



Document 22
Asset Category – Tree Cutting
LPN

Asset Stewardship Report
2014

Ian Draper

Approved by Richard Wakelen / Barry Hatton

Approved date 06/03/2014

Document History

Version	Date	Details	Originator	Revision Class	Section Update
1.0	12.022014	Original	N/A	N/A	N/A
1.1	16.02.2014	Re-Submission First Draft. "Trees" extracted from document 14 (I&M Faults and Trees) and set up as a separate document.	Ian Draper	Minor	Multiple sections
1.2	28/02/2014	Updated as per Gold check list and Tables and references	Manjula Singh	Minor	Throughout the document
1.3	03.03.2014	Comments from RW incorporated Typographical changes Text added for clarity Table removed	Ian Draper	Minor	Preface, 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 4.0, 4.1, 4.2, 5.0, Appx 8, 9, 10 Table 1, Table 2, Appx 8, Appx 9, Appx 10 Appx 8
2.0	06.03.2014	ASR approved by BH and version set to 2.0	Ian Draper	Minor	Doc History and headers

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) and the 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 9 – Efficiency benchmarking with other DNO’s:** This helps to inform readers how UK Power Networks is positioned from a benchmarking position with other DNO’s. It aims to show why we believe our investment plans in terms of both volume and money is the right answer when compared to the industry, and why we believe our asset inspection and intervention proposals are efficient and effective and in the best interest for our customers.

3. **Appendix 10 – Material changes since the July 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.

Contents

1.0	Executive Summary Tree Cutting	6
1.1	Scope	6
1.2	Strategy	6
1.3	ED1 Proposals.....	7
1.4	Summary Table of ED1 investment.....	8
1.5	Innovation	10
1.6	Risks and Opportunities	10
2.0	Description of Tree Cutting	10
2.1	Asset Information.....	10
2.2	Tree cutting cycles	11
2.3	Vegetation Density.....	11
3.0	Investment Drivers	12
3.1	Summary of Fault Trends.....	12
4.0	Asset Assessment.....	13
4.1	Types of Contract.....	13
4.2	Issues – Refusals and Limited Cut.....	13
4.3	Ash Dieback.....	13
4.4	ETR132	13
5.0	Intervention Policies	13
6.0	Innovation.....	14
7.0	ED1 Expenditure Requirements for Tree Cutting.....	15
7.1	Method: Constructing the Plan	15
7.2	Tree Cutting Plan.....	15
8.0	Deliverability	16
	Appendices	17
	Appendix 1 Age Profiles – N/A.....	17
	Appendix 2 HI Profiles – N/A.....	17
	Appendix 3 Fault Data – N/A.....	17
	Appendix 4 WLC Case Studies – risk, cost, performance, condition, profiles for various options – N/A	17
	Appendix 5 NLRE Plan – Included in this document – N/A.....	17
	Appendix 6 Sensitivity Analysis – N/A	17
	Appendix 7 Named Schemes – N/A.....	17

Appendix 8 – Output NAMP/ED1 Business Plan Data table Reconciliation	18
Appendix 9 – Efficiency Benchmarking	19
Appendix 10 – Material Changes Since July 2013 ED1 Submission	21

1.0 Executive Summary Tree Cutting

1.1 Scope

This Tree Cutting Asset Strategy Report describes the management of vegetation in the vicinity of overhead lines to minimise the effect of trees on the network. The “tree cutting” umbrella encompasses various activities including inspections/surveys, tree cutting, trimming and/or felling, and resilience management. It also includes ancillary costs such as preparing and carrying out shutdowns, replanting trees, compensation payments, etc.

This document presents a re-submission of the July 2013 proposals for the ED1 period, including additional appendices to show alignment between the documented tables and the RIGs tables (Appendix 8 – Output NAMP/ED1 Business Plan Data table Reconciliation), and benchmarking against other DNOs (Appendix 9 – Efficiency Benchmarking). A summary of the main changes between this and the original July 2013 submission is included in Appendix 10 – Material Changes Since July 2013 ED1 Submission.

