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Electricity Policy Document 473

Issue 10 July 2022

Policy for Overhead Line Standards – Design, Construction, Refurbishment, Selection and Classification

Amendment Summary

ISSUE NO. DATE	DESCRIPTION
Issue 9 **October 2021**	New template applied throughout. Prepared by: D M Talbot Approved by: Policy Approval Panel and signed on its behalf by Steve Cox, Engineering and Technical Director
Issue 10 **July 2022**	Option of using Copper Oil treated LV poles added as an alternative to Creosote following a risk assessment on the risk of contact with creosote in recreational areas. Prepared by: David Talbot Approved by: Policy Approval Panel and signed on its behalf by Steve Cox, DSO Director

Contents

1 Introduction

This Electricity Policy Document (EPD) applies to the overhead line network owned by Electricity North West Limited (Electricity North West), as distribution licensee. It covers policy for design, construction and refurbishment standards, together with components and materials for overhead lines.

Guidance is given on selecting the appropriate standard to use in given circumstances. (This process is flow-charted in Appendix A.)

Classification of overhead lines is covered, together with policy on overhead lines in the vicinity of recreational areas and policy with respect to overhead apparatus in the vicinity of high risk sites.

The policy on the required levels of inspection and maintenance to maintain these standards is stated in EPD405.

2 Scope

The content of this EPD applies to all types of overhead line (from LV to 132kV) owned by Electricity North West, including mural wiring, whether fed from overhead line or underground cable.

3 Definitions

Overhead Apparatus	Any Electricity North West owned asset which is energised above earth potential and has open/exposed terminals, excluding ground-mounted plant and any part of the underground cable system. This includes all overhead lines, supports (poles, towers etc), associated equipment and pole-mounted substations (including 'Totem Pole' structures).
Totem Pole Structure	Pole mounted equipment that is supplied via a 6.6/11kV or 230/400V cable and not connected to any overhead conductors.

4 Policy for Design, Construction and Refurbishment of Overhead Lines

4.1 General

Overhead lines shall be designed, constructed and refurbished using the guidance given in this EPD and the following Electricity North West documents:

- Electricity Specification (ES) 400 series specifications for design and construction standards, including materials.
- Code of Practice (CP) 420 Part 1 (wood pole lines) and CP420 Part 2 (steel tower lines) for construction practice.
- CP421 for maintenance and refurbishment policy and practice.

- CP430 Part 1 (wood pole lines) and CP420 Part 2 (steel tower lines) for Linesmen's working procedures and modules.

Where a particular subject is not yet covered by one of the above Electricity North West documents, the following publications shall be used in the order of preference given below:

- Other relevant Electricity North West documents (unless superseded by a more recent Energy Networks Association Technical Specification (ENA TS) or BS/BS EN).
- ENA TS.
- BS or BS EN standard.

All overhead line design, construction and refurbishment shall meet the requirements of ESQCR. If there is any conflict between existing Electricity North West overhead-line documents and ESQCR, the most onerous information shall take precedence. Refer to EPD101 for more guidance. For more details of how this requirement shall be interpreted refer to CP421.

Refer to Appendix C for policy on managing risks of collisions between birds and overhead lines.

4.2 Exposure to Electric and Magnetic Fields

The overhead line network shall comply with CP422. This Code of Practice covers the situations where it is necessary for Electricity North West to demonstrate compliance with the exposure guidelines that apply to public exposure to power frequency electric and magnetic fields (EMFs) emanating from the electricity system.

The document also sets out the key principles and requirements for the optimum phasing of all new high voltage (132kV and above) double-circuit power lines, and the conversion of existing power lines where appropriate.

Optimum phasing of existing lines is covered in CP421 under refurbishment.

4.3 Mandatory Restrictions on use of Creosote-Treated Wood Poles

Electricity North West's policy is to continue to install creosoted poles for all new and replacement installations, except within playgrounds etc, and in accordance with the following guidance: July 22

- Installations in parks, gardens and recreational and leisure facilities shall be subject to a risk assessment. At such locations poles sited on boundary lines and not immediately adjacent to pathways, car parks and other areas frequently used by the public the risk shall be deemed acceptable and continued use of creosoted poles is therefore acceptable.
- Individual site surveys shall confirm this to be appropriate choice on a case by case basis.
- Where the risk of using a creosoted pole is judged to be unacceptable the alternative is to seek an alternative route for HV overhead lines or to use underground cable along the same route. For LV overhead lines Copper Oil treated poles can be used as an alternative to creosoted poles. July 22

The above policy is based on the following legislative guidance:

- As a result of "The Creosote (Prohibition on Use and Marketing) (No. 2) Regulations 2003", the "Electricity Association, European Legislative Developments, Update May 2003", states:
- ***"...the continued use of creosote treated timber for electric power transmission and telecommunications poles has been confirmed as a derogation, but may not be used:***
- in playgrounds
- in parks, gardens, and outdoor recreational and leisure facilities where there is a risk of frequent skin contact".
- At the time of writing, there is no useful definition of "frequent skin contact" with respect to the above legislation:

The "Electricity Association, European Legislative Developments, Update May 2003", states:

"The Directive has largely been implemented into UK Legislation without significant change to the original text. Significantly no guidance or clarification of the terms within the text has been offered in relation to the definition of "frequent skin contact."

5 Standards for Design, Construction and Refurbishment of Overhead Lines

5.1 Standards for 230/400V Overhead Lines on Wood Poles

New lines shall be designed and constructed to Electricity North West Electricity Specification ES400O4.

Existing aerial bundled conductor (ABC) lines shall be refurbished to CP421 using ES400O4. Full compliance shall be achieved for this option.

Existing bare-wire lines shall be refurbished as follows:

- Preferably, bare-wire lines shall be replaced by ABC lines designed and constructed to Specification ES400O4. Full compliance shall be achieved for this option.
- Where it is not practicable to replace a bare-wire line by an ABC line or underground cable, the existing bare-wire line shall be refurbished to CP421 using ENA TS 43-30. Full compliance shall be achieved for this option.

Guidance on the appropriate line type to be used in any given circumstances is outlined in Section 6.

5.2 Standards for 6.6/11kV and 33kV Overhead Lines on Wood Poles

New lines shall be designed and constructed to Electricity North West Electricity Specification:

- ES400O2 for compact-covered-construction (CCC) using covered conductor.
- ES400O3 for bare-wire overhead lines.

NOTE: that ENA TS 43-10 and ENA TS 43-20 have been withdrawn, therefore, cannot be used for new build or rebuild work.)

Existing lines shall be refurbished to CP421 using:

- ES400O2 for CCC overhead lines.
- ES400O3 for bare-wire overhead lines built to ES400O3 and historical heavy duty construction overhead lines, eg ENA TS 43-20.
- Steelwork detailed in CP420 Chapter 14 for light duty construction overhead lines, e.g. ENA TS 43-10 or BS1320.

Design of new lines shall cater for the loading of three conductors (i.e. a 3 phase line) and a maximum conductor temperature of 75°C in all cases. Any individual deviation from this shall be agreed with the Overhead Line Circuits Manager.

Guidance on the appropriate line type to be used in any given circumstances is outlined in Section 6.

5.3 Standards for 33kV Overhead Lines on Small Footprint Steel Towers

New and replacement lines shall be designed and constructed on wood poles as stated in 5.2 above, as appropriate.

It is permissible to refurbish lines to the standard applicable at the time of construction.

5.4 Standards for 132kV Overhead Lines on Wood Poles

“Trident” lines shall be designed, constructed and refurbished to ENA TS 43-50.

Design of new lines shall cater for a maximum conductor temperature of 75°C in all cases. Any individual deviation from this shall be agreed with the Overhead Line Circuits Manager.

5.5 Standards for 132kV Overhead Lines on Steel Towers

Lines shall be designed and constructed to ENA TS 43-7, Specification L4(M) or ENA TS 43-9, Specification L7(C), as appropriate.

It is permissible to refurbish lines to the standard applicable at the time of construction.

Refer to CP422 for guidance on optimum phasing of all new high voltage (132 kV and above) double-circuit power lines, and the conversion of existing power lines where appropriate.

6 Selection and Classification of Overhead Lines

6.1 Selection of Appropriate Line Type

6.1.1 General

Guidance for selecting an appropriate line type to use in given circumstances is flow-charted in Appendix A. The flowchart shall be used with reference to the following information. (The remainder of Section 6 contains background information on the selection criteria given in Appendix A.)

Recreational areas and other high risk sites (see classification below), need special consideration. Guidance is given below.

6.1.2 230/400V Overhead lines on Wood Poles

Selection criteria are fully covered in Appendix A.

6.1.3 6.6/11kV and 33kV Overhead Lines on Wood Poles (New Lines)

ES400O2 shall be used in circumstances where there is a significant advantage in using a covered conductor. The covering provides limited abrasion resistance and protection against the effects of corrosion and weather (refer to ES400O2 for more detail). The covering also provides some protection against serious injury or death as a result of contact. CCC shall be used as follows:

- CCC lines shall be used for wooded and forested areas, and recreational sites.
- CCC lines shall be used in other circumstances where the performance of a CCC line is deemed to be superior to the performance of an equivalent bare-wire line. This may include a section of CCC line within a conventional bare-wire line.

