Document 12
Asset Category – ESQCR
SPN

Asset Stewardship Report 2014

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Approved by Richard Wakelen / Barry Hatton

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Document History

Version	Date	Details	Originator	Revision Class	Section Update
1.0	13.02.2014	Original Submission	NA	NA	NA
1.1	13.02.2014	Initial Draft for Resubmission	Manjula Singh	Minor	Removed cable pits from the whole document
1.2	16.02.2014	Volume & Expenditure tables and graphs are updated as per 14th Feb RIGS tables	Manjula Singh	Minor	Clearance & Climbable tree volumes and expenditures are revised.
1.3	22.02.2014	Added Appendix 5, 8, 9 &10.	Manjula Singh	Minor	Appendix 5,8,9 &10.
1.4	25.02.2014	Updated as per Richard's Review comment	Manjula Singh	Minor	Throughout the document
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1.6	26.02.2014	Changed as per Chino's review comment	Manjula Singh	Minor	Section 7.1.1 & 7.1.2
1.7	27.02.2014	Additional explanation provided for difference between the July 2013 submission and the 2014 submission	Chino Atako	Minor	Appendix 10
1.8	28.02.2014	Explanations provided for differences observed in Appendix 8	Chino Atako	Minor	Appendix 8
1.9	04.03.2014	Changed table 4 as per Barry's Review comment.	Manjula Singh	Minor	Section 4
2.0	06.03.2014	Approved by Barry Hatton	Manjula Singh		None

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 9 – 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.

Contents

1.0 Executive Summary SPN ESQCR Compliance

1.1 Scope

The Electricity Safety, Quality and Continuity Regulations 2002 (ESQCR) provides the requirements for power quality and supply continuity and specify safety standards. Compliance with ESQCR is a statutory requirement for distribution network operators (DNOs). UK Power Networks has defined its company policies to adhere to ESQCR and minimise risks to members of the public and employees.

This document details our proposed asset policy, practice and funding in the ED1 period in order to comply with the safety aspects of ESQCR in the following areas:

- Signage for overhead lines and substations
- Overhead line ESQCR compliance areas involving anti-climbing devices, clearance issues, climbable trees, stays and risk mitigations

Investment proposals for cable pits are now covered in the asset stewardship report for cable pits.

1.2 Investment Strategy

In SPN, any safety or ESQCR compliance issues are identified through a defined periodic inspection of its assets. These compliance issues are prioritised through a risk-based prioritisation model and are resolved appropriately within the agreed timelines based on the severity of these issues.

UK Power Networks' investment strategy for ED1 has been set to comply with ESQCR in order to minimise the risk to members of the public and employees.

1.3 ED1 Proposals

This document summarises the expenditure on ESQCR compliance-related issues on signage, overhead lines during ED1.

The ED1 investment proposals for signs have been set based on a 30-year expected life for signs. Investment proposals for all other ESQCR issues have been set based on historical defect reporting rates. A thirty-percent data correction factor has been applied to historical defects based on observations during a data cleansing exercise in the asset register. For clearance issues (including ground, horizontal and climbable tree issues), a number of assumptions have been made to determine the amount of structural mitigation required. These assumptions are:

- Structural mitigation to be carried out on all clearance issues other than climbable trees (unchanged from original submission).
- For climbable tree issues, structural mitigation to be carried out as follows - 60% of LV, 3% of HV and 3% of EHV issues in EPN and SPN.
- The number of new issues that will be identified each year will reduce by 3% each year.
- All outstanding clearance issues, in DCR5, will be cleared before the start of ED1. The provision in ED1 for structural mitigation is only for new clearance issues that arise in ED1.

Details on how the investment plans have been developed are provided in section 7.1.

Based on continuous efforts to achieve improved compliance through the defect management programme in DPCR5, the average annual expenditure on ESQCR issues will be 32% lower in ED1.

Major Category	DPCR5	ED1	DPCR5 yearly average expenditure	ED1 yearly average expenditure	% change
Signage	£680,682	£1,077,120	£136,136	£134,640	-1%
OHL Issues	£33,239,836	£35,936,248	£6,647,967	£4,492,031	-32%
Grand Total	£33,920,518	£37,013,368	£6,784,103	£4,626,671	-32%

Table 1 - SPN ESQCR expenditure summary for ED1

(Source: 21st February 2014 ED1 Business Plan data tables CV2, CV8 & CV5)

1.4 Innovation

UK Power Networks has introduced a risk-based framework to manage ESQR compliance. We believe our approach is industry-leading because of the way risk is minimised and urgent compliance issues are identified, prioritised and resolved. The risk-based framework is implemented using a centrally managed, risk-based prioritisation model to identify the priority of an issue on a scale of P1 to P5, with P5 issues being the most urgent.

1.5 Risks and Opportunities

	Description of similarly likely opportunities or risks arising in ED1 period	**Level of (uncertainties)/ cost growth (£m)**
Risk/ opportunity	Deviation from average asset life for signs	+/-5%

Table 2 – Risks and opportunities

2.0 Description of SPN ESQCR Compliance Focus Areas

The Electricity Safety, Quality and Continuity Regulations 2002 (ESQCR) came into force on 31 January 2003. The new regulations specify safety standards aimed at protecting the general public and employees from danger. In addition, the regulations specify power quality and supply continuity requirements to ensure an efficient and economic electricity supply service for consumers. They replace the Electricity Supply Regulations 1988.

The scope of this document in terms of ESQCR is limited to the safety compliance standards that protect the general public and employees from danger. ESQCR has implications for many parts of UK Power Networks and the impact is incorporated into company policy and practice and these issues are included in other sections of this ED1 submission. The areas covered in this document are:

- Signage
    - Warning signs (overhead line and substation signs)
- Overhead line issues
- Anti-climbing devices
- Statutory clearance requirements related to building clearance, ground clearance and street light and furniture clearance.
- Statutory clearance requirements from climbable trees
- Stays
- Risk mitigation of key risks, ESQCR location risk and ESQCR equipment risk

SPN has an overhead line network of 12,300km, comprising poles, towers and overhead line services, 471 grid and primary substations and 21,254 secondary substations on the distribution network.

Category	Asset class	Asset category	Total
Substation	Site	Grid substation site	156
		Primary substation site	315
		Secondary substation site	21,254
Overhead line	Tower	132kV or 66kV tower	2,549
		33kV tower	617
	Pole	132kV pole	107
		33kV pole	11,783
		HV pole (>1kV and <33kV)	68,229
		LV pole	126,819
	Overhead LV service	Overhead LV service	103,682
SPN total			335,511

Table 3 – Substations, overhead line assets (Source: UKPN 2012/2013 RIGS V1Table)

3.0 Investment Drivers

3.1 ESQCR

The main drivers covered by this document are the safety aspects of complying with ESQCR in respect of warning signage, overhead line safety issues .The aim is to minimise the risk to members of the public and employees.

ESQCR came into force on 31 January 2003. The regulations allowed for a phased introduction (within fixed timescales) of the following new requirements:

- Where necessary, signs attached to substations must be updated by 2005; these include sufficient safety signs complying with Schedule 1 and property notices bearing location or identification of substation.

- Compliant safety signs must be attached to all structures supporting high-voltage overhead lines by 2013, i.e. all old-style safety signs should be replaced.
- Safety signs complying with Schedule 1 must be attached to all structures supporting bare low-voltage lines by 2013.
- All stay wires attached to overhead line supports carrying bare conductors must be fitted with insulators fixed at least three metres above ground level by 2013.
- Pre-1937 cut-outs with fuses in earth or neutral conductors must be removed from service by 2013 (This is covered in *Document 11: Services and Terminations*).
- Formal risk assessment of substations must be carried out by 2005.
- Formal risk assessment of overhead lines or, if appropriate, parts of lines must be carried out by 2008.

UK Power Networks has made significant progress over DPCR5 to clear the backlog of work required to comply with the above requirements, status of which are included below. However, the scale of the issues already identified and the on-going volume of issues being raised means there are still outstanding areas for UK Power Networks to manage through the rest of DPCR5, in ED1 and through to ED2. This is largely due to the changing nature of the network – in particular, changing land use and the continued maturity of trees in the vicinity of LV lines. Risk assessments have also been modified to include the recording of mitigations. This has resulted in increased focus on risk interventions, which will continue through ED1. Forecasts of the volumes required and their basis are outlined in section 7.

With regards to the first requirement UK Power Networks became fully compliant in 2005. The ongoing replacements planned for ED1 is based on ageing and natural degradation, as well as the need for replacement due to vandalism.

With regards to requirements 2, 3 and 4 UK Power Networks still has a number of outstanding overhead sign and stay defects that are being managed under the Company-wide Defect Management Programme.

In reference to the first requirement UK Power Networks completed the work required on substation signage by 2005. The ongoing replacement is based on ageing and natural degradation, as well as the need to replace due to vandalism.
With regards to requirements 2 3 and 4 UK Power Networks still has a number of outstanding overhead sign and stay defects that are being managed under the Companywide Defect Management Programme.

The formal risk assessments of substations and overhead lines have been completed, meeting the requirements of 6 and 7. New substations and overhead lines are assessed upon installation and, where appropriate, existing ESQCR assessments are updated through routine inspection. However, it is apparent that inspectors did not always assess risks or identify key risks in a consistent way. As a

result, significant investment has been made and continues to be made in training inspectors to improve the accuracy of recording mitigations for ESQCR-related risks.

UK Power Networks initiated a more rigorous mitigation identification policy in 2011. For example, an overhead conductor that is non-compliant with the statutory clearance is recorded as a clearance defect and the appropriate intervention is implemented. However, where the line complies with the statutory clearances but over-sails a school playing field, a mitigation of undergrounding may be identified. Another example is where a pole-mounted transformer and bare 11kV line are present in a garden. These could comply with the statutory clearances and have all the appropriate signs and anti-climbing devices; however, in terms of mitigating the risk, it may be appropriate, following a risk assessment, to relocate the pole-mounted transformer and overhead line away from the garden.

UK Power Networks must also demonstrate compliance with ESQCR by complying with the Electricity Association's Standard ENA TS 43-8 Overhead Line Clearances. Under ESQCR, the minimum height requirement for conductors over roads is 5.8 metres, to allow for high-sided vehicles. This covers equipment such as pilot wires, control cables and stay wires connected to other supports. UK Power Networks still has a number of outstanding overhead line clearance defects that are being managed under the Company-wide Defect Management Programme.

3.2 Identifying Interventions Required

All substations and the complete overhead network have been risk-assessed in accordance with ESQCR. The risk assessment methodology was developed and the survey work was complete by the end of 2008. Throughout 2009, this data was passed through our data quality control and assurance processes and entered into our asset register, Ellipse. As a consequence of this work, between January and March 2010 a strategic review of ESQCR was carried out.

The review concluded that the volume of critical ESQCR compliance issues identified was higher than forecast. These issues have been recorded as defects in the asset management register, Ellipse. This resulted in a significant change in strategy towards a targeted ESQCR clearance programme. For example, the existing plans for LV overhead line refurbishment and the large-scale replacement of bare LV conductors for ABC have been changed to a targeted approach, through which sections of the overhead are prioritised according to the ESQCR risk rating. Prior to the change in strategy, the review in 2010 estimated it would take up to 10 years to resolve all the recorded ESQCR defects.
In September 2011, a robust defect management programme was launched to address the outstanding issues raised by the end of DPCR5. The ESQCR compliance issues are now managed as part of this wider defect management programme to address defects against all asset categories. UK Power Networks uses a risk-framework-based model to robustly manage and prioritise the defects. The

defect prioritisation model considers the risk to public safety, quality of supply, environmental risk and the ESQCR risk rating. This prioritisation model and the defect management programme are detailed further in section 6.

New ESQCR compliance issues are identified during routine inspections of our assets. Inspection frequencies are outlined in Engineering Maintenance Standard EMS 10-0002.

Urgent ESQCR compliance issues are also reported to UK Power Networks' Accident and Incident Reporting line (AIRLine). Any compliance issues that are considered an immediate risk to public safety must be reported to AIRLine. A member of staff is assigned to investigate and risk-assess the issue and arrange for resolution within an appropriate risk-based timescale.

3.2.1 Signage

The Overhead Line Inspectors' Handbook and Substation Inspectors' Handbook detail the requirements for safety signage, ensuring full compliance with ESQCR. Signage issues are identified and, where possible, rectified as part of routine inspection of our assets. Signage issues not rectified at the time of inspection are prioritised and managed as part of the defect management programme.

3.2.2 Overhead line issues

The Overhead Line Inspectors' Handbook details the requirements for full ESQCR compliance on overhead lines. The handbook includes detailed sections on identifying the ESQCR compliance issues associated with anti-climbing devices, clearances and stays, as well as a section on ESQCR risk management that takes into account the various types of assets. It details how the risk assessments and mitigating measures implemented at each site are recorded. Training has been provided on the contents of the handbook, including the risk mitigations. Following a successful assessment, inspectors are issued with a controlled copy of the handbook.

This formal ESQCR risk assessment comprises two parts. The first part is the assessment of the risk of the equipment; the second part is the assessment and classification of the risk of danger to the public, given the nature and situation of the equipment and the reasonably foreseeable probability or possibility of interference, vandalism, unauthorised access or accidental contact.

Equipment comprising exposed conductors is a higher risk in view of the consequences of persons coming into contact with that equipment. Plant that is fully insulated or metal-enclosed will generally be lower risk. For example, bare overhead line conductors and exposed terminals on transformers or switchgear will generally be higher risk than distribution substations with metal-enclosed plant. Equipment or plant that is likely to be attractive to vandals or thieves (e.g. terminal towers) will

generally be higher risk than plant that is less attractive to such persons (e.g. single wood poles).

Electrical equipment in housing estates or in close proximity to unsupervised recreational playing fields will generally be at higher risk of danger from interference than equipment situated on sparsely populated land or contained within occupied premises.

The results of the risk assessments have been recorded together with the identification of each substation or overhead line circuit, the measure or value of the risk assessment, the date of the latest risk assessment and a brief summary of the key risks for the substation or circuit, e.g. farm machinery, vandalism, fishing, theft, playing fields, etc. If the assessment results in a high overall ESQCR risk rating or identifies a key risk, suitable risk mitigation is required. The strategy to record these risk mitigations as part of the ESQCR risk assessment was introduced in 2011. The actions and mitigation carried out for each risk depend on the risk assessment, but could include additional warning signs, enhanced anti-climbing guards, intruder alarms, steel doors, or the replacement of equipment with a safer alternative technology, e.g. insulated conductors. The mitigation carried out is an output of completing the risk assessment; the obligation on electricity companies is to prevent danger as far as is reasonably practicable.

Regulation 3(3) of ESQCR pays particular attention to the risk of danger from contact or interference with overhead lines by persons engaged in leisure or work activities close to lines. A duty is placed on electricity companies to take proactive measures to advise the public of the hazards associated with overhead lines and to educate them on how to avoid danger.