The proposals for tree cutting were previously included in document 14 – I&M, Faults and Trees, but have been separated out for ease of reference. This document covers the volumes for DPCR5 and the forecast for the remainder of DPCR5 and ED1 periods. It is expected that ED2 volumes will continue at a similar level to that for ED1.

1.2 Strategy

The strategy for tree cutting is to ensure vegetation around overhead lines is managed in order to keep the risks to the network and the general public, as well as overall costs, as low as reasonably practical.

Tree cutting will be managed through the deployment of contractors and in-house staff to maintain cutting to ENA Technical Specification 43-8 (horizontal and vertical clearances) and to achieve a more resilient network as required by ENA Technical Recommendation ETR132 (Network Resilience) of the ESQCR 2006.

The overall strategy for ED1 is to manage, at the lowest cost, a steady state position with clearances remaining compliant, except where refusals prevent this being achieved, across the period. This approach is based on anticipated vegetation growth and historic reporting, combined with local knowledge and experience and

depends on consents from land-owners being granted. The proposed approach manages any change in risk.

The forecast figures for tree cutting and inspection volumes have been derived from Table "O" (Volumes) from the 19th February 2014 NAMP, covering from 2013/14 to 2022/23, which in turn are based on overall network lengths.

Asset volumes and network statistics have been taken from the RIGS V1 return (2013) in km and converted to spans where appropriate.

1.3 ED1 Proposals

The rationale for tree cutting is outlined below:

Tree Cutting will continue in alignment with existing policies in order to maintain statutory clearances.

It is proposed that the full network will be surveyed and inspected in accordance with the cyclic cutting and inspection regime. Tree trimming will be carried out where appropriate, based on the results of the surveys, faults, or in response to customer information (reactive cutting).

Although the operating voltage of part of the network is 66kV, for the purposes of tree cutting, the LPN network is considered as entirely 132kV as it is built to that construction, with corresponding span lengths and clearance requirements.

1.4 Summary Table of ED1 investment

	DPCR5					RIIO-ED1									DPCR5 Average	ED1 Average
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023			
	£m	£m	£m	£m	£m	£m	£m	£m	£m	£m	£m	£m	£m			
LV Cut	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LV Inspect	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
HV Cut	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
HV Inspect	-	0.01	0.03	-	-	-	-	-	-	-	-	-	-	0.02	-	
EHV Cut	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
EHV Inspect	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
132kV Cut	-	-	-	-	0.00	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.00	0.02	
132kV Inspect	-	-	-	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Cut & Inspect Total	-	0.01	0.03	-	0.00	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	
ETR132 (HV)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
ETR132 (EHV)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
ETR132 (132kV)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
ETR132 Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Trees Total	-	0.01	0.03	-	0.00	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02			

Table 1 - Summary Expenditure Table (£m). Source: RIGs 2012/2013.

The average ED1 annual spend matches that in DPCR5.



1.5 Innovation

For tree cutting, UKPN are always looking to new processes for improving line clearances and compliance with the regulations. The opportunities for improvements in tree cutting within LPN are limited. Improved techniques to achieve resilience through routine tree cutting in accordance with ETR132 are being investigated (4.4).

1.6 Risks and Opportunities

	Description of similarly likely opportunities or risks arising in ED1 period	Uncertainties
Opportunity	Benefits from renegotiations affecting the use of other UKPN contractors within the LPN region.	-£5k per annum
Risk	ETR132 resilience work may be required outside the normal ENATS 43-8 cutting.	+£27k per annum

Table 2 – Risk and Opportunities

2.0 Description of Tree Cutting

Tree cutting and vegetation clearance is a critical activity in the overhead areas of UKPN's network in order to keep tree related unplanned outages to a minimum and to meet ESQCR statutory obligations.

Growing or falling trees (not felled) contribute to Customer Interruptions (CIs) and Customer Minutes Lost (CMLs).

In order to improve network resilience in extreme weather conditions, ESQC Regulation 20A, documented in more detail in the Engineering Networks Association Technical Report No 132 (ETR 132), requires UKPN to achieve network resilience (i.e. tree cutting/management to prevent supply interruptions) over 20% of its entire overhead line network by 31/01/2034.

