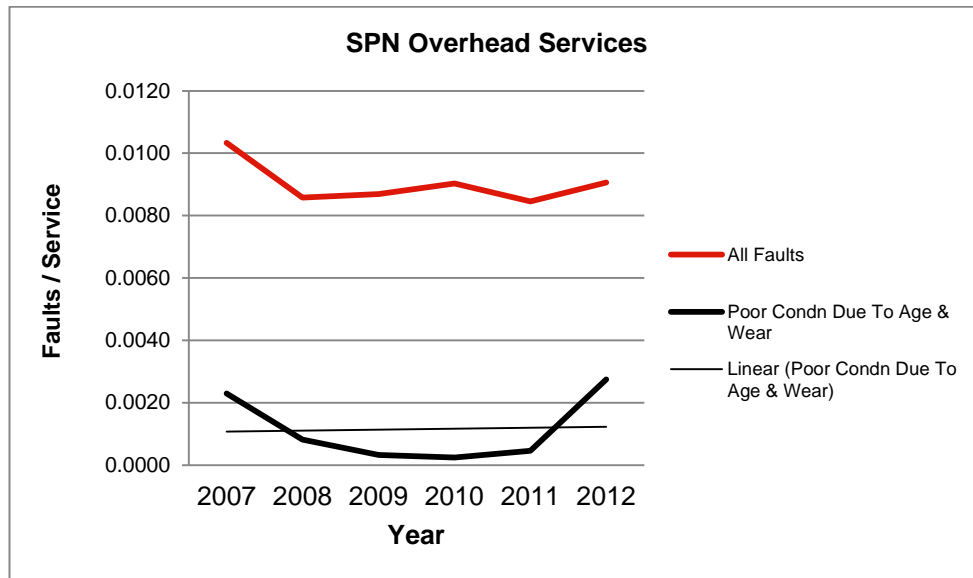


Figure 10 – Overhead Services fault rates (Source - UKPN Fault Cube)

Records of remedial work, carried out historically, are held in SAP. Analysis of historical replacement rates is also used to determine the number of cut-out replacements required each year.

4.2 Asset Criticality

4.2.1 Risers and laterals

Replacement of risers and laterals that have reached the end of life are prioritised for replacement on the numbers of occupants within the premises and number of floors.

A criticality rating table (see table 5) has been developed to assist in the prioritisation of work and the ability of the Fire and Rescue service to evacuate residents in the event of fire using external ladders should the internal staircase be inaccessible.

Criticality Category	Description
1	Up to 2 floors and 4 premises
2	Up to 2 floors and more than 4 premises
3	3-4 floors and up to 8 premises
4	3-4 floors and more than 8 premises
5	More than 4 floors

Table 5 – Criticality table

4.2.2 Underground services and cut-outs

There is no criticality framework for underground services & cut-outs. However future consideration may be given to the size of the services, and whether they are single or three-phase supplies to determine a criticality framework.

4.2.3 Overhead services

There is no criticality framework for overhead services. However overhead services are assessed and prioritised for replacement or other remedial work based on the ESQC risk rating. The ESQC risk rating is dependent on the equipment risk rating and location risk.

The ESQC equipment is assessed as High, Medium or Low based on the following rules:

- High risk - Service - Not up to UK Power Network’s Specification (Reference Overhead line Inspectors handbook)
- Medium risk – Service is insulated
- Low risk – Concentric, Duplex/Triplex, Service – ABC

The ESQC location risk is assessed based on the location of the service.

4.3 Network Risk

There is no separate network risk framework for cutouts. However the number of non-compliant cutouts reported on the network will provide a measure of assessing network risk.

4.4 Data Validation

R&L inspection data entered using handheld devices uses table validation when the data is input on site. This ensures only data within the specified range can be input.

All reports received from third parties or UK Power Networks staff will be assessed against the intervention policies (outlined in section 5.1) to determine the need to replace a service or cutout.

4.5 Data Verification

There is a well-documented process to ensure that NETMAP is updated when services are replaced. A key part of the process requires field staff to complete System Alternation Notices (S.A.N) whenever services are replaced. These S.A.Ns are sent to the Network records team and the Network Control teams.

Cutouts are not recorded on any SPN systems.

4.6 Data Completeness

We are carrying out surveys of risers and laterals in SPN, as part of a ten-year programme, to verify ownership. All of our overhead services and underground services are recorded on our network mapping tool, NETMAP.

5.0 Intervention policies

5.1 Intervention options

The only intervention option considered for underground services and cutouts is replacement. Overhead services may be replaced or shrouded depending on their condition and ESQC risk rating. The intervention policies for replacements are held in 'EDS 02-0045 Standard for the Replacement of Service Cables and Service Terminal Equipment' and summarised in the following sections.

5.1.1 Risers and Laterals

The criteria for replacing rising and lateral services shall be the same as for service cables (section 5.1.2) plus the following additional reasons:

- If the cables are contained with a metallic tube which is un-earthed.
- If the tube is used for the customer's earthing and it is not of a screwed barrel type.
- The earth continuity and the adequacy of bonding connections shall be adequate to provide the customer with an appropriate earth for the type of installation. The work undertaken to restore the earth will be kept to a minimum.
- Mineral insulated cables will not normally be replaced, except where the earth continuity and bonding is inadequate.
- Replace all VIR risers and laterals

5.1.2 Services and Terminations

A service cable (overhead, underground) will only be replaced for the following reasons if:

- It is faulty and it is beyond economic repair or a repair is impractical.
- It is overloaded and the conductors are too small (use Table 5 – Single Phase Cable Ratings as a guide to determine whether a service cable is overloaded).
- The insulation is showing signs of deterioration.
- It is located in a loft space in which case where practicable; it shall be removed from the loft space.
- The overhead flight phase conductor(s) are not insulated with PVC or XLPE.
- The conductors are not of a bundled design and the phase conductor is below the neutral.
- An overhead line services does not comply with the requirements of Section 11 of the UK Power Networks Overhead Line Inspectors Handbook.

Cable Type	Size (in ²)	Maximum Rating (A)
Paper Insulated, lead	0.007(7/0.036)	50
Paper Insulated, lead	0.01 (7/0.044)	60
Paper Insulated, lead	0.0145 (7/0. 052)	75
Mineral insulated	0.007	50
Mineral insulated	0.01	60
Mineral insulated	0.0145	75

Table 6 – Single Phase Cable Ratings

**Overhead services may be shrouded with Insuline LV Conductor shrouding if they are in good condition, but there are clearance issues that cannot easily be resolved.*

Figure 11 shows a section of cable being covered with Insuline conductor. Insuline insulation is considered an effective insulation when used on bare wire overhead lines. It can be used to mitigate the risk of horizontal clearances, e.g. buildings, street lights and climbable trees.



Figure 11: Insuline conductor

5.1.3 Cutouts

A cut-out shall only be changed under the following circumstances, if:

- It is damaged or faulty
- It is of a type with fuse in the neutral
- It is of a type with re-wireable fuses
- The metal clad casing is unearthed
- The cut-out is deemed to be overloaded.
- If a PME connection is required and the cut-out is not suitable for this purpose

5.2 Policies: selecting preferred interventions

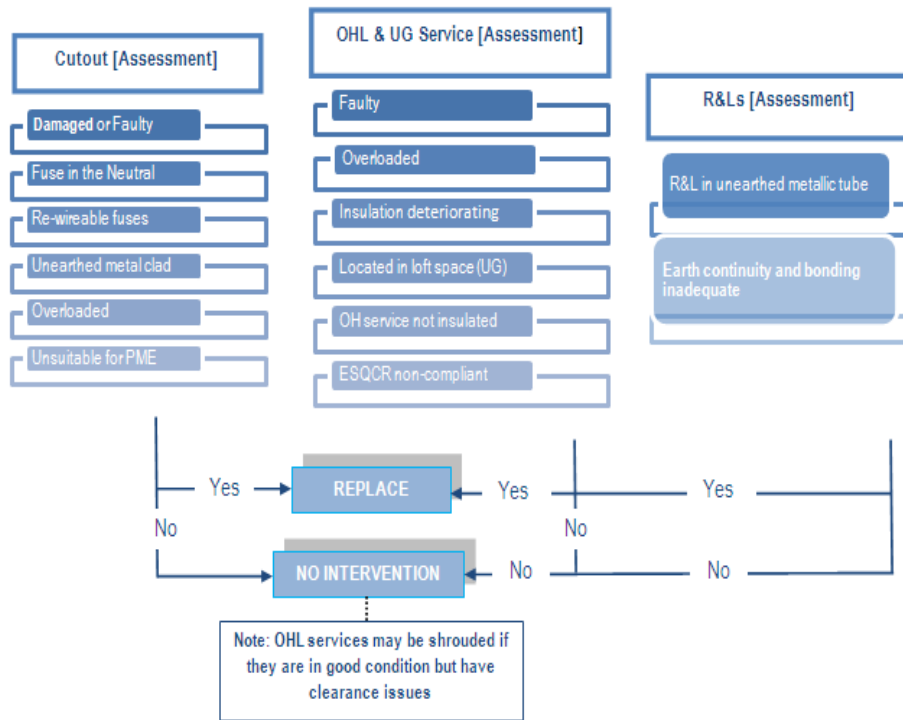


Figure 12 – Decision tree for interventions

Figure 12 shows the intervention options for cutouts, R&Ls and underground services. The decision tree summarises only services that are non-compliant with the policy, *EDS 02-0045 Standard for the Replacement of Service Cables and Service Terminal Equipment*, will be replaced.

