Electricity Distribution

nationalgrid

Company Directive

STANDARD TECHNIQUE : OH8B

Guidance when Replacing, Diverting, Extending or Modifying 11kV Legacy OH Line and Poles

Following the issue of TBX112 and TBX112U which relate to the requirements when designing and constructing overhead line this guidance has been prepared in response to frequently asked questions relating to what should be done when planning and working with existing legacy overhead lines.

This guidance is not stand alone and unless otherwise stated below is subject to the requirements of POL: OH4 and POL: OH8 and their associated STs.

Author: **Mike Chapman**

Implementation Date: **July 2021**

Approved by

Carl Ketley-Lowe
Engineering Policy Manager

Date: **26th July 2021**

Target Staff Group	**Applicable Staff include, Network Service Teams e.g. DMs, TMs, Planners, Technicians, Wayleaves Specialists, OH Line teams, Training involved with Training, Surveying, Planning, Construction, Maintenance of 11kV OH Lines**
Impact of Change	**Amber – New document which should already reflect business as usual activities Communication at next team meeting and within one month of the issue date of this document.**
Planned Assurance checks	**On completion of project related work the technician responsible for controlling the job shall ensure that ACDs and labelling have been installed in accordance with this ST.** **Policy Compliance Specialists shall undertake periodic checks of systems to ensure compliance.**

All references to Western Power Distribution or WPD must be read as National Grid Electricity Distribution or NGED

IMPLEMENTATION PLAN

Introduction

Following the issue of TBX112 and TBX112U which relate to the requirements when designing and constructing overhead line this guidance has been prepared in response to frequently asked questions relating to what should be done when planning and working with existing legacy overhead lines and poles.

This guidance is not stand alone and unless otherwise stated below is subject to the requirements of POL: OH4 and POL: OH8 and their associated STs.

Main Changes

New Document which provide guidance and clarification on what should already be established practices.

Impact of Changes

The guidance and clarification provided in this document should for the most part reflect existing practices however it is recognised that in certain locations dependant on staff functions, knowledge, training and experience that further supplementary training of staff involved with wayleaves, surveying, planning and construction may be required.

Implementation Actions & Timetable

This document is to be implemented on the 1st September 2021.

Team Managers to brief all relevant staff of the contents of this document by 31st August 2021.

Engineering Training Team to review the contents of this document and revise training material accordingly.

Policy Compliance Specialists shall undertake periodic checks of projects and systems to ensure compliance. The checks shall be fed back to the Engineering Policy Manager and OH Line Policy Engineer.

The following presentations can be used where appropriate to assist Team Managers with background information when briefing relevant staff and / or used by staff to provide further guidance on OH line design, construction and how to use the tables in ST: OH4T.

- OH Line Design & Construction History & Legislative Requirements
- OH Line Design & Construction Considerations
- OH Line Design & Construction Using ST: OH4T

REVISION HISTORY

Document Revision & Review Table		
Date	**Comments**	**Author**
July 2021	• New Document	Mike Chapman

Contents

1.0 Introduction

Following the issue of TBX112 and TBX112U which relate to the requirements when designing and constructing overhead line this guidance has been prepared in response to frequently asked questions relating to what should be done when planning and working with existing legacy overhead lines and poles.

This guidance is not stand alone and unless otherwise stated below is subject to the requirements of POL: OH4 and POL: OH8 and their associated STs.

2.0 General Requirements

Any work carried out associated with legacy Overhead line is subject to the following general requirements.