2.1 Asset Information

The overhead network in LPN comprises of the following:

Overhead Line Voltage	Network Length in km
132kV	7
66kV	15

Table 3 - Asset Information. Source: RIGs Return 2013.

2.2 Tree cutting cycles

UKPN follows a proactive vegetation management regime based on a cyclic programme as follows:

Overhead Line Voltage	Cycle in Years
132kV	1
66kV	1

Table 4 - Tree cutting cycles (source: Tree cutting contracts)

2.3 Vegetation Density

According to the Forestry Commission National Inventory of Woodland and Trees, the level of vegetation in the LPN area is very small. The forecast is based on historic performance, the routing of overhead lines, and experience. The percentage of spans requiring tree cutting in LPN is around 25%.

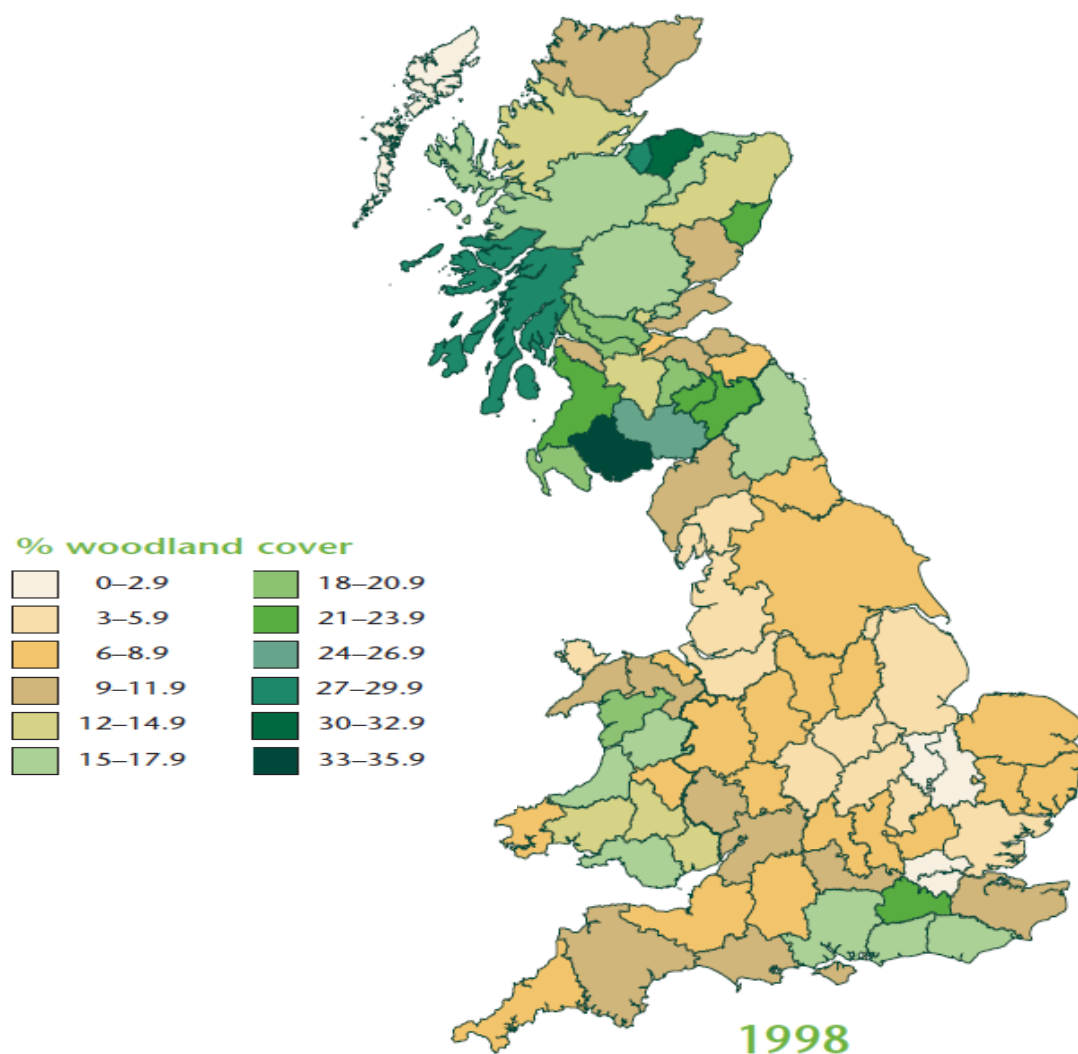


Figure 1 Map taken from the 2003 Forestry Commission National Inventory of Woodland and Trees showing vegetation density.

