ESB NETWORKS

Proposal for Resilient Forestry Corridors to Protect Electricity Supplies to Communities

Issue date: November 2026



Contents

1. Introduction 3

2. Purpose and Scope 4

3. Background and Context 4

4. Objectives 5

5. Proposed Resilience Corridor Model & Key Principles 6

6. Managing Productivity Impacts 8

7. Supporting Environmental, Climate & Biodiversity Objectives 10

8. Forestry Categories 12

9. Legislative & Regulatory Support for the Proposal 13

10. Conclusion 15

Appendix A-
Existing Corridor Arrangements and the proposed Resilience Corridor Model 16

Appendix B -
Windthrow Risk Modelling and Risk Assessment 18

Appendix C -
Commercial Forestry adjacent to Overhead Electricity Networks:
Extent, Current Corridor Widths & Age Profile 21

Appendix D -
Glossary of Key Terms 23

1. Introduction



ESB Networks has prepared this document to present a proposed long-term approach to managing forestry-related risks to electricity networks. The proposal centres on the development of resilient forestry corridors to help protect electricity supplies to homes, farms and businesses during severe storms. In recent years, fallen trees and forestry windthrow have contributed to damage to electricity infrastructure and prolonged power outages, particularly where overhead electricity lines run close to commercial forestry.

This proposal sets out a practical approach to reducing that risk while also taking account of forestry objectives, environmental objectives and requirements, forest owner considerations and overall cost to society. It draws on the recently completed "International Review of Storm Resilience Strategies for Power Networks" and on technical advice from forestry consultants Purser Tarleton Russell Ltd (PTR).

A glossary of key terms used in this document is included in Appendix D.

2. Purpose and Scope

The purpose of this proposal is to set out a proposed resilient forestry corridor model and identify the key design and operational considerations together with the legislative, regulatory and forestry-licensing measures needed to support its implementation.

The scope of this proposal is limited to the 10 kV, 20 kV and 38 kV distribution overhead networks, where adjustments to existing corridor widths are required to mitigate windthrow risk.

Existing arrangements for transmission overhead lines, including lines at a voltage of 110 kV, 220 kV and 400 kV, are considered to provide an appropriate level of resilience and are therefore outside the scope of this proposal.

Low voltage distribution overhead networks, (i.e. lines at a voltage of less than 10 kV) are not included in the scope of this proposal.

3. Background and Context

Ireland has experienced an increase in severe wind events in recent years including Storms Darwin, Ophelia, Darragh and Éowyn. These events highlight the growing frequency and severity of disruption affecting both our electricity network and forestry plantations. Against this backdrop, Climate Sectoral Adaptation Plans have been developed across both the electricity and forestry sectors, incorporating essential strategies to reduce the risk of prolonged power outages for homes, farms and businesses across Ireland while also considering more storm resilient forest management practices to help protect and future proof forestry investments from windthrow.

Following the record levels of disruption to our electricity network caused by Storm Éowyn in January 2025, ESB Networks was tasked with initiating an immediate programme referred to as the Winter 25 Grid Resilience Plan which included targeted risk-mitigating corridor clearfelling and widening along high-risk sections of the distribution network (excluding low voltage lines). This voluntary programme will be delivered by the end of 2026. A further phase, targeting other high-risk areas, is planned to commence in January 2027. Participating forest owners are compensated by ESB in accordance with existing compensation practices.

While this programme provides an immediate, targeted response to identified risks, it does not constitute an enduring national solution. A longer-term approach is required, and important legislative and regulatory changes are being developed to facilitate changes in how forestry corridors can be planned and managed in future to mitigate the impacts of severe storm events.

The proposed resilience corridor model is intended to provide an efficient and enduring solution, transitioning away from the use of a fully clearfelled and permanently unplanted corridor model towards a resilience corridor design delivered through a multi-annual programme. The programme will also provide forest owners with a fair, transparent and proportionate compensation process for both afforestation and reforestation sites.

4. Objectives

The objectives of this proposal are:

Space for safety

Woodland for resilience

A 20m clear zone, with resilient forestry alongside

Stop the risk getting worse by addressing forestry corridor resilience at afforestation and reforestation stage.

Address legacy forestry corridors using a prudent risk-based approach to identify and prioritise sites where windthrow presents a risk to the electricity network and continuity of supply to customers.

Provide forest owners with the opportunity to address identified forestry risks to the electricity network arising from windthrow within a specified timeframe, having regard to their operational schedules and commercial requirements, with proportionate and targeted intervention by ESB only where necessary to protect the electricity network.

Improve the resilience and reliability of the electricity supply to homes, farms and businesses.

Maximise the forest areas for afforestation and reforestation.

Provide clear arrangements for landowner engagement, responsibilities and a fair, transparent and proportionate compensation process.

Minimise the cost to society, both for the electricity customer, the forestry sector and the State. Support appropriate environmental, biodiversity and climate-resilience outcomes.

5. Proposed Resilience Corridor Model & Key Principles

Plant today

Build resilience for tomorrow

Design corridors at planting and replanting stages

To achieve the objectives set out above, ESB Networks proposes a corridor designed to reduce the risk to the electricity network arising from windthrow while supporting continued forestry use (a "Resilience Corridor"). The Resilience Corridor would be comprised of the following: -

- A **"Safety Zone"** meaning a 20-metre-wide unplanted area required to support the safe operation, inspection, maintenance and access needs of the electricity line. It has a maximum clearance of 10 metres on each side of the overhead electricity line centreline.
- A **"Resilient Zone"** meaning an area directly adjacent to the Safety Zone planted or managed with lower windthrow-risk tree species and appropriate silvicultural practices. Its purpose is to act as a buffer between the electricity line and higher-risk commercial conifer planting. It has a maximum width of 17.5 metres on each side of the Safety Zone thereby minimising the risk of tree strikes during windthrow events.

Figure 1 below provides a high-level illustration of the proposed Resilience Corridor design. **Appendix A** compares the existing voluntary corridor arrangements, the current voluntary corridor clearfelling/widening programme and the proposed Resilience Corridor model, explaining the limitations of the existing approaches and the rationale for the proposed design.