Under ESQCR, the term ‘reasonably practicable’ is used frequently throughout the regulations. Essentially, the term requires duty holders to undertake a risk assessment of the circumstances at hand, i.e. how do the risks of interference, danger or interruption of supply compare with the time, trouble and expense that would be involved in taking steps to eliminate or minimise the risks? The greater the degree of risk, the less weight can be given to the cost of measures needed to prevent that risk.

3.3 Examples of Compliance Issues

3.3.1 Signage issues

Figures 1–6 outline examples of signage compliance issues. The Health and Safety Executive (HSE) reported the signage issues shown in Figures 4 and 5 during a substation signage audit in January 2012. Further details of the audit and improvement actions taken are detailed in section 3.5. Sign defects vary in priority

from P3 to P4 on overhead line structures, depending on the ESQCR risk rating and the voltage. Substation signage is P4. Where possible, sign defects are rectified at the time of inspection.

Figure 1– Signage missing/fallen off

Figure 2– Incorrect signage

Figure 3 – Faded signage due to UV exposure

Figure 4 - Vandalised sign with graffiti

Figure 6 – Substation signage missing

Figure 5– Faded ownership details

3.3.2 Overhead line issues

Figures 7–14 are examples of overhead line compliance issues, as well as examples of high-risk and key-risk sites where risk mitigations are required.

Figure 7– Defective anti-climbing device;

Figure 8 -Ground Clearance highest priority, P5 priority is P3 or P4 depending on the ESQCR risk rating

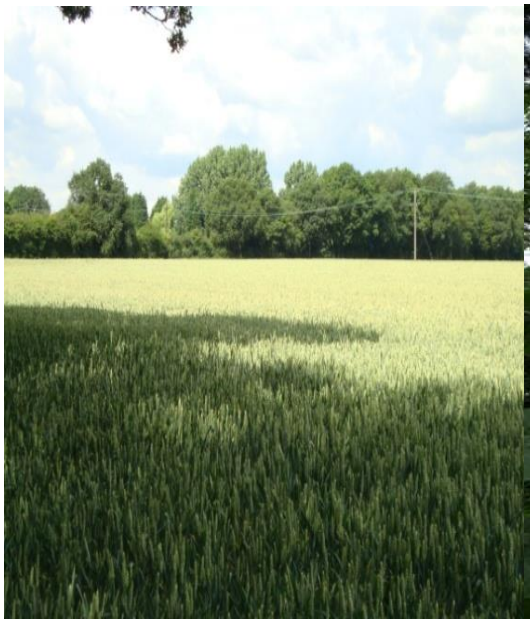

Figure 9– Ground clearance issue is

Figure 10- Climbable tree issue; priority varies from P3 to P5

Figure 11- Boat storage yard; key-risk and high-risk mitigation

Figure 12- Climbing aid; key-risk requiring

Figure 13- A pole transformer in a recreational

Figure 14 -A pole transformer with evidence of farm machinery is a key risk requiring mitigation

The boat yard in Figure 11 would be classified as a key risk due to the risk of contact from the boat masts with the overhead line. Examples of mitigation for an overhead line near a sailing or fishing lake could be the erection of danger signs near or under the line advising people to keep away or carry long equipment parallel to the ground. Depending on the risk assessment, it could extend to creating a fenced 'no go' area or undergrounding the line.

The second example of a key risk site, in Figure 12, shows a shed offering a climbing aid, as well as vegetation encroachment. In this case, the required risk mitigation would be to remove the vegetation and modify the anti-climbing device or remove the shed if practical to do so. Figure 13 shows a pole transformer in a recreational area. These are open spaces where people may be flying kites or model aircraft and where children or youths are likely to be present. Examples of actions taken to mitigate risks include presenting in schools on the dangers of overhead lines. However, in many of these cases, overhead lines are undergrounded. Figure 14 shows a farmyard, where high-sided vehicles and farm machinery coming in to contact with the bare overhead line is a high risk. Again, mitigations vary from public safety visits to undergrounding the line.

3.4 Intervention Thresholds

3.4.1 Signage (overhead line and substations)

As part of ESQCR compliance, safety signs must be attached to all structures supporting high-voltage overhead lines and all structures supporting bare low-voltage lines by 2013. All old-style safety signs should be replaced. In addition, sufficient safety signs and property notices bearing location or identification of a substation are also required.

Signs also require replacement if they are vandalised, removed or faded. Depending on the position of the sign, the average asset life can be reduced significantly due to ultraviolet exposure, where the signage is faded by sunlight and requires replacement. Figure 3 in section 3.3 is a typical example of a yellow 'danger of death' sign that has faded due to direct sunlight.

Where possible, UK Power Networks has reviewed the signage design with the supplier, in particular the ownership sign on substations, to use a black pigment instead of colours, because the black pigment increases average asset life. Figure 6 shows the previous ownership signage that has faded. However, ESQCR requires the 'danger of death' sign to be yellow.

As mentioned previously, signage issues are rectified where possible at the time of inspection to ensure maximum cost-efficiency.

UK Power Networks still has a number of outstanding sign defects that are being managed under the Companywide Defect Management Programme.

3.4.2 Overhead line issues

Overhead line ESQCR compliance issues identified by inspectors are recorded as defects in the asset register, Ellipse. The Overhead Line Inspectors' Handbook details the requirements for full ESQCR compliance – for example, if there is inadequate statutory clearance to ground, 'ground clearance defect' is recorded against the asset. Likewise, if an anti-climbing device is ineffective or missing, 'defective anti-climbing device' is recorded against the asset. Also, as part of ESQCR, all stay wires attached to overhead line supports carrying bare conductors must be fitted with insulators fixed at least three metres above ground level by 2013. These are recorded as defective stays. Similar defect categories exist for all ESQCR compliance issues. These defects are prioritised for rectification as part of the defect management programme. UK Power Networks still has a number of outstanding overhead line defects that are being managed under the Companywide Defect Management Programme. These are detailed in section 6.

As mentioned previously, in 2011 UK Power Networks implemented a strategy to record suitable risk mitigations as part of the ESQCR risk assessment on overhead lines. If an ESQCR risk assessment results in a high-risk site or identifies a key risk, inspectors now identify and record risk mitigations to be carried out. For each situation, there is a range of possible risk mitigations. These vary from enhanced signage to structural mitigations. The full list of mitigations is detailed in section 5.1. A trained inspector assesses each site and the most cost-effective solution to mitigate the risk is applied. Where possible, the inspector will also carry out and record completion of the risk mitigation. Examples of mitigation that an inspector could carry out include enhanced warning signage and leaflet/letter drop. Where a structural mitigation is selected, a further assessment is carried out with planning to ensure the most cost-effective long-term mitigation is applied.

3.5 Incidents and Events

AIRLine is UK Power Networks' Accident and Incident Reporting line. Any compliance issues that are considered an immediate risk to public safety must be reported to AIRLine. All staff and contractors as well as members of the public can report incidents to AIRLine through the customer call centre.

This section outlines the number of incidents reported to AIRLine between 2010 and 2012 on signage, overhead line issues.

3.5.1 Signage

Figure 15 shows an increasing volume of signage issues reported to AIRLine. This is a result of increased awareness by all UK Power Networks staff and contractors, following an audit on substation signage carried out by the HSE in SPN in January 2012.

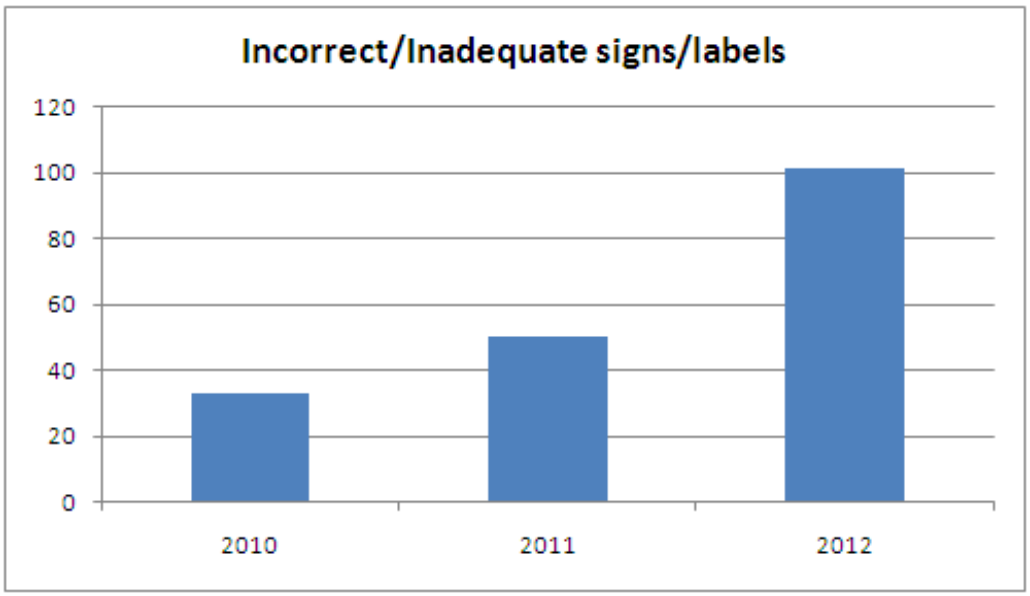

Figure 15 – Incorrect signage incidents reported to AIRLine

The audit focused on the ESQCR requirement to display sufficient safety signs on substations, as well as identification of ownership and location details. Compliance issues identified included faded, vandalised and missing signage, as illustrated in Figures 3, 4 and 5 of section 3.3.

Following the audit by the HSE, a full review of signage was carried out and signs were redesigned to avoid the use of colours where possible, so as to reduce fading. Dedicated briefing sessions were held with inspectors across all of UK Power Networks. ESQCR signage requirements were also included in team brief sessions for all staff to ensure a wide audience could identify and report ESQCR signage-compliance issues. The simple message was for staff to ask themselves: If you were

the emergency services and arrived on site, could you contact the owner of the site and readily provide location or an identification number for the site? This is critical information required by the emergency services if an incident were to occur. Figure 16 displays the team brief communication.

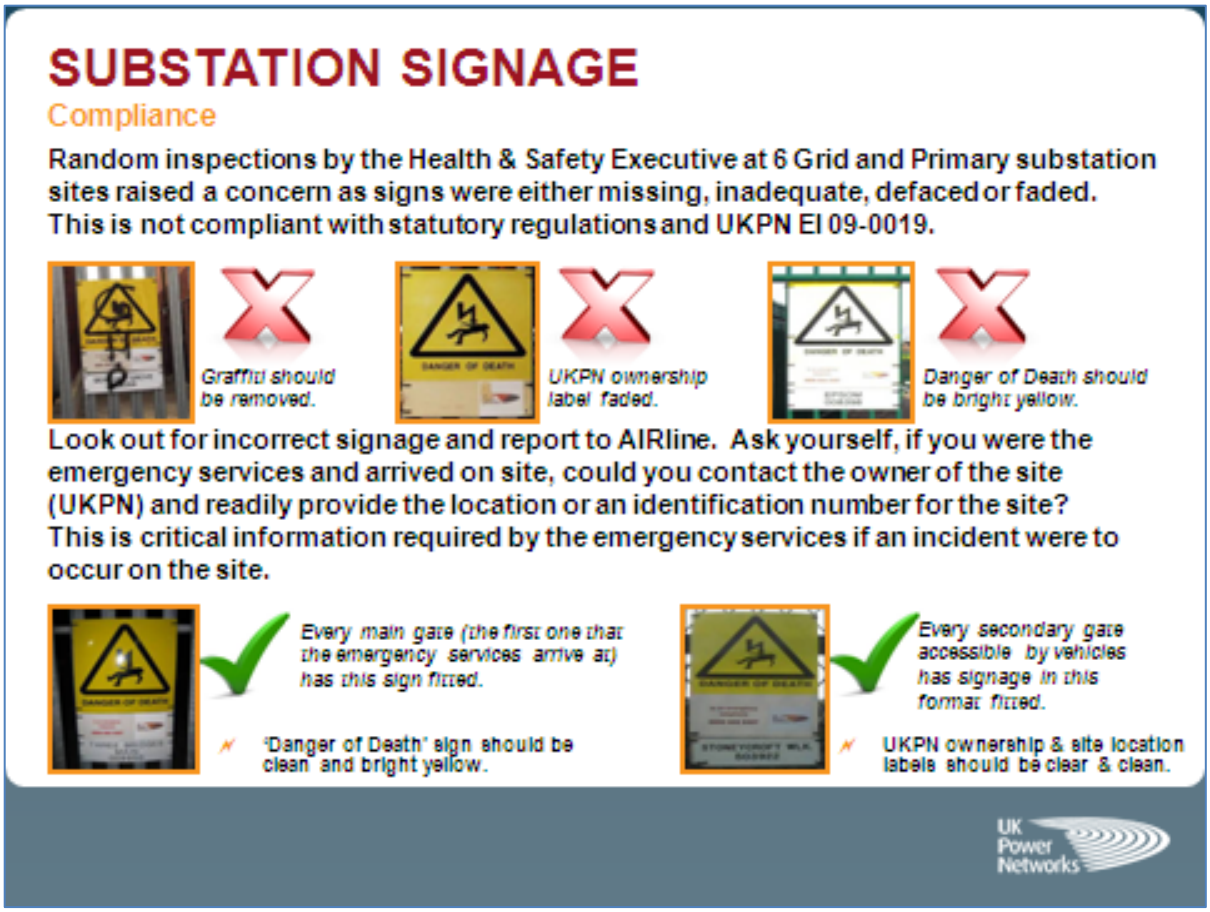

Figure 16– Team brief communication following audit

3.5.2 Overhead line issues

Figure 17 shows an increasing volume of overhead line issues reported to AIRLine. Again, this is a result of improved awareness of the importance and requirement of ESQCR compliance. Where incidents or events are identified as requiring a full investigation, a lead investigator is nominated and findings and recommendations are recorded. Thorough investigations are carried out on ESQCR overhead line compliance issues, particularly where the potential to compromise public safety is identified. As part of the investigation, a full risk assessment of the site is undertaken and full compliance with ESQCR and UK Power Networks policies is rigorously checked and enforced. Any lessons learned and recommendations are formally recorded and tracked to ensure completion.