3.0 Investment Drivers

Tree cutting is driven primarily by quality of supply considerations which can manifest themselves through a programme of inspections, customer requests, or faults, initiating the clearance of trees. There is a requirement to achieve statutory clearances, and any risks, such as presented by climbable trees, need to be removed and/or mitigated against.

3.1 Summary of Fault Trends

There have been no recorded faults for this very small population of assets in the reporting period, and hence no data or graph is shown.

4.0 Asset Assessment

Tree cutting and vegetation management relies on the checking and identification of circuits requiring clearance from trees. It is a specialist area with various limitations and issues preventing a standard approach being adopted throughout all regions.

Experience has shown that the availability of suitable utility arboricultural contractors within LPN is limited, attracting premium rates.

4.1 Types of Contract

LPN tree cutting on 132kV tower routes is typically managed through the EPN(S) contract.

4.2 Issues – Refusals and Limited Cut

One of the major issues affecting effective tree-cutting is gaining permission to cut to the required clearances. UK Power Networks sets a preference of clearance to ground level within the swathe required, which is often achievable at 132kV and 66kV. However, landowners often apply restrictions limiting the cut allowed, or preventing access to their property.

Our public safety team's role is to assist in this by providing targeted information to landowners and land users in order to improve the understanding of overhead line safety such as clearances from trees, buildings etc.

4.3 Ash Dieback

Little is known about the effect of ash dieback and how it will impact on future tree-cutting requirements, but the effect in LPN is considered to be minimal.

4.4 ETR132

It is proposed to address the requirements of resilience (ETR132) in LPN, through a risk-based approach and increased cutting – which will be absorbed into the cyclic regime applied at 66kV and 132kV.

5.0 Intervention Policies

EOP 01-0009 outlines the policy for “Vegetation Management in the Vicinity of Overhead Lines and Structures”. In addition, EDS 08-0103 – the policy for

“Increasing the Storm Resilience of Overhead Lines on UKPN Networks” relates to tree-cutting in this context. These documents outline the minimum and required clearances, the methodology to apply them, and mitigation for various recorded site risk ratings.

The above intervention cycles (section 2.2) have been set as a guide, using an iterative process utilising a risk based approach with the experience of network performance and taking into account clearances achieved in particular spans and growth rate of the vegetation.

6.0 Innovation

UKPN will continue to look for opportunities for innovation and cost saving, and will apply new techniques from other parts of the business where applicable within LPN.

7.0 ED1 Expenditure Requirements for Tree Cutting

7.1 Method: Constructing the Plan

Tree cutting will continue to follow existing policies such as EOP 01-0009 and EDS 08-0103 including the requirements of ENATS 43-08 and ETR132.

EOP 01-0009 – Vegetation Management in the Vicinity of Overhead Lines.

EDS 08-0103 – Increasing the Storm Resilience of Overhead Lines on Networks owned by UKPN.

ENATS 43-08 – Overhead Line Clearances.

ETR132 – Improving Network Performance under Abnormal Weather Conditions by use of a Risk Based Approach to Vegetation Management near Electric Overhead Lines.

The whole network will be surveyed/inspected in cyclic periods which will be reviewed after two full cycles. The volumes for inspection (in spans) are based on the km length of overhead line, multiplied by an average spans per km rate which is applicable to both 66kV and 132kV operating voltages. Although operating at two different voltages, the construction is 132kV type, and hence the proposals are shown at 132kV only.