2.1. Where legacy OH lines are to be diverted, extended or it is necessary to modify i.e. uprate from single to 3 phase the chosen conductor and its size shall be based on the following requirements:-

1. Use of a standard ST: OH4T conductor which shall be ≥25HDC or ≥50AAAC (see Appendix A for additional information on standard conductors)
2. Anticipated load that would be expected in the next 20 years,
3. ST: SD1H - The Treatment of Losses in an Inclusive Network Design Process
4. ST: SD4A - Design of WPD's 11kV and 6.6kV Networks

2.2 Installation of poles and OH lines are subject to Section 37 Planning permission, however there are 'Exemptions' to which permitted development rights may apply. Other than for SSSI, AONB, European sites etc. a list of 'Exemption' sites are detailed below

- The height of any support above ground in the replacement line does not exceed the height of the highest existing support which is being replaced by more than 10%.
- Additional poles may be inserted into the existing line / route
- Where a line is installed in a different position from the existing line the distance between any small support i.e. ≤10m and the existing line does not exceed 30 metres and the distance between any other support and the existing line does not exceed 60 metres and the existing line will be removed within 12 months.
- Additional support poles can be installed at existing pole positions e.g. lazy leg supports
- Free standing structures can be installed
- Any line up to and including 20 kV which is used or intended to be used for supplying a single customer

Where the installation of assets are to be undertaken by using the 'Exemption' rules, a six week notice is required to be sent to the local planning authority for confirmation that the works are within the scope of the activities included within the permitted development order.

If further information is required guidance should be sought from a local wayleaves specialist who should have access to the latest Section 37 and Overhead Lines Exemptions Regulations.

2.3. Any proposed changes that affect the position of existing poles, stays and line routes on private land will require wayleave consent from the land owner.

2.4. Where reasonably practical the OH Line diversion, extension or 3 phasing should be designed to a 75^{o}C design temperature.

2.5. Where this document identifies that a survey is required it shall mean that before any modifications are made the proposed line route will need to be assessed, during which the following details will require noting.

- Existing structure height, grade age and condition
- Span length/s
- Angles of deviation
- Conductor type and size
- Land heights relative to the conductor / plant and equipment (Topography) underneath and 10m either side
- Objects in the vicinity of the line that could influence its performance e.g. trees, buildings, fences
- Road, rail, water crossings
- Line height relative to sea level
- Or anything else which may affect the proposed changes e.g. land use, farm machinery and future likely maintenance requirements

The information gained from the survey can then be used to identify suitable locations for poles and using the maximum operating temperature of the proposed conductor the production of a line profile together with pole heights that will ensure minimum WPD clearances to ground and objects, contained in ST: OH1A Tables WPD1 & WPD2, will be maintained. Once produced poles grades together with their foundations and any stay requirements can be determined and a pole schedule / construction plan produced so as to ensure the line is designed and built in accordance with ST: OH4T.

Depending on the topography (rise & fall) of the ground relative to the OH line conductor one of the surveys identified in clauses 2.5.1 & 2 will be required as a minimum.

Whichever survey is carried out the details shall be used for the determination of relative pole grades, heights and positions stay and foundation requirements so that a clear and suitable job / construction plan or pole schedule and for complex surveys a line profile along the line route can be produced. All documents relating to the site survey shall be kept for future reference within the project planning file.

2.5.1. Basic Survey

A basic survey can be carried out on simple / small jobs where the ground is relatively level / minor undulations only i.e. the base of the pole can be seen from an adjacent pole and the ground between them is relatively flat and has no mounds, hillocks etc. which are more difficult to calculate conductor clearances to without the aid of specialist survey equipment.

These types of survey shall be carried out as part of the planning stage and could be carried out by a Survey Specialist, Wayleave Specialist, Planner, Tech or Linesperson who has a good working knowledge and experience with OH lines and using the tables in ST: OH4T.

The information shall be compiled on a suitable route plan during the site survey can then then be used in conjunction with the relative conductor tables in ST: OH4T to determine the sag at the maximum operating temperature, strut (vertical) and windspan loadings for the conductor system so as to produce a clear job plan and or pole schedule which identifies pole length, grade, foundation and stay requirements which ensures WPD clearances are met and the line is designed and built in accordance with ST: OH4T.