Although the covered conductor used in CCC lines is not an insulated conductor, the covering does provide some measure of protection against serious electric shocks and burning. This feature of CCC shall be considered when constructing or refurbishing lines in high risk areas (refer to Section 6.2). For example, CCC shall be used for 11kV or 33kV lines in the vicinity of a recreational site (e.g. fishing site) if the alternatives of undergrounding or diverting are not viable and the danger cannot be adequately managed by the installation of warning notices.

Because of this safety feature of CCC (which simultaneously provides better continuity of supply), the more widespread use of CCC is advocated, and CCC shall be considered as an option when constructing new 11kV or 33kV lines or replacing existing bare-wire lines.

Only CCC lines or bare copper conductor lines shall be used within 20km of the coast (high-water mark). The "coast" does not include the high-water mark of river estuaries or tidal stretches of river. (Note: bare copper conductor may also be used where the exclusions of this section do not apply. Long creep insulators shall be used as stipulated in ES400I4.)

ES400O3 shall be used in circumstances where the equivalent CCC line is deemed to offer no significant performance or safety advantages.

6.1.4 132kV Overhead Lines on Wood Poles

Selection criteria are fully covered in Appendix A.

6.1.5 132kV Overhead Lines on Steel Towers

Selection criteria are fully covered in Appendix A.

6.2 Safety and Security Risk Classification

6.2.1 Introduction

This section provides guidelines for risk classification of structures in order to secure the safety of the public as far as is reasonably practicable. The principal legal document under which this section has been prepared is ESQCR.

Every overhead line structure shall be classified as either “Normal” risk or High” risk, in accordance with the following guidance. (For the purpose of this section and records held in Ellipse, “structure” shall also include the associated preceding span.) The classification process shall take into account the nature and situation of individual structures and the nature and situation in which they are placed.

It is important to note that the classification of a structure can change. For example, a change in land usage could occur, resulting in a re-classification of the affected structure. For this reason, checking the relevant environmental factors is included as part of line patrol activities (refer to EPD405 and CP421).

The following features shall be considered in assigning a risk classification. The main features which will determine the final classification are:

- Complexity of the particular apparatus.
- Vulnerability to environmental conditions.
- Vulnerability to third party interference.
- Use of the land as observed or otherwise known.

There are also structures which may be particularly susceptible to interference (primarily for the purpose of metal theft), due to their remote location and easy access, previous history of interference, etc. These structures may have a baseline classification of either normal risk or high risk. Such structures require enhanced security measures. Refer to CP997 for more information on identification of such structures and the enhanced security measures to be applied.

The application of enhanced security measures to a high risk structure produces a new classification of structure: normal-risk-by mitigation.

Enhanced security measures can be applied to any high risk structure to change its classification to normal-risk-by-mitigation.

6.2.2 Normal Risk

The Normal risk classification shall be applied when there is nothing special about the nature or situation of the structure (or surrounding area) being assessed.

6.2.3 High Risk

6.2.3.1 General Guidance

In order for an overhead line structure to be classified as High risk, there shall be something special about the nature and/or situation of that structure and/or its surroundings which cause it to be a greater potential danger to the general public than one classified as Normal, by virtue of its vulnerability to interference either by ignorance or malevolence.

Such circumstances might be indicated by there being a more than the usual likelihood of unauthorised climbing, interference or danger.

Typical High risk structures are those located in proximity to recreational sites, official (formal) or unofficial (informal). Unofficial recreational sites will not be identified as such, but there will be indicators as to the location of such sites. (Refer to Section 6.2.3.2 below, for guidance on identifying unofficial recreational sites.) Structures on or near official and unofficial recreational sites shall always be classified as High risk structures.

High risk structures need not necessarily be associated with recreation. Any pole-mounted transformer installations in the urban/suburban fringe shall initially be considered High risk until an examination of all the relevant circumstances justifies a downgrading. Any "totem pole", (i.e. a pole without any directly associated overhead line) shall be included in this context.

Structures in work areas need to be carefully assessed and all factors taken into consideration before classifying them. Examples of work areas are farm-yards, factories, warehouses or other areas of land where normal working could involve activities or equipment that might come into close proximity or contact with overhead lines. Typical items of equipment that could contact overhead lines are ladders, mobile plant or vehicles.

6.2.3.2 Identification of Unofficial Recreational Sites

Typical areas used as unofficial recreational sites include:

- Unsupervised secluded areas close to schools and built-up areas.
- Waste or derelict land.
- Fields and woodlands; especially with unsupervised public access.
- Playing fields.
- Fishing areas.
- Demolition and redevelopment sites.

The following list is provided for guidance only and is not exhaustive, but the presence of one or more of these items normally indicates that the area is being used as an unofficial recreational site.

- Evidence of interference and/or vandalism.
- Graffiti.

- Evidence of climbing aids in the vicinity of the structure.
- Nearby tracks and paths formed by common use.
- Litter (e.g. junk-food litter, hypodermic syringes, etc).

An additional hazard associated with overhead line structures in areas containing old third party plant and equipment is the false impression that because the site appears derelict, all the equipment and plant will be dead and therefore any structures in the area will be safe to climb or otherwise interfere with.

Further general hazards comprise nearby structures, such as sheds, fences, walls, etc, which could provide seclusion and/or a method of access to overhead line structures.

6.2.4 Normal-Risk-By-Mitigation

As stated above, any high risk structure to which the enhanced security measures specified in CP997 have been applied, shall be re-classified as normal-risk-by-mitigation.

Any structure which is classified as normal-risk-by-mitigation shall be treated as a normal risk structure, with resultant reduced inspection frequency, etc (refer to CP421 for more detail). However, if the enhanced security measures are compromised, the structure reverts immediately to high risk.

6.2.5 Registering the Risk Categorisation and Associated Data

Each site shall be inspected, and a risk classification determined based on the nature of surrounding environment (the likelihood of interference). It is not possible to be prescriptive in classifying each structure site, as by its very nature this must be subjective and take into account local indications and experience as well as the factors noted above.

The factors influencing the classification shall be recorded. Normally this will be carried out using a risk assessment questionnaire. For new sites the factors must also be recorded, but usually by the project engineer responsible for the construction of the overhead line, using the same format as the overhead line inspection and submitted to the Data Management section, for up loading into the records held in Ellipse.

7 Recording of Line/Pole Related Data

In addition to line and pole data, related equipment also needs to be recorded in Ellipse to facilitate future line patrols, checks, replacement, etc. One such example is the post-mounted fishing prohibition notice (refer to CP420 Chapter 09).

Every defect (including tree defects) shall be recorded against the associated structure and its preceding span.

All actions taken to improve security shall be entered in Ellipse in the format of an Ellipse Work Order, referenced against the structure record. Also, following completion of the improvement works another inspection shall be carried out to record the revised status of the site. Ideally this shall be carried out immediately following the work but shall be carried out no greater than 2 calendar months following its completion.

It should be noted that even with the application of measures to mitigate the risks, if the nature and situation of the equipment or surrounding environment has not changed, then the Risk Classification may not change. As indicated below the application of control measures may allow the frequency of inspections to be reduced.

8 Policy for all High Risk Sites (Including those in Proximity to Recreational Areas)

8.1 Liaison with Landowners

8.1.1 Existing Lines

Subsequent to a structure being classified by the Electricity North West as high risk, and after the inspecting engineer has formed the opinion that additional safety action involving the landowners/tenant, etc would be prudent, a formal approach to the landowner shall be made. (This requirement does not preclude the possible need for the initial verbal request for permission to enter property for patrol/inspection purposes, or action in urgent cases.) A standard method of formal approach shall be adopted as follows:

- An individual letter shall be sent to the landowner/tenant.
- Survey to determine minimum conductor/ground and other clearances on site as appropriate.
- An appropriate letter shall be sent to the landowner/tenant.
- Where no further action is considered necessary, landowner/tenant to be advised in writing of normal minimum conductor clearances (together with plan if appropriate).
- Where further action is required which involves landowner's/tenant's co-operation or consent, follow up with site meeting and agree safety measures to be adopted.
- After agreement has been reached, record details by letter to landowner/tenant, and include statement of minimum physical clearances.

NOTE:

Minimum conductor/ground or conductor/structure clearance declared shall be based on either (a) conductor sag at maximum operating temperature under still air conditions or (b) conductor sag at maximum operating temperature with the conductors inclined at 45°, whichever provides the worst situation for the aspect under consideration. Maximum sag consideration shall also make allowance for new conductor/line pole settlement and long-term conductor creep where applicable. Checks of line clearances shall be carried out during inspections as detailed in CP421 to ensure compliance with statutory and Electricity North West's policy. CP421, allows for clearances approaching the minimum statutory clearance to be rechecked a further two times with a 12 month period to confirm whether or not improvement action is required

All site meetings with landowners/tenants (formal and informal) shall be covered by an internal memorandum of interview. A written record shall be made of any agreement reached, including a statement of the minimum physical clearance under a line or other apparatus associated with or near to the site.

Copies of all correspondence and internal memoranda of interview to be retained within the Wayleave files as long as the relevant wayleave or easement applies. If a wayleave or easement is cancelled, the associated records can be discarded in accordance with ESQCR.

8.1.2 New Connections to Existing or Proposed Properties in Areas Identified as High Risk

The general method of formal approach given in Section 8.4 shall be followed.