Tree cutting will be carried out on those spans identified as requiring clearance from trees. The volumes are based on the cutting cycle, and network lengths derived from the 2012/13 RIGs return. The revised unit costs of tree cutting include ancillary costs such as: planning and notification of shutdowns; planting (replacement trees); land agent fees; traffic permits; compensation; and similar incidental costs.

7.2 Tree Cutting Plan

The plan is tabulated below.

Description of Activity	2014/ 2015	2015/ 2016	2016/ 2017	2017/ 2018	2018/ 2019	2019/ 2020	2020/ 2021	2021/ 2022	2022/ 2023
EHV Tree Cutting - Spans Cut	Included below								
EHV Tree Cutting - Spans Inspected									
132kV Tree Cutting - Spans Cut	8	18	18	18	18	18	18	18	18
132kV Tree Cutting - Spans Inspected	33	72	72	72	72	72	72	72	72
ETR132 Resilience Tree Management (km)	Included above								
Includes RIGs Lines: CV14 Line 9, 10, 11, 12, 19									

Table 5- DPCR5 & ED1 Forecast – Trees (Source RIGs.)

ED2 Volumes	2023 /2024	2024 /2025	2025 /2026	2026 /2027	2027 /2028	2028 /2029	2029 /2030	2030 /2031
EHV Tree Cutting - Spans Cut	Included below							
EHV Tree Cutting - Spans Inspected								
132kV Tree Cutting - Spans Cut	18	18	18	18	18	18	18	18
132kV Tree Cutting - Spans Inspected	72	72	72	72	72	72	72	72
ETR132 Resilience Tree Management	Included above							

Table 6 - ED2 Forecast – Trees

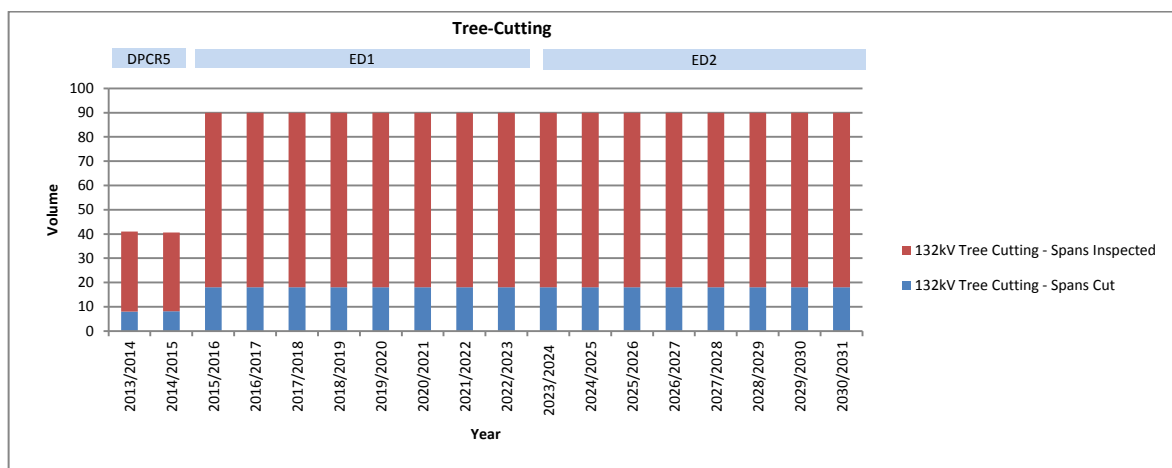


Figure 2 - DPCR5, ED1 & ED2 Historical and Forecast Values

8.0 Deliverability

The proposed programme is based on network lengths and historic cut-to-inspect ratios. A targeted-cut regime will be introduced utilising a risk-based approach centring on the spans affected by vegetation and incorporating resilience management. Resources will be sourced from EPN(S) wherever possible.

Appendices

Appendix 1 Age Profiles – N/A

Appendix 2 HI Profiles – N/A

Appendix 3 Fault Data – N/A

Appendix 4 WLC Case Studies – risk, cost, performance, condition, profiles for various options – N/A

Appendix 5 NLRE Plan – Included in this document – N/A.