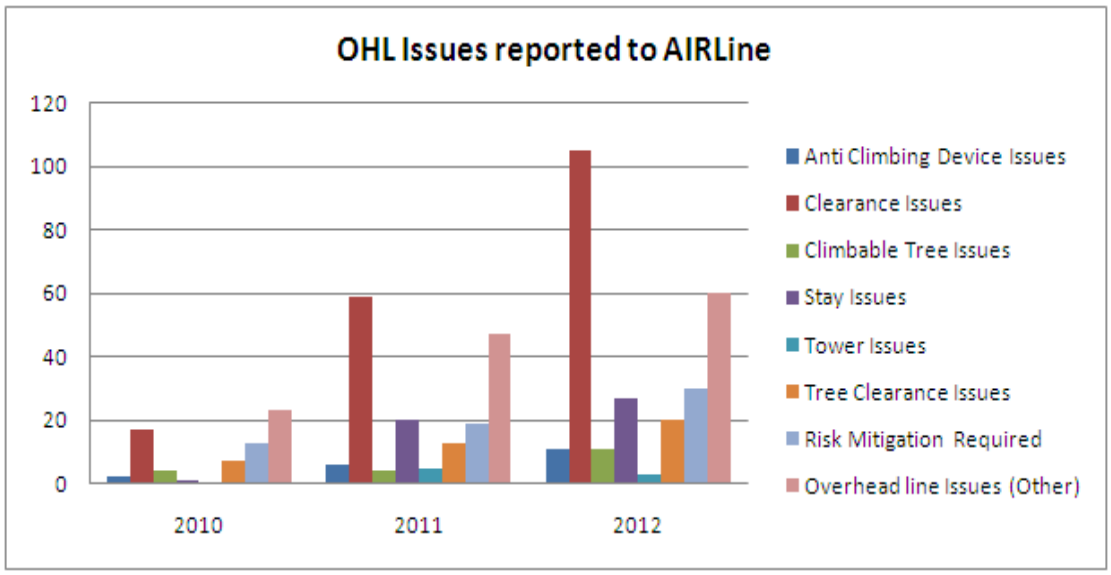

Figure 17 – Overhead line ESQCR-related incidents reported to AIRLine

One serious network incident occurred in the summer of 2010. At Faygate in SPN, an employee of a scaffold company received electrical burns upon making accidental contact with an 11kV overhead line that over-sailed the scaffold company yard. Following investigation, the line was undergrounded.

Following the Faygate incidents and other incidents in EPN, a series of meetings were held with the Health and Safety Executive (HSE), starting in 2010 and continuing through until 2012. Learning points from the investigations were incorporated in to company policy, in particular the mitigation identification policy. They also instigated a series of additional safety inspections to ensure the appropriate key risks and mitigations were being recorded correctly, and that our plans were robust in mitigating and reducing the risk to the general public from danger. This increased focus has resulted in a much higher than expected level of ESQCR issues and required mitigations than originally forecast for DPCR5.

4.0 Asset Assessment

4.1 Asset Health

The asset health for ESQCR is measured by the number of outstanding compliance issues recorded as defects in the asset register, Ellipse. Table 4 details the number of defects recorded in Ellipse for SPN, as of May 2013 and December 2013.The table also shows progress made in reducing the number of defects.

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Section	Issue	Outstanding defects May 2013	Outstanding defects December 2013	Raised between 29 May and December 31	Cleared
Signage		17,764	11,079	677	7,362
Overhead line issues	ACD	2,934	2,301	210	843
	Statutory clearance	1,931	1,258	327	1,000
	Climbable tree	6,348	5,798	807	1,357
	Stays	4,213	3,138	237	1,312
	Risk mitigations	4,202	6,389	2,871	684
Grand total		**37,392**	**29,963**	**5,129**	**12,558**

Table 4 – SPN: Outstanding ESQCR compliance issues

(Source: Asset Register ELLIPSE)

A detailed analysis including historical figures and future forecasts of ESQCR compliance defect categories is presented in section 7.

4.2 Asset Criticality

UK Power Networks developed a comprehensive, centrally managed, risk-framework-based model to identify the priority of issues on the network and ensure they are resolved within an appropriate timescale. This prioritisation model includes the ESQCR defects detailed in this document, as well as all other defects against our assets recorded during inspections.

Each of the defect categories were reviewed and assigned a risk score based on:

- Regulatory risk
- Safety risk
- Environmental risk
- Quality of supply risk
- Financial risk

Regulatory, safety and environmental risk are assigned a higher weighting to ensure they are prioritised.

Based on these risk scores, each of the defect categories is assigned a priority from P1 to P5, each of which has an associated indicative resolution time:

- P5: Very high – 3 months
- P4: High – 1 year
- P3: Medium – 2 years
- P2: Low – 4 years
- P1: Very low – At next maintenance

This prioritisation model ensures defects are carefully, efficiently and rigorously prioritised to maximise effective delivery and cost-efficiency. Very-low-priority P1 defects are managed as part of next maintenance and will not drive a separate intervention. Sufficient timescales are allowed for P2 and P3 defects to allow effective planning and inclusion as part of planned maintenance where possible. Examples of defects and their respective priorities are given in section 3.3.

4.3 Network Risk

Table 4 in section 4.1 outlines the current status of ESQCR compliance. ESQCR compliance issues detailed in this document focus on safety risks.

4.4 Data Validation

The asset register system was modified in early 2012 to allow it to identify defects that are resolved without physical intervention. A detailed analysis of the defects raised and also rectified during 2012 has been carried out and is summarised in Table 6. From this analysis, it has been identified that some of the defects raised by inspectors are conservative; 30% did not require a physical intervention. This reporting will improve through the development and training of the defect handbook detailed in section 6. This data quality improvement factor has been applied to the historical volume of defects and mitigations raised, which were used to construct the ED1 plan to ensure realistic and accurate volumes of compliance issues are forecast for ED1.

Total volume of defects raised in 2012 that have been rectified	73,064
Defect resolved through asset repair/replacement	50,788
Defect resolved through re-inspection/data analysis	22,276
Defects data quality improvement factor	30.49%

Table 5 – Data validation.

4.5 Data Verification

Following the implementation of the strategy to record risk mitigations as part of the ESQCR risk assessment on overhead lines in 2011, 1,200 poles were visited and inspector findings verified. Based on the survey results, the recording of vehicle/machinery contact with an overhead line as a key risk was identified as an area for improvement. Further clarification was provided to inspectors through an engineering bulletin procedure, EBP 01-0026, titled "The correct classification for ESQCR Key Risk K9".

4.6 Data Completeness

As detailed in section 3.1, all substations and the complete overhead network has been risk-assessed in accordance with ESQCR. However, a further risk assessment on overhead lines started in 2011, when recording of information related to ESQCR risk mitigation was introduced in the asset register. It will take four years to complete this risk mitigation assessment, which will be carried out as part of routine safety inspections.

5.0 Intervention Policies

5.1 Interventions: Description of Intervention Options Evaluated

5.1.1 Signage

ESQCR compliance issue	Compliance description	Description of intervention options
Signs	Provision of warning signs for overhead line structures and substations	Replacement of defective and non-compliant signs Cleaning of signs that are dirty or have graffiti, where possible

Table 6 – SPN: Interventions on signage

5.1.2 Overhead line issues

The interventions required to resolve overhead line ESQCR compliance issues are detailed in Engineering Operating Standard EOS 01-0002. Engineering Operating Standard EOS 09-0061 and Overhead Line Inspectors' Handbook detail the risk mitigation interventions required following the identification of a high- or key-risk site. Table 7 summarises the intervention options.

ESQCR compliance issue	Compliance description	Description of intervention options
Anti-climbing devices	Anti-climbing device provision	Replacement of defective and non-compliant anti-climbing devices (all voltages)
Clearances	Re-establish horizontal and vertical statutory clearances – low-voltage	**Horizontal clearances** - Permanent shrouding or ABC replacement - Relocating poles **Vertical clearances** - ABC replacement - Replacement of poles with taller poles - Re-tensioning conductors - Scheme prepared by Distribution Planning for diversion or undergrounding
	Re-establish horizontal and vertical statutory clearances – high voltage and above	**Horizontal clearances** - Relocating poles **Vertical clearances** - Replacement of poles with taller poles - Re-tensioning conductors - Scheme prepared by Distribution Planning for diversion or undergrounding
Climbable trees	Climbable tree risk mitigation – low voltage	- Permanent shrouding or ABC of spans with climbable trees - Access restrictions will be referred to the network operations tree managers and, if necessary, Operational Property and Consents.
	Climbable tree risk mitigation – high voltage and above	- Diversion or undergrounding if routine tree-cutting has not been able to resolve the climbable tree - Access restrictions will be referred to network operations tree managers and, if necessary, Operational Property and Consents.
Stays	Overhead line stay replacement	- Replacement of defective stays and non-compliant stays - Installation of insulators on stays without insulators
ESQCR high risk or key risk	Risk mitigation on overhead lines where a high or very high ESQCR risk site is identified or a key risk is identified	- Enhanced warning signage, Install high-level danger sign - Enhanced anti-climbing device - Warning posters, Leaflet/letter drop, GS6 information pack - Visit by UK Power Networks Public Safety team - High-visibility link marker - Vegetation clearance - Supplementary patrols - High-security lock - Security surveillance - Remove infringement Structural mitigation: ABC conductor, Permanent shrouding, Shroud plant, Re-conductor with BLX (CCC), Underground, Relocate asset, Remove asset, Catenary cable

Table 7 – SPN: Interventions on overhead lines

5.2 Policies: Selecting Preferred Interventions

Each site will be risk-assessed and the most cost-effective intervention will be applied. Intervention for specific compliance issues depends on a variety of factors, such as location of the asset, landowner consents and whether it is an isolated problem or a wider problem that necessitates an entire route refurbishment.

The following sections explain the decision tree for selecting the appropriate intervention.

5.2.1 Signage and overhead line issues

Appropriate risk mitigations are selected in accordance with the ESQCR risk assessment, depending on the location risk, equipment risk and key risk. Guidance on selecting the preferred interventions is detailed in the Overhead Line Inspectors' Handbook.

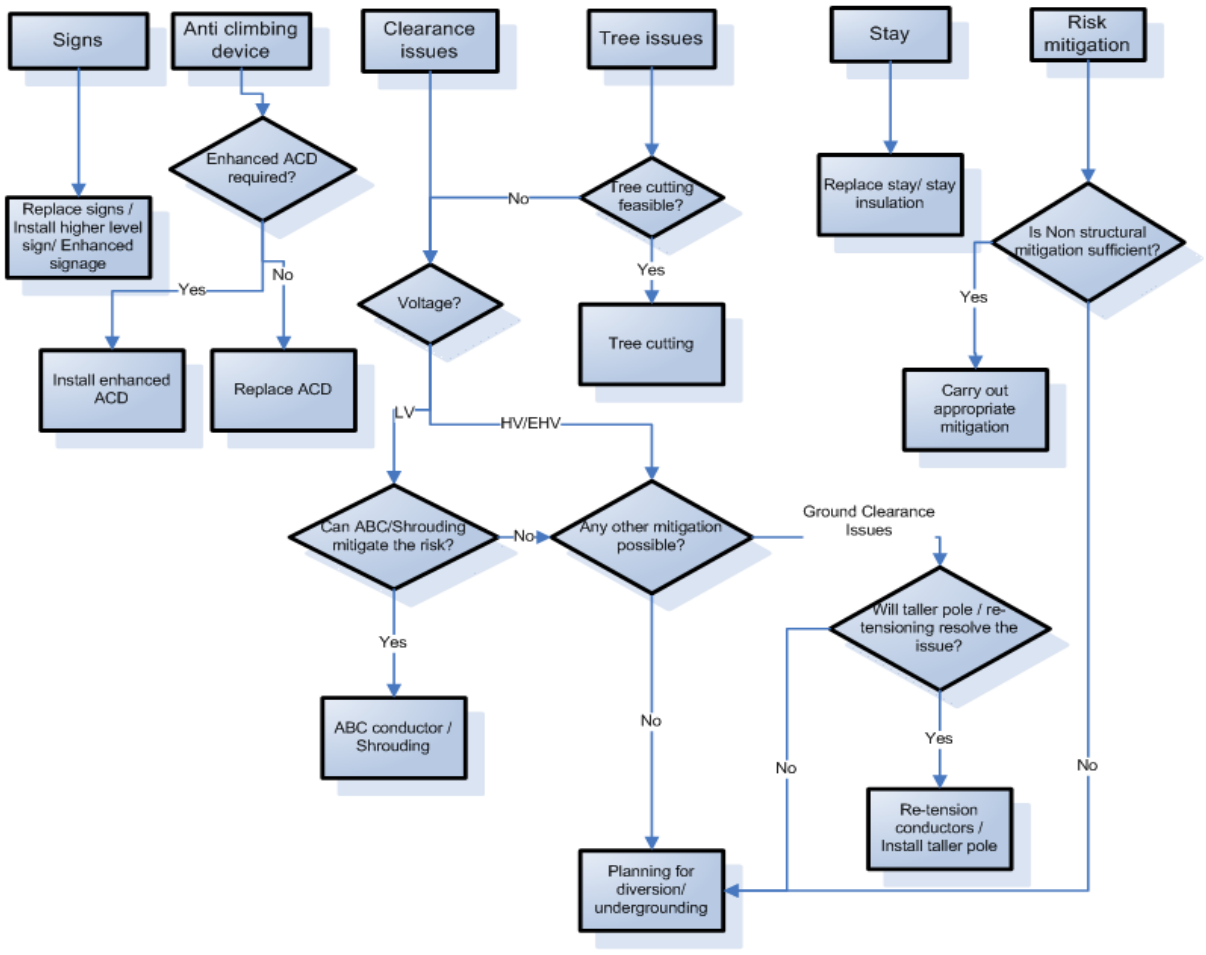

Figure 18 – Decision tree on ESQCR issues, including signage and overhead line issues

6.0 Innovation

6.1 Defect Management Programme

UK Power Networks launched the defect management programme in September 2011 to review, prioritise and resolve defects identified during inspections.

A risk-based model was developed and implemented to robustly prioritise defects from P1 to P5 as described in section 4.2. This prioritisation model ensures defects are carefully, efficiently and rigorously prioritised to maximise effective delivery and cost-efficiency, and ensure the most critical ESQCR compliance issues are highlighted; the strategy of the programme has been to address the highest priority P5 defects in the first two years.

The programme has well-established defect task forces in each region, chaired by the heads of Network Operations and supported by Asset Management and Health and Safety. Asset Management ensures that a uniformed defect resolution approach is adopted across the regions and that best practices and lessons learned are shared. The task force reviews the defects identified, monitors progress on resolutions, and continuously reviews defects and intervention options to identify any opportunities for continuous improvement.

Task force structure

Roles	Participants
Chairman	Head of Operations
Steering Committee	Head of Asset Strategy, Head of Health and Safety, Head of Asset Information
Co-ordination, Data reports	Asset Management Team
Team	Tree Managers Civil Managers I&M Managers Capital Delivery Managers
Meeting Frequency	Monthly meetings

Table 8 – Task force structure

6.1.1 Progress

Through a focused and targeted approach to defects, the programme successfully reduced the outstanding volume of defects in UK Power Networks by 33% by the end of 2012. The highest priority P5 defects were nearly halved, achieving 48.18% reduction in the same period.