New connections shall be offered underground within the boundary of the site. Where proposed undergrounding of new site connections is unacceptable to the owner/operator, they shall be advised in writing of the possible dangers presented by an overhead line connection to their site and of their responsibility to advise site users of the need for any special precautions.

8.2 Site Appraisal

For overhead apparatus in identified high risk areas, it will be necessary to take additional steps to protect the public. A comprehensive engineering appraisal shall be made, taking into consideration all factors, including safety and economics, to determine the additional measures to be adopted.

In the case of existing overhead lines, consideration shall be given to the conditions in any wayleave agreement and Electricity North West statutory duties in respect of the effects of the presence of lines across the site.

The engineering appraisal shall take into account all the factors listed below.

NOTE:

Any reference made to minimum clearances below does not overrule the possibility of increased clearances being required due to "normal use of land" considerations, and this aspect shall not be overlooked in the assessment of any situation.

8.3 Safety Measures

8.3.1 Undergrounding or Diversion

A designer's risk assessment should indicate whether or not undergrounding or diversion of the line on to an alternative route should be considered. (This is a separate exercise from routine safety and security inspection, although it is likely to utilise data gathered during such inspections).

8.3.2 Clearances

Clearances for overhead lines and associated equipment shall, as a minimum, be in accordance with CP420 Part 1 Chapter 15.

New overhead lines or refurbished lines shall have the minimum ground clearances as stated in CP420 Part 1 Chapter 15.

The provision of additional line/ground or line/structure clearances shall be determined from assessment of site conditions and activities.

8.3.3 Safety Signs

All overhead line supports shall be fitted with safety signs as stated in CP420.

The use of post-mounted warning notices shall be considered and implemented where appropriate (refer to CP420 and CP690).

8.3.4 Line Crossing Points

Line crossing points shall be established at all locations deemed necessary. Appropriate warning notices shall be installed (refer to CP420).

8.3.5 Anti-Climbing Measures

Anti-climbing measures for high risk sites shall be implemented as stated in CP420.

8.3.6 LV Lines

Bare-wire LV lines may be refurbished by the fitting on additional shrouding or by replacement with ABC lines to ES400O4, or by undergrounding A risk assessment shall be carried out, on a line by line basis, in order to indicate approach should be adopted.

8.3.7 Patrols

Additional patrols shall be undertaken at high risk sites in accordance with CP421.

8.3.8 Site Agreements

Following the liaison with the landowner/operator site agreements can be utilised to document a management plan to enhance safety at the site.

8.3.9 Further Examples of Additional Safety Measures

Further examples of additional safety measures that shall be considered, and implemented as necessary, are as follows:

- Replacement of terminal span(s) of 11kV with 230/400V line. ABC conductors are preferred. In such cases pole transformer equipment shall be positioned outside or just inside the site perimeter.
- Relocation, where practicable, of existing pole mounted equipment to the outside of the site perimeter or, if this is not practicable, to a position just inside the site perimeter.
- Replacement of Bare-wire 11kV and 33kV lines with covered conductor (to ES400O2) in circumstances where diverting, undergrounding or replacing with 230/400V ABC are not options.

8.4 Special Considerations for Lines in Proximity to Recreational Areas

8.4.1 Assessment of Hazards on Sites Classed as Recreational

In considering lines crossing over or in the near vicinity of recreational sites, the assessment of clearances and other safety requirements shall take into account the normal use of such sites, with particular emphasis on the following:

- Lack of anticipation by the public due to change in their normal environment, ignorance of possible hazards and the reasonable adventure instinct of children, particularly in respect of climbing.
- The types of structures, equipment, vehicles, boats etc, which may be near or brought into proximity of the overhead line and associated apparatus. Typical examples are as follows:

  The use of ladders to reach the roofs of static holiday caravans.

  On camping and touring caravan sites, the manipulation of ridge poles to a height greater than the total length of the pole.

  The passage of boats with masts erected.

  Kite flying.

  The use of fishing equipment.

It is not intended to take into general account activities or situations where the training or awareness of participants should be such as to include recognition, and avoidance of power line hazards. Examples of these activities are: flying (power and gliding); parachuting.

8.4.2 Guidance on Action to be Taken

8.4.2.1 New Lines to Supply all New or Existing Recreational Sites including Licensed or Local Authority Caravan/Camping Sites

In general, HV lines, together with associated pole mounted equipment shall remain either outside or just inside the site boundary. The remaining length of circuit between the HV terminal and the supply point shall be provided by means of:

- 230/400V overhead line of bare conductor, fitted with sufficient shrouding or constructed using ABC, or
- 230/400V underground cable.

Where there are difficulties in complying with (a) above and it becomes necessary to continue HV circuits to a position well inside the site boundary, the circuits between the site boundary and the HV equipment shall be offered underground.

Lines on such sites shall be subject to the following:

- The route of HV lines approach span(s) to a site boundary shall be at an angle of not less than 60° to the boundary in order to avoid unnecessary proximity to the site.
- Overhead line routes shall not cross over any plot of land specially designated as a children's play area.
- Poles supporting HV auxiliary equipment within the site shall be sited in a boundary position where recreational activity is likely to be at a minimum.
- Clearances shall be in accordance with CP420 (Part 1 or Part 2) Chapter 15, particularly the section on Vulnerable Sites (other clearances shall be in accordance with the relevant section of Chapter 15).
- Should it become necessary to provide lateral clearances in addition to the above vertical clearances, the clearance figure to be adopted shall be determined after consideration of all relevant factors.

8.4.2.2 Lines to Supply Premises where the Owner/Occupier is Likely to allow Unlicensed Touring Caravan/Camping Facilities

HV and 230/400V line routes shall be planned in the normal manner taking into account any definite proposals regarding recreational facilities.

Enhanced clearances (refer to the section on High Sites in CP420 (Part 1 or Part 2) Chapter 15) shall be provided over land where there appears to be a reasonable prospect of caravanning/camping taking place.

The applicable mandatory safety measures for a high risk area, as identified from Sections 8.3 and 8.4, shall be applied.

Any additional safety measures, as per Sections 8.3 and 8.4, shall only be taken in relation to definite proposals.

8.4.2.3 Existing Lines Over or Adjacent to Existing Recreational Sites (Official and Unofficial)

The clearances and other safety measures specified for new lines shall not automatically be considered retrospective for existing lines. Where, however, site examination has indicated that additional safety measures are required, appropriate measures shall be applied. Beyond this, for lines up to and including 33kV, additional measures shall be adopted in caravan, tenting and yachting situations where the possibility of accidental contact could be reasonably foreseen. Measures 8.3.1, 8.3.3 (ground-mounted signs) and 8.3.9 ("Replacement of terminal span(s)...") shall be considered in order of economic merit.

8.4.2.4 New Lines in Vicinity of Recreational Sites (other than those specified above)

Such lines shall be routed such that, preferably, they remain at a distance greater then 100m outside the recreational site boundary.

9 Vegetation Management Near Overhead Lines

9.1 General

Vegetation control shall be managed using the guidance given in this EPD and the following Electricity North West documents:

- CP424 – Vegetation Control for Overhead Lines.
- CP421 for refurbishment policy and practice.

This policy will assist Electricity North West in discharging the Company's responsibilities under the ESQCR.

9.2 Statutory Requirements

Regulations 18(5) and 20A of The Electricity Safety, Quality and Continuity Regulations 2002 as amended by The Electricity Safety, Quality and Continuity (Amendment) Regulations 2006 (refer to EPD101), states:

"18(5) No overhead line shall, so far as is reasonably practicable, come so close to any building, tree or structure as to cause danger."

"20A**.** A generator or distributor shall, so far as is reasonably practicable, ensure that there is no interference with or interruption of supply caused by an insufficient clearance between any of his overhead lines and a tree or other vegetation"

The Explanatory Note [to the Electricity Safety, Quality and Continuity (Amendment) Regulations 2006] (refer to EPD101), states:

"Regulation 4 augments the current duty for generators and distributors to maintain sufficient clearances between electricity lines and trees to avoid danger to the public (regulation 18(5) of the ESQCR) by requiring further vegetation control in order to avoid, so far as is reasonably practicable, interference with or interruption of supply. This amendment is embodied in a new regulation 20A to the ESQCR, which will not apply until 31st January 2009."

Guidance on the Electricity Safety, Quality and Continuity Regulations 2002 (refer to EPD101), states:

"18(5).This requirement places a continuous duty on generators and distributors to maintain a safe distance between any overhead line and any tree, building or other structure where persons may be present.

In general, duty holders may demonstrate compliance with this requirement by complying with the Electricity Association's Standard 43-8 Overhead Line Clearances dated 1988.

It is the expectation of the Department of Energy and Climate Change that distributors operate tree cutting programmes with sufficient frequency to ensure that trees do not become a source of danger, for example

due to children climbing trees near overhead lines. Licensed distributors should note that they have powers under paragraph 9 Felling and lopping of trees etc. of Schedule 4 of the Electricity Act 1989 (as amended by the Utilities Act 2000) to fell or lop trees which could become a source of danger."

9.3 Statutory Vegetation Clearances

Statutory safe vegetation clearances shall be maintained on a continual programme using site survey data stored in Ellipse. Clearances to existing overhead lines shall be maintained to CP420 Chapter 15.