2.5.2. Full Survey

A full survey is required where the site conditions are more complex e.g. the ground height undulates / changes within a span relative to the conductor height such that the lowest point is not at the midspan position or the foot of the pole cannot be seen from the adjacent pole,

These types of survey shall be carried out as part of the planning stage and shall be carried out by a Survey Specialist, Wayleave Specialist who have had specific survey training and knowledge on how to use the survey equipment

The survey itself is usually carried out using modern electronic surveying equipment e.g. Trimble to plot the rise and fall of the ground relative to the conductor height and pole positions so as to ensure clearances to ground and other object can be calculated and maintained. All survey data is recorded electronically, and on completion of the survey is transferred into a wood pole modelling software program e.g. Optimal which will draw up a ground profile which when used in conjunction with the Company's standard sag tables contained in ST: OH4T will produce a line profile and relevant pole schedule which identifies pole length, grade, foundation and stay requirements which ensures WPD clearances are met and the line is designed and built in accordance with ST: OH4T.

2.6. When there is a requirement to work out structure loads / forces created by legacy conductors on new poles an equivalent conductor from ST: OH4T should be used together with the relevant tables for that conductor. This will provide indicative loadings that should be used to determine pole grade and length, foundation and any stay requirements.

Where no direct equivalent conductor in ST: OH4T is available then the next size conductor up in ST: OH4T should be used.

Further information on standard and equivalent conductor sizes can be found in Appendix A.

2.7. Where lines are to be diverted, extended or upgraded to 3 phase existing poles associated with the work may be retained subject to the following criteria.

- “D”, “S”, “L” and light class poles shall not be retained
- Good poles in excess of 60 years of age shall not be retained
- Poles which have been damaged or been repaired e.g. Pole Reinforcing Systems shall not be retained
- Good poles where windspan / strut loading calculations show they and their foundations are suitable may be retained, however they shall be inspected and tested during the planning process in line with ST: OH5B by suitably trained & competent staff to ascertain their condition at which time their length, size and planting depth shall be verified.

2.8. Other than for clause 3.1 below where existing intermediate poles are to be retained there may be a possibility that they are not planted at the standard burial depths outlined in ST: OH4T. Where the existing pole is planted at reduced depth then the windspan capability outlined in the "Unstayed Pole Wind Span Limits" Tables in ST: OH4T for the relevant conductor and pole length shall be reduced by.

Ground condition	Kicking Block		
	None	One	Two
Average	50%	30%	20%
Good	40%	20%	10%

Note: In all cases until proven otherwise it must be assumed that no kicking block is fitted to the existing pole.

2.9. Where an existing angle pole is to be retained it shall be fitted with a least one kicking block that is positioned 500mm below ground level.

Note: In all cases until proven otherwise it must be assumed that no kicking block is fitted to the existing pole.

2.10. It is permissible to use an existing pole to install new items of plant however in addition to the meeting the criteria outlined in clause 2.7 it shall also be capable of dealing with the additional loads placed on it by the item of plant.

2.11. Where plant and equipment is installed on an existing pole which is to be changed or moved then it shall be assessed for re-use in accordance with ST: SP3C.

For example a PMT can be re-used providing it is

- Less than 15 years old
- In good serviceable condition
- Minimum of 25kVA single phase rating
- Minimum of 50kVA three phase

2.12. Plant connected to the extension, diversion, modified OH line shall be done so as to balance the network across the 3 phases.

2.13. All plant earthing / bonding associated with existing equipment shall be checked and tested during the planning process in accordance with ST: OH5G to ensure segregation, resistance etc. so that it can be bought in line with the current requirements of ST: OH4H and ST: TP21D during the construction phase.

2.14. Stays and rods may be retained if they have been replaced in the preceding 20 years however any that are deemed suitable for retention shall be subject to a thorough examination in accordance ST: OH8A and changed accordingly.