Appendix 6 Sensitivity Analysis – N/A

Appendix 7 Named Schemes – N/A

Appendix 8 – Output NAMP/ED1 Business Plan Data table Reconciliation

Outputs	NAMP (Volume)											Asset Stewardship reports / RIGs Table (Volume)											
	NAMP Line	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Total	Total **	RIGs Table	RIGs Row	Investment description	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	Total
EHV Tree Cutting - Km Cut	2.43.02									0		CV14	10	EHV Tree Cutting - Spans Cut									0
EHV Tree Cutting - Km Inspected	2.43.02									0		CV14	11	EHV Tree Cutting - Spans Inspected									0
132kV Tree Cutting - Km Cut	2.43.01	6	6	6	6	6	6	6	6	44	144	CV14	12	132kV Tree Cutting - Spans Cut	18	18	18	18	18	18	18	18	144
132kV Tree Cutting - Km Inspected	2.43.01	22	22	22	22	22	22	22	22	176	576	CV14	13	132kV Tree Cutting - Spans Inspected	72	72	72	72	72	72	72	72	576
Total		28	28	28	28	28	28	28	28	220	720				90	90	90	90	90	90	90	90	720

Table 7- Output NAMP / ED1 Business Plan Data table Reconciliation (source: 19th February 2014 NAMP Table J LessIndirects /21st October RIGS Table)

Notes:

NAMP volumes are route lengths in **km**. RIGs table volumes are circuit lengths in **SPANS** for cutting and inspections.

Due to the construction, height and span lengths, LPN's network is considered to be all at 132kV for tree cutting and inspections.

Cutting volumes are based on a percentage of spans inspected which has been derived from experience and historic achievement. Not all spans affected by trees require cutting in every cycle.

* Conversion from km to spans based on: 132kV 3.273 spans/km

Appendix 9 – Efficiency Benchmarking

The following chart shows the comparative network lengths. Due to the scale of the graph, the 22km of overhead network in LPN is not discernable.