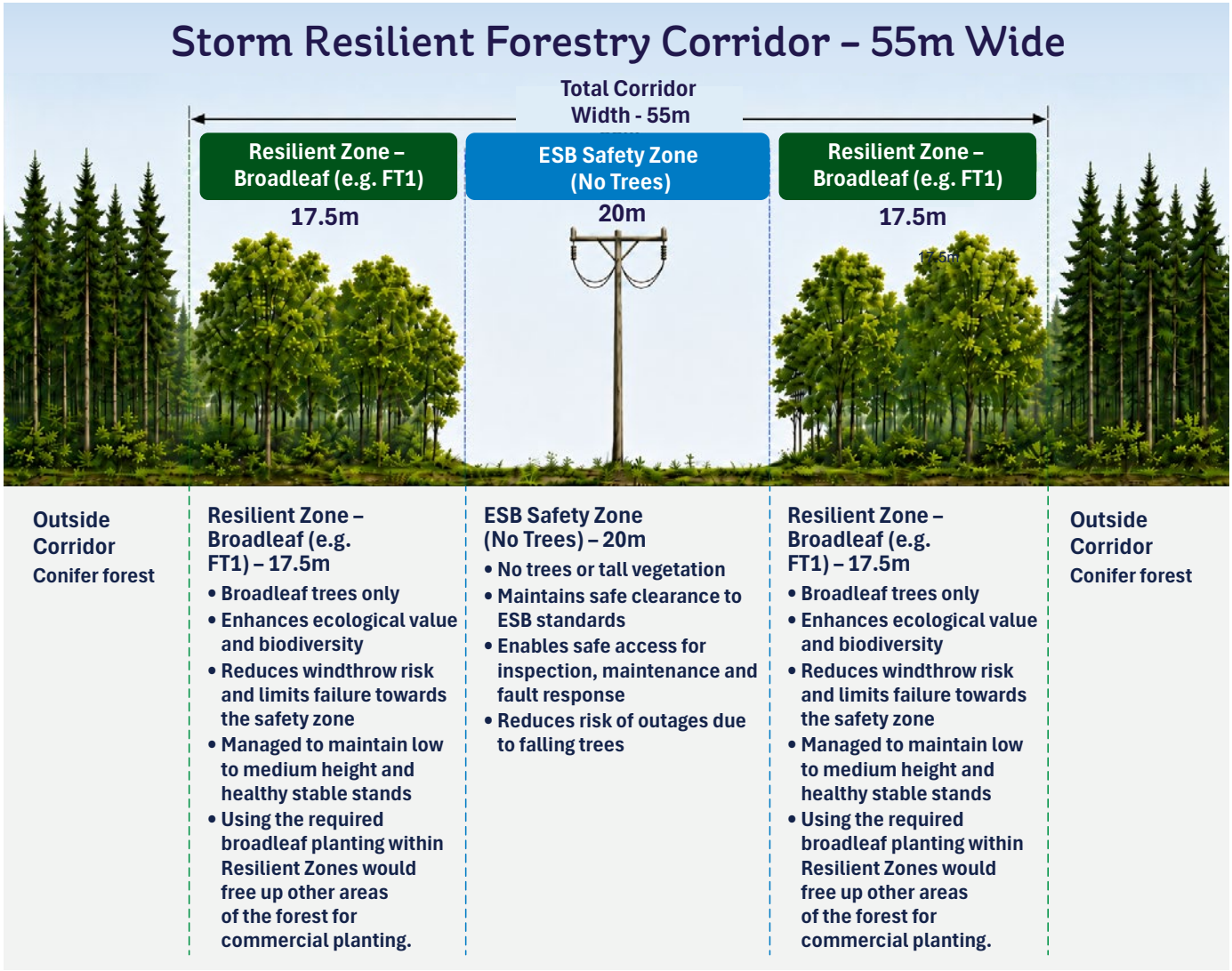
While fully unplanted 55-metre-wide corridors would largely eliminate the risk of tree strike, they would result in a significant and unnecessary loss of forest cover and associated environmental and economic benefits and so do not form part of an enduring sustainable forest or electricity corridor design. They should be considered only as a last resort where the identified risk cannot be adequately addressed through the Resilience Corridor design.

The area available for forestry can be maximised by allowing forests to grow up to the Safety Zone, provided the adjacent forest stand is designed for storm resilience. This is best practice in other European countries.

The "Right Tree in the Right Place" principle: To adapt to climate change and safeguard the electricity supply to communities, the Resilient Zone would adopt a resilient forest design utilising site appropriate species with lower susceptibility to windthrow, including native/broadleaf species. While Sitka spruce, the predominant conifer species in Irish commercial forestry, is highly productive, due to its shallow rooting properties, its fast growth and other factors, it is prone to windthrow in certain conditions, with the risk increasing significantly once trees reach approximately 20 to 25 metres in height.

The Forest Service in the Department of Agriculture, Food and the Marine ("the Forest Service") has developed a Climate Resilient Reforestation Pilot Scheme, which provides a relevant model for this approach by supporting the replacement of non-native conifer stands with native woodlands. Similarly, the proposed Resilient Zone could use site-appropriate native/broadleaf species with lower susceptibility to windthrow to replace higher-risk conifer crops. The existing broadleaf planting requirements as set out in the latest afforestation schemes could be utilised within the Resilient Zones, helping to maintain overall forestry and commercial planting areas.

Figure 1 – A high-level Illustration of the Proposed Resilience Corridor Design



6. Managing Productivity Impacts

Resilience with commercial forestry retained

No commercial forestry area lost in 93% of the 90 sampled sites under the proposal

The potential impacts on forest productivity arising where commercial conifer areas are displaced can be offset or minimised through the following measures:

- **Including Land beneath Electricity Lines within the Forest Area:**
  Currently land within the Safety Zone underneath an electricity line is not included in the forestry licensing process. This proposal seeks to have the Safety Zone included within the forest area going forward for both reforestation and afforestation purposes and, subject to the applicable forestry scheme requirements, allowing it to contribute towards Areas of Biodiversity Enhancement ("ABE") requirements. Under this proposal, the Resilient Zone would remain part of the forest area and would be available for resilient planting, including planting that contributes towards applicable broadleaf planting requirements.

- **Locating Broadleaf Planting within the Resilient Zone:**
  Using the broadleaf planting requirement within Resilient Zones would free up other areas of the forest for commercial planting. Reorientating required broadleaf planting within the Resilient Zones as part of reforestation design and operations would result in the reduction of lost commercial conifer forestry area. A statistical assessment of 90 sites found that, in 93% of cases, the Resilient Zone could be fully accommodated within the broadleaf planting requirement under the applicable forest scheme, with no loss of commercial conifer forestry hectares.

- **Using the Safety Zone to contribute to ABE requirements:**
  Subject to the applicable forestry scheme requirements, including the 20-metre Safety Zone as forming part of the forest and allowing it to contribute to ABE would help forest owners in meeting the applicable 15% ABE requirement while freeing up more of the remaining forest area for productive commercial planting.

Forest Owner-led Risk Mitigation with ESB Intervention Only Where Necessary

Through the application of a transparent windthrow risk assessment process, forest owners, with their forestry advisors where appropriate, would receive advance notice of identified material windthrow risks affecting their forests which, in turn, could pose a risk to the electricity network, and afforded the opportunity to undertake the identified risk-mitigation works themselves within a specified timeframe, having regard to their own operational schedule and commercial requirements.

Where a forest owner has not undertaken the necessary works within the timeframe, the risk is still present and needs to be addressed, or where the nature or urgency of the risk requires earlier intervention, ESB would undertake proportionate and targeted clearfelling only where necessary to protect the electricity network. Any intervention would be limited to the trees and area reasonably necessary to address the identified risk to the network and ultimately ensuring continuity of supply to electricity customers. Clearfelling for that purpose would not, of itself, require the Resilient Zone to remain unplanted or prevent subsequent resilient replanting and management in accordance with the proposed Resilience Corridor design and the applicable forestry licensing framework.

Compensation

A fair, transparent and proportionate compensation and cost recovery framework should be established and updated routinely to reflect changes in timber and land valuation in the future. The compensation model will apply to affected forest land, whether currently forested or planted in the future, where corridors are established in legislation.