2.15. All records (electric office and relevant asset registers) shall be updated in accordance with ST: AM4A.

2.16. The OH network shall be left ESQCR compliant e.g. ACD's fitted in accordance with ST: OH4M and labels / notices in accordance with ST: OH4N.

2.17. Any vegetation in the proximity of the line shall be managed to ensure relevant cyclic clearances have been achieved.

2.18. Where the existing and proposed line has a history or there is a risk, given its location, of wildlife interaction, e.g. collision, electrocution or structure undermining then suitable precautions shall be taken so as to reduce the risk of contact and improve network resilience.

2.19. Unless otherwise stated current materials (Steelwork, insulators and conductor fittings etc.) shall be used wherever reasonably practicable to do so.

3.0 One off Pole Changes

One off pole changes (e.g. "D", "S" & "L" pole changes) are considered to be refurbishment and as such unless otherwise stated below are subject to the requirements of ST: OH8A and in addition to the requirements of Section 2 the following shall apply

3.1. Providing the existing pole has shown good service i.e. statutory clearances outlined in ST: OH1A are being met, pole is capable of dealing with the loads placed on it; for example it is not leaning, stays have not slipped, and there is no evidence of conductor clashing then it is permissible to replace it on a

1. Like for like basis, this means

- The replacement pole is at least the same grade as that being replaced and as a minimum a medium grade pole shall be used.

- Foundation is as a minimum the same as the existing foundation providing the existing burial depth is as a minimum in accordance with previous design requirements.

- The as left span length is no greater 1m of the original span length.

- The length of pole out of ground is at least the same as that being replaced and as a minimum the planting depth of the original design shall be used.

  In practice to aid with the replacement it is likely that the new pole will be slightly higher than the existing

  - For intermediate poles it is permissible to increase the length out of the ground up to 0.5m without unduly affecting pole loadings and tension in the conductors.

  - For tensioned conductors e.g. sections and terminals taller poles are permitted subject to 3.2 below.

  Note: where it is necessary to increase the length of the pole to obtain the necessary height to transfer the conductors then the planting depth may need adjusting to accommodate the increase in length.

  - The stay angle (stay spread) and stay number and type are at least that of the original pole and the stay bisects the angle of line deviation.

2. Alternatively the pole can be replaced using a suitable General Arrangement Figure from ST: OH4T for the equivalent conductor size e.g. for 16mm HDC use figure drawing associated with 25mm HDC.

   To determine the pole grade, length, pole top steelwork suitability, foundation and any stay requirements refer to ST: OH4T tables using the equivalent conductor size to that which is on site.

3.2. The existing profile of the line has not been or will not be compromised by the pole change i.e.

- Over the intervening years the ground / land use has not changed or building or other objects have been placed in the vicinity which could change the clearance requirements.

- The tension in the conductor is not altered by the change in any significant way as this could have an adverse effect on clearances or adjacent structures and / or conductor condition.

  For example something as simple as changing a single dish insulator for a double dish composite insulator will result in an additional 140mm length inserted in the line this will lead to a reduction in tension which could result in clearance infringements to ground and objects. Whereas an increased by more than 10% could affect adjacent structures and / or the conductor condition as well as inadvertently affecting the profile.

3.3. The impact on any adjacent poles and stays shall also be assessed e.g. windspan capability of pole and foundation, uplift, down pull, change phase separation and stays.

4.0 Moving a Pole Forward or Back from its Current Position

Where it is necessary to move a pole forward or back from its current position but still in line with existing line route then in addition to the requirements of Section 2 the following shall apply

4.1. The new pole shall be installed in accordance with ST: OH4T.

4.2. To determine pole, foundation, stay and GA requirements of the new pole then an equivalent conductor in ST: OH4T shall be used (information on standard and equivalent conductor sizes can be found in Appendix A).

4.3. Subject to Clause 4.4 where possible the tension in the conductor should not be altered by the change in any significant way to that which was originally found on site. This should avoid any adverse impact on adjacent poles and spans.