UKPN – Outstanding defects

Sep 2011 baseline

Category	P5 - VERY HIGH	P4 - HIGH	P3 - MEDIUM	P2 - LOW	P1 - VERY LOW	Grand Total
OHL	36,688	30,538	240,522	30,315	6,460	**344,523**
Pole Condition	98	15,621	2,482	0	0	**18,201**
Towers	21	1,260	15,338	5,574	0	**22,193**
Trees	8,378	160,475	24,269	0	0	**193,122**
Civil	1,043	12,850	23,743	15,403	15,647	**68,686**
Link box	8,718	4,597	1,863	1,422	15,946	**32,546**
Plant	1,820	80	206	31,759	4,565	**38,430**
Grand Total	**56,766**	**225,421**	**308,423**	**84,473**	**42,618**	**717,701**

Dec 2012 End status update

Category	P5 - VERY HIGH	P4 - HIGH	P3 - MEDIUM	P2 - LOW	P1 - VERY LOW	Grand Total
OHL	25,659	33,070	127,304	25,199	101	**211,333**
Pole Condition	15	17,841	2,665	0	0	**20,521**
Towers	28	1,165	12,561	5,404	0	**19,158**
Trees	1,742	76,598	43,607	302	0	**122,249**
Civil	731	11,308	18,784	8,408	9,037	**48,268**
Link box	0	8,747	0	0	4,279	**13,026**
Plant	1,240	957	409	34,905	5,768	**43,279**
Grand Total	**29,415**	**149,686**	**205,330**	**74,218**	**19,185**	**477,834**

The outstanding defect count has reduced by 239,867 (~33.42%)

P5 defects have reduced by 48.18%

Table 9 – UK Power Networks defect management 2012

SPN has contributed significantly to the overall progress of the defect management programme and achieved a 38% reduction in outstanding defects by the end of 2012. In addition, SPN achieved an impressive 67% reduction of the highest priority P5 defects in the same period. The strategy is to address all outstanding issues raised by the end of DPCR5.

December 2013 End Status

Asset Category	P5	P4	P3	P2	Total
Civil	341	8,106	7,058	9,563	**25,068**
Link box	0	6,858	0	0	**6,858**
OHL	7,986	27,175	96,027	24,780	**155,968**
Plant	1,119	320	457	19,655	**21,551**
Pole Condition	13	15,098	2,364	0	**17,475**
Towers	39	1,312	12,181	2,252	**15,784**
Trees	1,276	45,084	13,322	0	**59,682**
Total	**10,774**	**103,953**	**131,409**	**56,250**	**302,386**

Table 10 – UK Power Networks defect management 2013

Table 10 details progress made in reducing the number of defects as of December 2013.The strategy is to address all outstanding issues raised by the end of DPCR5.

SPN Performance

Sep 30 2011 baseline

Category	P5 - VERY HIGH	P4 - HIGH	P3 - MEDIUM	P2 - LOW	P1 - VERY LOW	Grand Total
OHL	1,797	6,982	51,753	8,958	999	**70,489**
Pole Condition	34	3,943	758	0	0	**4,735**
Towers	14	624	4,479	2,310	0	**7,427**
Trees	1,801	25,306	9,854	0	0	**36,961**
Civil	348	3,707	6,158	2,804	4,568	**17,585**
Link box	847	859	421	133	3,356	**5,616**
Plant	699	18	43	4,977	1,372	**7,109**
Grand Total	**5,540**	**41,439**	**73,466**	**19,182**	**10,295**	**149,922**

December 2012 End status

Category	P5 - VERY HIGH	P4 – HIGH	P3 - MEDIUM	P2 - LOW	P1 - VERY LOW	Grand Total
OHL	1,102	4,900	26,277	8,134	33	**40,446**
Pole Condition	10	2,807	385	0	0	**3,202**
Towers	0	553	4,081	2,052	0	**6,686**
Trees	105	10,523	3,375	69	0	**14,072**
Civil	179	3,874	6,286	1,902	3,348	**15,589**
Link box	0	1,923	0	0	567	**2,490**
Plant	396	606	81	7,006	2,096	**10,185**
Grand Total	**1,792**	**25,186**	**40,485**	**19,163**	**6,044**	**92,670**

The outstanding defect count has reduced by 57,252 (38.19%)

P5 defects have reduced by 67.65 %

Table 11 – SPN defect management update

December 2013 End Status

Asset Category	P5	P4	P3	P2	Total
Civil	124	1,282	2,021	3,043	**6,470**
Link box	0	1,316	0	0	**1,316**
OHL	469	5,370	18,349	8,389	**32,577**
Plant	308	82	78	5,938	**6,406**
Pole Condition	11	2,800	484	0	**3,295**
Towers	22	551	5,125	723	**6,421**
Trees	60	6,540	386	0	**6,986**
Total	**994**	**17,941**	**26,443**	**18,093**	**63,471**

Table 12 – SPN defect management update

Table 12 shows the progress made in reducing the number of defects as on December 2013 in SPN. SPN successfully reduced the outstanding defect count by 58% by the end of 2013 from the September 2011 Baseline. The strategy is to address all outstanding issues raised by the end of DPCR5.

6.1.2 Defect reporting tool

An online defect-reporting tool has been developed to improve visibility of the defects and aid planning for the resolution of defects. The reporting tool is accessible by both UK Power Networks staff and its contractors. It enables access to and viewing of the defects and progress graphs for efficient monitoring and tracking of key performance indicators.

6.1.3 Inspectors' Defect Handbook

A handbook on defects for inspectors is being developed to provide clarity on defects. This will cover all defect categories, not just the categories detailed throughout this document. The handbook will aid improved reporting and understanding defects and is planned for completion by the end of 2013.

6.2 ENA joint working group on overhead line service clearances

UK Power Networks is an active member of an Electricity Networks Association (ENA) working group, set up to develop a co-ordinated approach to overhead line clearances with a particular focus on service and LV clearances.

The group will carry out a detailed risk assessment to evaluate the risks associated with low-clearance issues to explore whether the heights outlined in ESQCR are appropriate or if a lower height would add negligible risk at a significantly reduced cost. The group has engaged with the HSE, which supports the undertaking of a detailed risk assessment.

If the assessment and the HSE support the reduction of the heights outlined in ESQCR, the proposal will be submitted to the Department of Energy and Climate Change (DECC). The timescale for the project is 2-3 years.

6.3 Energy Innovation Centre – Live Alert project

UK Power Networks are funding the development of The Energised Alert (http://www.energisedalert.co.uk/). This device from Live Alert Ltd will act as a voltage alarm that senses when its electrical potential exceeds a pre-set limit without any connection to earth. It will be used to detect a rise in potential due to close proximity or contact with an overhead line.

This device could potentially be used by UK Power Networks staff, contractors and third parties working in the vicinity of overhead lines, to reduce the number of accidental contact with overhead lines.

7.0 ED1 Expenditure Requirements for ESQCR Compliance

7.1 Constructing the Plan

The investment strategy for ED1 has been set to achieve ESQCR compliance and minimise the risk to members of the public and employees. Any defects identified will also be resolved during the ED1 period. The current defect management programme will address the outstanding defects by the end of DPCR5 where practical. A targeted approach to resolving ESQCR compliance issues will continue throughout ED1.

ED1 expenditure requirements for ESQCR safety compliance in SPN is divided into two sub categories:

- Signage:
  - Warning signs (overhead line and substation signs)
- Overhead line issues:
  - Anti-climbing devices
  - Statutory clearance requirement related to building clearance, ground clearance and streetlight and furniture clearance
  - Statutory clearance requirement from climbable trees
  - Stays
  - Risk mitigation of key risks, ESQCR location risk and ESQCR equipment risk
- The other areas of expenditure for ESQCR compliance are covered in specific asset stewardship reports for other asset groups.

7.1.1 Signage and overhead line issues

ED1 planning on signage and overhead line issues is based on historical figures of defects raised each year. This is used to forecast the volume of defects that will be raised throughout ED1. Any skewed annual volumes of defects raised were taken in to consideration. This is the case for ESQCR statutory clearance issues at EHV, where defects identified were significantly higher in 2011 compared with all other years. Enhanced training for overhead line inspectors was carried out in 2011. Volumes identified in 2012 have reduced significantly and are in line with clearance defects identified in other years. To ensure an accurate forecast, the volumes reported during 2011 have been discounted.

A detailed analysis of the defects identified and resolved during 2012 showed that 30% of the defects did not require an intervention. This is due to conservative reporting by inspectors. As detailed in section 6, an Inspectors' Defect Handbook is being developed to improve the accuracy of reporting. Based on the results of the analysis, a data correction factor of 30% has been applied to the annual average volume of defects identified during the DPCR5 period to arrive at the forecast for ED1. This ensures forecast volumes are realistic and accurate. A summary of the analysis is detailed in section 4.4.

Where appropriate, the forecast volumes are verified using the average asset life. Forecast volumes that result in a lower-than-expected average asset life based on the historical volume of defects raised are discounted and the volumes are aligned with the average asset life.

In addition, compliance issues rectified as part of other planned work has also been taken in to consideration. This is particularly relevant for climbable trees which are resolved through tree cutting.

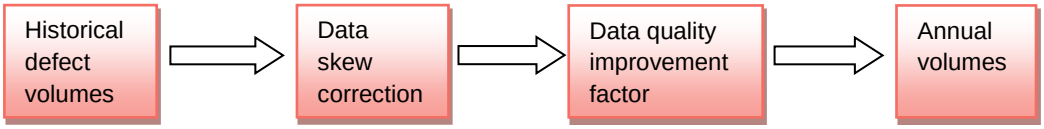

Figure 19 – SPN volume forecasting methodology

Overhead line mitigations identified through the improved ESQCR risk assessment strategy implemented in 2011 will require intervention over the remaining years in DPCR5 and throughout the ED1 period.

Section 7.1.2 provides the detail on the how the clearances and climbable tree mitigation plan was determined.

7.1.2 Clearances and climbable tree issues

Clearance issues refer to inadequate clearances to ground (roads, footpaths etc), Buildings and other structures. The ESQCR proposals for clearances and climbable tree issues are based on the following assumptions:

- Structural mitigation to be carried out on all clearance issues other than climbable trees (unchanged from original submission).
- For climbable tree issues, structural mitigation to be carried out as follows - 60% of LV, 3% of HV and 3% of EHV issues in EPN and SPN.
- The number of new issues that will be identified each year will reduce by 3% each year.
- All outstanding clearance issues, in DCR5, will be cleared before the start of ED1. The provision in ED1 for structural mitigation is only for new clearance issues that arise in ED1.

Structural mitigation for climbable tree issues is preferred to tree cutting for the following reasons:

- Will help reduce the impact of customer tree-cut refusals
- Provide permanent mitigation and remove the need for repeat tree cutting visits
- Tree cutting costs are often comparable to structural mitigation costs

Table 13 shows a summary of the tree cut refusals observed in SPN three-year period 2009-2011. Majority of these are at LV locations. If the number of refusals experienced each year continues, this would account have an impact on approximately 20% of climbable tree issues identified each year.

	VOLTAGE	**2009**	**2010**	**2011**
SPN	LV POLE	152	128	46
	HV POLE >1KV AND <33KV	21	111	145
	33KV POLE	5	0	0
	GRAND TOTAL	**178**	**239**	**191**

Table 13 - Number of tree cutting refusals each year

Structural mitigation of climbable tree issues will provide permanent mitigation reducing the need for repeat visits to maintain the tree clearances. Structural mitigation will also reduce the impact of weather-related failures on the network by reducing the number of spans which can possibly be affected by bad weather.

There are a number of structural works carried out on overhead lines in SPN each year. These include:

- LV overhead line refurbishment/rebuild/restrings driven by condition
- HV overhead line refurbishment/rebuild/restrings driven by condition
- Undergrounding of overhead lines due to other reasons (diversions, amenity etc)
- ESQCR mitigation works.

These programmes of work will remove/reduce the likelihood of the overhead line spans worked on from developing clearance issues.

Table 14 shows the number of spans that would have some structural work carried out on them each year. This is approximately 3% of the number of poles inspected each year. For this reason we have factored in a reduction of clearance issues raised each year by 3%, in the ESQCR plan.

DNO	Pole population	Poles inspected each year (4 year cycle of inspections)	Structural Work Every Year	% Reduction in no of poles inspected that could have clearance issues
EPN	497,230	124,308	2,814	2%
SPN	206,225	51,556	1,849	4%
UKPN	703,455	175,864	4,663	3%

Table 14 : Reduction in number of clearance issues raised

7.2.3 Setting the Plan

Table 15 shows the calculation steps used to determine the structural mitigation plans for ESQCR issues

	Voltage	Historical Data					Data Quality Factor (applied to average historical figure)	Forecast (Overall Number of clearance issues)	Structural mitigation % (applied to forecast no. of issues identified)
		2010	2011	2012	Total	Average			
SPN CLIMBABLE TREE	LV	4,629	3,368	692	8,689	2,896	70%	2,027	60%
	HV	36	398	130	564	188	70%	132	3%
	EHV	364	131	9	504	168	70%	118	3%
								2,277	
SPN CLEARANCE ISSUES	LV	790	403	517	1,710	570	70%	399	100%
	HV	126	618	73	817	100	70%	70	100%
	EHV	6	143	2	151	4	70%	3	100%
								472	

Table 15: Methodology used for forecast

7.2 Additional Considerations

None.

7.3 Asset Volumes and Expenditure

As part of the defect management programme and the strategy to address outstanding defects by the end of DPCR5, SPN is investing significant expenditure and efforts. Although the volume of work is challenging over the next two years, we believe it is deliverable with the continued support and stable contract relationship established with our overhead line contractor. Some areas with lower expenditure and criticality are forecast to continue until the end of 2015. These efforts will result in improved ESQCR compliance, thereby leading to a 32% reduction in average annual expenditure during ED1. Table 16 and Figure19 detail the historic and forecast expenditure on ESQCR compliance issues. Table 17 details the volumes.

Major Category	Category	DPCR5 total	ED1 total	DPCR5 yearly average expenditure	ED1 yearly average expenditure	% change
Signage	Signs	£680,682	£1,077,120	£136,136	£134,640	-1%
OHL Issues	ACD	£882,407	£570,164	£176,481	£71,271	-60%
	Clearance	£14,089,220	£8,285,700	£2,817,844	£1,035,712	-63%
	Climbable Tree	£14,481,901	£18,727,464	£2,896,380	£2,340,933	-19%
	Stays	£1,207,262	£1,969,400	£241,452	£246,175	2%
	Risk Mitigation	£2,579,046	£6,383,520	£515,809	£797,940	55%
Grand Total		£33,920,518	£37,013,368	£6,784,102	£4,626,671	-32%

Table 16 – SPN: ESQCR expenditure (Source: Costs - 19th February 2014 NAMP, Table J Less Indirects)

ESQCR expenditure proposed includes the Signs, ACD, Clearance, Climbable tree, Stays and Risk mitigations .There is a step change in the expenditure from ED1 to ED2 this is due risk mitigation expenditure.