Working together

Growing resilience

Clear information, time to act and a proposed fair compensation framework

Maintenance Responsibilities

Long-term resilience maintenance requirements within the Resilience Corridors can be minimised through utilising an appropriate corridor design. An appropriate funding mechanism can only be detailed once the final corridor design and corresponding maintenance requirements have been fully determined. However, the following key considerations should be central to that determination: -

- Under this proposal, the unplanted 20-metre Safety Zone would be included within the associated forest area but would remain unplanted. Maintenance within the Safety Zone would generally be minimal and would only be necessary where natural regenerating trees and other vegetation pose a risk to safe access or to the safe and reliable operation of the network.
- Under this proposal, the Resilient Zone would remain part of the managed forest, including any clearfelling undertaken to address an identified network risk and would continue to be replanted and managed as part of the forest in accordance with the applicable forestry licence and the Resilience Corridor design.
- ESB would undertake resilience maintenance required within the Safety Zone and Resilient Zone specifically to ensure the safety, reliability and continued operation of the network. All other forestry management would remain the responsibility of the forest owner, in accordance with the applicable forest licence.

Rationale for the Proposed Corridor Widths

Increasing the width of the Safety Zone, while species with higher susceptibility to windthrow remain within striking distance of the electricity line, would not deliver a proportionate improvement in network resilience. Windthrow risk is generally negligible when trees are young, and their falling distances are short. However, the risk rises rapidly as trees approach approximately 20 metres in height and continues to rise as they grow beyond this height, with a corresponding increase in the clearance distance needed to reduce the risk of tree strike. Accordingly, widening the Safety Zone alone would provide limited additional protection unless higher-risk species are located beyond striking distance. The proposed Resilient Zone addresses this risk by providing a lower windthrow-risk buffer between the Safety Zone and adjoining commercial conifer planting.

Appendix B summarises relevant UK and Irish research identifying when conifer species become vulnerable to windthrow. This research supports the proposed Resilience Corridor design comprising a 20-metre Safety Zone (10 metres clearance on each side of the electricity line centreline) together with a 35-metre Resilient Zone (17.5 metres on each side of the Safety Zone), planted with a lower-risk species mix.

7. Supporting Environmental, Climate & Biodiversity Objectives

Right tree Right place

Lasting benefits

Site-suitable planting supports forest cover, biodiversity and carbon storage

The proposed Resilience Corridor approach seeks to maintain the environmental benefits of afforestation and reforestation whilst minimising the loss of forestry areas that would arise if fully clearfelled and unplanted corridors (deforestation) were adopted as the enduring corridor model. Retaining the Resilience Corridor as part of the forest also provides opportunities to support wider forestry, climate and biodiversity objectives, as outlined below.

New EU Forest Strategy for 2030 and EU Biodiversity Strategy for 2030

The implementation of the proposed Resilience Corridor model has a clear synergy with both the New EU Forest Strategy for 2030 and the EU Biodiversity Strategy for 2030.

Across both strategies, biodiversity is recognised as an integral requirement, with improved forest resilience as a strategic objective in responding to the impacts of climate change for forests in Ireland.

The commitments in these strategies are driving future forestry strategy/policy towards: -

- Closer-to-nature forestry, promoting mixed species and structurally diverse stands.
- New indicators and thresholds for sustainable forest management, covering biodiversity, ecosystem health, and climate objectives.
- Biodiversity-friendly afforestation and reforestation guidelines, supporting the three billion trees pledge.
- Ecosystem-based management and adaptive restoration across EU forests.
- Investment in disaster prevention, preparedness, and post disaster “restore and reforest better” conditions.

This represents a systemic shift away from production-driven monocultures toward more ecologically diverse and multifunctional forests. By incorporating native species into Resilient Zones, the proposal would enable the forest to coexist with the electricity network while demonstrating Ireland’s clear commitment to the objectives of both strategies.

Maximising Forest Cover & Carbon Sequestration

By retaining the Resilient Zone as part of the managed forest, the proposed approach would provide clear benefits for forest owners, electricity customers and wider society. In particular, it would mitigate the loss of forest cover (or deforestation) from the national forest estate that would otherwise arise if fully clearfelled 55-metre-wide corridors were established, excluded from the forest management plan and adopted as the enduring corridor model.

It is estimated that this approach could retain between 10,000 and 14,000 hectares of forest cover within the national estate compared to a fully clearfelled and permanently unplanted 55-metre-wide corridor.

Where a species such as birch is planted in the Resilient Zone, the average carbon sequestration capability is estimated at approximately 4.3 tonnes of CO2 per hectare per year when modelled over a 100-year timeframe. For comparison, a typical FT12 Mixed High Forest plantation comprising spruce and birch (Yield Classes 24 and 8 respectively, thinned and managed on a rotation to financial maturity) is estimated to capture an annual average of approximately 14.8 tonnes of CO2 per hectare when analysed over two or more rotations.

Although the average annual carbon sequestration rate of birch is lower, where birch is established as native woodland, its lifetime value or Carbon Abatement Potential (CAP) is estimated at approximately 254 tonnes of CO2 per hectare over a 100-year period. This compares to 460 tonnes of CO2 per hectare for a typical FT12 Mixed High Forest plantation comprising spruce and birch for the same period.

The calculations above were derived using the Teagasc Forest Carbon Tool, available at teagasc.ie.

In contrast, a fully clearfelled and permanently unplanted 55-metre-wide corridor excluded from the forest would provide negligible carbon abatement potential.

Biodiversity Gain

The proposed Resilience Corridor design (combining open space with native/broadleaf species on either side) has biodiversity benefits by, in effect, creating two woodland types with the potential to attract more wildlife. It could also create native/broadleaf woodland patches between commercial forests supporting far higher diversity of invertebrates compared to non-native conifers. A single mature oak tree, for example,could support a rich diversity of insects, which in turn provide an important food source for birds. By utilising such corridors to combine areas of open space with increased native/broadleaf planting adjacent to commercial conifer plantations, the proposed approach has the capability of creating a more complex, biodiverse habitat. These areas could also function as biodiversity stepping stones between woodland habitats, improving landscape connectivity.

The LIFE ELIA project in Belgium and France provides a clear example of environmental stewardship and sustainability corridor management that is in line with the corridor design approach proposed by ESB Networks. The project transformed transmission corridors into ecological assets through measures including graded forest edges, habitat restoration, and grazing to enhance biodiversity while maintaining network safety.

In addition to supporting the resilience of the electricity infrastructure and continuity of supply to electricity customers, this proposal also supports the delivery of key additional benefits for other legislative requirements including:

- Supporting the objectives of the EU Nature Restoration Regulation;
- Supporting relevant obligations under Irish and European climate and forestry frameworks to include the Climate Action and Low Carbon Development Act, 2015 as amended, and
- Supporting the delivery of risk-mitigation strategies/measures addressing risks identified in the most recently published Climate Sectoral Adaptation Plans developed by both DAFM and the Department of Climate, Energy and the Environment (DCEE).