Note: where there is a requirement to alter the tension in the conductor significantly then subject to Clause 4.6 the section length may need to be unbound and the complete section re-tensioned using the tables in ST: OH8A.

4.4. WPD recommended clearances to ground and objects outlined in ST: OH1A shall be met.

Subject to clause 4.6 below where it is reasonably practical to do so pole heights should be determined using a 75^{o}C design temperature i.e. where adjacent structures are not compromised.

4.5. A survey of the proposed location of the pole shall be carried out.

The survey data can then be used to determine pole grade and length, foundation, stay and GA requirements which will ensure the poles and stays are suitable to deal with all relevant loads and WPD recommended clearance to ground and objects are met.

4.6. The impact on any adjacent poles and stays shall be resolve e.g. windspan capability of pole and foundation, uplift, down pull etc.

5.0 Divert an Existing Line (away from the existing line route)

Where it is necessary to divert an existing line then in addition to the requirements of Section 2 the following shall apply

5.1. It is permissible to swing up to two spans of the existing conductor onto new poles on the proviso that the existing conductor is in good condition i.e. no signs of fatigue, damage, mid-spans tension joints etc. and it can be swung across without it contacting the ground or other objects which may damage it.

Note: Cad Cu, <25mm^2 Cu and <50mm^2 Aluminium based conductors will need to be terminated and a new standard conductor used for the diversion in accordance with the requirements of clause 5.2.

a. A survey of the line route over which the diversion is to take place shall be carried out.

This survey data can then be used to profile the line route so as to be able to determine pole grade and length, foundation, stay and GA requirements which will ensure the poles and stays are suitable to deal with all relevant loads and WPD recommended clearance to ground and objects are met.

b. To determine the relative loads, if the conductor to be swung over is not a standard ST: OH4T conductor then the calculations will need to be carried out using an equivalent conductor in ST: OH4T (information on standard and equivalent conductor sizes can be found in Appendix A).

c. The impact on any adjacent poles and stays shall also be assessed e.g. windspan capability of pole and foundation, uplift, down pull, change in line angle and stays relative to any new angle etc. and to keep this impact to a minimum and wherever possible the tension in the conductor is not altered by the change in any significant way to that which was originally found on site.

5.2. Where there is a requirement to divert more than two spans then with reference to Clause 2.1 a standard ST: OH4T conductor shall be used.

a. The requirements of ST: OH4T shall be used to carry out the design in which a survey of the line route over which the diversion is to take place shall be carried out.

The survey data can then be used to profile the line route either using the tables in ST: OH4T or using suitable profiling software so as to determine pole grade and length, foundation, stay and GA requirements which will ensure the poles and stays are suitable to deal with all relevant loads and WPD recommended clearance to ground and objects are met.

b. The impact on any adjacent poles and stays shall also be assessed e.g. windspan capability of pole and foundation, uplift, down pull, change in line angle and stays relative to any new angle etc.

c. The transition point between the legacy overhead line and the new overhead line shall be made using an appropriate section crossarm and where applicable i.e. where the tension is greater on one side than the other then suitable out of balanced stay/s will be required. This can be determined by taking tensions indicated in ST: OH8A for the legacy conductor type and compare them at different sag & tension temperatures to the new conductor sag & tensions which are outlined in ST: OH4T with any difference being multiplied by 3 to obtain the overall tension difference. The out of balance stay shall then be positioned against the span with the greatest tension.

6.0 Extending an Existing Line

Where it is necessary to extend an existing line in addition to the requirements of Section 2 the following shall apply

6.1. With reference to Clause 2.1 of this guidance document a standard ST: OH4T conductor shall be used.

6.2. Where it is required to extend a single phase line then in accordance with ST: SD4A then the extension shall be carried out using 3 phases.

6.3. The requirements of ST: OH4T shall be used to carry out the design in which a survey of the line route over which the diversion is to take place shall be carried out.