9.4 Network Improvement Vegetation Management

Network performance under abnormal weather conditions shall be improved by use of a risk based approach to vegetation management near overhead power lines.

A risk based approach to vegetation management shall make use of Ellipse condition data and further on site assessments by suitably qualified staff with regards to the risk of particular trees being damaged under abnormal weather conditions.

The guidelines for creating a Risk Based Approach are covered in Appendix D.

10 Third Party Attachments

10.1 General

No new Third Party attachments shall be allowed on Electricity North West overhead structures. Any individual deviation from this shall be agreed with the Overhead Line Circuits Manager.

Third Parties shall be given appropriate notice, as described below, to remove their existing attachments, where reasonably practicable, as part of any refurbishment scheme or other major work. Costs to remove such attachments shall be borne by the relevant Third Party.

10.2 Telecoms

Written notice shall be given under the terms and conditions as laid down in Energy Networks Association Engineering Recommendation (ENA ER) EB-BT2. Existing attachments owned by third party telecoms operators shall be removed, if required to carry out safety work, and re-attached afterwards if the period of notice has not been completed.

Third Party attachments shall be removed from all HV poles after written notice to the Third Party.

10.3 Street Lighting

Third Party Street Lighting Authorities shall be given written notice as per ENA ER L13/2 to remove their existing attachments, where reasonably practicable, as part of any Pole change. Costs to remove such attachments shall be borne by the relevant Third Party (Refer to EPD283).

10.4 Post Office Furniture

Written notice shall be given under the terms and conditions as laid down in ENA ER L22/1.

11 Documents Referenced

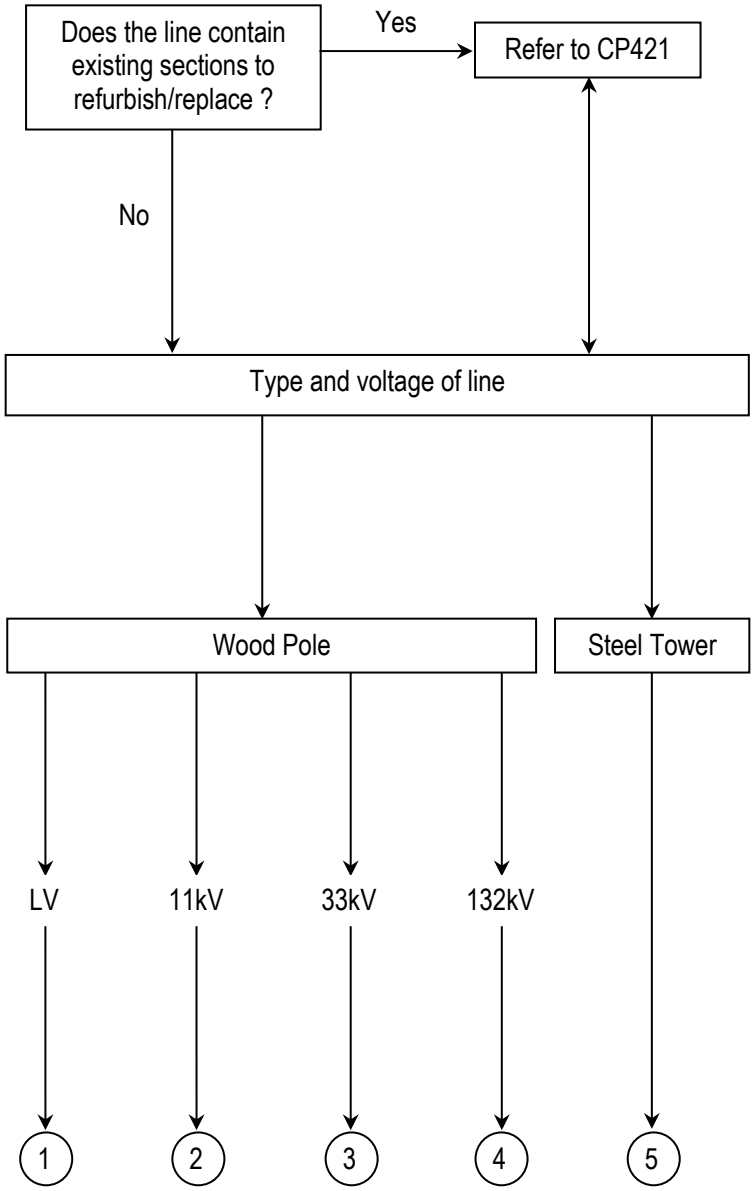
DOCUMENTS REFERENCED	
(The) Creosote (Prohibition on Use and Marketing) (No. 2) Regulations 2003	
Electricity Act 1989	
Electricity Safety, Quality and Continuity Regulations	
Health & Safety at Work Etc Act 1974	
Utilities Act 2000	
Electricity Association, European Legislative Developments, Update May 2003	
ENA TS 43-7:	132kV Steel Tower Transmission Line Specification L4(M) – 1978 1 x 175mm^2 ACSR per phase - 1 x 70mm^2 ACSR Earthwire, Issue 2, 1985 Amendment 1, 1993
ENA TS 43-8:	Overhead line clearances 1988.
ENA TS 43-9:	132kV Steel Tower Transmission Line Specification L7(C) – 1978 2 x 175mm^2 ACSR per phase - 1 x 175mm^2 ACSR Earthwire, Issue 1, 1986 Erratum 1991 and Amendment 1, 1993
ENA TS 43-10	(withdrawn).
ENA TS 43-20	(withdrawn).
ENA TS 43-30:	Low Voltage Overhead Lines on Wood Poles.
ENA TS 43-50:	132kV Single Circuit Overhead Lines on Wood Poles.
ENA TS 43-90:	Anti-Climbing Devices & Safety Signs for HV Lines up to & Including 400kV.
ENA ETR 132:	Improving Network Performance under Abnormal Weather Conditions by use of a Risk Based Approach to Vegetation Management near Electric Overhead Lines.
ENA ER EB-BT2:	Conditions for British Telecom and Public Electricity Suppliers' joint use of poles.

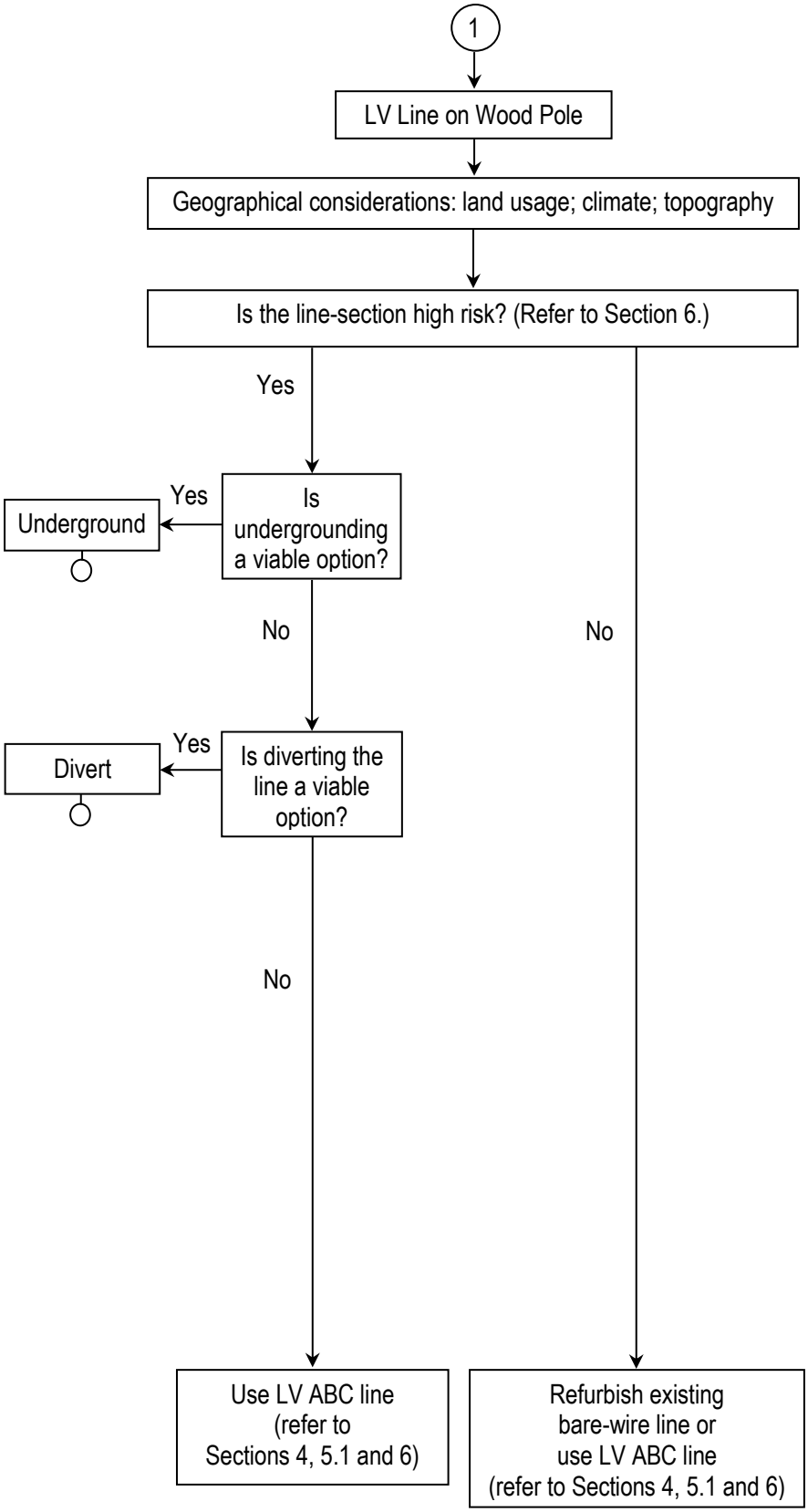
ENA ER L13/2 (2003):	Street lighting brackets recommendations for attachment to jointly used poles.
ENA ER L22/1 (1971):	Attachment of Post Office letterboxes and signs to poles supporting LV or MV overhead lines.
EPD101:	Application of The Electricity Safety, Quality and Continuity Regulations 2002 in Electricity North West.
EPD403	(withdrawn).
EPD405:	Inspection, Maintenance & Risk Classification on Overhead Lines.
ES400I4:	Specification for Overhead Line Insulators.
ES400O2:	Overhead-Lines of Compact-Covered-Construction (CCC) for 6.6/11 and 33kV: Design and Construction.
ES400O3:	Bare-Wire Overhead-Lines on Wood Poles for 6.6/11 and 33kV: Design and Construction.
ES400O4:	Aerial Bundled Conductors for LV: Design and Construction.
CP420 Part 1:	Policy and Practice for Wood Pole Overhead Lines.
CP420 Part 2:	Policy and Practice for Steel Tower Overhead Lines.
CP421:	Maintenance and Refurbishment Policy for Wood Pole Lines and Steel Tower Lines up to 132kV.
CP422:	EMFs from Overhead Power Lines.
CP423:	Overhead Line - Linesman's Manual - Live Line Working.
CP430 Part 1:	Overhead Line - Linesman's Manual - Wood Pole.
CP430 Part 2:	Overhead Line - Linesman's Manual - Steel Tower.
CP690:	Resources and Measures to Promote Public Safety Awareness in the Vicinity of Electricity North West Electricity Network Equipment.
CP997:	Enhanced Security Measures for Wood Poles and Steel Towers.