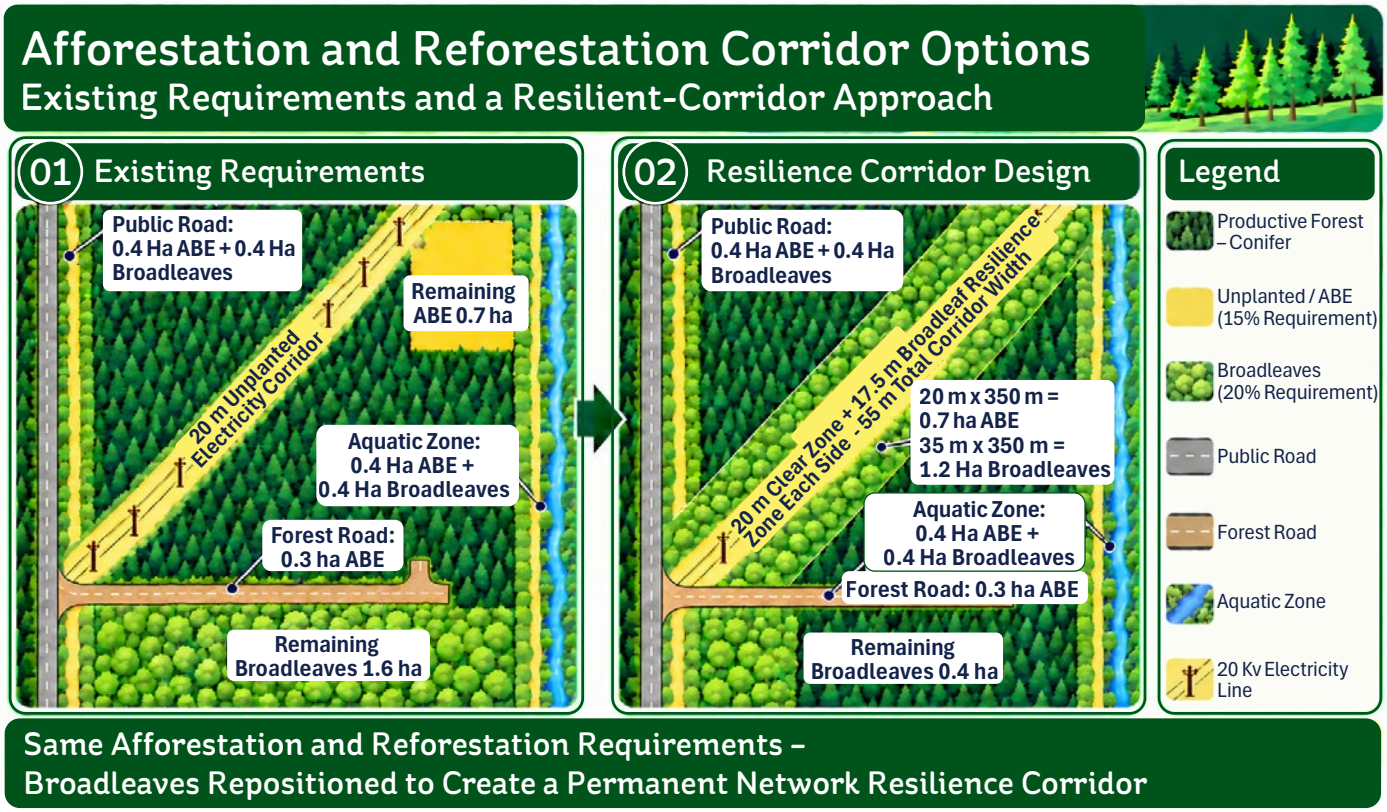
8. Forestry Categories

To deliver the objectives set out above, ESB Networks proposes tailored mechanisms for the following categories of forestry adjacent to electricity infrastructure:

- **Legacy forestry**: Existing plantations established under earlier licensing conditions where current risk may not have been addressed, with currently approximately 3,700 km of network overhead lines exposed to varying windthrow risk, depending on age, height, ground conditions, forest management practices and other factors.
- **Future forestry**: New planting (afforestation) and subsequent rotations (reforestation), where appropriate licence conditions could be designed to incorporate the proposed Resilience Corridor design, site-appropriate species selection and forest management practices from the outset, to prevent or reduce the risk to the electricity network arising from windthrow throughout each rotation.

Appendix C provides a detailed breakdown of the extent of commercial forestry adjacent to our network for each voltage level (excluding low voltage electricity lines), current voluntary corridor widths, the estimated age profile of forest stands adjacent to the network, and DAFM afforestation targets.

Figure 2 – Demonstrates how a forest could be remodelled using an actual forest site



9. Legislative & Regulatory Support for the Proposal

Based on the above, ESB Networks considers that the proposed Resilience Corridor model, which seeks to deliver an efficient, resilient and enduring solution for the distribution electricity system while maximising forestry coverage, can best be supported through an appropriate combination of legislative, regulatory and forestry licensing measures as outlined below:

9.1 The Resilience Corridor to form part of the Forest

The legislative and regulatory framework should expressly recognise the Resilience Corridor as forming part of the associated forest, so that it can be administered through the forestry licensing and scheme framework and so that Safety Zone and Resilient Zone obligations can be incorporated into forest design, planting, maintenance and future rotations.

9.1.1 Statutory 20-metre Safety Zone (with Compensation where applicable)

ESB Networks supports the introduction of a statutory 20-metre-wide Safety Zone for the 10 kV, 20 kV and 38 kV overhead networks to remain unplanted for safe operation, inspection, maintenance and access.

The proposed legislation should provide for compensation for forest owners and other qualifying persons as outlined in the proposal.

9.1.2 Resilient Zone to remain Part of the relevant Forest

Trees and other vegetation within the 35-metre Resilient Zone would remain part of the managed forest and would be established and managed under the applicable Ministerial licence (granted on foot of the Forestry Act, 2014 as amended). Appropriate licence conditions would provide an opportunity to minimise windthrow risk to the electricity network while maximising overall forest cover and area available for commercial planting. Licence conditions would also clarify practical responsibilities for managing trees and other vegetation within the Resilient Zone, with the aim of reducing risks to the safe and reliable operation of the electricity network. Clearfelling of trees within the Resilient Zone for network risk-mitigation purposes would not, of itself, remove that area from the managed forest or prevent its subsequent resilient replanting and management.

The proposed legislation should provide for compensation for forest owners and other qualifying persons as outlined in the proposal.

9.2 National Windthrow Risk Model & Risk-Mitigation Arrangements

ESB Networks would welcome the development and ongoing maintenance of a national windthrow risk model for Ireland. The model should assess the likelihood of windthrow by reference to the factors that contribute to windthrow risk. Its outputs should inform an assessment of the resulting risk to the forest and to the electricity network, including potential tree strikes, damage to infrastructure, obstruction of access and interruption of supply. With an agreed risk tolerance for the resulting network risk established, the assessment would support site prioritisation and inform the timing of risk-mitigation measures, particularly for legacy forestry. Forest owners would have the opportunity to undertake identified risk-mitigation works themselves within a specified timeframe informed by the assessed risk, subject to proportionate ESB intervention only where necessary, as set out in Section 9.4. This is particularly important for managing electricity network risk arising from legacy forestry.