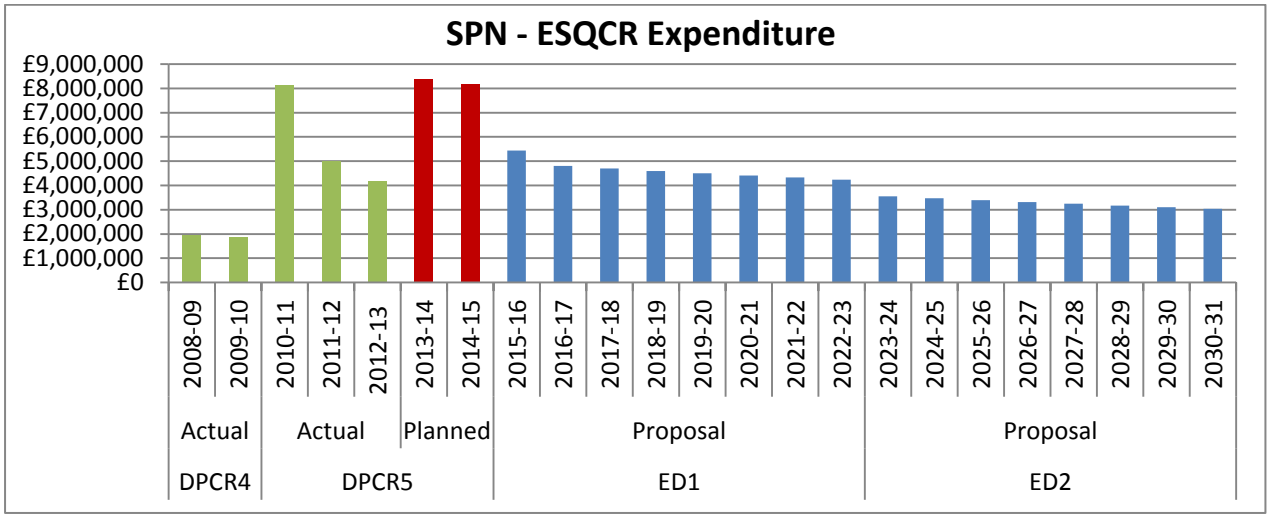

Figure 19 – SPN expenditure on ESQCR compliance (Source: Costs - 19th February 2014 NAMP, Table JLess Indirects)

Category	Sub-category	DPCR5 total volumes	DPCR5 average annual volumes	ED1 total volumes	ED1 average annual volumes
Signage	Signs	71,649	14,330	96,000	12,000
Overhead line issues	Anti-climbing device	7,576	1,515	2,290	186
	Clearance	6,853	1,371	3,316	412
	Climbable tree	28,678	5,736	8,561	1,072
	Stays	11,795	2,359	6,566	688
	Risk mitigation	6,469	1,294	8,184	1,023
Grand total		133,020	26,605	124,917	15,381

Table 17 – SPN: ESQCR ED1 volumes. (Source: Costs - 19th February 2014 NAMP, Table O)

7.4 Commentary

The following sections use a combination of actual and planned expenditure for DPCR5. The first three years are actual expenditure which is shown in green. The remaining DPCR5 years are forecast expenditure, which is shown in red. ED1 and ED2 forecast expenditure is shown in blue.

Volume graphs detail the historic and forecast compliance issues raised and resolved. These are the actual volumes raised and resolved in Ellipse. As detailed in section 4.4, an analysis of the data identified that some of the defects raised by inspectors were conservative and 30% did not require a physical intervention. However, these will still show as resolved defects in Ellipse but they will have no corresponding cost recorded against them. The ED1 forecast takes this data quality improvement factor into consideration and the volumes for ED1 shown are volumes resolved through physical intervention only.

In addition, analysis has found that defects were not always resolved in Ellipse at the time when they were physically resolved on site. Defects are being cleared in Ellipse during inspection patrols where they no longer exist either because they were previously resolved or due to over cautious reporting. This cleansing of the data is expected to continue as part of the defect management programme through to the end of DPCR5. As a result, it is anticipated that a high number of the defects will be resolved when compared to the corresponding expenditure for the remaining years in DPCR5. Therefore it is not possible to compare the historic UCI with the UCI for ED1 as ED1 details physical work only.

As per section 5.2, there are a number of intervention options which can be selected to resolve an ESQCR compliance issue. Each site will be risk assessed and the most effective intervention will be applied. The unit cost of resolving an ESQC compliance issue is arrived at through a weighted average of the cost of multiple intervention options that can be used to resolve the issue.

7. 4.1 Signage

As mentioned in section 3.4, warning signs require replacement if they are vandalised, faded or found to be non-compliant with ESQCR and UK Power Networks policies.

Figure 21 shows the volume of ESQCR sign-compliance issues recorded as defects in the asset register. A large volume of these signs are replaced as part of routine inspections. It has been found that some inspectors identify and resolve defects at the time of inspection without recording the work in Ellipse. This is the reason for the low volume of defects identified in Ellipse in recent years compared with the forecast for ED1. The recording process has been improved to ensure all the replacements are recorded in the asset register.

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As a result, the ED1 volumes are calculated solely on average asset life. There is a population of 360,000 signs. Based on a 30-year average asset life, the forecast annual volumes for ED1 are 12,000.

The expenditure is detailed in Table 18, with the profile outlined in Figure 20. The increased expenditure in 2011/12 was due to the ESQCR requirement to fit signs to all overhead structures by 2013 and the increased focus following the audit by the HSE. The average annual expenditure is forecast to be £135k.

NAMP	Description	DPCR5 total	ED1 total	DPCR5 average	ED1 average	% change
1.13.05	ESQCR provision for warning signs	£680,682	£1,077,120	£136,136	£134,640	-1%

Table 18 – SPN: ED1 expenditure on signage (source: Costs – 19th February 2014 NAMP, Table JLess Indirects)

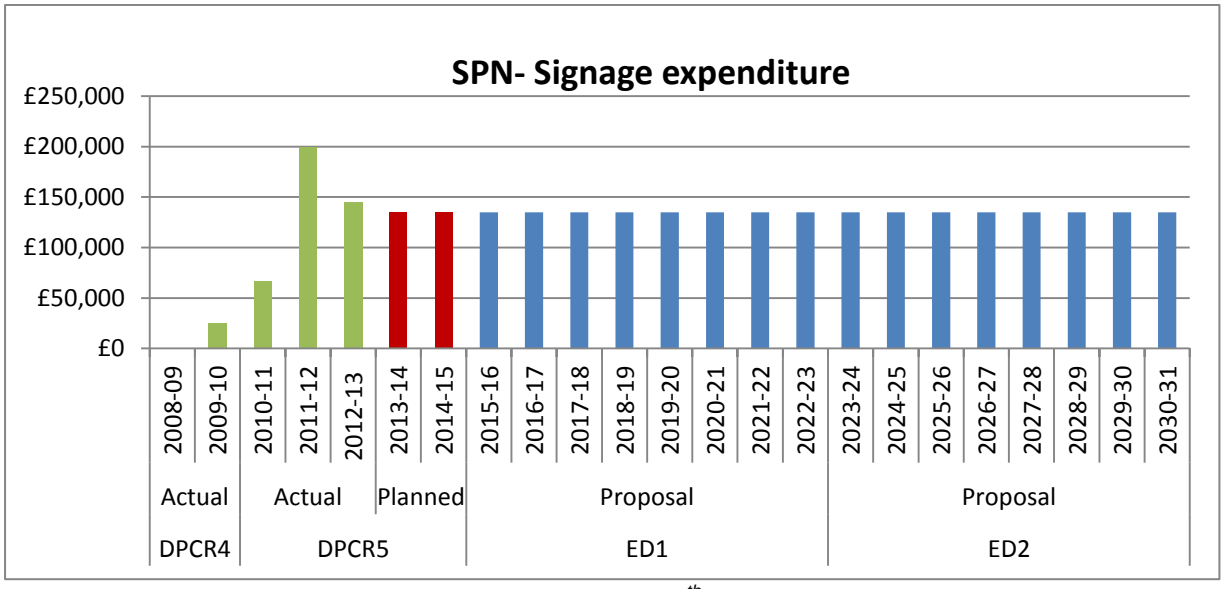

Figure 20 – SPN expenditure on signs (Source: Costs – 19th February 2014 NAMP, Table JLess Indirects)

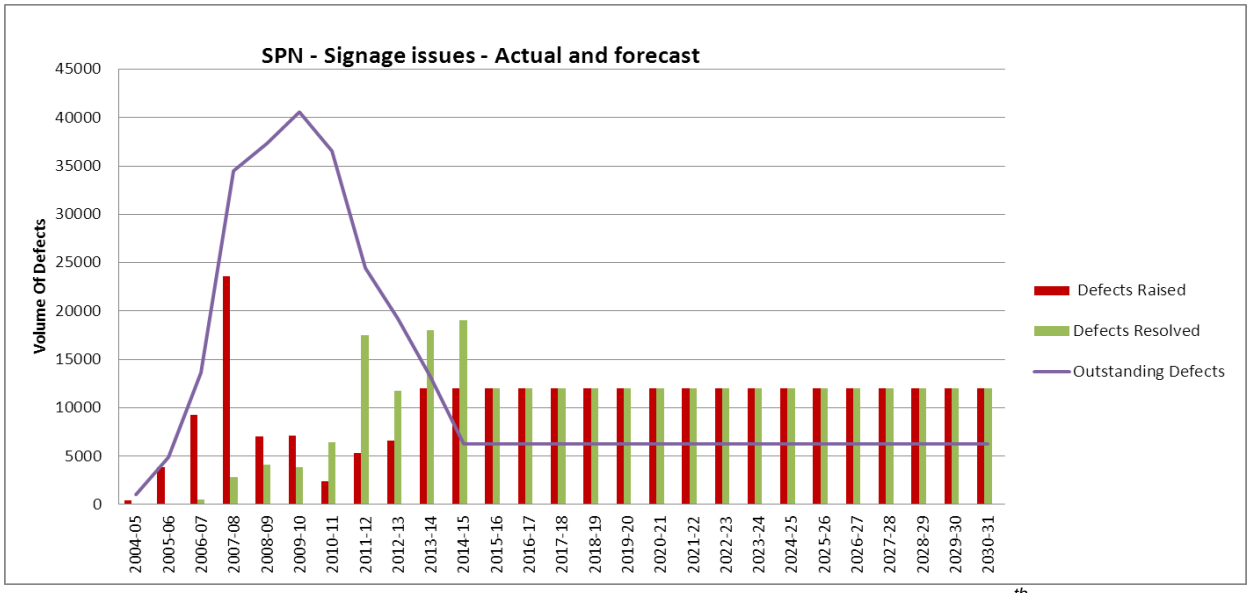

Figure 21 – SPN historical and forecast volumes on sign issues (source: Volumes – 19th February 2014 NAMP, Table O)

7.4.2 Overhead line issues

Anti-climbing devices (ACD) – These are used to prevent the general public from accessing the electrical plant hosted on overhead line assets.

SPN is investing £882k during DPCR5 to address ESQCR anti-climbing device compliance issues. As per the strategy of the defect management programme, SPN has focused its efforts on higher-priority P5 issues in 2012/13, such as clearances and climbable trees that pose higher risk to public safety. Anti-climbing devices are categorised as P4 or P3 depending on the voltage and ESQCR risk rating. SPN will refocus on anti-climbing device compliance issues to clear all outstanding issues by the end of 2015.

Figure 23 shows the volume of ESQCR anti-climbing device compliance issues recorded as defects in the asset register. SPN inspectors reported an average annual volume of 681 anti-climbing device requirements between 2010 and 2012. However, it is not expected to continue at this rate, as this would imply a lower than expected average asset life. Thus the ED1 volumes are calculated solely on average asset life. There is a population of 11,000 anti-climbing devices. Based on a 60-year average asset life, the forecast annual volumes for ED1 are 186.

The expenditure is detailed in Table 19, with the profile outlined in Figure 22. The average annual expenditure is forecast to be £71k, which is a 60% reduction in ED1 compared with DPCR5.

NAMP	Description	DPCR5 total	ED1 total	DPCR5 average	ED1 average	% change
1.13.08	ACD provision	£882,407	£570,164	£176,481	£71,271	-60%

Table 19 – SPN: ED1 expenditure on anti-climbing devices (source: Costs – 19th February 2014 Table J Less Indirects)

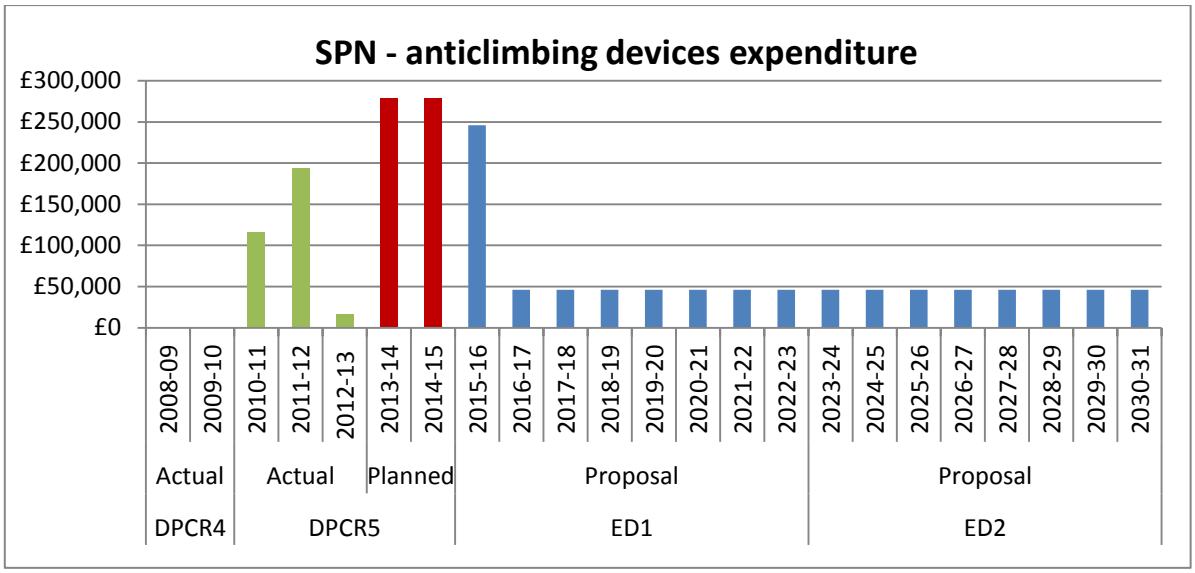

Figure 22 – SPN expenditure on anti-climbing devices (Source: Costs – 19th February 2014 NAMP, Table J Less Indirect