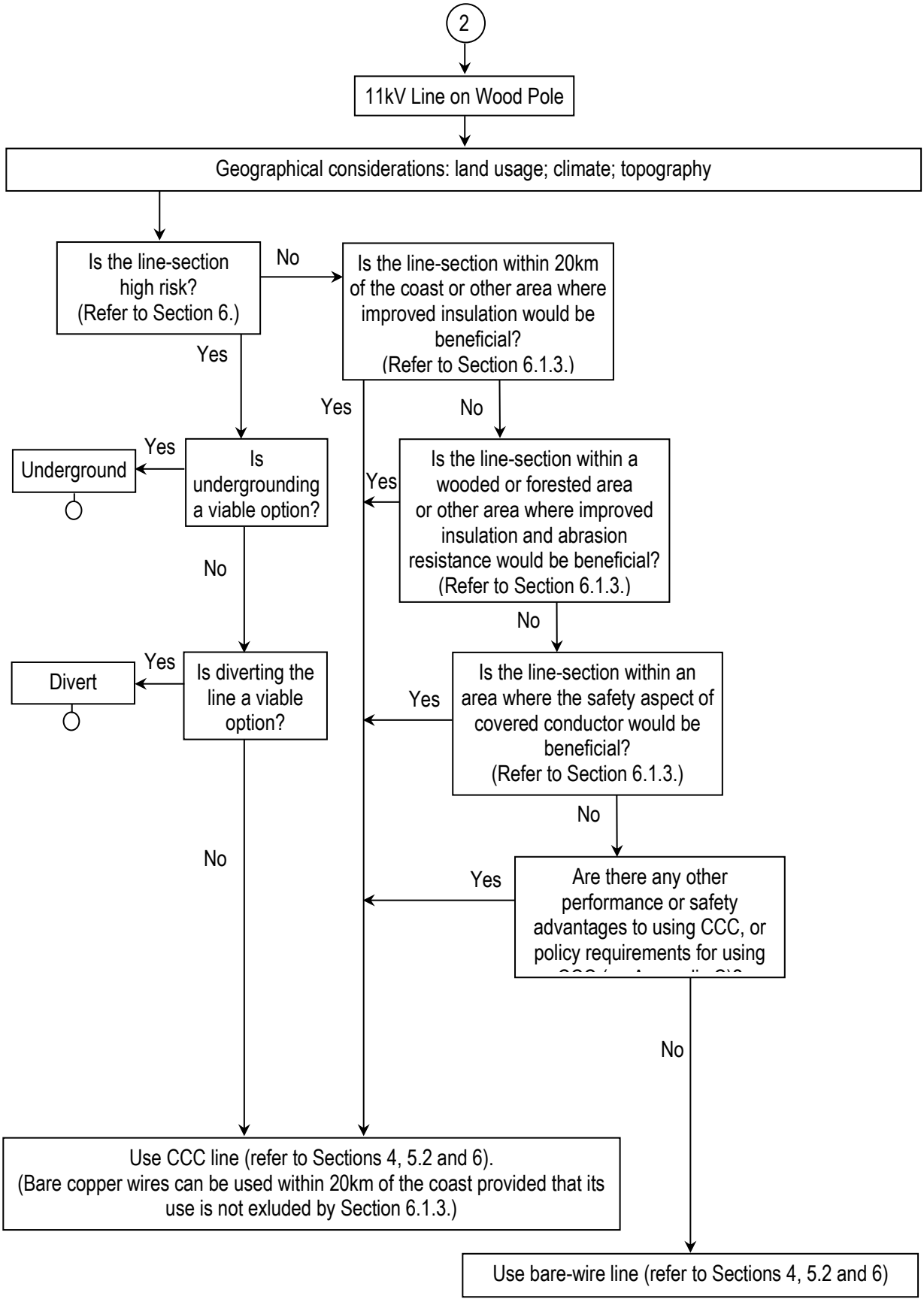
12 Keywords

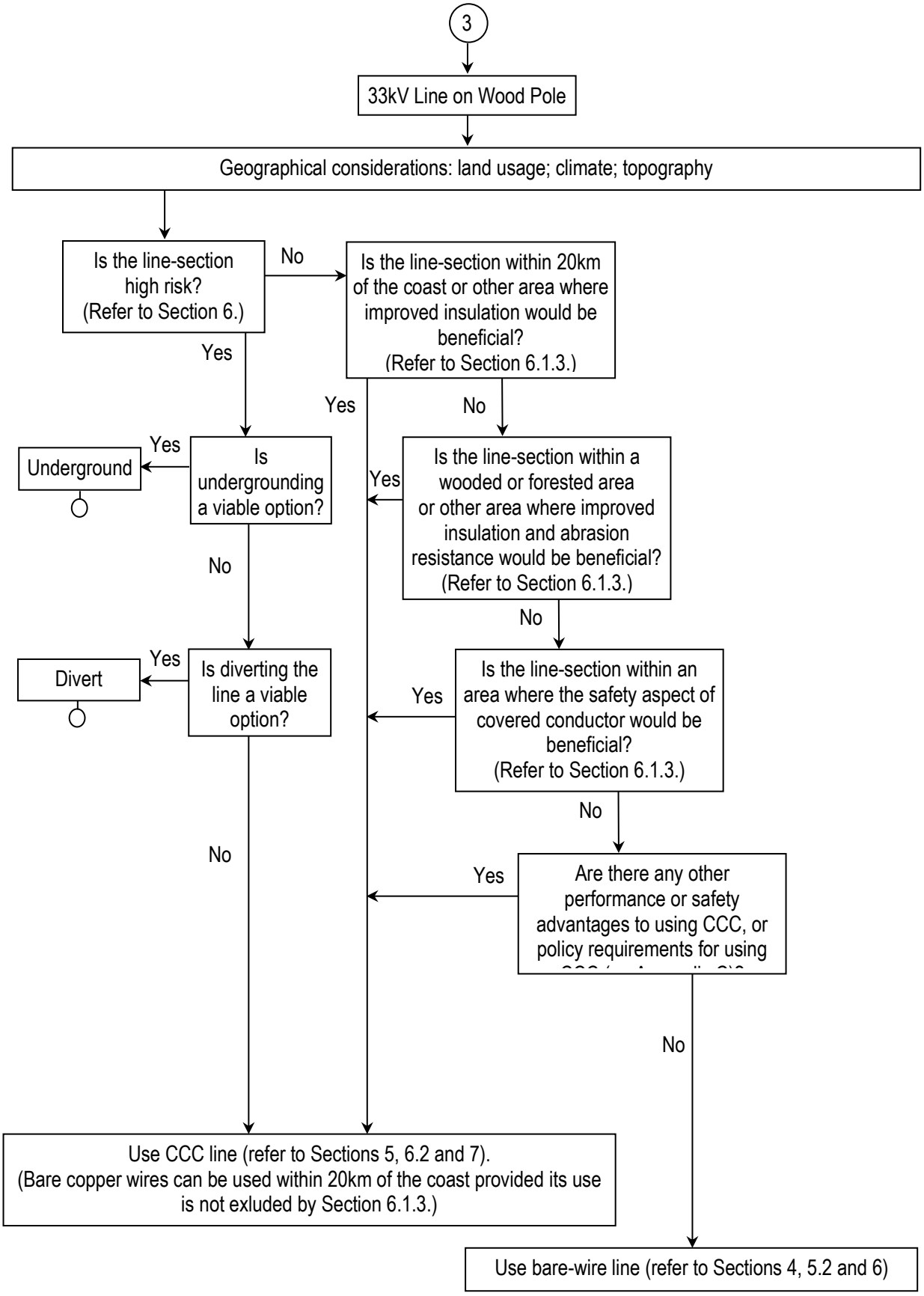
Design; overhead; refurbishment;