5.2.1 Opportunities for OPEX/CAPEX trade-offs

UK Power networks employs a proactive replacement strategy for risers and laterals and overhead line services. This will ensure that costs are kept to a minimum as reactive costs are often more expensive than planned replacement costs.

6.0 Innovation

6.1 Risers and Laterals

UK Power networks have adopted a new approach to inspect, maintain and replace risers and laterals located within multi-occupancy premises. A ten-year cycle of inspections will be carried out to confirm ownership and the condition of these risers and laterals. In SPN the policy is that riser and lateral systems that are of an adoptable standard, or would have been at the time of construction, are owned by the Company.

Based on sample inspections and testing, of R&Ls, completed in 2012 it was established that there are issues with the breakdown of insulation in Vulcanised India Rubber cables and rods. The insulation of VIR type cable is known to degrade over time in a manner which can lead to sections of insulation breaking away under mechanical manipulation. All VIR type cable operated by UKPN would be expected to be at least 50 years old and installed in areas open to public access e.g. basements, broom cupboards, walls of flats adjacent to the metering. There is a therefore a high likelihood of inadvertent damage to these installations by third parties which could potentially lead to fire or exposed conductors coming into contact with persons. For these reasons a proactive program of replacements will be carried out for risers and laterals with VIR.

7.0 ED1 Expenditure Requirements for Services and terminations

7.1 Constructing the plan

7.1.1 Risers and laterals

Of the 157,000 properties initially identified, the inspection results obtained in Section 2 indicate that UKPN can expect to confirm ownership of 43% of these properties upon completion of the inspection programme. This equates to 67,500 properties. See Section 2 for further information.

The inspection results in Section 2 also show that 3.5% of the riser and lateral installations inspected were in poor condition including those insulated with Vulcanised India Rubber (3%).

This means that asset replacement is required in 3.5% of the 67,500 properties which is some 2360 properties.

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

Each property contains on average 4 laterals and 0.4 risers. i.e. not all properties contain a riser but just laterals installed from a ground floor intake position.

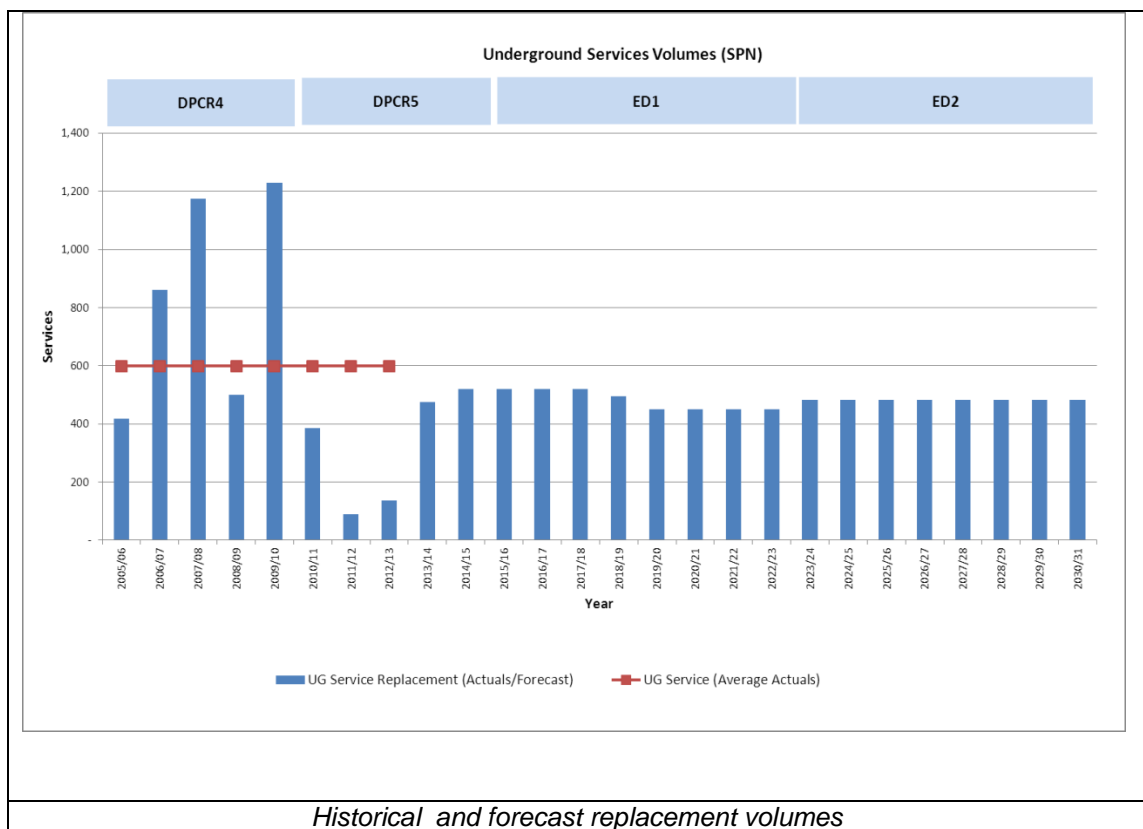
Therefore 8,896 laterals and 896 risers require replacements which have been phased over ED1.

	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	ED1 Total
Planned Replacement of Laterals	1,112	1,112	1,112	1,112	1,112	1,112	1,112	1,112	8,912
Planned Replacement of Risers	112	112	112	112	112	112	112	112	896

Table 7 - Risers and laterals planned replacement volumes in ED1 (Source: 19th February 2014 NAMP Table O)

7.1.2 Underground services

The investment levels for underground services have been set based on historical achievements. Figure 13 shows the historical replacement volumes and the corresponding fault rates for underground services.



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

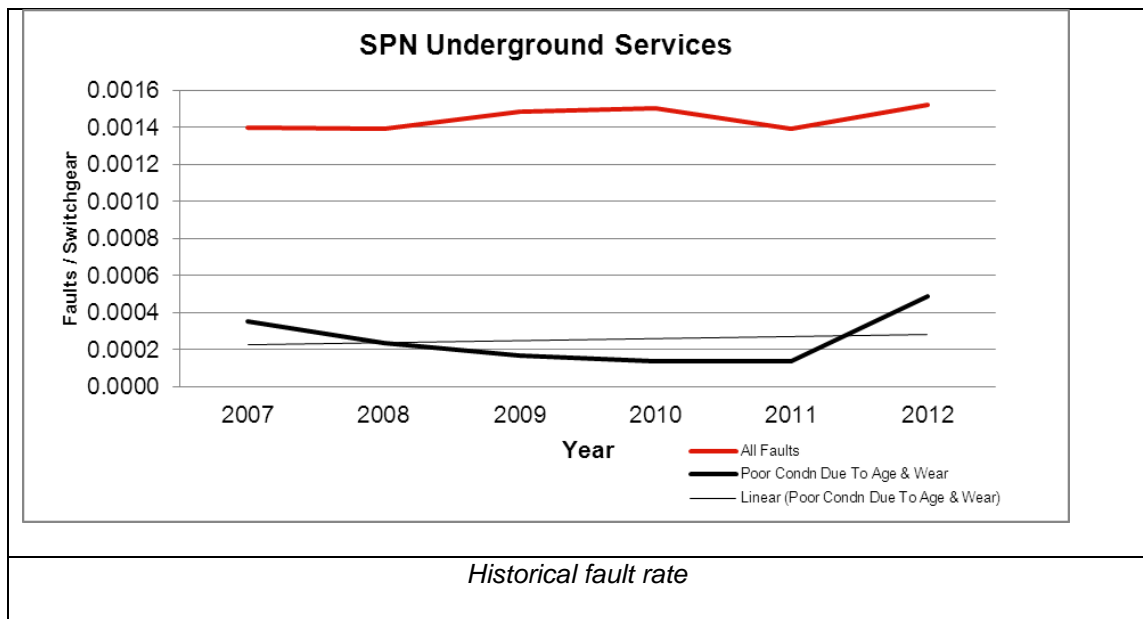


Figure 13: Underground services justification

The level of investment set in ED1 is similar to the average achievement over the 7-year period 2005 to 2012, excluding the two years of unusually high replacement activity 2007/2008 and 2009/2010. Table 7 shows the historical achievement volumes compared to the average annual volume proposed in ED1.