Appendix B provides details of the key risk factors that influence windthrow risk and that would need to be considered in developing an appropriate model.

9.3 Use the Model to inform Future Planting & Rotations

The national windthrow risk model could also support prospective forest owners and the Forest Service in identifying appropriate risk-mitigation measures and informing planting policies for future forests and subsequent rotations.

9.4 Provision for Proportionate ESB Intervention Only Where Necessary

The legislation should provide forest owners with an opportunity to address identified material risks from their forests to the electricity network arising from windthrow within a specified timeframe informed by the assessed risk. Where the risk remains to be addressed after that timeframe, or the nature or urgency of the risk requires earlier intervention, the legislation should provide for proportionate and targeted ESB intervention only where necessary to protect the electricity network. Any works would be targeted at the identified risk to network safety, reliability and resilience, and limited to the extent reasonably necessary to address it. ESB intervention may require the targeted clearfelling of high-risk forestry to establish the Resilience Corridor. This would not require the entire Resilience Corridor to remain permanently unplanted. The Safety Zone would remain unplanted; however, the Resilient Zone could be subsequently replanted and managed in accordance with the Resilience Corridor design and the applicable forestry licensing framework.

9.5 Replanting Arrangements to reduce the Likelihood of Recurrence

Where targeted clearfelling is undertaken by the forest owner or by ESB where necessary to address a risk to the network, the subsequent treatment of the clearfelled area should distinguish between the Safety Zone and the Resilient Zone. The Safety Zone would remain unplanted as required for the safe operation, inspection, maintenance and access needs of the electricity line. The Resilient Zone would remain available for resilient replanting and management in accordance with the applicable forestry licensing framework. Any subsequent replanting there should be designed in accordance with the proposed Resilience Corridor model, using appropriate lower windthrow-risk species and resilient forest design to reduce the likelihood of the risk recurring. The Forest Service could apply relevant guidance and expertise to the design of these replanting schemes, reducing the likelihood of recurrence while minimising the impact on the forest owner.

9.6 Transitional Phase covering Legacy Forestry

The legislation should provide for a fair and balanced transition for legacy forestry, delivered over a multi-year programme recognising the time and resources required to deal with approximately 3,700 km of overhead electricity lines adjacent to legacy forestry. The transitional arrangements should address both mature and immature forestry and should not place unrealistic obligations on forest owners, ESB or other affected parties following the legislation coming into effect. Implementation should be phased according to assessed network risk, with any ESB intervention governed by the criteria set out in this proposal.

9.7 Compensation

Compensation should be addressed through a clear, fair, transparent and proportionate statutory framework, with governing principles established in primary legislation and detailed arrangements prescribed by secondary legislation, e.g. ministerial regulations. The framework should prevent duplicate recovery or recurring, open-ended compensation for the same loss while recognising demonstrable losses arising from enduring planting restrictions within the Safety Zone. It should take account of existing ESB compensation and easement arrangements and the role of forestry schemes in supporting planting within the Resilient Zone while balancing the interests of affected parties and electricity customers. These measures are necessary to ensure that the proposed Resilience Corridor model is legally robust, operationally workable and capable of supporting both electricity resilience and forestry policy objectives.

10. Conclusion

Targeted action

Shared protection

Safeguard forests and power supplies; 55m clearance remains a last resort for high-risk mature forests

The proposed Resilience Corridor model provides a practical, proportionate and long-term framework for reducing forestry-related risks to the electricity network while supporting continued forestry use and wider environmental, biodiversity and climate-resilience objectives. The model is intended to respond to the increasing risks presented by the increasing frequency and severity of severe weather events associated with climate change.

For legacy forestry, the model would prioritise sites according to assessed network risk and provide forest owners with an opportunity to address identified material risks to the electricity network arising from windthrow themselves within specified timeframes. Proportionate and targeted ESB intervention would occur only where necessary, including where the risk remains after the specified timeframe or where the nature or urgency of the risk requires earlier action.

Implementation will require coordinated legislative, regulatory and forestry-licensing measures, including clear responsibilities, fair, transparent and proportionate compensation arrangements, and appropriate transitional provisions. Given the scale of legacy forestry adjacent to approximately 3,700 km of the relevant network, implementation will necessarily take place over a multi-year programme. A phased and risk-based approach completed over an agreed timeframe will therefore be required, having regard to the scale of the challenge, cost, deliverability, and the potential impacts on the forestry sector.

ESB Networks therefore recommends that the model be progressed collaboratively with the relevant Departments, the Forest Service, forest owners, forest owner representative organisations, forestry representative bodies and other stakeholders. As the legislative framework develops from the Heads of Bill through detailed legislative drafting and the preparation of statutory instruments, sustained collaboration will be required to develop an appropriate, workable and balanced solution that recognises both the importance of forestry and the critical role of the electricity network in supplying homes, farms and businesses.

Through this proposed long-term approach, ESB Networks seeks to develop resilient forestry corridors that reduce the impacts of severe storms on the electricity network and help protect reliable electricity supplies to homes, farms and businesses, while supporting continued forestry use and wider environmental objectives.

Appendix A- Existing Corridor Arrangements and the proposed Resilience Corridor Model

Scenario 1: Full Forest No Resilience for Network

- Windthrow risk greatest on maturity 25-30m plus
- Sitka Spruce particularly prone to windthrow risk
- 20m sufficient for electricity network, but mature forest at high risk of windthrow



Illustrative visualisation of a forestry corridor

The current voluntary 20-metre corridor arrangement for 10 kV, 20 kV and 38 kV overhead lines provides ESB Networks with access for inspection, maintenance/repair and network upgrades. However, mature Sitka spruce can exceed 25 metres in height and, during storms, may fall onto poles or overhead lines. In severe cases, collapsed forest sections can break poles and also delay access for repairs, prolonging customer outages.

Scenario 2: Lost Forest Full Resilience for Network

- Electricity network resilient, but loss of significant afforestation opportunity
- Extreme and last resort - Windthrow risk rises rapidly from 20-25m tree height upwards
- Variations of between 20m and 55m do not give proportionate changes in risk



Illustrative visualisation of a widened forestry corridor

The current voluntary corridor clearfelling programme widens corridors from 20 metres to 55 metres by agreement with landowners, aiming to keep mature conifers outside falling distance of overhead infrastructure. However, widening the corridor to between 20 metres and 55 metres does not remove the risk of network damage or supply interruption. In severe windthrow events, collapsed forest sections may still block access to faults, delaying pole replacement and repairs.

Scenario 3: Maximised Forestry Resilient Network

- 20m safety zone is all that is required to clear
- Design forest for climate change and enable commercial planting by reallocating broadleaf and ABE across the forest scheme as a whole
- Resilient forest design less susceptible to windthrow
- Optimal co-existence of electricity and forestry



Illustrative visualisations of the proposed resilient forestry corridor at 2, 15 and 35 years.