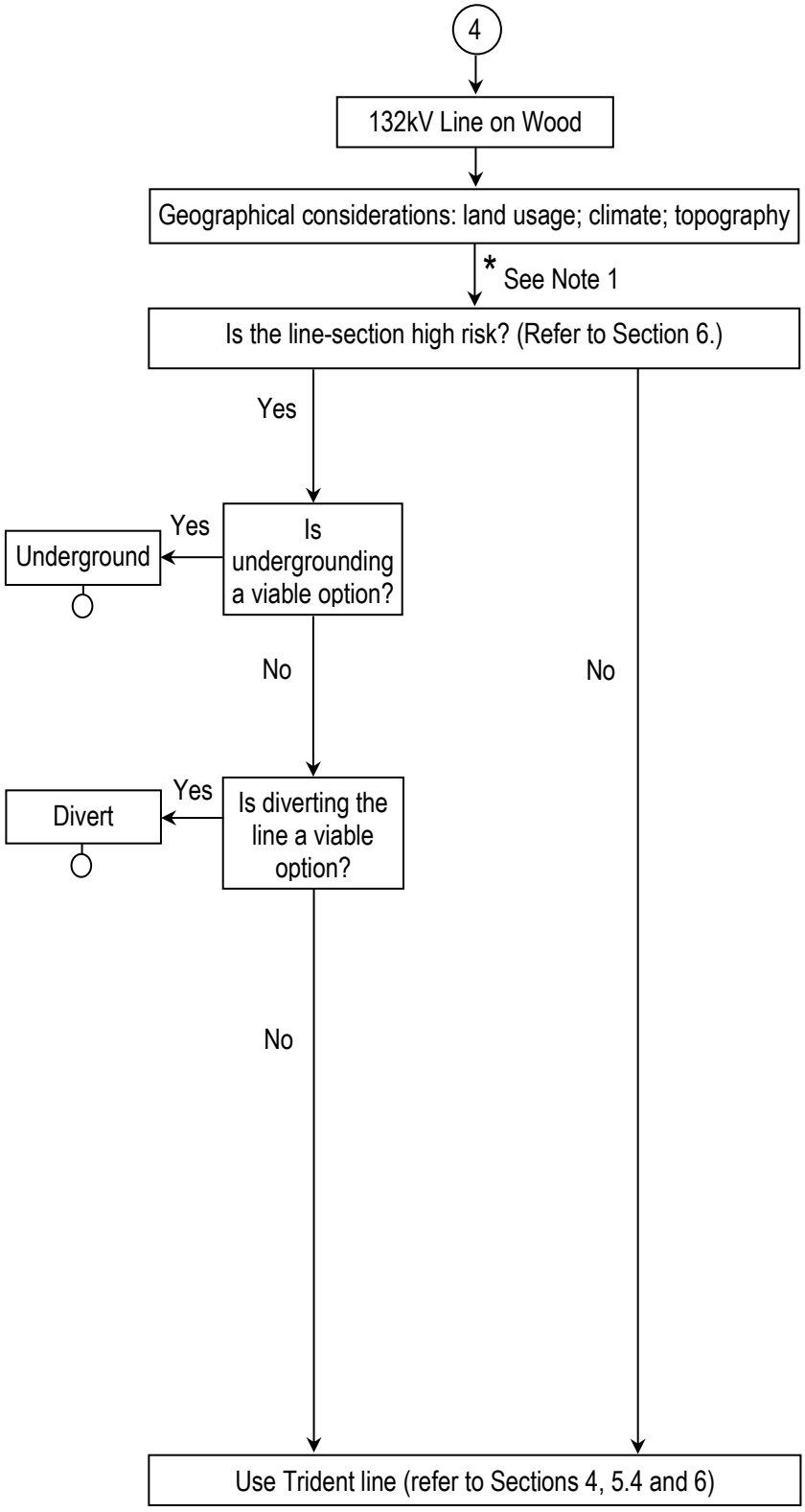
Appendix A – Line Selection Flowchart



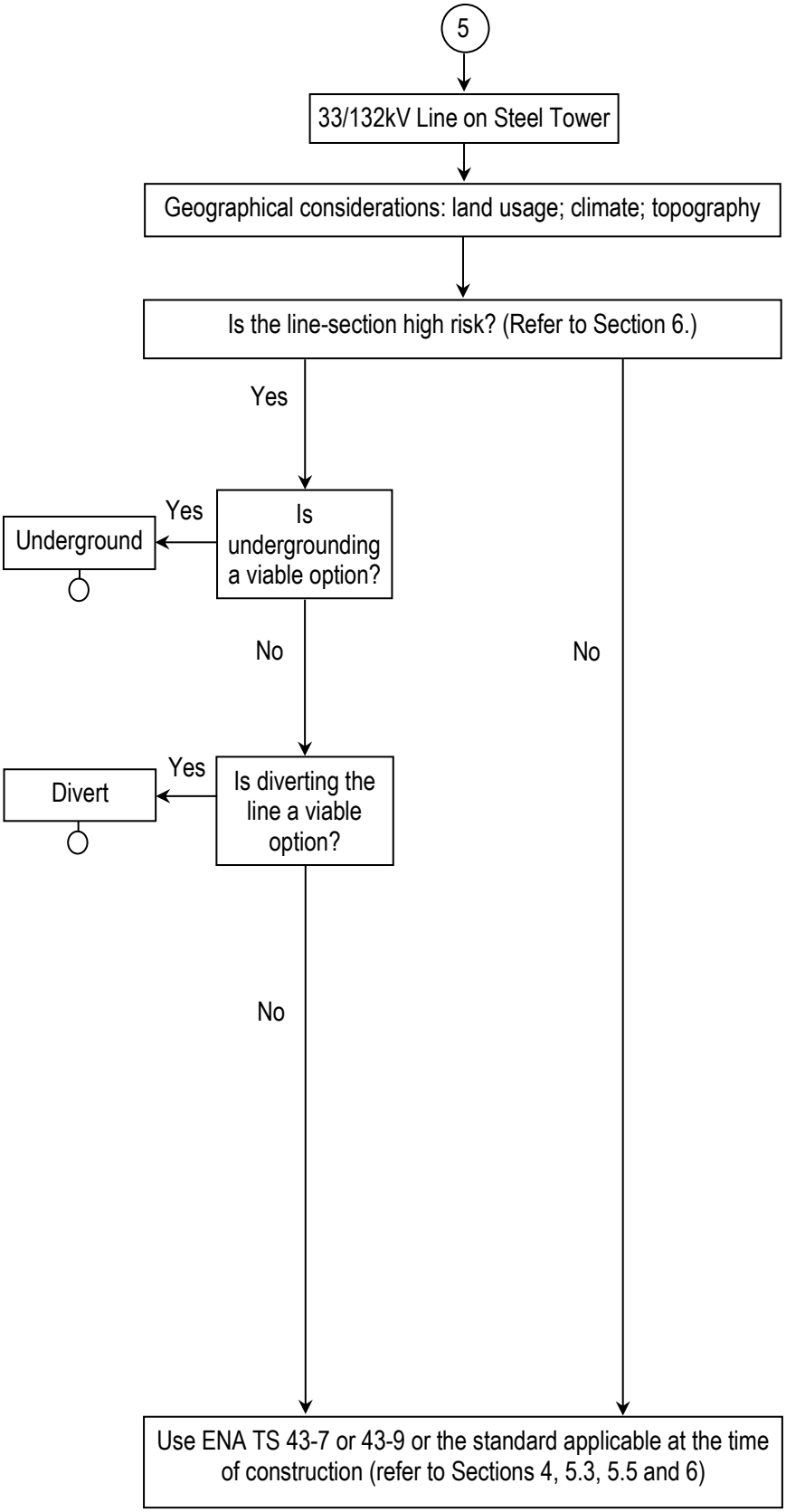








Note 1: Trident can only be built safely when a vehicle can get to each pole position.



Appendix B

Policy for Improving Network Performance Under Abnormal Weather Conditions by Use of a Risk Based Approach to Vegetation Management Near Overhead Lines

B1 Introduction

This Appendix describes Electricity North West policy with respect to improving network performance under abnormal weather conditions by use of a risk based approach to vegetation management near overhead power lines.

This risk based approach shall make use of Ellipse condition data and further on site assessments by suitably qualified staff with regards to the risk of particular trees being damaged under abnormal weather conditions. The risk based approach is based on the guidance outlined in Energy Networks Association Engineering Technical Report (ENA ETR) 132 with adjustments as detailed below.

