EirGrid Policy

Policy on Wind Turbine Clearance to OHL's Rev 1

Background

Commercial wind turbines absorb energy from the wind and this has the effect of reducing the wind speed in their wake. Conductors on overhead transmission lines are susceptible to damage from vibration initiated by wind, in particular at low wind speeds. EirGrid's policy reduces the likelihood of premature wear on conductors and fittings as a result of this arrangement which, if uncontrolled, may lead to a significant reduction in asset life, increased maintenance, unplanned outages or ultimately conductor failure.

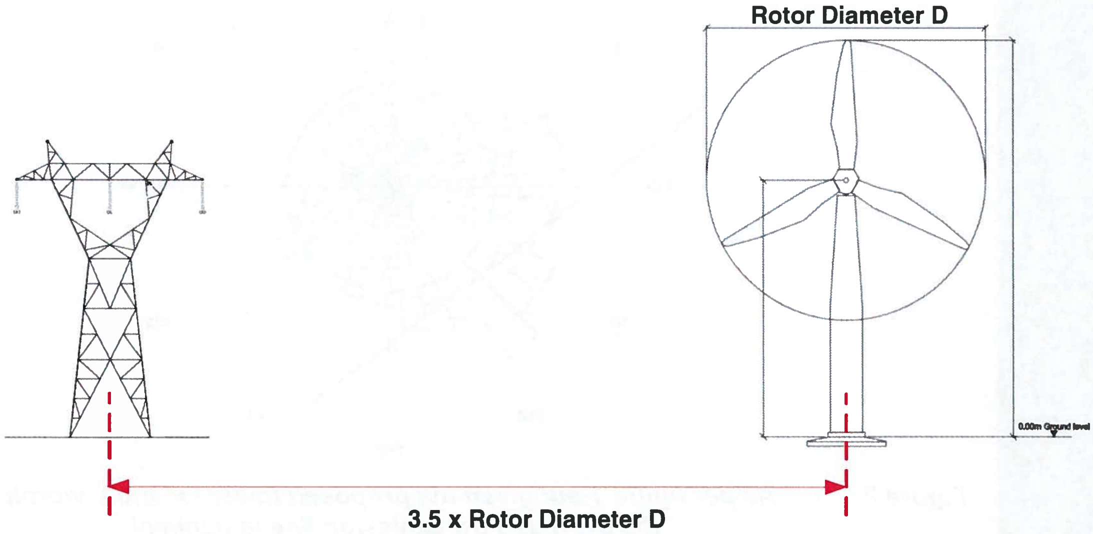
Policy

EirGrid's current policy, based on international experience, is that the distance between an overhead transmission line (110kV, 220kV or 400kV) and a commercial wind turbine should not be less than three and a half rotor diameters unless EirGrid have risk assessed and approved a reduction in clearance, as shown in Figure 1 and Figure 2.

Minimum clearance for all turbines and overhead transmission lines shall be falling distance plus flashover distance for the relevant voltage. Falling distance shall be measured from the turbine foundation edge.

Flashover distance at 110kV = 1.1m
Flashover distance at 220kV = 2.4m
Flashover distance at 400kV = 4.1m

The distance between a wind turbine and an overhead transmission line shall be measured horizontally from the closest point on the centre-line of the overhead transmission line (not the tower locations) to the centre-line of the turbine body.



Small and Micro Wind Turbines are covered in the Planning and Development Regulations 2008.

Risk Assessments

The risk of damage to overhead transmission lines depends on the line/turbines relationship with the wind rose from each site and so a full assessment should be made. Developers proposing turbines within 3.5 x D of an overhead transmission line should submit to EirGrid wind roses for proposed turbine locations so a risk assessment can be performed.

Wind roses should be based on a minimum of 12 months measured data.

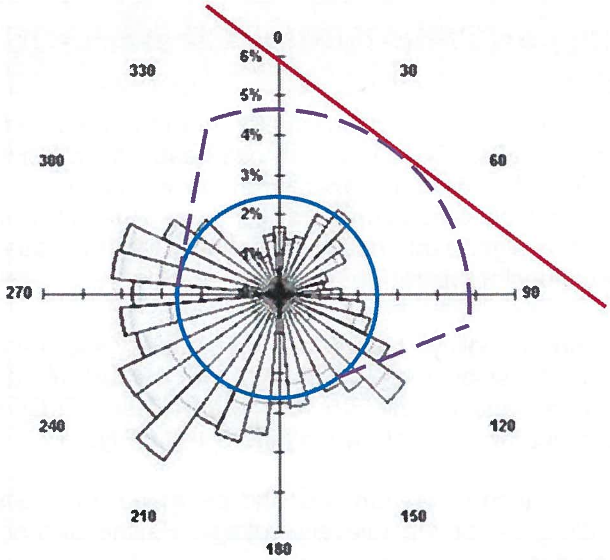


Figure 1: ***The prevailing wind is from the South West. The line, shown in red, requires a clearance as depicted by the purple arc in this example. The blue circle represents the minimum clearance i.e. falling distance (measured from turbine foundation edge) plus flashover distance.***