The survey data can then be used to profile the line route either using the tables in ST: OH4T or using suitable profiling software so as to determine pole grade and length, foundation, stay and GA requirements which will ensure the poles and stays are suitable to deal with all relevant loads and WPD recommended clearance to ground and objects are met.

6.4. The impact on any adjacent poles and stays shall also be assessed e.g. windspan capability of pole and foundation, uplift, down pull, change in line angle and stays relative to any new angle etc.

6.5. The transition point between the legacy overhead line and the new overhead line shall be made using a suitable GA from ST: OH4T for the largest conductor and where applicable i.e. the tension is greater on one side than the other then suitable out of balanced stay/s will be required. This can be determined by taking tensions indicated in ST: OH8A for the legacy conductor type and compare them at different sag & tension temperatures to the new conductor sag & tensions which are outlined in ST: OH4T with any difference being multiplied by 3 to obtain the overall tension difference. The out of balance stay shall then be positioned against the span with the greatest tension.

7.0 Converting Single Phase to Three Phase

Where it is necessary to upgrade an existing single phase line to three phase then in addition to the requirements of Section 2 the following shall apply

7.1. With reference to Clause 2.1 of this guidance document a standard ST: OH4T conductor shall be used.

7.2. Dissimilar type, material and sized conductors shall not be used.

Note: imperial and equivalent metric conductors with the same CSA can be used.

7.3. The requirements of ST: OH4T shall be used to carry out the design in which a survey of the line route over which the diversion is to take place shall be carried out.

This survey data can then be used to profile the line route either using the tables in ST: OH4T or using suitable profiling software so as to determine pole grade and length, foundation, stay and GA requirements which will ensure the poles and stays are suitable to deal with all relevant loads and WPD recommended clearance to ground and objects are met.

7.4. The impact on any adjacent poles shall also be assessed e.g. windspan capability of pole and foundation, uplift, down pull, change in line angle and stays relative to any new angle etc.

7.5. The transition point between the legacy overhead line and the new overhead line shall be made using a suitable GA from ST: OH4T for the largest conductor and where applicable i.e. the tension is greater on one side than the other then suitable out of balanced stay/s will be required. This can be determined by taking tensions indicated in ST: OH8A for the old conductor and compare then at the relevant temperatures to the new conductor tensions which are outlined in ST: OH4T with any difference being multiplied by 3 to obtain the overall tension difference.

APPENDIX A

CONDUCTOR INFORMATION

A.1 Equivalent ST: OH4T Conductors

Where as part of the design it is necessary to use as an equivalent standard conductor to the existing legacy conductor then the following table can be used as an indicative guide to determine the likely strut loading that will be placed on a structure by the legacy conductor.