B2 Risk Based Approach

B2.1 Targeting Strategy

The targeting strategy to identify the extent of the network to be considered shall consist of using a Risk Managed Analysis Model based on the Matrices in ENA ETR 132 to rank the lines. Additionally, the following shall be applied:

- Where there are multiple feeds into a Bulk Supply Point (BSP) or Primary Substation then initially one circuit shall be established as the resilient route and the other routes managed after all BSPs or Primary Substations have at least one resilient circuit.
- Where there are multiple feeds and one or more circuits are underground circuits then these shall be identified as the initial resilient route.
- After the line has been identified as the resilient route and any trees cut for resilience, this shall then be logged in Ellipse.
- The targeting strategy shall be reviewed on an annual basis.

B3 Risk Managed Analysis Model

B3.1 Initial Cost/Benefit Analysis

An initial cost / benefit analysis shall be in the form of a desktop exercise producing a matrix based on the Matrix in ENA ETR 132 with the addition of the overhead route length for each line and a variation to the formula for calculating the Ranking Value (Cost per Customer). The Ranking Value is calculated using the following formula:

$$\text{Ranking Value} = \frac{\text{Customers (C) x Length of Overhead Line (L)}}{\text{Estimated cost per span (P) x Number of Tree Affected Spans (T)}}$$

The Ranking shall be in order of Ranking Value with top priority being the highest calculated value. Ranking will descend with decreasing Ranking Value.

B3.2 Detailed Cost/Benefit Analysis

The information gathered from a detailed on-site assessment of the vegetation for each line shall be used to refine the estimated cost per span and number of tree affected spans. A new matrix shall then be produced using the matrix from the Initial Cost / Benefit Analysis above and applying the revised cost per span and number of tree affected spans figures. This will then provide the final ranking.

Appendix C – Policy on Managing Collision Risks – Birds and Overhead Lines

Collisions between birds (particularly migratory swans and geese) and overhead power lines not only results in injury or fatality for the birds concerned but can cause disruption to electrical supply networks, including loss of power to customers. Electricity North West is keen to reduce the number of such collisions.

Electricity North West's Policy is to fit approved bird diverters to overhead power lines (new and refurbished), in conjunction with a refurbishment programme, in areas of high collision risk outlined below and any other areas where collisions have been recorded. The use of covered conductor shall also be considered in these areas – it is more visible to birds (and will reduce possible conductor clashing, etc – refer to main body of text for other uses of covered conductor).

Collision risk maps developed from EA flood risk data and collision risk modelling are illustrated in Figures 1 to 5. The modelling was based on data for migratory swans. Flood risk data were incorporated, because flooded areas will have an effect on locations and flight paths of birds, particularly birds such as migratory swans, as shown by the example in Figure 5.

Figure 1

Flood risk areas identified by the Environmental Agency for the North West of England and North Wales Regions

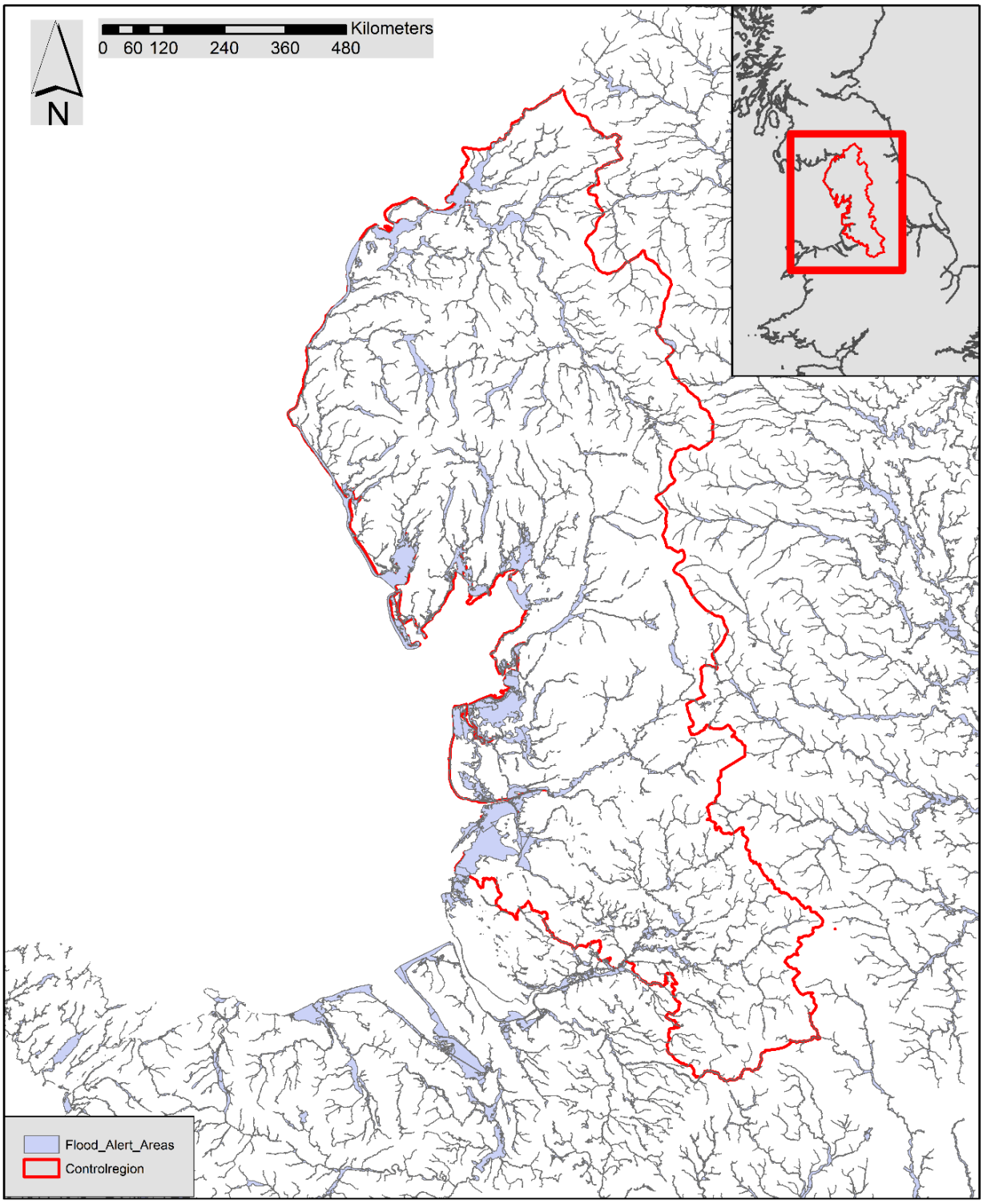


Figure 2

Areas of High Collision Risk Identified by the Factors in the Model

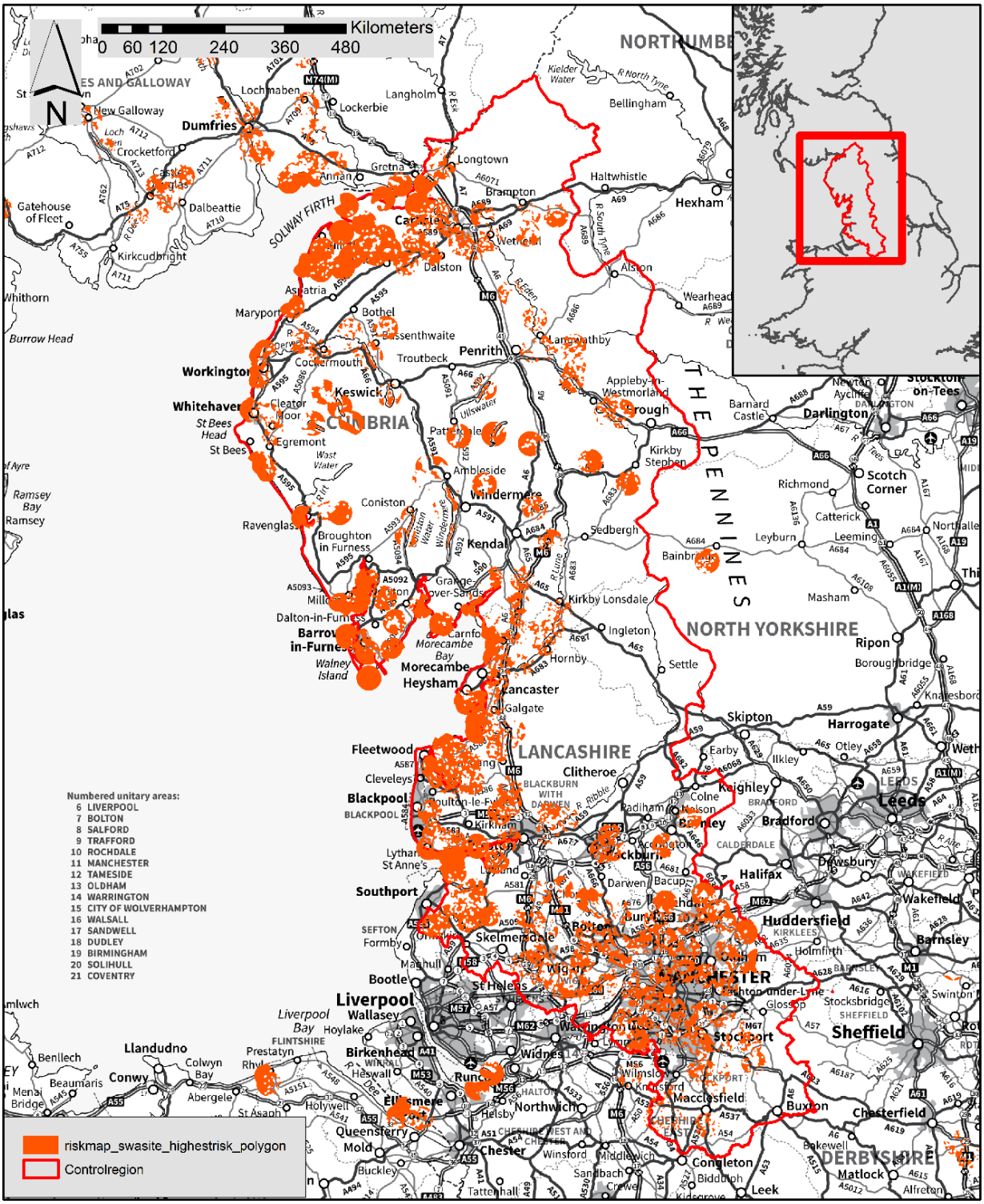


Figure 3

Map Highlighting the Higher Density Collision Areas (>0.085 Per Square Km) and the Areas Selected Best Fit Areas for The Model