	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	*Average - Last 7 years	Average ED1
UG Service Replacement (Count)	419	860	1,174	501	1,229	385	89	451	482

Table 8. Underground service removals placement volumes 2005 – 2012 (*Excludes the two years of unusually high replacement activity 2007/2008 and 2009/2010)

The ED1 proposals are higher than the achievements in the first few years of DPCR5. This is necessary to curtail the increasing condition-related fault rates evident in figure 13.

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

7.1.3 Overhead services

The investment levels for overhead services have been set based on historical achievement and a review of condition-related fault rates.

There has been a decreasing trend in overall fault rates, for overhead services in the last five years. However there has also been an increasing trend in condition-related failures of overhead services in the last few years.

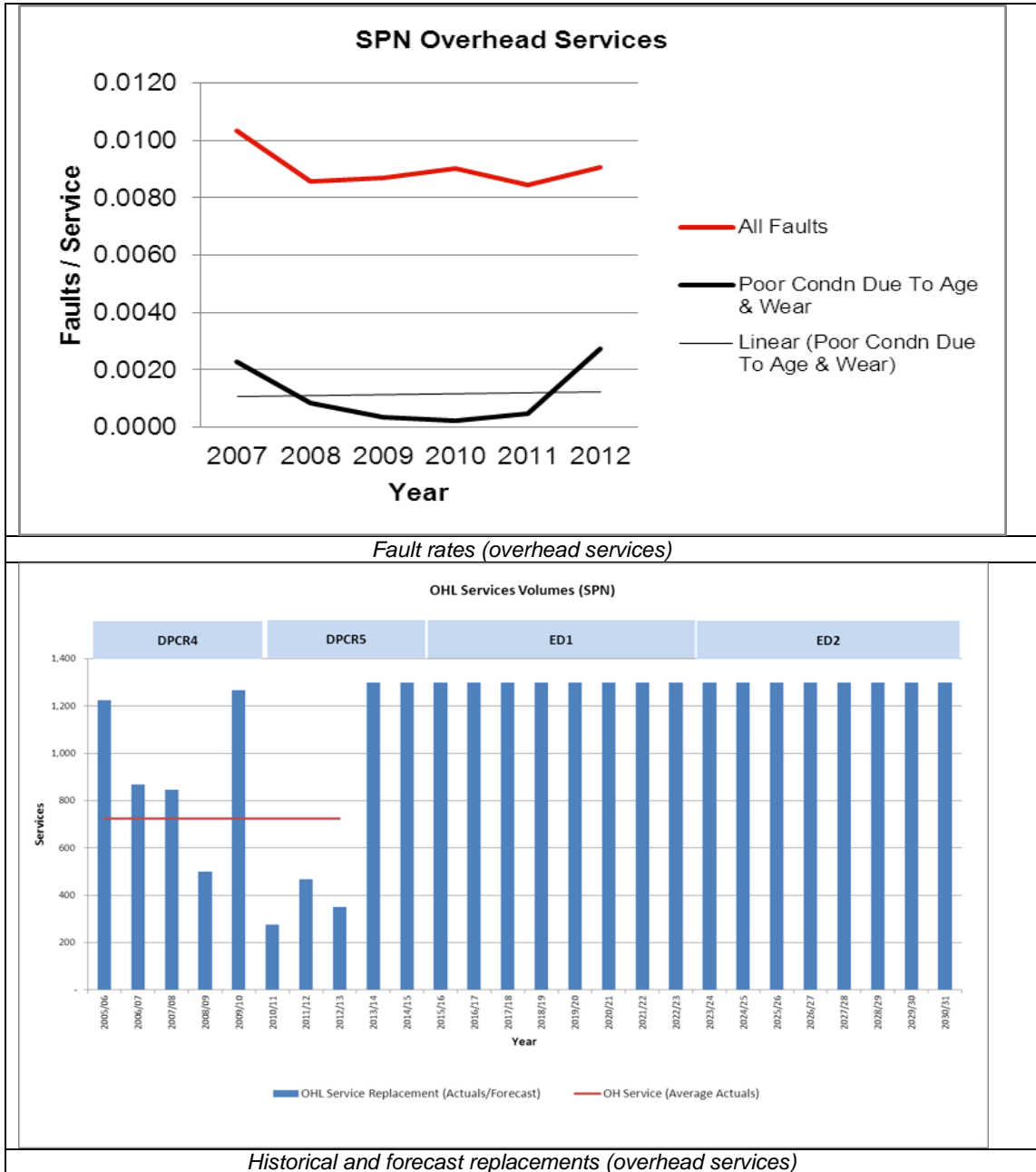


Figure 14 Overhead services justification

The increasing condition-related failures could be attributed to the ageing services population and the small number of replacements at the start of ED1. For this reason the replacement rates for the remainder of DPCR5 and ED1 has been increased. The ED1 proposals are similar to the volumes of achievement at the start and end of DPCR4.

7.1.4 Cutouts

The investment proposal for planned cutout replacements in ED1 is based on historical achievements and the anticipated impact of the smart meter rollout programme which will be carried out between 2014 and 2019.

During the smart meter roll out, meter operators will inspect all cutouts and service terminations associated with meters. It is assumed that approximately 2% of all cutouts will be replaced between 2013 and 2020, due to the impact of the smart meter roll out programme. As a result the number of planned replacements is expected to decrease in that period.

A review of historical replacements show that typically 0.16% of the cutout population is replaced each year. Following the smart meter rollout the replacement rate is expected to reduce to 0.05% of the population. Table 9 shows the comparative figures.

Licence area	Cutout volumes excluding half-hourly customers	Steady state replacement rate	Cut out replacements post-smart meter rollout (2021/2022 – 2022/2023)
SPN	2,114,809	0.16% of the population; 3,454	0.05% of the population; 1,057

Table 9: Forecast rates of cutout replacements before and after the smart meter rollout

Table 10 shows the annual replacement volumes between 2013 and 2023. The reduced cutout replacements between 2015/2016 and 2020/2021 is due to the large numbers of other cutouts that will be replaced during the smart meter rollout

NAMP Ref	Description	2013/2 014	2014/2 015	2015/2 016	2016/2 017	2017/2 018	2018/2 019	2019/2 020	2020/2 021	2021/2 022	2022/2 023
1.17.01.6532	Cut Outs Replaced	3,454	3,454	2,591	1,727	864	864	864	1,782	1,057	1,057

Table 10: Forecast cutout replacement volumes (Source: 19th February 2014 NAMP Table O)

7.2 Asset volumes & expenditure

7.2.1 Risers and laterals

Figures 12 and 13 show the historical and forecast work for the replacement of risers and laterals in SPN. The ramp up in the first few years will allow us to secure resources to achieve the steady state forecasts in ED1.