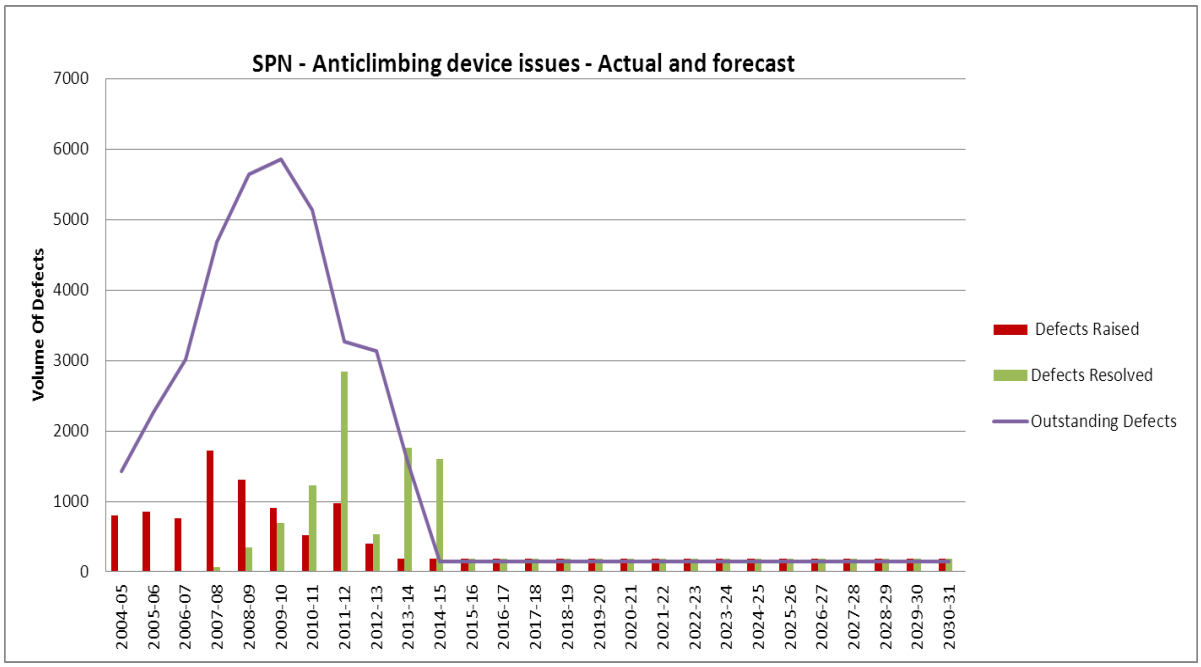

Figure 23– SPN historical and forecast volumes on anti-climbing device issues (source: Volumes – 19th February 2014 NAMP, Table O)

ESQCR statutory clearance – As detailed in Section 3.2, following a full survey and risk assessment of the overhead line network, a strategic review of ESQCR was carried out, which resulted in a targeted approach to resolving ESQCR clearance issues. Of the previously allocated funds for large-scale ABC work, 10% has been used to focus on statutory clearances and 90% has been used to focus on LV climbable trees. This has been included in the DPCR5 expenditure. Statutory clearances detailed in this section includes ground clearance, building clearance and streetlight and furniture

SPN invested significant expenditure in the resolution of statutory clearance issues during the beginning of DPCR5. A review of this indicated that the defect was not always cleared in Ellipse when the work was carried out. As part of the defect management programme, clearance defects have been attributed the highest priority, P5. SPN has surveyed the P5 defects in 2012 and cleared the defect where it no longer exists. This accounts for the high number of clearance defects resolved in 2012. This issue has been rectified through enhanced training and improved systems to ensure accurate reporting.

Figure 25 shows the volume of ESQCR clearance issues recorded as defects in the asset register. SPN inspectors reported an average annual volume of 1,486 ESQCR clearance issues between 2010 and 2012. However, as detailed in section 7.1, volumes identified in 2010 and 2011 have been discounted.

As new compliance issues continue to be raised, the targeted approach will continue throughout DPCR5 and through to ED1, with a reduction forecast in ED2. Due to improved compliance following the defect management programme, the average annual volume forecast for ED1 is 412. Methodology used for revised volume forecast is described in the section 7.2.

The expenditure is detailed in Table 20, with the profile outlined in Figure 24. The increased efforts in DPCR5 will reduce the expenditure requirements for ED1 by 63% reducing the average annual expenditure on statutory clearances to £1m during ED1, from an average annual expenditure of £2.8m in DPCR5.

NAMP	Description	DPCR5 total	ED1 total	DPCR5 yearly average expenditure	ED1 yearly average expenditure	% change
1.13.17	Re-establish statutory clearances - HV	£1,816,336	£2,121,000	£363,267	£265,125	-27%
1.13.18	Re-establish statutory clearances - LV	£11,808,552	£5,979,828	£2,361,710	£747,478	-68%
1.13.21	Re-establish statutory clearances - EHV	£139,867	£184,872	£27,973	£23,109	-17%
1.41.03	LV overhead line refurbishment (including ABC)	£324,467		£64,893	Not Used For ESQCR driven work in ED1	
Grand Total		£14,089,220	£8,285,700	£2,817,843	£1,035,712	-63%

Table 20 – SPN: ED1 expenditure on clearance issues (source: Costs - 19th February 2014 NAMP, Table JLess Indirects)

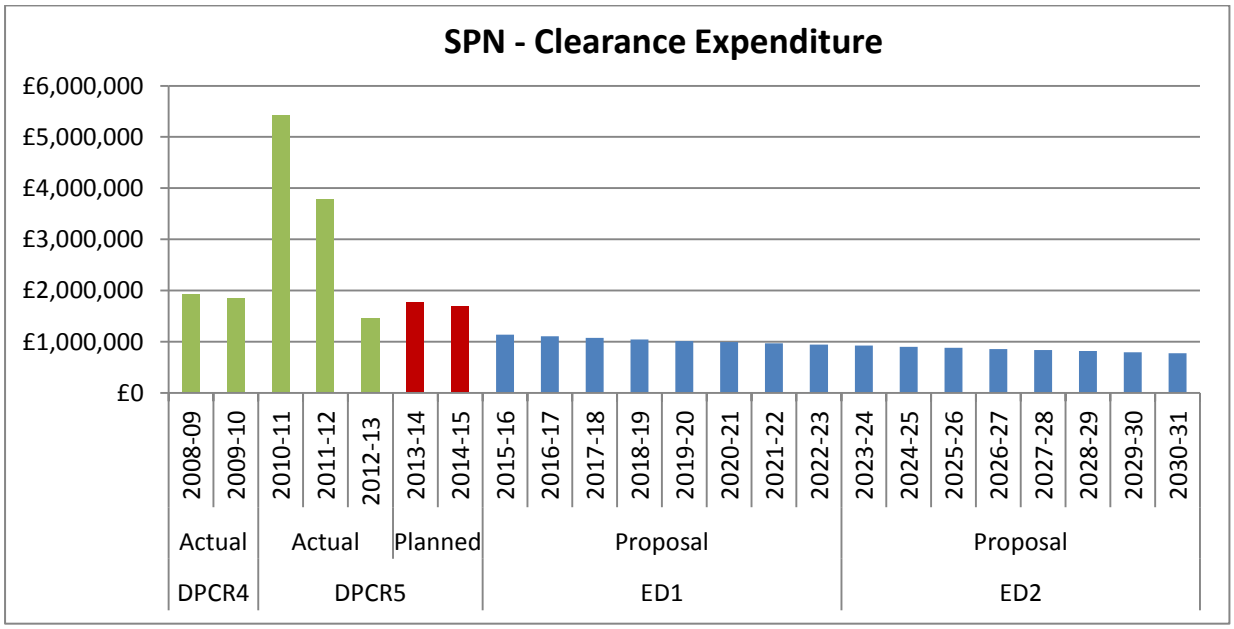

Figure 24 – SPN expenditure on Clearances (Source: Costs - 19th February 2014 NAMP, Table JLessIndirects)

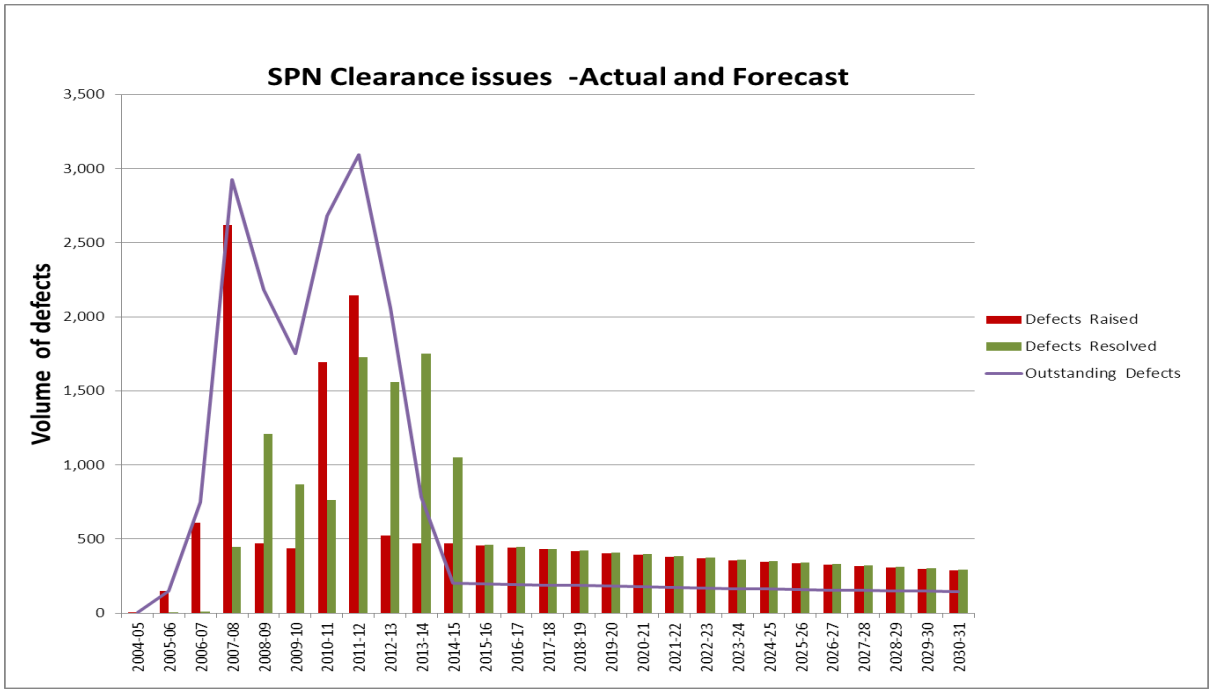

Figure 25 – SPN historical and forecast volumes on ESQCR clearance issues (source: Volumes - 19th February 2014 NAMP, Table O)

Climbable trees issues – When addressing a climbable tree issue, tree-cutting is the first resolution option to explore. For HV and above, this is generally the most cost-effective solution. However, in a small percentage of cases, where there are recurring or widespread issues and landowner refusals to tree-cutting, a decision will be taken to underground or divert the section.

For LV, due to recurring problems with mature trees and a large number of landowner refusals to tree-cutting, the most cost-effective long-term solution is often to ABC the section.

Due to this, climbable trees have had a big influence in the change in strategy towards a targeted approach to resolving ESQCR clearance issues. Instead of large-scale ABC work, there has been a targeted approach for resolving climbable trees. Of the previously allocated funds for large-scale ABC work, 90% has been used to focus on LV climbable trees. This has been included in the DPCR5 expenditure. This targeted approach will continue throughout ED1.

As with clearances, the climbable tree defect was not always cleared in Ellipse when the work was carried out. This has been corrected through re-surveying defects as part of the defect management programme.

Climbable trees vary in priority from P5 to P3, depending on the voltage and ESQCR risk rating. The focus will continue to be on addressing the climbable tree compliance issues throughout the rest of DPCR5, with a total investment of £14.5m. The targeted approach to ABC refurbishment will continue through ED1. This will significantly improve compliance with ESQCR for climbable trees. As well as improving compliance, this work will also result in the improved condition of the overhead line network.

Figure 27 shows the volumes of ESQCR climbable tree issues recorded as defects in the asset register. SPN inspectors reported an average annual volume of 3,252 ESQCR climbable tree issues between 2010 and 2012. As new compliance issues continue to be raised, the targeted approach will continue throughout DPCR5 and through to ED1, with a reduction forecast in ED2. Due to improved compliance following the defect management programme, the average annual volume of defects raised is forecast to be 2,277 for ED1, of which 1,072 are forecast to be resolved by structural mitigations like ABC or undergrounding. Methodology used for revised volume forecast is described in the section 7.2.This is shown in blue in Figure 27.The expenditure is detailed in table 21 with the profile outlined in Figure 26.

NAMP	Description	DPCR5 total	ED1 total	DPCR5 yearly average expenditure	ED1 yearly average expenditure	% change
1.13.22	Climbable tree risk mitigation - HV	£685,567	£164,000	£137,113	£20,500	-85%
1.13.23	Climbable tree risk mitigation - EHV	£180,712	£364,872	£36,142	£45,609	26%
1.13.24	Climbable tree risk mitigation - LV	£10,482,706	£18,198,592	£2,096,541	£2,274,824	9%
1.41.03	LV overhead line refurbishment (including ABC)	£2,920,199		£584,040	Not Used For ESQCR driven work in ED1	
1.41.04	LV OHL Undergrounding due to clearance to trees	£212,717		£42,543		
Grand Total		£14,481,901	£18,727,464	£2,896,379	£2,340,933	-19%

Table 21 – SPN: ED1 expenditure on climbable trees (source: Costs - 19th February 2014 NAMP, Table JLess Indirects)

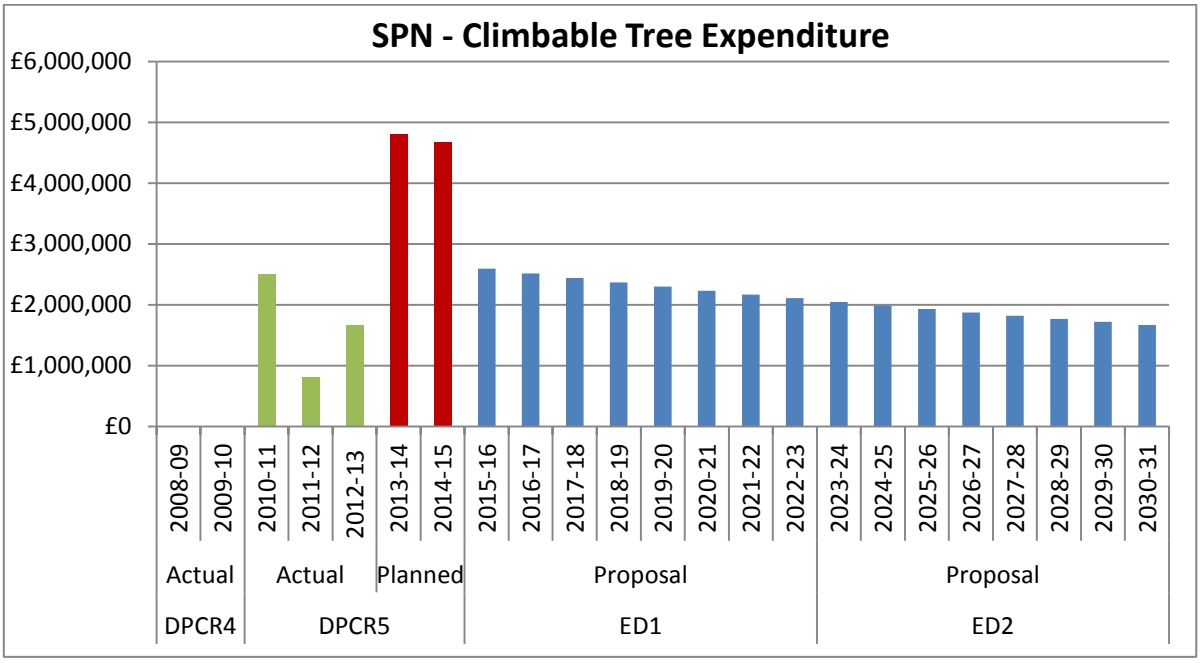

Figure 26 – SPN expenditure on climbable trees (Source: Costs - 19th February 2014 NAMP, Table JLessIndirects)