ESB Networks' proposal is based on providing an unplanted 20-metre Safety Zone for inspection, routine maintenance/repair and network upgrades. The Resilient Zone would be planted with site-appropriate species with lower susceptibility to windthrow, including native/broadleaf species. Such species are already required to be incorporated into conifer-heavy afforestation planting plans under current forestry schemes. This approach would reduce windthrow risk, avoid deforestation, and provide a more windfirm buffer between the overhead line and less windfirm, higher-risk conifer planting. Incorporating this design into new forests and future rotations would allow forest owners to maximise land use while improving network resilience.

Appendix B - Windthrow Risk Modelling and Risk Assessment

ESB Networks proposes that the following parameters are the key components of a Windthrow Risk Model

Key Factors influencing Windthrow Risk
ESB Networks proposes that the following parameters are the key components of a Windthrow Risk Model:

1. Wet Soils

Peat, peaty gley and gley soils are wet with high water tables and very slow natural drainage. Rooting depth is restricted, reducing stability as trees mature.



2. Windy Climate

Ireland's Atlantic location brings frequent strong storms. Gusts of 22–27 m/s can uproot trees on wet soils. Sustained winds >25–29 m/s can cause major damage.



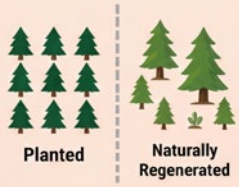
3. Shallow Rooting Species

Sitka spruce has shallow roots and less anchorage than deep rooting species like oak or Douglas fir, increasing the risk of windthrow.



4. Planted Trees Vs. Natural Regeneration

Planted trees are regularly spaced and may not develop a full, site-adapted root system. Naturally regenerated trees generally develop stronger, more stable rooting.



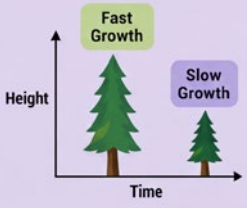
5. Monocultural Stands

Single-species stands have roots at similar depths and all trees are the same age and height, making them more vulnerable to windthrow.



6. Fast Growth Rates

Rapid height growth can outpace root development, leading to poorer stability compared with slower-grown stands.



7. Simple Stand Structure

A single canopy of trees with similar height and crown depth offers little diversity or resilience compared with more complex forest structures.



8. Cultivated Ground

Mounding and ploughing facilitate establishment but can restrict root spread, resulting in incomplete root architecture and increased vulnerability later on.



9. Mechanical Operations

Heavy machinery compacts soil, especially along extraction routes and forest roads. Compaction creates weak zones where trees are more likely to fail.



10. Delayed Thinning

As trees grow taller they rely on neighbours for support. Late thinning suddenly exposes trees, and the period 1–2 years after thinning is a high-risk time for windthrow.



Key insight **Forest instability is not caused by a single factor.**
It is the combination of wet soils, strong winds, shallow rooting species and management practices that increases the risk of wind damage in Irish forests.

Summary of UK and Irish Research on Windthrow Risk in Conifers

Windthrow risk is low while forestry is young but increases as crops mature and approach "critical height" – the top height at which windthrow is expected to begin. Critical height varies by site conditions. The UK Windthrow Hazard Classification System identifies six hazard classes, from Class 1, the lowest risk, to Class 6, the highest risk, as summarised in Table 1.

Table 1 - The UK Windthrow Hazard Classification System

Critical and terminal heights for different windthrow hazard classes and thinning systems (Miller, 1985)

Windthrow Hazard Class	Unthinned Stands		Selectively Thinned Stands		Systematically Thinned Stands	
	Critical Height m	Terminal Height m	Critical Height m	Terminal Height m	Critical Height m	Terminal Height m
1	28.0	32.5	25.0	28.5	25.0	27.5
2	25.0	29.5	22.0	25.5	22.0	24.5
3	22.0	26.5	19.0	22.5	18.0	20.5
4	19.0	23.5	16.0	19.5	14.5	17.0
5	16.0	20.5	13.0	16.5	11.5	14.0
6	13.0	17.5	10.0	13.5	9.0	11.5

Irish Windthrow Risk Modelling

A similar windthrow risk model was developed for Ireland in 2009. That model identified a number of key factors that influence the probability of windthrow in Sitka spruce, including top height, soil type, wind zone, thinning regime and altitude. Figure 3 below illustrates Ireland's wind hazard zones alongside the distribution of forests, providing context for wind exposure as a factor in assessing windthrow risk.

Need for Updated Resilience Measures

Since the 2009 model was developed, storm events such as Storm Éowyn have demonstrated the potential for higher wind speeds and more severe impacts on both forestry and electricity infrastructure. ESB Networks therefore considers that a future corridor design should include a Resilient Zone adjacent to the Safety Zone.

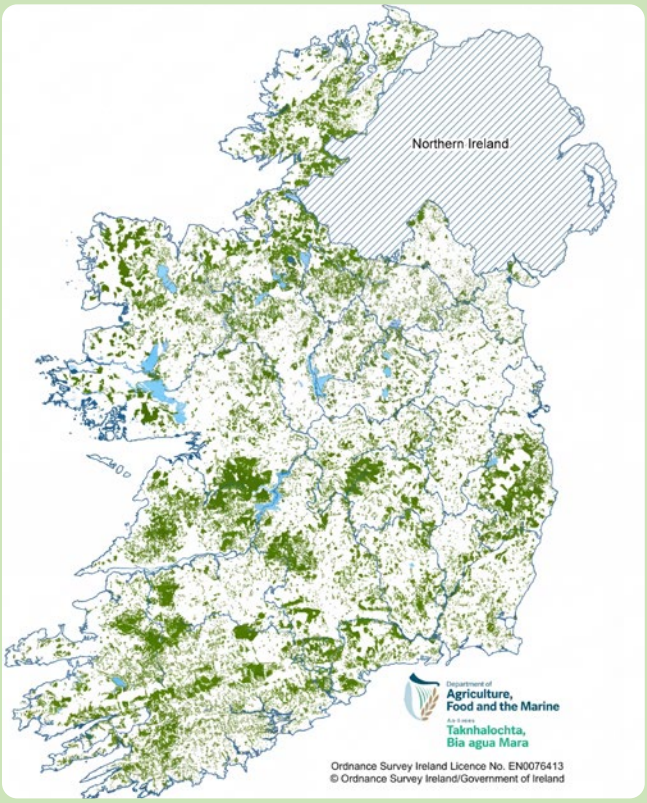
Design Implication

The Resilient Zone should be planted with appropriate lower windthrow-risk species and designed with regard to the corridor width and its proximity to the overhead network. This would reduce the likelihood of mature trees falling onto the line, while supporting a more sustainable long-term corridor solution.