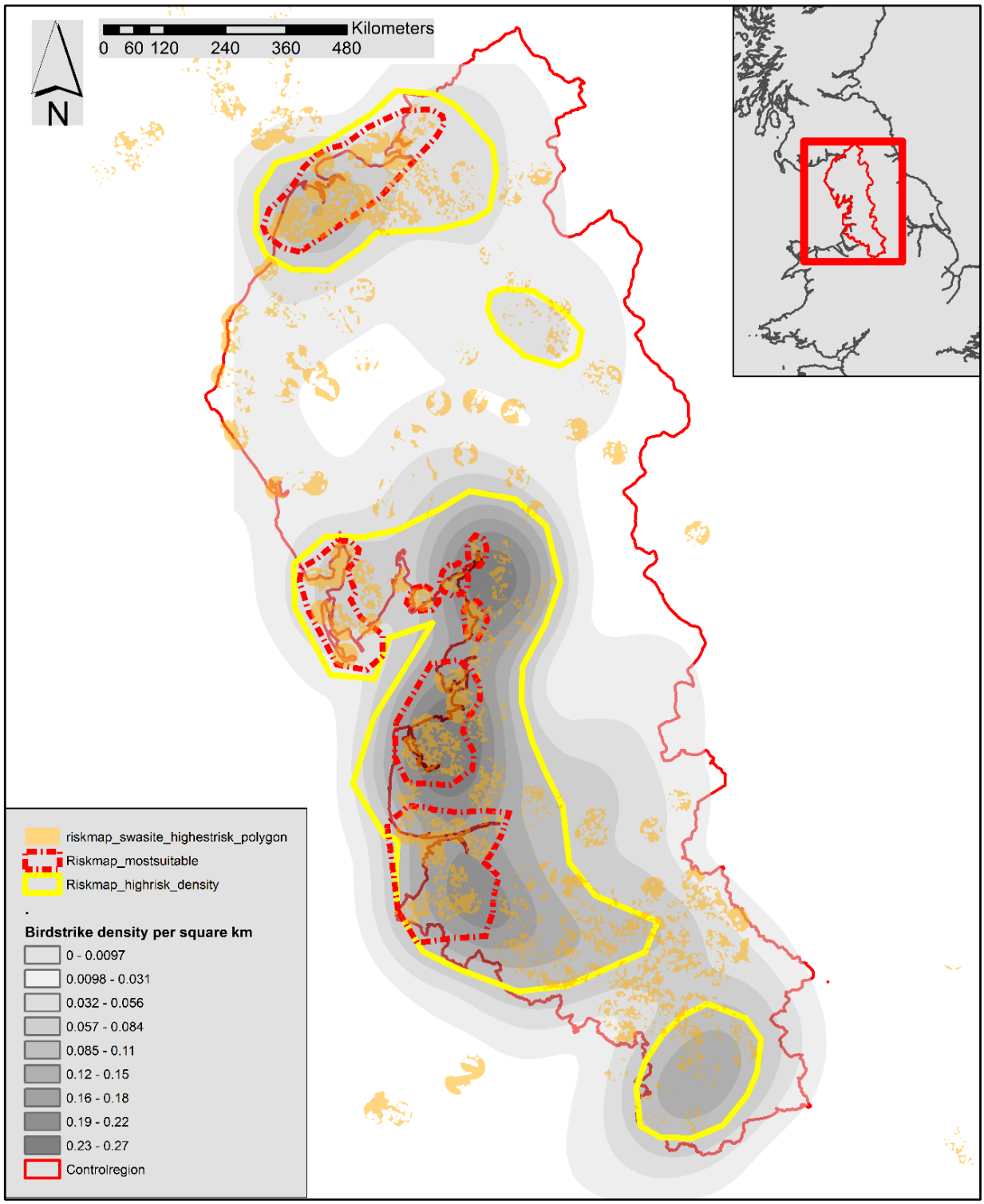


Figure 4

An example of the risk map applied to a local scale around the wildfowl and wetlands trust at martin mere, Lancashire. this could help target current mitigation and routing of any future power lines

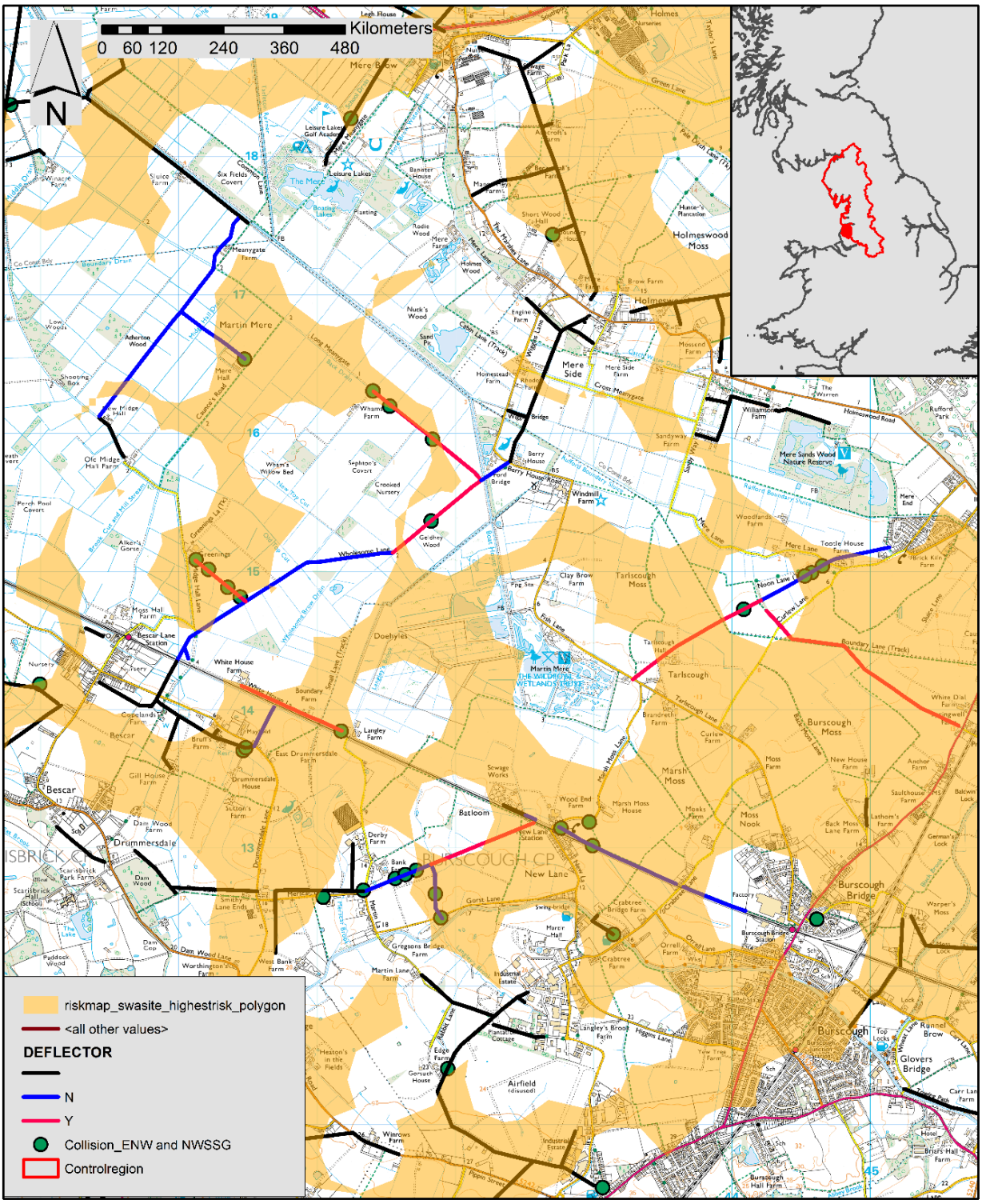


Figure 5

An example of the flood risk map over-laid with the high risk collision areas and power lines that fall within the flood risk areas. The figure shows that some power lines currently out of the high risk collision areas may become high risk if birds change locations due to flooding events