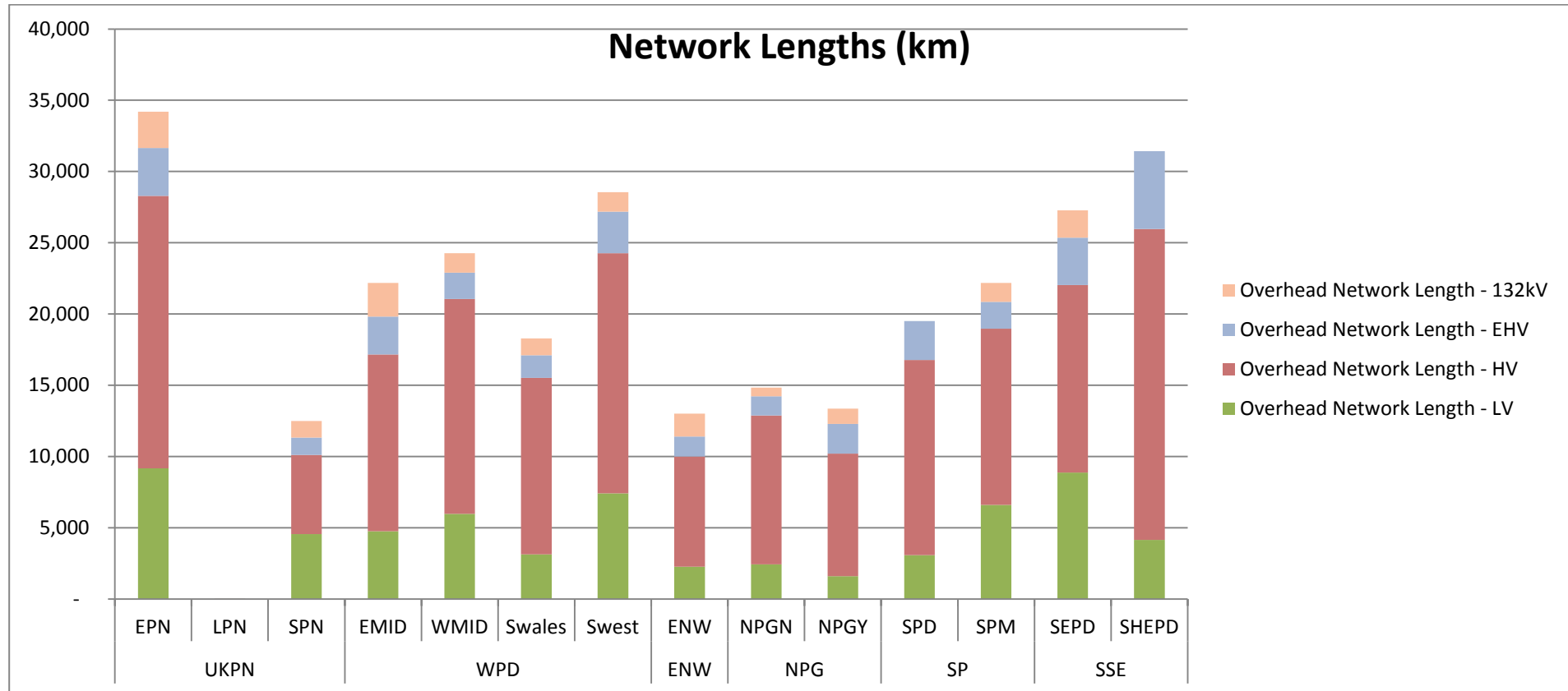


Figure 3 – Efficiency Benchmarking of Network Lengths (Sources: DNO data share_2013)

Appendix 9 (Cont'd).

The following graph shows the effective Unit Costs – based on total ED1 expenditure, divided by the total volume (in spans) of all activities (i.e. cutting, inspection and ETR132 – converted to spans) for all voltages. LPN’s UCI reflects the higher costs involved in maintaining such a small network at effectively one voltage (132kV).