Figure 3 – Wind Hazard Zones & Forest Distribution in Ireland

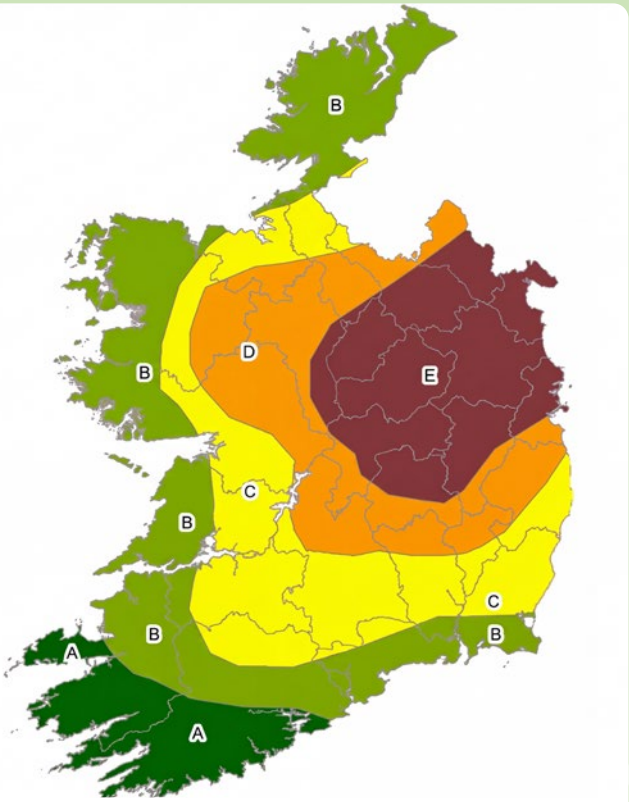
Forests are more concentrated in the windier southern and western parts of Ireland

Forest locations in Ireland



Greater forest concentration occurs in the southern and western parts of Ireland, which are also among the windier areas

Wind Hazard Zones in Ireland



Wind Hazard Zones

- A Highest Wind Hazard
- B High Wind Hazard
- C Moderate Wind Hazard
- D Low Wind Hazard
- E Lowest Wind Hazard

Appendix C - Commercial Forestry adjacent to Overhead Electricity Networks: Extent, Current Corridor Widths & Age Profile

Table 2: Extent of Commercial Forestry by Voltage Level and Current Voluntary Corridor Widths

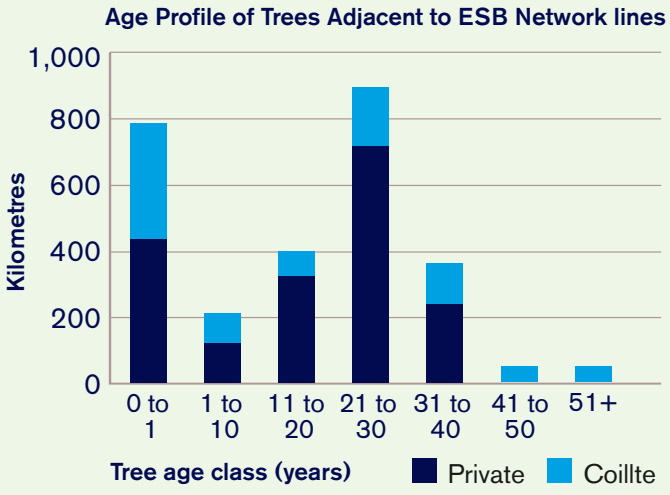
Voltage	Network km's	Total Network km's in Forest	% Network in Forest	Current Voluntary Corridor Dimensions
10kV & 20kV	85,006	3,112	3.7%	20m
38kV	5,623	263	4.7%	20m
110kV	4,750	298	6.3%	61m
220kV	1,820	72	4.0%	68m
400kV	435	38	8.7%	74m
Total	**97,634**	**3,782**	**3.9%**	

Forestry corridors are not currently a statutory requirement for forest owners. Around 27% of the network with forestry adjacent to it is covered by voluntary easement agreements with ESB, mainly on higher-voltage infrastructure. In 2025, ESB Networks began targeted engagement with approximately 1,600 landowners on 10 kV, 20 kV and 38 kV circuits affected by forestry-related storm disruption, seeking their agreement to allow ESB to clearfell a forestry corridor on their lands totalling 55 metres in width and to grant a 55-metre forestry easement in favour of ESB covering the full corridor width. Where an existing 20-metre corridor is already covered by a forestry easement, this involves widening the corridor and extending the easement to cover a total width of 55 metres. To date, 6% of contracted landowners have agreed to provide 55-metre corridors.

Estimated Forest Age Profile and DAFM Afforestation Targets

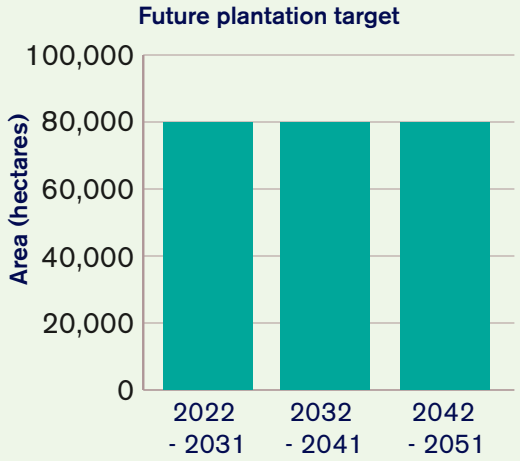
Figure 4: Age Profile of Forestry and DAFM Targets for Future Afforestation Programmes.

Utilise a risk based approach to deal with high risk windthrow site



ESB network data (2025) analysis within Coillte (2024) and privately owned forests (DAFM, 2023)

Plant with resilience in mind: Implement a resilient forest & corridor design at the start



Adapted from Ireland's Forest Strategy (2023 - 2030) (DAFM, 2024)

The graphs above show the age profile of forestry adjacent to the electricity network, based on data from the DAFM and Coillte. They also show DAFM's future afforestation targets.

Together, they highlight the need for complementary measures to:

- prevent additional risk through climate-resilient forest and corridor design;
- prioritise legacy forestry sites according to assessed forest risk, informed by a national windthrow risk model;
- provide forest owners with an opportunity to undertake identified risk-mitigation works themselves, with proportionate and targeted ESB intervention only where necessary in accordance with Section 9.4; and
- provide for resilient replanting and management within the Resilient Zone following risk-mitigation works, in accordance with the applicable forestry licensing framework.

Appendix D - Glossary of Key Terms

This glossary explains key technical, forestry, electricity network, environmental and legislative terms used in this paper. It is intended to support a shared understanding of the proposal for resilient forestry corridors and the associated measures required to protect electricity supplies to communities.