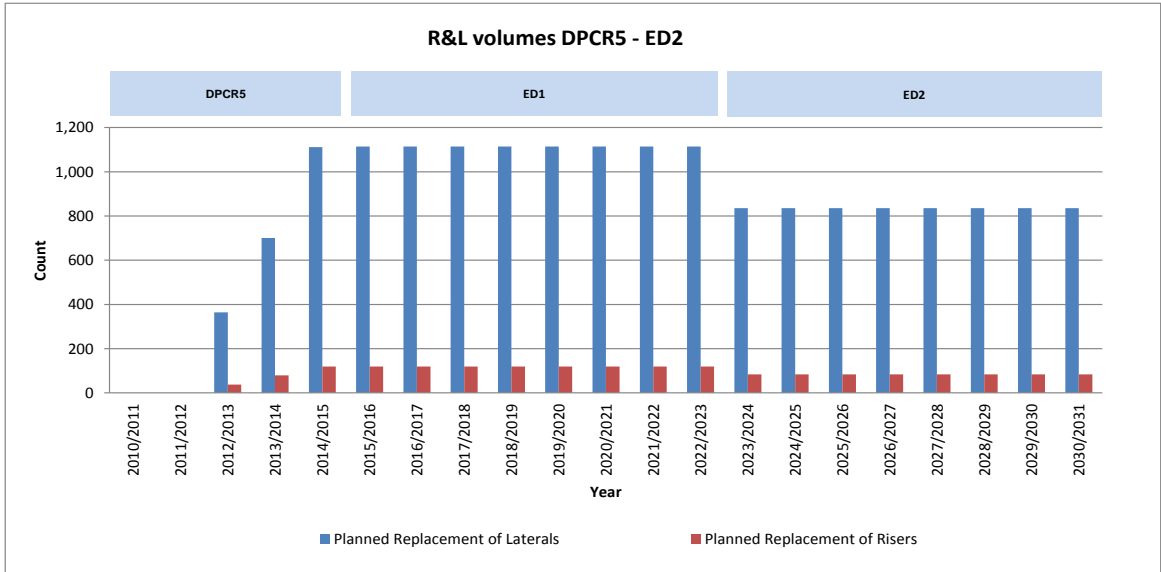


Figure 15 - R&L volumes DPCR5-ED2 (Source – 19th February 2014 NAMP Table O)

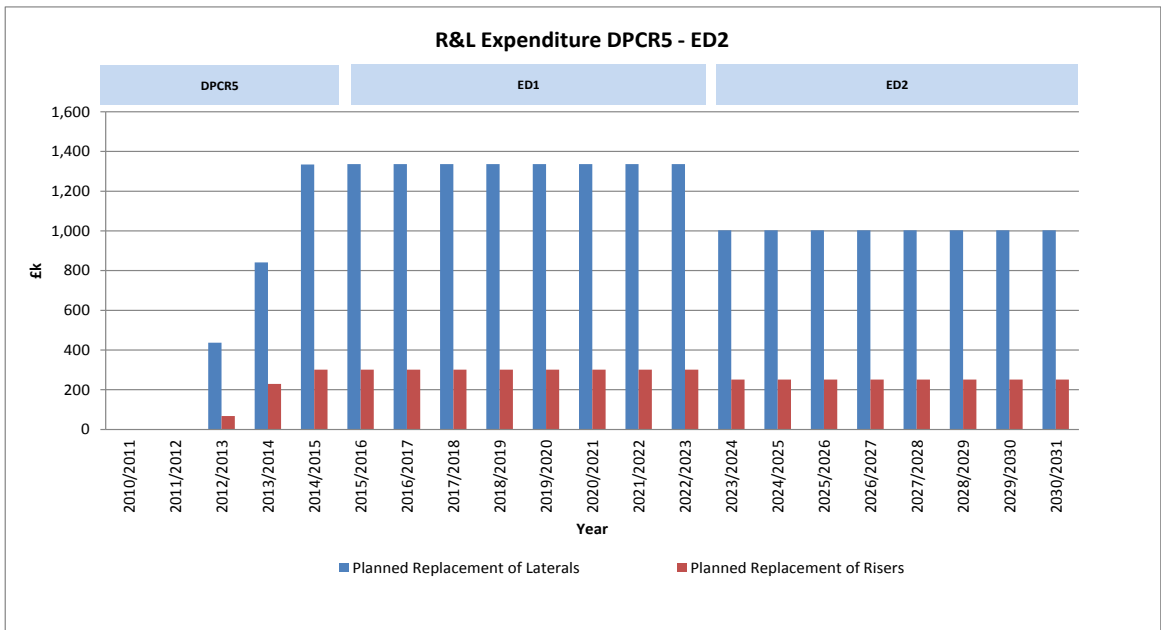


Figure 16 - R&L costs DPCR5 - ED2 (Source – 19th February 2014 NAMP Table J LESS INDIRECT)

7.2.2 Underground Services

Figures 17 and 18 show the forecast volumes and costs for the replacement of underground services.

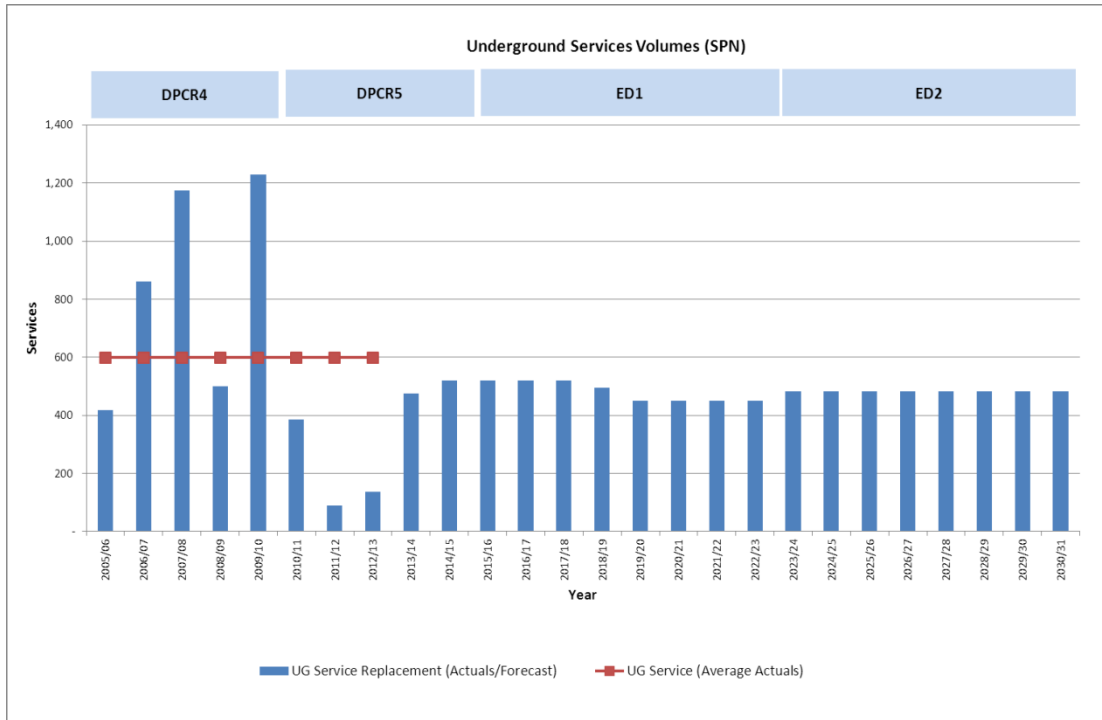


Figure 17 – Underground Services Volumes DPCR4 – ED2

Sources:

- DPCR4 & DPCR5 FBPQ - Table NL3 (DPCR5 FBPQ)
- DPCR5 (First three years) - 2013/2014 RIGS CV3 table
- DPCR5 (Last Two years) - 2013/2014 RIGS CV3 table
- ED1 - 2013/2014 RIGS CV3 table
- ED2 - From Age-Based Analysis

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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.