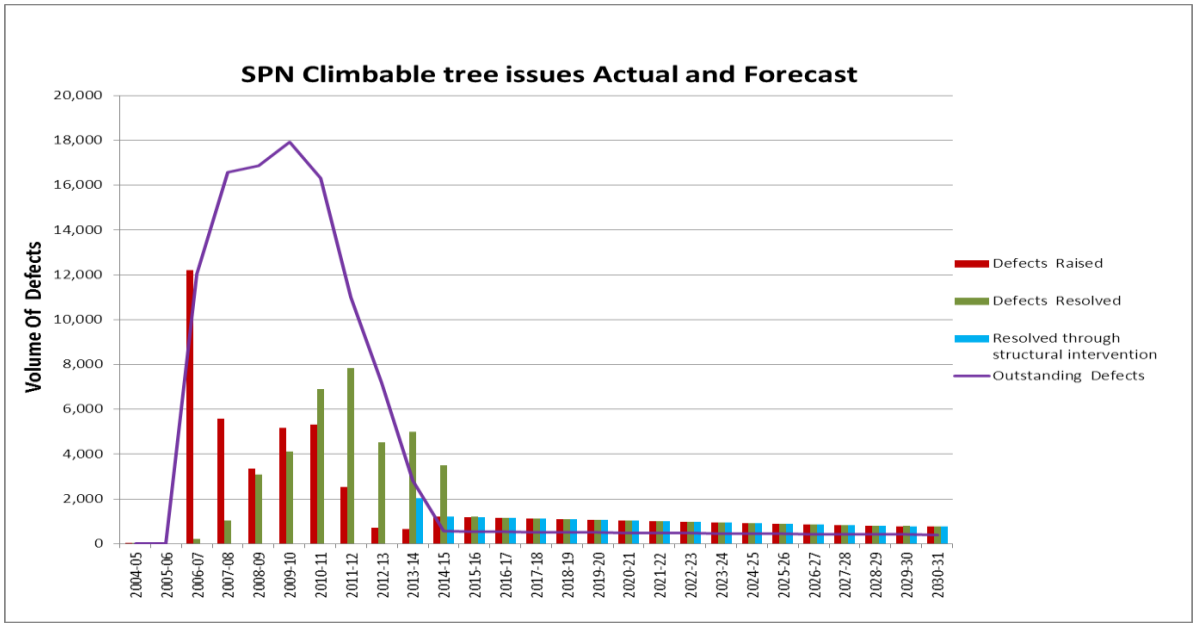

Figure 27 – SPN historical and forecast volumes on climbable tree issues (source: Volumes - 19th February 2014 NAMP, Table O)

Stays – As per the strategy of the defect management programme, SPN has focused its efforts on higher-priority P5 issues, such as clearances and climbable trees, which pose higher risk to public safety. ESQCR stay compliance issues are categorised from P5 to P3 depending on the voltage and ESQCR risk rating. However, only a small number of the outstanding defects are P5. SPN will focus on stay compliance issues to clear all outstanding issues by the end of 2015.

Figure 29 shows the volume of ESQCR stay compliance issues recorded as defects in the asset register. SPN inspectors reported an average annual volume of 2,366 ESQCR compliance stay issues between 2010 and 2012. These defects have been reviewed by the defect management task force, who have highlighted some over-cautious reporting, and some stays will not require replacement. This is being corrected through improved policy clarity in the Inspectors' Defect Handbook, as well as further training to the inspectors.

Due to this, reporting of defective stays is not expected to continue at this rate, as it would imply a lower than expected average asset life. Thus the ED1 volumes are calculated solely on average asset life. There is a population of 41,000 stays in SPN. Based on a 60-year average asset life, the forecast annual volumes for ED1 are 688.

The expenditure is detailed in Table 22, with the profile outlined in Figure 28. Expenditure will reduce from £600k per year at the end of DPCR5 and settle at £206k during ED1. Expenditure prior to 2013 was not recorded on a stand-alone expenditure line in SPN and was included as part of other planned work.

NAMP	Description	DPCR5 total	ED1 total	DPCR5 average	ED1 average	% change
1.13.32	Replacement of stays	£1,207,262	£1,969,400	£241,452	£246,175	2%

Table 22 – SPN: ED1 expenditure on stays (source: Costs – 19th February 2014 NAMP, Table J Less Indirects)

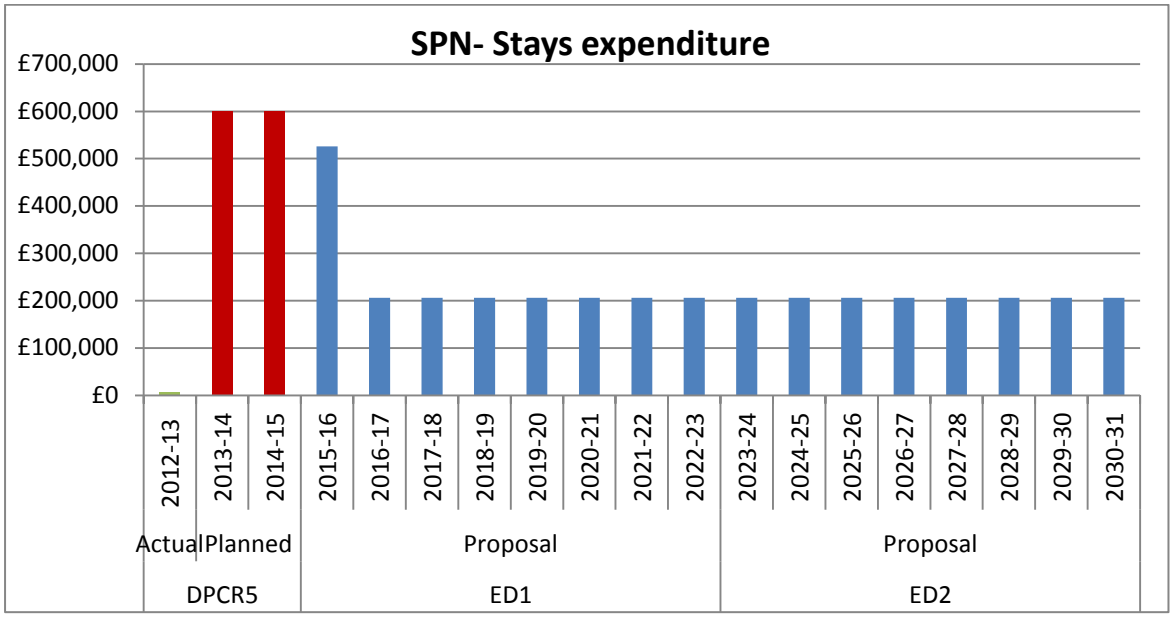

Figure 28 – SPN expenditure on stays (Source: Costs – 19th February 2014 NAMP, Table JLessIndirects)

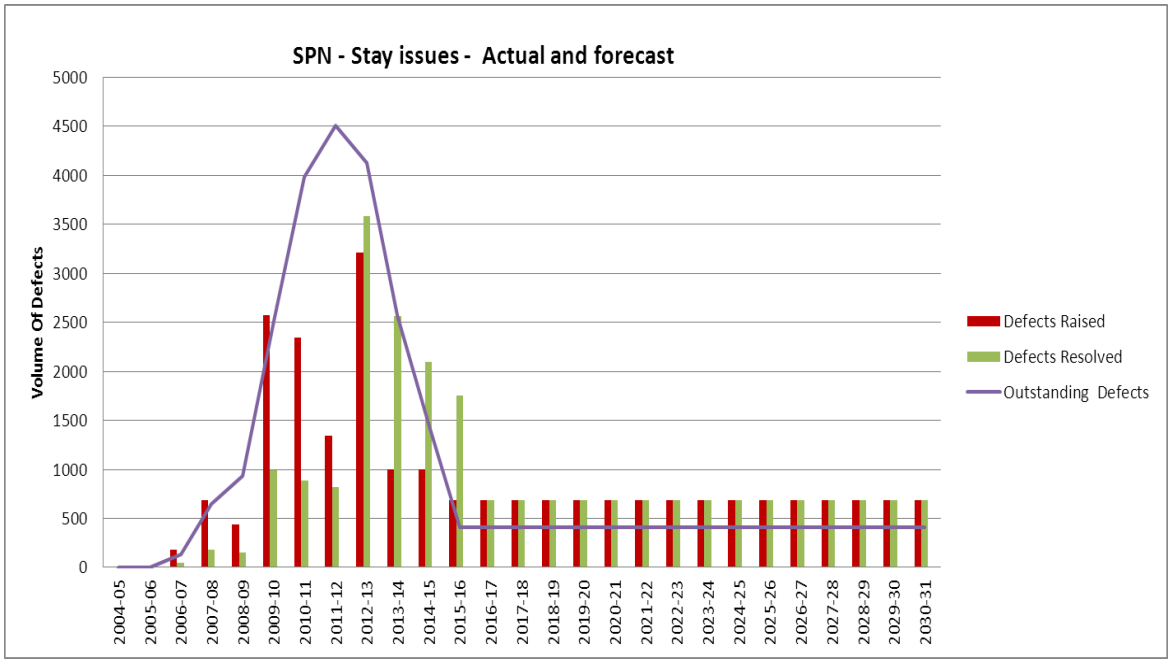

Figure 29 – SPN historical and forecast volumes on stay issues (source: Volumes – 19th February 2014 NAMP, Table O)

Risk mitigation – The strategy for recording risk mitigations was introduced in 2011. As per section 5.1, there is a wide range of risk mitigations and the cost of each varies from £11, in the case of enhanced signage that can be fitted at the time of inspection, up to £20,000 for structural mitigations where undergrounding is required.

The average annualised 2011 and 2012 data on the mitigation requirements captured by SPN inspectors is detailed in Table 25. Reporting at this level is expected to continue throughout the first round of routine safety inspections, which is a four-year cycle scheduled for completion towards the end of 2015. As shown in Figure 31, a significant reduction in the number of new mitigations identified from 2016 onwards is forecast.

Required mitigations identified will need to be carried out over the remainder of the DPCR5 period and the full ED1 period due to the scale of the challenge. They will be prioritised based on the ESQCR risk assessment.

The expenditure is detailed in Table 23, with the profile outlined in Figure 30. The annual average expenditure for mitigations is forecast to be £758k during ED1 for wood poles and £40k for towers. A significant reduction in expenditure is forecast for ED2.

NAMP	Description	DPCR5 total	ED1 total	DPCR5 average	ED1 average	% change
1.13.15	Risk Mitigation Measures on Towers	£130,511	£318,240	£26,102	£39,780	52%
1.13.16	Risk Mitigation on Wood poles	£2,448,535	£6,065,280	£489,707	£758,160	55%
Grand Total		£2,579,046	£6,383,520	£515,809	£797,940	55%

Table 23 – SPN: ED1 expenditure on risk mitigation (source: Costs – 19th February 2014 NAMP, Table J Less Indirects),

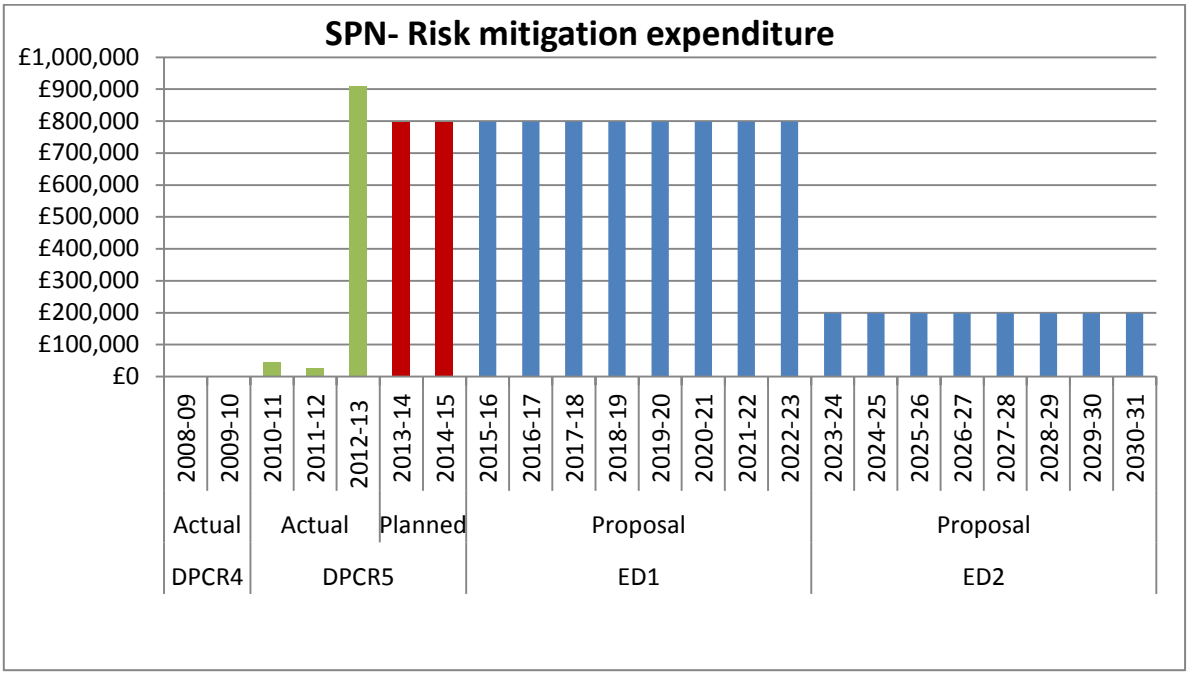

Figure 30 – SPN expenditure on risk mitigation (Source: Costs – 19th February 2014 NAMP, Table JLessIndirects)

Mitigation Type	2011 (annualised)	2012	Average annual forecast*
MIT – Enhanced anti-climbing device	298	399	349
MIT – Enhanced warning signage	869	623	746
MIT – GS6 information pack	75	58	67
MIT – High visibility line marker	57	41	49
MIT – High level danger sign	319	236	278
MIT – High security locking	0	6	3
MIT – Remove infringement	189	314	252
MIT – Leaflet/letter drop	130	92	111
MIT – Supplementary patrol	9	1	5
MIT – Warning posters	50	118	84
MIT – Visit by Public Safety team	89	86	88
MIT – Structural mitigation	353	470	412
MIT – Security surveillance	7	4	6
MIT – Vegetation clearance	669	487	578
Total	**3,114**	**2,935**	**3,028**

Table 24 – SPN: Historical data on risk mitigation (source: Asset Register ELLIPSE)