Term	Explanation
Afforestation	The establishment of new forest on land that was not previously forested. In this paper, afforestation is relevant because future planting near overhead electricity lines could be designed from the outset to reduce windthrow risk.
Area of Biodiversity Enhancement (ABE)	An area within a forestry scheme that is managed to support biodiversity and environmental outcomes. The paper proposes that the 20-metre corridor could contribute to ABE requirements where appropriate.
Broadleaf species	Tree species with broad leaves, such as oak, birch or beech. In this paper, site-appropriate native or broadleaf species are referenced as potential for lower windthrow-risk planting within Resilient Zones, subject to their suitability for the intended windthrow-risk reduction and the applicable forestry scheme requirements.
Carbon sequestration	The process by which trees and forests absorb and store carbon dioxide from the atmosphere. Maintaining forest cover and avoiding unnecessary deforestation supports carbon sequestration objectives.
Climate Sectoral Adaptation Plans	Sectoral plans designed to prepare infrastructure, services and land use for the impacts of climate change. In this paper, they are relevant to both electricity network resilience and forestry management.
Climate-resilient reforestation	Replanting that uses forest design, species selection and layout to improve resilience to climate-related pressures, including severe wind events. The paper refers to this approach as a model for resilience corridor design.
Commercial forestry	Forestry managed primarily for timber production or other commercial outputs. The proposal seeks to balance electricity resilience requirements with the productivity and value of commercial forestry.
Clearfelling	The felling of all standing trees within a defined area. In this paper, clearfelling describes the works undertaken to remove an identified risk; it does not, of itself, determine the long-term planting status of the cleared area. The Safety Zone would remain unplanted, while the Resilient Zone may be replanted and managed in accordance with the proposed Resilience Corridor design and the applicable forestry licensing framework.
Compensation mechanism	A fair, transparent and proportionate process for compensating forest owners or other qualifying persons for defined, demonstrable losses arising from corridor establishment or clearfelling where corridor requirements affect commercial forestry, or impose enduring planting restrictions within the Safety Zone.
Critical height	The top height at which windthrow is expected to begin in a forest stand. The paper notes that this varies by site conditions and is central to assessing windthrow risk.
Department of Agriculture, Food and the Marine (DAFM)	The Government department responsible for forestry policy, schemes, licensing and forestry standards in Ireland. The paper refers to DAFM schemes, targets and resilience-based forestry measures.

Term	Explanation
Department of Climate, Energy and the Environment	The Government department responsible for developing and implementing national policy on climate action, energy, environmental protection, and sustainable resource management. Its work includes supporting Ireland's transition to a low-carbon economy, overseeing energy security and regulation, and protecting the natural environment.
Distribution System Operator	ESB Networks DAC is the licensed operator of the electricity distribution system. DSO functions are carried out on its behalf by ESB Networks. In this paper, references to the electricity distribution system or distribution network within the proposal's scope mean the 10 kV, 20 kV and 38 kV overhead distribution networks.
Distribution Asset Owner	ESB is the licensed owner of the distribution system. DAO functions are carried out on ESB's behalf by ESB Networks.
Easement agreement	A legal agreement that grants rights over land for specified purposes, such as access to electricity infrastructure or maintaining a corridor. The paper notes that some network corridors are currently covered by easement agreements.
Electricity corridor	A defined area around overhead electricity infrastructure where forestry and vegetation are managed to protect the safe and reliable operation of the network.
Forestry licence conditions	Conditions attached to a forestry licence that govern planting, replanting, management or related activities. The paper proposes using licence conditions to support resilient forest design near electricity corridors.
Forest owner	The person or entity responsible for the ownership and management of a forest.
Future forestry	New planting (afforestation) and subsequent rotations (replanting) where corridor and resilience requirements can be incorporated into licence conditions from the outset.
High Voltage (HV) or Transmission	Higher-voltage electricity infrastructure, including 110 kV, 220 kV and 400 kV network assets referenced in the paper's forestry exposure analysis.
Legacy forestry	Existing forestry that was planted under earlier licensing or corridor arrangements and may now present a risk to overhead electricity infrastructure due to age, height, location or site conditions.
Medium Voltage (MV)	The medium-voltage electricity network, including 10 kV and 20 kV overhead lines. These circuits are a key focus of the proposal because of their exposure to forestry-related storm disruption.
National windthrow risk model	A proposed national model to assess the probability of windthrow based on factors such as tree height, soil type, wind zone, altitude, thinning regime and other site characteristics. The model would help identify where intervention is required.
Network risk arising from windthrow	The risk of damage to electricity infrastructure, restricted access for inspection or repairs, or interruption of supply resulting from windthrow. This is distinct from the likelihood of windthrow occurring in a forest stand.
Overhead line	Electricity infrastructure carried above ground on poles or towers. The paper focuses on overhead lines located beside or within commercial forestry, where falling trees can cause damage and prolonged outages.

Term	Explanation
Proportionate intervention	Targeted action limited to what is reasonably necessary to address a specific risk. Under the proposal, ESB intervention would occur only where necessary, including where an identified material risk to the electricity network arising from windthrow remains or where the nature and/or urgency of the risk requires earlier intervention to protect the electricity network.
Replanting arrangements	Requirements that may arise under forestry licensing to re-establish forest following clearfelling. The paper proposes that replanting should incorporate resilient forest design.
Resilience Corridor	A corridor design that combines an unplanted Safety Zone for the electricity network and an adjacent Resilient Zone planted or managed with lower windthrow-risk species and appropriate silvicultural practices, designed to reduce windthrow risk while supporting forestry, biodiversity and environmental objectives.
Resilient Zone	An area beside the Safety Zone planted or managed with lower windthrow-risk species and appropriate silvicultural practices. Its purpose is to act as a buffer between the overhead line and higher-risk commercial conifer planting.
"Right Tree in the Right Place" principle	A forestry design principle that matches tree species to the location, site conditions and long-term management objectives. In this paper, it means selecting species near electricity infrastructure that reduce windthrow and network resilience risks.
Safety Zone	The unplanted corridor immediately around an overhead electricity line. The paper refers to a 20-metre statutory safety zone as the minimum area required to support safe operation, inspection, maintenance and access.
Silvicultural practices	Forest management factors that influence how trees grow and how stable a stand is. Examples include thinning, rotation length, drainage and ground preparation.
Sitka spruce	A productive commercial conifer species widely used in Irish forestry. The paper notes that Sitka spruce can become vulnerable to windthrow in certain conditions, particularly as trees increase in height.
Stand	A group of trees growing together in a defined area and generally managed as a unit. Windthrow risk is commonly assessed at stand level because tree height, exposure, soil and management practices vary between stands.
Storm resilience	The ability of infrastructure and land management systems to withstand, respond to and recover from severe weather events. The paper's central objective is to improve storm resilience for communities supplied by overhead electricity networks.
Terminal height	The height at which a stand is expected to become highly unstable or unsuitable for continued growth due to windthrow risk. The table in Appendix B compares terminal height across windthrow hazard classes and thinning systems.
Thinning	The removal of selected trees from a stand to manage growth, quality or spacing. Thinning can influence windthrow risk by opening the canopy and increasing exposure within the stand.
Top height	A measure of the height of the dominant trees in a stand. It is a key factor in windthrow risk assessment because taller trees are generally more exposed and may have a greater falling distance.

Term	Explanation
Vegetation management	The inspection, cutting, clearing or management of vegetation near electricity infrastructure to protect public safety and network reliability.
Wind zone	A geographic classification that reflects exposure to wind. Wind zone is relevant to windthrow risk because stands in more exposed locations face higher wind loading.
Windthrow	The uprooting or blowing over of trees by strong winds. Windthrow is a core risk addressed by the proposal because fallen trees can damage overhead lines, delay repairs and cause prolonged customer outages.
Windthrow Hazard Class	A classification used to describe relative windthrow risk. The paper references six classes, with Class 1 being least hazardous and Class 6 being most hazardous.



ESB Networks
Leopardstown Road
Dublin 18
D18XN80

Tel 1800 372 757 or +353 21 2386555
Email esbnetworks@esb.ie

esbnetworks.ie