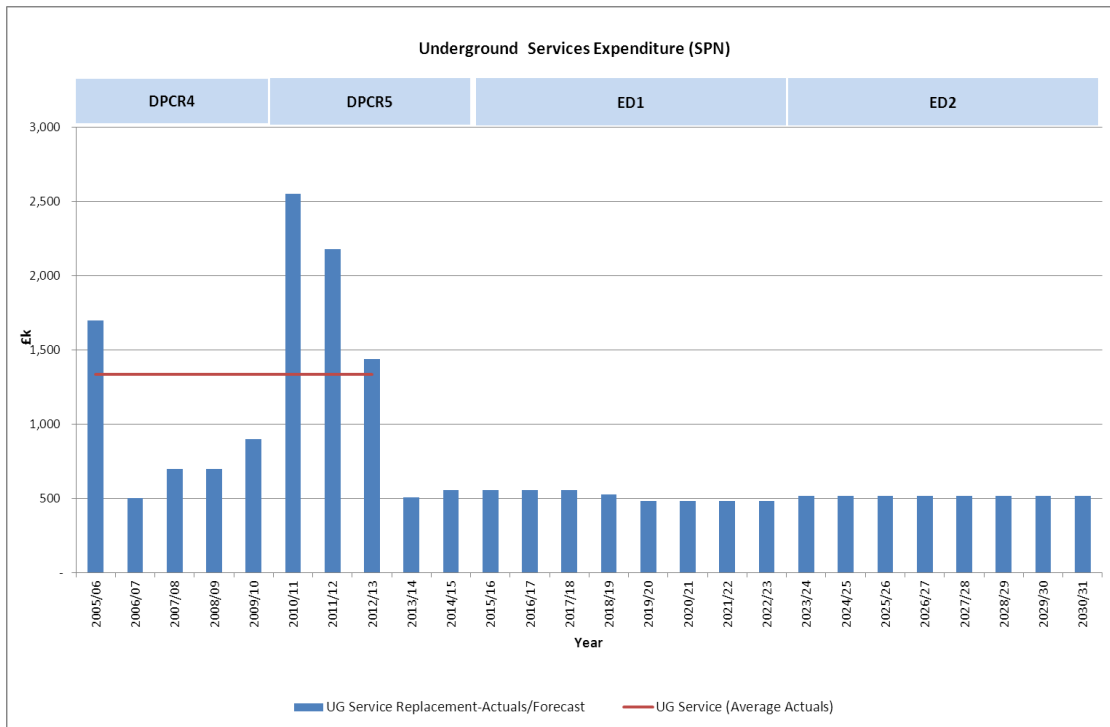


Figure 18 – Underground Services Costs DPCR4 – ED2

Sources:

- DPCR4 & DPCR5 FBPQ - Table NL1 (DPCR5 FBPQ)
- DPCR5 (First three years) - 2013/2014 RIGS CV3 table
- DPCR5 (Last Two years) – 14th June NAMP (Table J LESS INDIRECT)
- ED1 – 14th June NAMP (Table J LESS INDIRECT)
- ED2 - From Age-Based Analysis * UCI

7.2.3 Overhead services

Figures 19 and 20 show the forecast volumes and costs for the replacement of underground services.

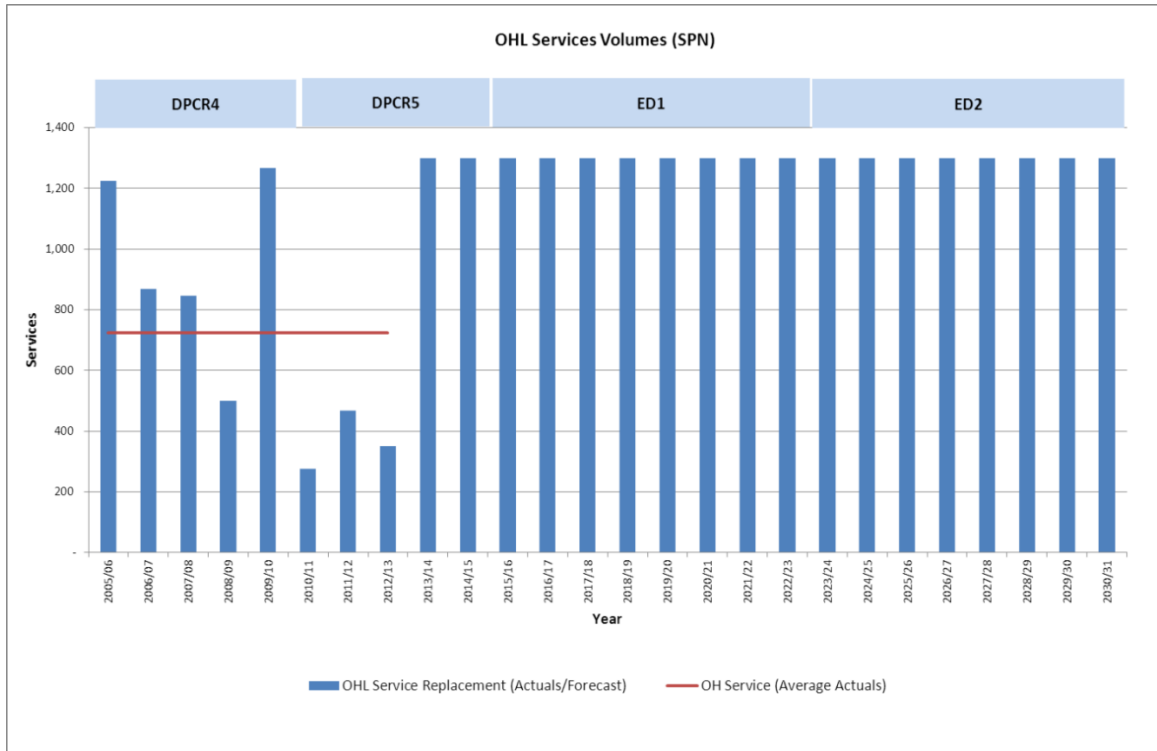


Figure 19 – Overhead Line Services Volumes DPCR4 – ED2

Sources :

- DPCR4 & DPCR5 FBPQ - Table NL3 (DPCR5 FBPQ)
- DPCR5 (First three years) - 2013/2014 RIGS CV3 table
- DPCR5 (Last Two years) - 2013/2014 RIGS CV3 table
- ED1 - 2013/2014 RIGS CV3 table
- ED2 - From Age-Based Analysis

Note - 2010/11, 2011/12 and 2012/13 volumes are 'equivalent' volumes from expenditure observed in the three years; NB – A change request needs to be submitted to smooth the ED1 costs as well as reduce 2013/14 and 2014/15 costs to match ED1.

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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.

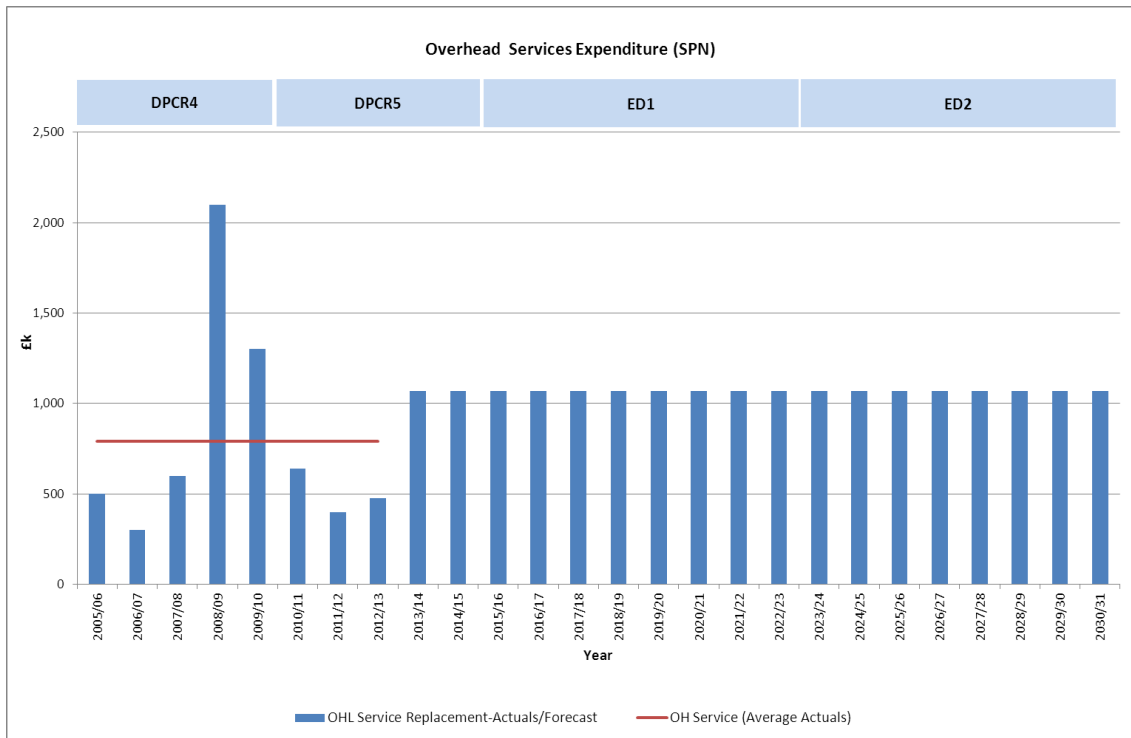


Figure 20 – Overhead Line Services Costs DPCR4 – ED2

Sources:

DPCR4 & DPCR5 FBPQ - Table NL1 (DPCR5 FBPQ)

DPCR5 (First two years) - 2011/2012 RIGS CV3 table

DPCR5 (Last Three years) – 14th June 2013 NAMP (Table J LESS INDIRECT)

ED1 – 14th June 2013 NAMP (Table J LESS INDIRECT)

ED2 – Similar rate of investment in ED1 assumed

Note - 2010/11, 2011/12 and 2012/13 costs have been collated from the finance management tool – SAP.