ST: OH4T Equivalent Conductors Table to be Used for Determining Strut Loadings		
Legacy		ST: OH4T Standard Conductor
Size (inch^2 , mm^2), Name	Stranding / (mm^2)	Size (mm^2)
HDC		
.025, 16	3/2.65	25 HDC
.05, 32, 35	3/3.75, 7/2.46,7/2.5	32 HDC*
.058, 38	7/2.64,	38 HDC
.075, 50	7/2.95, 7/3	70 HDC
.1, 70	19/2.1, 7/3.55	70 HDC
.15, 100	7/4.22, 7/4.3	100 HDC
.2, 120	7/4.9, 19/2.8	150 HDC
.25, 150	19/3.33	150 HDC
CAD CU		
.017	3/2.36	25 HDC
.025	3/2.84	25 HDC
.05, .058	3/4.01, 7/2.62	60 AAAC
.075	3/4.9, 7/3.23	70 HDC
Ally Alloy, Sil, Silmalec, AAAC (named after trees)		
.025, 25 (Almond)	7/2.34	25 HDC
.03, 30 (Cedar)	7/2.54	25 HDC
.04 or 40 (Fir)	7/2.95	32 HDC*
.05 or 50, (Hazel)	7/3.3	50 AAAC (Hazel)
.1 or 100 (Oak)	7/4.65	100 AAAC (Oak)
.15 or 150 (Ash)	19/3.48	150 AAAC (Ash)
200 (Poplar)	37/2.87	200 AAAC (Poplar)
300 (Upas)	37/3.53	No Direct Equivalent
ACSR, SCA (named after animals)		
.025, 25 (Gopher)	6/2.36Al, 1/2.36St	25 HDC
.03, 30, (Weasel)	6/2.59Al, 1/2.59St	25 HDC
.04 or 40, (Ferret)	6/3.00Al, 1/3.00St	32 HDC*
.05 or 50 (Rabbit)	6/3.35Al, 1/3.35St	50 AAAC (Hazel)
.1 or 100 (Dog)	6/4.72Al, 7/1.57St	100 AAAC (Oak)
.1 or 100 (Mongrel)	26/2.30Al, 7/1.80St	150 AAAC (Ash)
.15 or 150 (Dingo)	18/3.35Al, 1/3.35St	150 AAAC (Ash)
.175, 175 (Caracal)	18/3.61Al, 1/3.61St	175 AAAC (Elm)
.15 or 150 (Wolf)	30/2.59Al, 7/2.59St	200 AAAC (Poplar)
.175, 175 (Lynx)	30/2.79Al, 7/2.79St	200 AAAC (Poplar)

.4, 400 (Zebra)	54/3.18Al, 7/3.18St	No Direct Equivalent
HDA, AAC, AL, (named after insects)		
.3, 300 (Butterfly)	19/4.65	300 AAC (Butterfly)
.4, 400 (Centipede)	37/3.78	400 C (Centipede)

* See A.2 below

A.2 Additional Information on ST: OH4T Standard Conductors

32mm HDC conductor shall be introduced into ST: OH4T as standard conductor during its next review as such it is permissible to use it when Replacing, Diverting, Extending or Modifying an existing line however the linked tables shall be used in accordance with the requirements of ST: OH4T when doing so.

- 0H ST Supporting Info\OH4\OH4T\32mm HDC.

APPENDIX B

SUPERSEDED DOCUMENTATION

This is a new document and no document is superseded by its issue.

APPENDIX C

ACCOCIATED DOCUMENTS

POL: OH 4 - Design, Construction and Reporting Standards for Overhead Lines on Poles
POL: OH 8 - Refurbishment of 11kV Overhead Lines on Wood Poles
ST: OH1A - Overhead Line Clearances to Ground and Objects for Reasons of Safety
ST: OH4H - Mounting Auxiliary Equipment on Wood Poles
ST: OH4M - Anti-Climbing Devices for HV Lines Up to and Including 132kV
ST: OH4N - Notices, Signs & Labels for Overhead Lines
ST: OH4T - The Design of Single Circuit High Voltage Overhead Lines on Wood Poles at 11kV and 33kV
ST: OH5B - Inspection, Testing and Repair of Overhead Line Poles
ST: OH5G - Testing of Earthing Systems Attached to Wood Pole Overhead Line Systems
ST: OH8A - Maintenance, Refurbishment and Strengthening of 11kV Wood Pole Lines
ST: SD1H - The Treatment of Losses in an Inclusive Network Design Process
ST: SD4A - Design of Western Power Distribution's 11kV and 6.6kV Networks
ST: SP3C - Selection and Re-Use of Off-Circuit Switchgear and Plant
ST: TP21D - 11kV, 6.6kV and LV Earthing
ST: AM4A - The Management of Asset Condition Information Collected during routine Asset Inspections

APPENDIX D

POLICY FEEDBACK

ST: OH8B Policy Feedback Comments Sheet.xlsx

APPENDIX E

KEY WORDS

Legacy, Overhead Line, Construction, Design