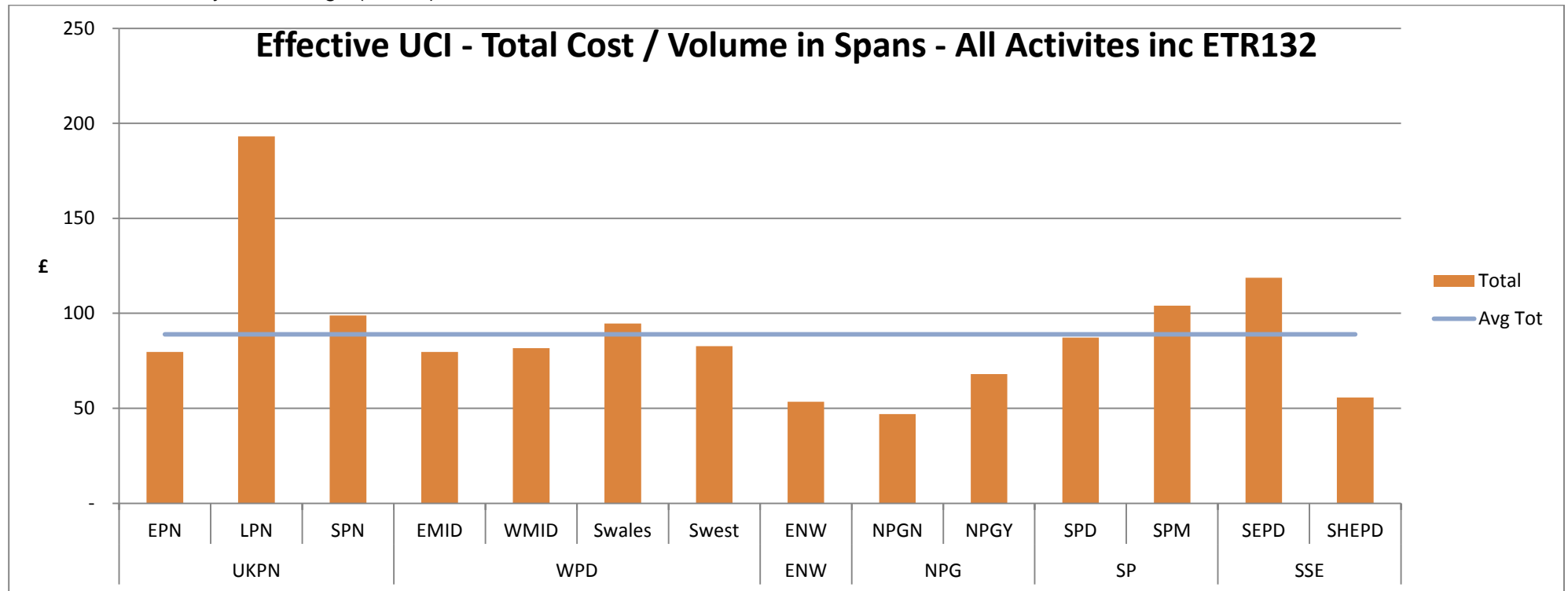


Figure 4- Efficiency Benchmarking (Source: DNO data share_2013)

Appendix 10 – Material Changes Since July 2013 ED1 Submission

10.1 Summary of Changes

Changes between the July 2013 submission and the March 2014 re-submission are summarised and discussed below.

Asset type	Action	Change type	2013 Submission	2014 Submission	Difference (Reduction)	Comment
Trees	Cut and Inspect	Volume	1333	720	(613)	Re-alignment with network length
		Investment (£m)	£0.182	£0.139	(£0.043)	UCI adjustments
		UCI (£k) – cut/inspect	£676.80/ £1.71	£886.48/ £19.73	£209.68/ £18.02	Includes ancillary & resilience costs
Trees	ETR132	Volume	N/A	N/A	N/A	Included above
		Investment (£m)	£0.0	£0.0	£0.0	Included above
		UCI (£k)	N/A	N/A	N/A	

Table 8 – Material Changes in ED1 Business Plan for LPN (Source: ED1 Business Plan Data Tables Following the OFGEM questions and answer process/ 21st February 2014 ED1 Business Plan Data Table)

The net effect (compared to the July 2013 submission) is a reduction of £0.04m (22.2%).

Tree Cutting & Inspections

The volumes of network stated for cutting and inspection at the various voltages (LV, HV, EHV and 132kV) are based on 2012/13 network lengths and have been amended and set at those values for the ED1 submission as there are no planned structural changes to the network. The cutting and inspection programme will follow the cyclic policy applicable during DPCR5. It is recognised that there are further spans containing vegetation with the potential to affect the overhead network. These do not currently require cutting, but, following inspection, may fall into that category. The UCIs have been revised to include ancillary costs associated with tree cutting, enhanced cutting for resilience management, and an allowance for bringing in contracting staff from outside the area.

ETR132 Resilience Management

It is expected that the cyclic cutting will include sufficient clearance to satisfy ETR132 resilience requirements.

The LPN network comprises a mixture of 66kV and 132kV network, built on 132kV construction towers. For this reason, the tree cutting is shown at 132kV although the operating voltage of part of the network is 66kV.

10.2 Detail

The volumes of network stated for cutting and inspection have been reviewed against the 2012/13 RIGs return and re-stated. The cutting and inspection regime remains in line with the cyclic policy applicable during DPCR5. It is recognised that there may be further spans containing vegetation, with the potential to affect the overhead network. These do not currently require cutting, but following inspection may fall into that category.

A new risk-based approach, which has been introduced in other parts of UKPN, giving priority to those areas close to overhead lines which have high levels of infestation (vegetation) and large numbers of customers likely to be affected will be applied in LPN.

Unit costs have been revised to include ancillary costs associated with shutdowns, consents and compensation, and to reflect additional expected costs resulting from compensation payments, re-planting and increased cutting costs necessary to achieve improved resilience. They also include an allowance for bringing in contracting staff from outside the area for inspections as well as cutting.

The revised proposals for the March 2014 re-submission are shown in Table 9.

DNO	Category	Totex submitted	Volume adjustment	Cost adjustment	ED1 Final Proposals
LPN	Trees	0.18	-0.04	0.00	0.14
% adjustment				-22%	

Table 9 Revised proposals for March 2014