7.2.4 Cutouts

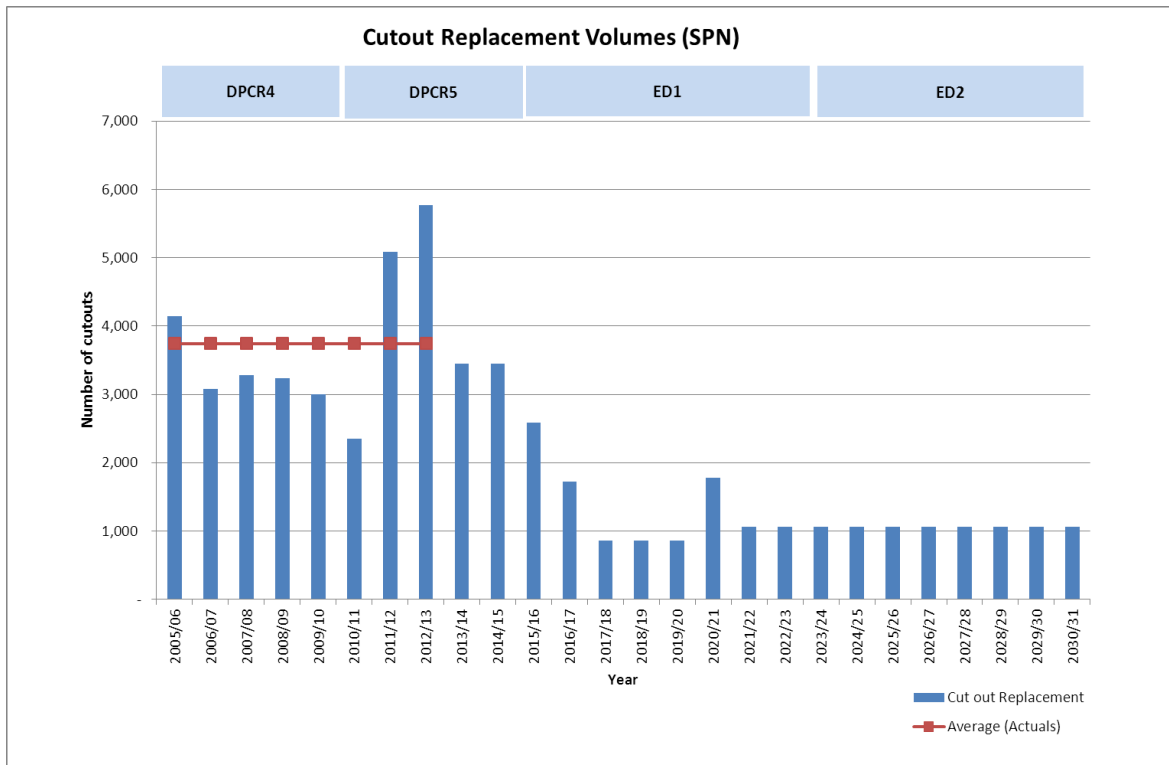


Figure 21 – Cutout Volumes DPCR4-ED2

Sources:

- DPCR4 & DPCR5 FB PQ - Table NL3 (DPCR5 FB PQ)
- DPCR5 (First three years) - 2013/2014 RIGS CV3 table
- DPCR5 (Last Two years) - 2013/2014 RIGS CV3 table
- ED1 - 2013/2014 RIGS CV3 table
- ED2 - From Age-Based Analysis

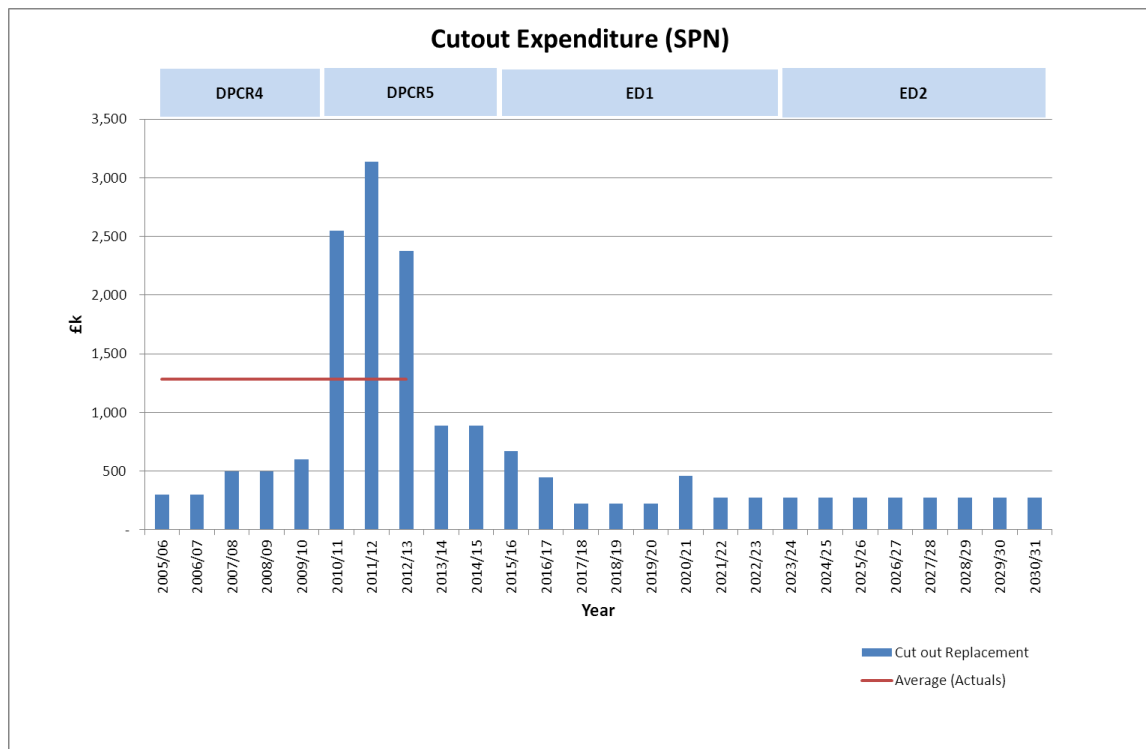


Figure 22 – Cutout costs DPCR4 – ED2

Sources:

DPCR4 & DPCR5 FBPQ - Table NL1 (DPCR5 FBPQ)

DPCR5 (First three years) - 2013/2014 RIGS CV3 table

DPCR5 (Last Two years) – 14th June NAMP (Table J LESS INDIRECT)

ED1 – 14th June NAMP (Table J LESS INDIRECT)

ED2 - From Age-Based Analysis

7.3 Commentary

The proposed investment programme for the replacement of R&Ls in ED1 in SPN is £12.3m and a ramp up to this level is already underway in DPCR5. No allowance was agreed for proactive inspections and replacement of R&Ls in DPCR5 because there was no proactive replacement policy. In 2011 a review of the policy on R&Ls was carried out which resulted in the inspection of a sample of R&Ls in SPN. The results of the inspections were extrapolated to determine investment requirements in ED1. The proposed level of investment in ED1 will ensure that sufficient provisions are available to replace R&Ls in poor condition and those with VIR, identified from routine inspections.

The proposed investment programme for the replacement of overhead and underground services in SPN is £12.6m (Underground services - £4.1m; overhead services - £8.5m). The proposals are based on historical achievements and observed fault rates. A key feature of the plan is that the investment levels have been set to manage the level of condition-related faults associated with services. Achievements for underground services in the first two years of DPCR5 have been lower than planned. This has led to an increase in condition-related faults from 2011 to 2012

(see Figure 9). The investment proposals for services have been increased from 2013 onwards to ensure that the condition-related fault trends are reduced.