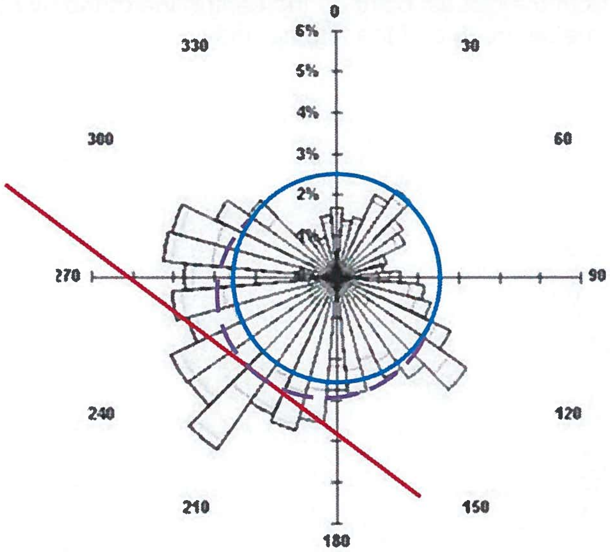


Figure 2: ***As per figure 1 but given the proposed tower location, vibrational impact on the overhead transmission line is minimal.***

Who this applies to:	**Pre Planning Submission:** All projects at the pre planning submission stage should engage with EirGrid if their plans include turbines within 3.5 x D of an existing or proposed overhead transmission line. **Mid Planning Submission*:** Developers of projects currently being considered by the planning authorities and where the clearance distances set out in this policy are applicable, should engage with EirGrid at the earliest opportunity. (*This clause is only applicable at date of publication – July 2014)

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	Post Planning Permission: This policy does not apply to wind turbines with planning permission in place or already constructed on the date of publication. Where the clearance distances set out in this policy are applicable, developers should engage with EirGrid at the earliest opportunity.
Derogation	Derogation requests from this policy will be by exception and will follow the derogation policy issue 1 (internal document, signed May 2013).

Revision History

Revision	Date	Description	Originator	Approvers
R0	Dec 2012	First issue drafted as a guidance document.	Paul Moran	Christy Kelleher Andrew Cooke
R1	July 2014	Second issue post stakeholder consultations. Risk assessment included.	Paul Moran	Liam Ryan Claire Kane John Fitzgerald

Sign-Off

Prepared by: Paul Moran TEM Consultant Engineer	**Date:** 1st July 2014.
Approved by: Liam Ryan TEM Manager	**Date:** 2/7/2014
Claire Kane Services and Policy Manager	**Date:** 2/7/2014
John Fitzgerald GD Director	**Date:** 3/7/14

Worked Example 1 – Minimum Falling Distance Calculation

- The turbine is much higher than the conductors and so the distance will be to the closest horizontal position of the conductors at maximum electrical sag or with a galloping ellipse due to rime or wet snow icing.
- The centre of the circular envelope will be the conductor position at worst case scenario (45° angle swing) from the crossarm support i.e. the typical 12m sag plus 2.5m insulator length.
- This gives a horizontal distance from the crossarm support position of 14.5 sin 45°plus the envelope radius of 6m plus a 3.1m flashover distance at 400kV.
- This totals 10.25+6+3.1=19.35m. Plus crossarm length = 30m approx. for a 400kV tower.