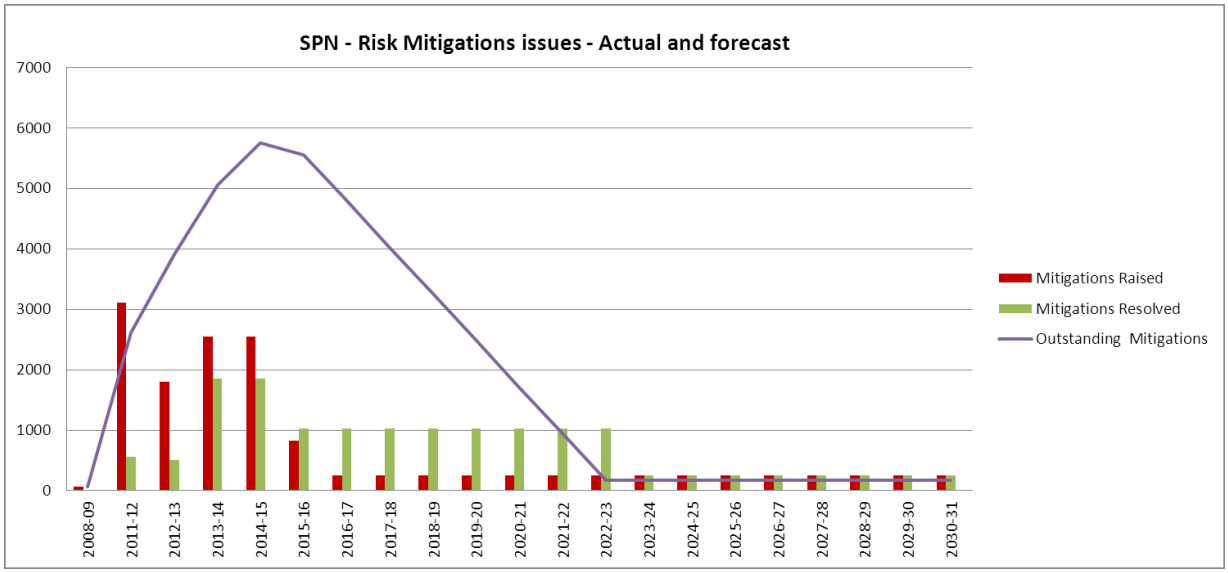

Figure 31 – SPN historical and forecast volumes on risk mitigation issues (source: Volumes – 19th February 2014 NAMP, Table O)

8.0 Deliverability

As detailed in the previous sections, as part of the defect management programme, SPN has increased expenditure and resources during the DPCR5 period to improve ESQCR compliance. Some resources have been ring fenced to ensure the plan is delivered, particularly in relation to overhead line clearances. With this increased resource allocation in place for the remaining two years of the DPCR5 period and stable contractor relationship, SPN will have sufficient resources available to deliver the ED1 plan for ESQCR compliance.

Appendices

Appendix 1 – Age Profiles

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Appendix 2 – HI Profiles

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Appendix 3 – Fault Data

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Appendix 4 – WLC Case Studies: risk, cost, performance, condition profiles for various options

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Appendix 5 – NLRE Expenditure Plan

Asset Type		RIG Table	RIGS Cost in (£m)									
Investment Description	NAMP Line	RIG Table	RIG Row	2015/6	2016/7	2017/8	2018/9	2019/20	2020/21	2021/22	2022/23	Total
Wood Pole ACD provision	1.13.08	CV8	11	0.246	0.046	0.046	0.046	0.046	0.046	0.046	0.046	**0.570**
ESQC Provision for Warning Signs	1.13.05	*CV8	*14	0.237	0.237	0.237	0.237	0.237	0.237	0.237	0.237	**1.894**
Replacement of Stays on OHL	1.13.32	CV5	6 &16	0.525	0.206	0.206	0.206	0.206	0.206	0.206	0.206	**1.970**
LV Safety Clearances												
Re-Establish Statutory Clearances - LV Shrouding Permanent	1.13.18											
Climbable Tree risk mitigation - LV Shrouding Permanent	1.13.24	CV2	6	0.078	0.075	0.072	0.069	0.067	0.065	0.064	0.063	**0.553**
Climbable Tree risk mitigation - LV (Diversions)	1.13.24											
Re-Establish Statutory Clearances - LV (Diversions)	1.13.18	CV2	11	0.172	0.165	0.158	0.152	0.147	0.143	0.141	0.139	**1.217**
Climbable Tree Risk Mitigation - LV (Reconductoring)	1.13.24											
Re-Establish Statutory Clearances - LV (Reconductoring)	1.13.18	CV2	16	2.069	2.007	1.946	1.886	1.831	1.776	1.723	1.671	**14.910**
Climbable Tree risk mitigation - Rebuild	1.13.24											
Re-Establish Statutory Clearances - LV (Rebuild)	1.13.18	CV2	21	0.691	0.671	0.651	0.632	0.614	0.596	0.579	0.561	**4.996**
Climbable Tree Risk Mitigation - LV (Undergrounding)	1.13.24											
Re-Establish Statutory Clearances - LV (Undergrounding)	1.13.18	CV2	26	0.346	0.335	0.326	0.317	0.308	0.299	0.291	0.282	**2.503**
HV Safety Clearances												
Climbable Tree risk mitigation - HV (Diversions)	1.13.22											
Re-Establish Statutory Clearances - HV (Diversions)	1.13.17	CV2	12	0.077	0.073	0.070	0.066	0.063	0.063	0.063	0.063	**0.539**
Climbable Tree Risk Mitigation - HV (Reconductoring)	1.13.22											
Re-Establish Statutory Clearances - HV (Reconductoring)	1.13.17	CV2	17	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	**0.112**
Climbable Tree Risk Mitigation - HV (Rebuild)	1.13.22											
Re-Establish Statutory Clearances - HV (Rebuild)	1.13.17	CV2	22	0.136	0.133	0.129	0.126	0.122	0.119	0.115	0.112	**0.994**
Climbable Tree risk mitigation - HV (Undergrounding)	1.13.22											
Re-Establish Statutory Clearances - HV (Undergrounding)	1.13.17	CV2	27	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	**0.640**
EHV Safety Clearances												**0**
Climbable Tree risk mitigation - EHV (Diversions)	1.13.23											
Re-Establish Statutory Clearances - EHV (Diversions)	1.13.21	CV2	13	0.023	0.023	0.023	0.023	0.023	0.023	0.023	0.023	**0.185**
Climbable Tree Risk Mitigation - EHV (Rebuild)	1.13.23											
Re-Establish Statutory Clearances- EHV (Rebuild)	1.13.21	CV2	23	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	**0.141**
Climbable Tree risk mitigation - EHV (Undergrounding)	1.13.23											
Re-Establish Statutory Clearances - EHV (Undergrounding)	1.13.21	CV2	28	0.022	0.022	0.022	0.022	0.022	0.022	0.022	0.022	**0.180**
Mitigations												**0**
Risk Mitigation Measures on Towers	1.13.15											
Risk mitigation on wood pole overhead lines	1.13.16	*CV8	*16	1.603	1.603	1.501	0.798	0.798	0.798	0.798	0.798	**8.697**
Total				**6.337**	**5.710**	**5.500**	**4.693**	**4.598**	**4.507**	**4.421**	**4.335**	**40.10**

Table 25 – ESQCR Expenditure plan (Source: 19th February 2014 NAMP JLessIndirects)

* The costs in Table CV8 Row 14 include provision for additional warning signs for a separate work programme "Substation Earthing Reinstatement Following Theft".

* The RIGS costs in Table CV8 Row 16 include an additional of £2.34m for Littlehampton Risk Mitigation project as it is remapped.

Appendix 6 – Sensitivity Analysis

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Appendix 7 – Named Scheme

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

Asset Types	Asset Stewardship reports										RIG Table										
Investment 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
Wood Pole ACD provision	1.13.08	988	186	186	186	186	186	186	186	2,290	CV8	11	988	186	186	186	186	186	186	186	**2,290**
ESQC Provision for Warning Signs	1.13.05	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	96,000	CV8	14	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	**96,000**
Replacement of Stays on OHL	1.13.32	1,750	688	688	688	688	688	688	688	6,566	CV5	6 &16	1,750	688	688	688	688	688	688	688	**6,566**
LV Safety Clearances																					
Re-Establish Statutory Clearances - LV Shrouding Permanent	1.13.18	59	57	55	53	51	49	48	47	419											
Climbable Tree risk mitigation - LV Shrouding Permanent	1.13.24	19	18	17	16	16	16	16	16	134	CV2	6	78	75	72	69	67	65	64	63	**553**
Climbable Tree risk mitigation - LV (Diversions)	1.13.24	59	57	55	53	51	49	48	47	419											
Re-Establish Statutory Clearances - LV (Diversions)	1.13.18	19	18	17	16	16	16	16	16	134	CV2	11	78	75	72	69	67	65	64	63	**553**
Climbable Tree Risk Mitigation - LV (Reconductoring)	1.13.24	708	687	666	646	627	608	590	572	5,104											
Re-Establish Statutory Clearances - LV (Reconductoring)	1.13.18	232	225	218	211	205	199	193	187	1,670	CV2	16	940	912	884	857	832	807	783	759	**6,774**
Climbable Tree risk mitigation - LV Rebuild	1.13.24	236	229	222	215	209	203	197	191	1,702											
Re-Establish Statutory Clearances - LV (Rebuild)	1.13.18	78	76	74	72	70	68	66	64	568	CV2	21	314	305	296	287	279	271	263	255	**2,270**
Climbable Tree Risk Mitigation - LV (Undergrounding)	1.13.24	118	114	111	108	105	102	99	96	853											
Re-Establish Statutory Clearances - LV (Undergrounding)	1.13.18	39	38	37	36	35	34	33	32	284	CV2	26	157	152	148	144	140	136	132	128	**1,137**
HV Safety Clearances																					
Climbable Tree risk mitigation - HV (Diversions)	1.13.22	2	2	2	2	2	2	2	2	16											
Re-Establish Statutory Clearances - HV (Diversions)	1.13.17	20	19	18	17	16	16	16	16	138	CV2	12	22	21	20	19	18	18	18	18	**154**
Climbable Tree Risk Mitigation - HV (Reconductoring)	1.13.22	0	0	0	0	0	0	0	0	0											
Re-Establish Statutory Clearances - HV (Reconductoring)	1.13.17	4	4	4	4	4	4	4	4	32	CV2	17	4	4	4	4	4	4	4	4	**32**
Climbable Tree Risk Mitigation - HV (Rebuild)	1.13.22	1	1	1	1	1	1	1	1	8											
Re-Establish Statutory Clearances - HV (Rebuild)	1.13.17	38	37	36	35	34	33	32	31	276	CV2	22	39	38	37	36	35	34	33	32	**284**
Climbable Tree risk mitigation - HV (Undergrounding)	1.13.22	1	1	1	1	1	1	1	1	8											
Re-Establish Statutory Clearances - HV (Undergrounding)	1.13.17	7	7	7	7	7	7	7	7	56	CV2	27	8	8	8	8	8	8	8	8	**64**
EHV																					
Climbable Tree risk mitigation - EHV (Diversions)	1.13.23	2	2	2	2	2	2	2	2	16											
Re-Establish Statutory Clearances - EHV (Diversions)	1.13.21	1	1	1	1	1	1	1	1	8	CV2	13	3	3	3	3	3	3	3	3	**24**
Climbable Tree Risk Mitigation - EHV (Rebuild)	1.13.23	1	1	1	1	1	1	1	1	8											
Re-Establish Statutory Clearances- EHV (Rebuild)	1.13.21	2	2	2	2	2	2	2	2	16	CV2	23	3	3	3	3	3	3	3	3	**24**
Climbable Tree risk mitigation - EHV (Undergrounding)	1.13.23	1	1	1	1	1	1	1	1	8											
Re-Establish Statutory Clearances - EHV (Undergrounding)	1.13.21	0	0	0	0	0	0	0	0	0	CV2	28	1	1	1	1	1	1	1	1	**8**
Mitigations																					**0**
Risk Mitigation Measures on Towers	1.13.15	51	51	51	51	51	51	51	51	408											
Risk mitigation on wood pole overhead lines	1.13.16	972	972	972	972	972	972	972	972	7,776	*CV8	*16	1,616	1,616	1,540	1,023	1,023	1,023	1,023	1,023	**9,888**
Total		**17,408**	**15,494**	**15,445**	**15,397**	**15,354**	**15,312**	**15,273**	**15,234**	**124,917**			**18,001**	**16,087**	**15,962**	**15,397**	**15,354**	**15,312**	**15,273**	**15,234**	**126,621**

***Table 26** Output NAMP / ED1 Business Plan Data Table Reconciliation (Source: 19th February 2014 NAMP Table O / 21st February 2014 ED1 Business Plan Data Tables)*

***** The differences in the totals in the asset stewardship report and the RIGS (CV8 Row 16) are due to volumes for the Littlehampton Risk mitigation project. Details of the Littlehampton risk mitigation project can be found in the applicable scheme justification paper.

Appendix 9: Material changes since the July 2013 ED1 submission

Changes to the ESQCR clearances table (CV2), between the July 2013 submission and the March 2014 re-submission, are summarised in Table 27.There are no changes to signs and overhead line issues which are mapped to CV8.

DNO	Action	Change type	2013	2014	Difference (Reduction)	Comment
SPN	Replace	Volume	18,726	12,734	(5,992)	Revised ESQCR mitigation strategy And remapping
		Investment	£51.1m	£27m	(£24.2m)	
		UCI (£k)	2.73	2.11	(0.62)	

Table 27 – Material Changes to July 2013 in ED1Submission for SPN

(Source: ED1 Business Plan Data Tables Following the OFGEM questions and answer process' / 21st February 2014 ED1 Business Plan Data Tables)

The reduction in volumes and expenditure from the 2013 to the 2014 submission is based on:

- Remapping of two projects (£14.2m reduction)
- Deletion of one project (£4.6m reduction)
- Revised assumptions on the number of ESQCR issues that will be raised each year and a revised ESQCR (clearances) structural mitigation strategy (£5.3m reduction)

Table 28 provides the detail on the changes in the proposed investment levels between the 2013 submission and the 2014 submission.

Description of Project Activity	2013	2014
ESQCR (clearances) structural mitigation plans	£32.3m	£27m
Undergrounding of HV overhead line project	£11.9m	Project remapped to CV3
Littlehampton ESQCR mitigation	£2.3m	Project remapped to CV8
LV undergrounding project	£4.6m	Project deleted
Total	**£51.1m**	**£27m**

Table 28 – Detailed comparison of cost breakdown in CV2 in the 2013 and 2014 business plans

Table 29 provides the detail on the volume changes between the 2013 submission and the 2014 submission. Please note that the volumes shown are the equivalent number of ESQCR issues, spans resolved on each of the projects shown.

Description of Project Activity	2013	2014
ESQCR (clearances) structural mitigation strategy	14,568	12,713
Undergrounding of HV overhead line project	2,000	Project remapped to CV3
Littlehampton ESQCR mitigation	1,198*	Project remapped to CV8
LV undergrounding project	960	Project deleted
Total	**18,726**	**12,734**

Table 29 – Detailed comparison of volume breakdown in the 2013 and 2014 business plans

*The volumes for the Littlehampton project, previously included in CV2 were an error. They have been corrected and remapped to CV8.