The proposed investment programme for the replacement of cutouts is £2.8m. This excludes cutout replacements due to the smart meter rollout programme. The investment profile shown takes in to account the large scale replacements due to the smart meter rollout. It is estimated that the installation of smart meters by meter operators will result in a 2% replacement rate of all cutouts inspected. Details of replacements due to the smart metering rollout can be found in Annex 10 of our RIIO-ED1 business plan. Following the completion of the smart meter roll-out programme, the replacement rate of cutouts is expected to reduce to 0.05% of the population.

7.4 Sensitivity Analysis

No sensitivity analyses have been carried out on the services and terminations ED1 proposals.

8.0 Deliverability

The replacement of R&Ls will be carried out primarily by directly employed staff with the use of some contractors. We have set the R&L replacement plan such that there is a ramp up in DPCR5 to the desired investment level in ED1.

The replacements of overhead and underground services are similar to historical levels of achievements. Most of the work will be carried out by existing resources in our Networks operations teams.

Replacement of cutouts are done live and will not require loss of supplies to other customers. A review of the historical cutouts replacements through DPCR4 and DPCR5 show that there is a steady increase in the number of replacements each year. The increase in overall cutout replacements is expected throughout the smart meter rollout period. However there will be a corresponding decrease in other planned cutout replacements (if we exclude the replacements due to the smart meter rollout). Additional resources will be sought where necessary to manage the increased replacements due to the smart meter rollout activities as well as other planned cutout replacement activities.

Appendices

Appendix 1 - Age profiles

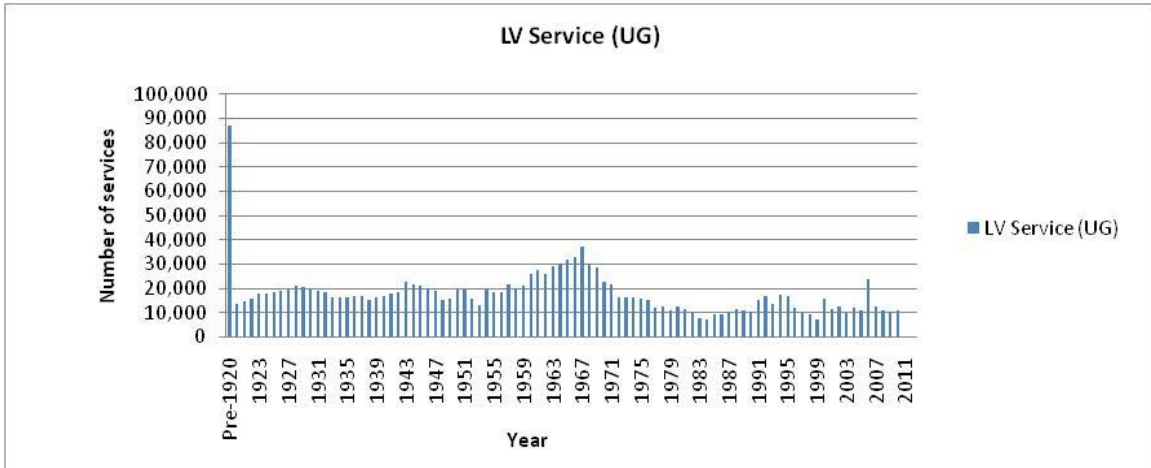


Figure 23 - Underground Service Age Profile (Source – RIGS 2012 CV3 Table V5)

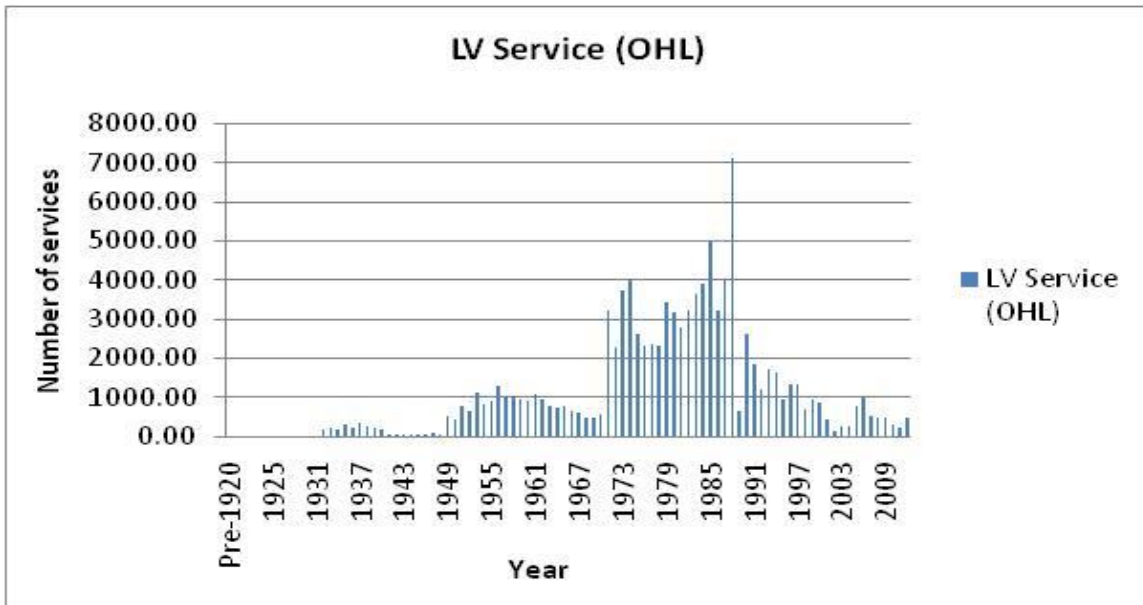


Figure 24 - Overhead LV Services (Source – RIGS 2012 CV3 Table V5)

Appendix 2 - HI profiles

N/A

Appendix 3 - Fault data

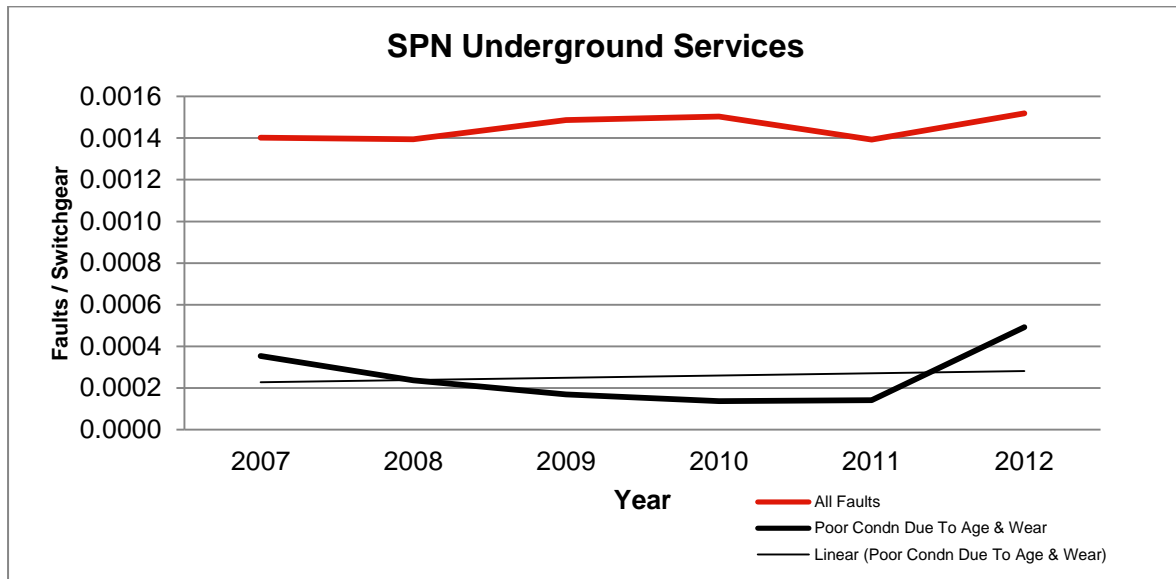


Figure 25 – Underground Services Fault rates (Source - UKPN Fault Cube)