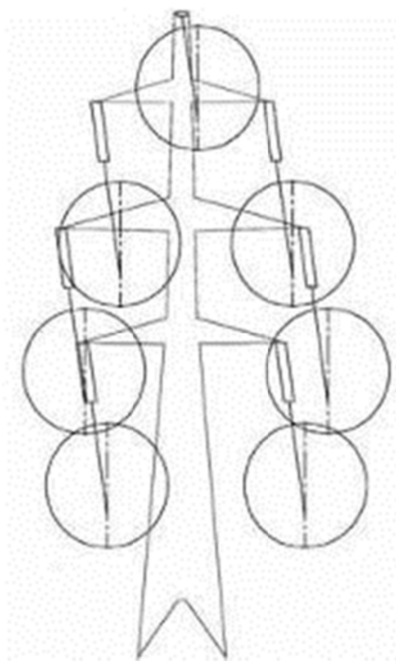

Figure 3: Conductor Swing

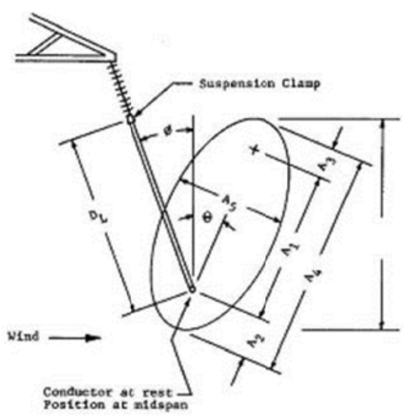

Figure 4: Conductor Swing

Figure 5: Fallen Turbine

Worked Example 1

Minimum Falling Distance Calculation

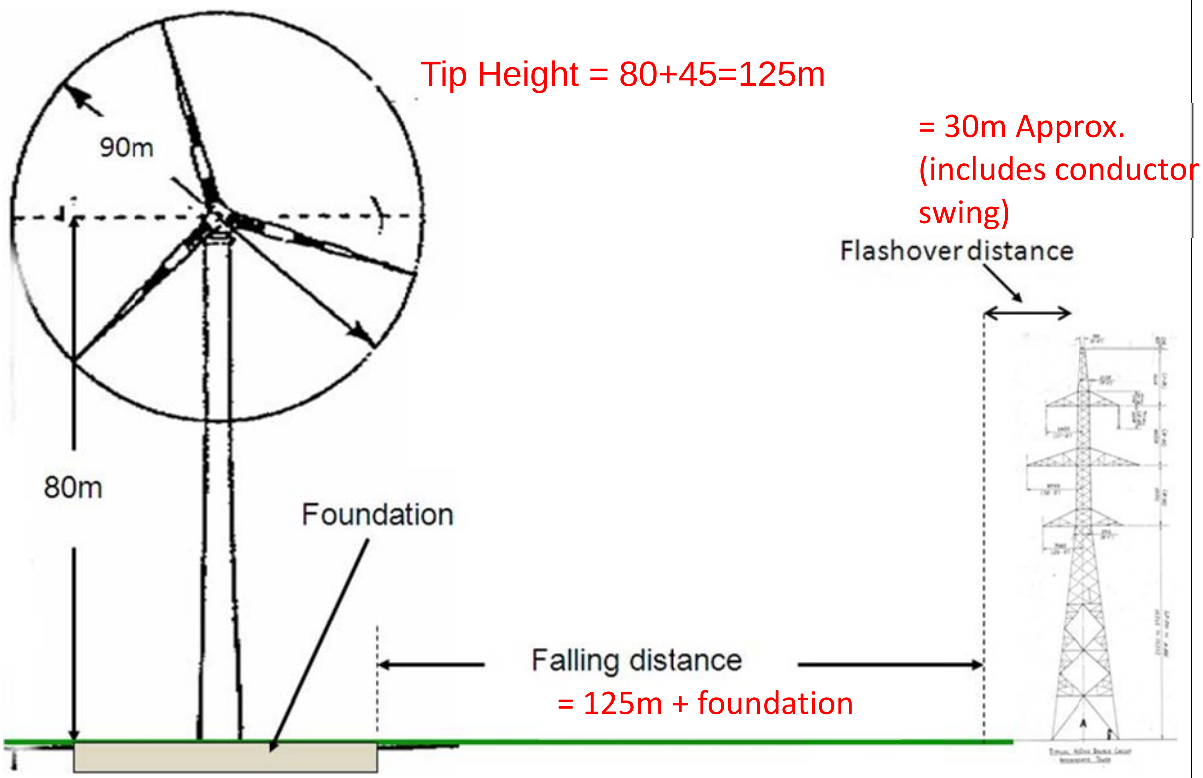

Figure 6: Worked Example 1

The calculation for **figure 6** is as follows for a typical 400kV single circuit lattice tower with a crossarm length of 9.5m:

11m to foundation edge + 125m falling distance (turbine tip height) + flashover & swing distance (10.25+6+3.1+9.5) = **153.85m Minimum**

Worked Example 2

Minimum Falling Distance Calculation

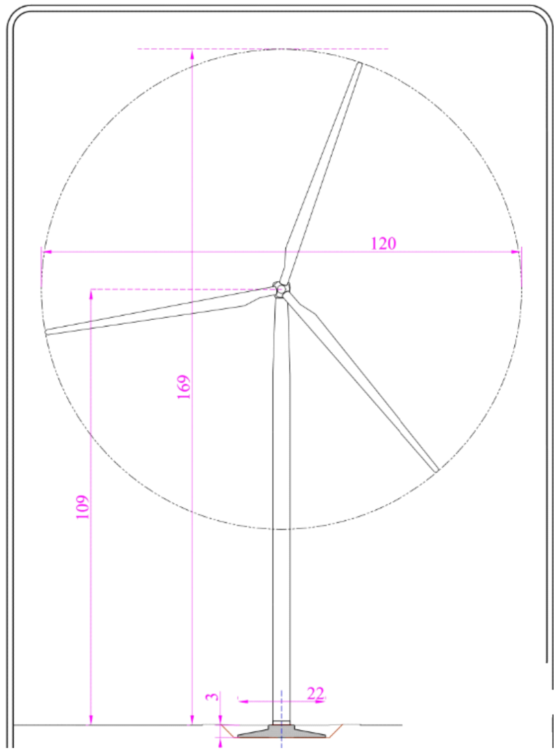

Figure 7: Worked Example 2

The calculation for **figure 7** is as follows for a typical 400kV single circuit lattice tower with a crossarm length of 9.5m:

11m to foundation edge + 169m falling distance (turbine tip height) + flashover & swing distance (10.25+6+3.1+9.5) = **208.85m Minimum**