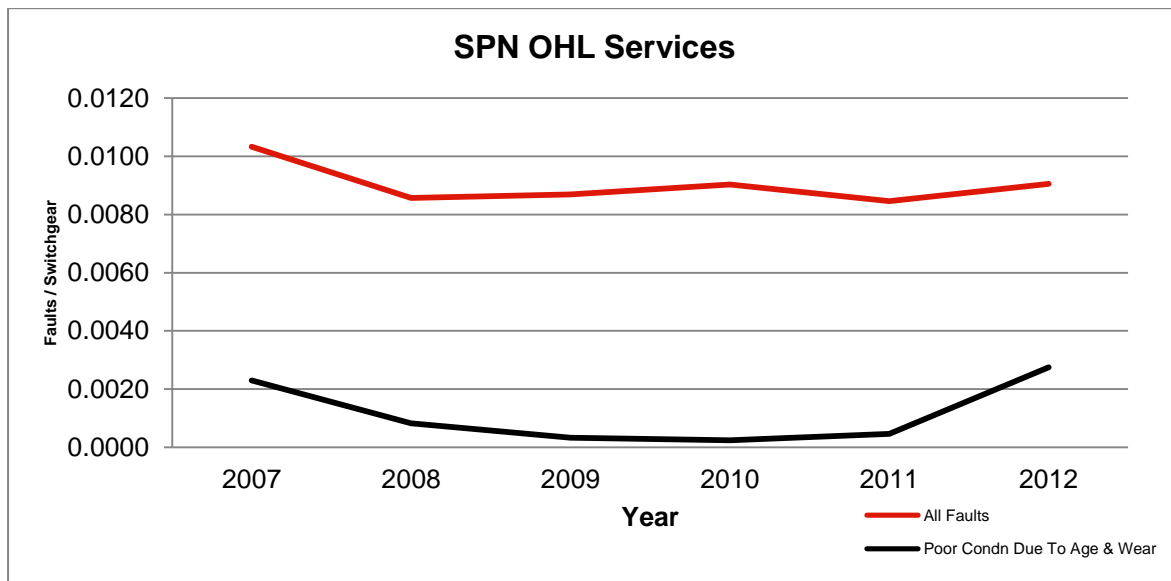


Figure 26 – OHL Services Fault Graphs (Source - UKPN Fault Cube)

Appendix 4 - WLC case studies

Not applicable.

Appendix 5 - NLRE Expenditure plan

NAMP Line(s)	Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	ED1 Total
Risers and laterals										
1.46.04	Replacement of Risers	202	202	202	202	202	202	202	202	1,613
1.46.04	Replacement of Laterals	1,337	1,337	1,337	1,337	1,337	1,337	1,337	1,337	10,694
Underground Services										
1.46.01	Replace Metered Services	448	448	448	422	374	374	374	374	3,260
1.46.06	UMS Service Replacement (SWA Only) - Non Chargeable Connections Work	107	107	107	107	107	107	107	107	854
Overhead services										
1.46.03	Replace Overhead Services - Ad Hoc Replacements & ESQC Response	316	316	316	316	316	316	316	316	2,531
1.46.05	Replacement of Mural Services	753.1	753.1	753.1	753.1	753.1	753.1	753.1	753.1	6,024.4
Cutouts										
1.17.01	Cut Outs Replaced (BAU)	668	446	223	223	223	460	273	273	2,788
	Total (£k)	3,831	3,609	3,386	3,360	3,312	3,549	3,362	3,362	27,764

Table 11– ED1 Expenditure Plan (Source 19th February 2014 NAMP Table J Less Indirect)

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NAMP Line(s)	Asset Category	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	ED1 Total
Risers and laterals										
1.46.04	Replacement of Risers	112	112	112	112	112	112	112	112	8896
1.46.04	Replacement of Laterals	1,112	1,112	1,112	1,112	1,112	1,112	1,112	1,112	8,896
Underground Services										
1.46.01	Replace Metered Services	420	420	420	395	350	350	350	350	3,055
1.46.06	UMS Service Replacement (SWA Only) - Non Chargeable Connections Work	100	100	100	100	100	100	100	100	800
Overhead services										
1.46.03	Replace Overhead Services - Ad Hoc Replacements & ESQC Response	1050	1050	1050	1050	1050	1050	1050	1050	8,400
1.46.05	Replacement of Mural Services	250	250	250	250	250	250	250	250	2,000
Cutouts										
1.17.01	Cut Outs Replaced (BAU)	2591	1727	864	864	864	1782	1057	1057	10,806

Table 12 - ED1 Forecast Volumes (Source 19th February 2014 NAMP Table O)

Appendix 6: Sensitivity Analysis

Not Applicable

Appendix 7: Named schemes

Not Applicable

Appendix 8: Output NAMP/ED1 RIGS reconciliation

Outputs		Asset Stewardship reports										RIGs Table										
Investment description	NAMP line description	NAMP Line	2015/6	2016/7	2017/8	2018/9	2019/20	2020/21	2021/22	2022/23	Total	RIG Table	RIG Row	2015/6	2016/7	2017/8	2018/9	2019/20	2020/21	2021/22	2022/23	Total
Risers & Laterals	Replacement of Risers	1.46.04.6 674	112	112	112	112	112	112	112	112	896	CV110	57	112	112	112	112	112	112	112	112	896
	Replacement of Laterals	1.46.04.8 519	1,112	1,112	1,112	1,112	1,112	1,112	1,112	1,112	8,896	CV110	58	1,112	1,112	1,112	1,112	1,112	1,112	1,112	1,112	8,896
Underground services	Replace Metered Services	1.46.01.6 671	420	420	420	395	350	350	350	350	3,055	CV3	141	520	520	520	495	450	450	450	450	3,855
	UMS Service Replacement (SWA Only) - Non Chargeable Connections Work	1.46.06.9 455	100	100	100	100	100	100	100	100	800											
Overhead services	Replace Overhead Services - Ad Hoc Replacements & ESQC Response	1.46.03.6 673	1,050	1,050	1,050	1,050	1,050	1,050	1,050	1,050	8,400	CV3	135	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	10,400
	Replacement of Mural Services	1.46.05.6 672	250	250	250	250	250	250	250	250	2,000											
Cut Out (Metered)	Cut Outs Replaced (BAU)	1.17.01.6 532	2,591	1,727	864	864	864	1,782	1,057	1,057	10,806	CV3	148	2,591	1,727	864	864	864	1,782	1,057	1,057	10,806
Total			5,635	4,771	3,908	3,883	3,838	4,756	4,031	4,031	34,853			5,635	4,771	3,908	3,883	3,838	4,756	4,031	4,031	34,853

Table 13 NAMP to RIGS mapping [Source: 19th February 2014 Namp Table O / 21st February 2014 ED1 Business Plan Data Tables]

Appendix 9: Material changes since the June 2013 ED1 submission

Asset type	Action	Change type	2013	2014	Difference (Reduction)
Risers and Laterals CV110	Replace	Volume Additions/Disposals	9,792	9,792	0
		Investment (£m)	12.31	12.31	0
		UCI (£k)	1.26	1.26	0
LV Service (UG) CV3	Replace	Volume Additions/Disposals	3,855 / 11,471*	3,855 / 3,855	0 / (7,616)
		Investment (£m)	12.20	4.10	8.1
		UCI (£k)	3.16	1.06	2.1
LV Service (OHL) CV3	Replace	Volume Additions/Disposals	10,400 / 10,400	10,400 / 10,400	0
		Investment (£m)	8.5	8.5	0
		UCI (£k)	0.83	0.83	0
Cutouts CV3	Replace	Volume Additions/Disposals	10,806 / 10,806	10,806 / 10,806	0
		Investment (£m)	2.8	2.8	0
		UCI (£k)	0.26	0.26	0

Table 14 - Material changes to the July 2013 ED1 submission [Source: October 2013 ED1 Submission / 21st February 2014 ED1 Submission]

*The volume of disposals of underground services in the 2013 business plan submission was more than the volume of additions because it included the removal of 7,616 redundant services in ED1. Following a review of the mappings to the reporting tables, all of the redundant services costs have been remapped to "C26: Network Operating Costs – Other" and the volumes removed from CV3.

This document now only includes costs relevant to *asset replacement (CV3)* and replacement of *rising and lateral mains (CV110)*. Unplanned replacements of services are included in the Inspection and Maintenance Asset Stewardship reports.