

## LAND MANAGEMENT

### **SUSTAINABLE LAND**

### **Shelter Design for Hill Country Farms**

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#### ***Main Points***

The benefits of a well-designed shelter belt include erosion control, animal and crop protection, building protection, and they are a potential source of timber. Because shelter belts can be expensive to establish, they need to be site correctly, especially on hill country

#### ***Research has shown:***

Sheltered areas are mainly governed by the height of the shelterbelt. Tall narrow belts are more efficient than wide ones. Shelter belts with 40 to 50% porosity reduce wind speeds over the greatest distances. Wind accelerates through gaps, around the ends of belts and over dense barriers.

To shelter the greatest area, shelter belts should be tall, permeable, unbroken and as long as possible. Two row designs using different species with different maturing ages can provide a continuity of shelter.

Careful establishment will promote good, even growth rates, and avoid losses leading to gaps. Silviculture can contribute to the effectiveness of the shelter, prolong the useful life of the belt, and add to the value of the trees at maturity.

#### ***Factors to Consider***

On hill country, the elements making up the landscape which influence microclimates need to be identified. These include:

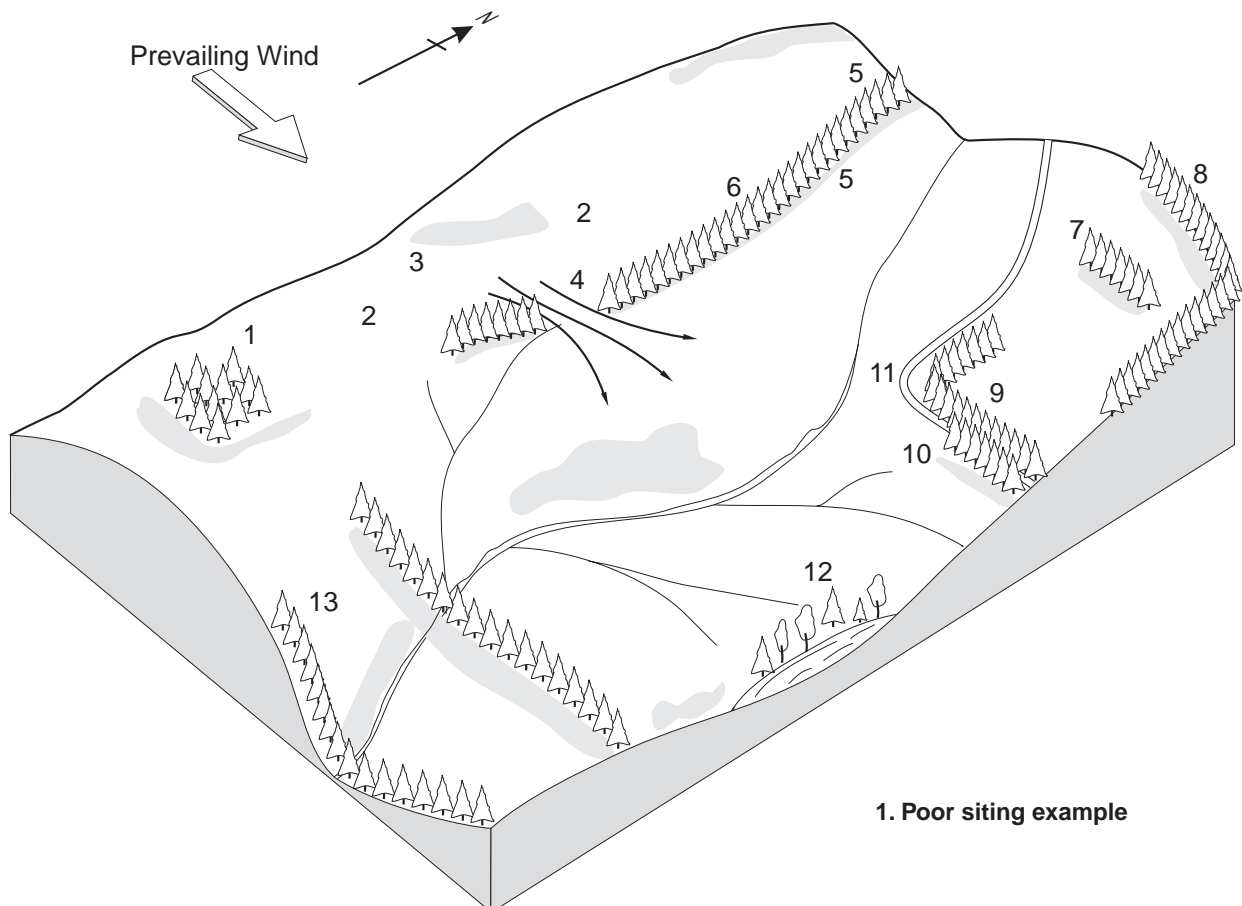
- topography – the slope gradient and land formations wetness and
- soils – geology, soil structure, deficiencies, capabilities
- climate – wind, rainfall, aspect, sunshine, temperatures, microclimates
- water – wet areas, wetlands, drainage patterns, stock water
- existing vegetation – remnant bush, existing shelter and woodlots
- views – into and out of the farm, landscape values
- access routes – vehicles, stock movement
- present land use – current management

## **Examples of good and poor siting of shelter belts**

### **Diagram One – Poor Siting**

1. Woodlots on or near the crests of a hill may use low productivity land but tree growth will be slow, and plantings could look terrible in the landscape.
2. Extensive areas without shade or shelter.
3. Saddles are especially windy areas.
4. Unnecessary gaps in shelter belts accelerate wind speeds.
5. Leeward mid slopes require minimum protection, so shelter here is not very valuable.
6. Shelter belts may interrupt cold air draining away, resulting in cold zones. However contour planting can help cultivation, and control run-off.

7. Short, poorly-oriented belts are of little value except for shade.
8. Planting here gives little value to this property, and offers no protection from the predominant wind.
9. Dense plantings of evergreens can shade the road, and may lead to wetness and icing problems.
10. Planting on both sides of a road is generally unnecessary, unless an avenue effect is required.
11. The vision of drivers is obscured by planting close to corners.
12. Ineffectual open windbreak of over-mature trees.
13. Dense east to west plantings give little shelter, but cast extensive shade on the southern side, and can cause cold air dams in frosty weather.

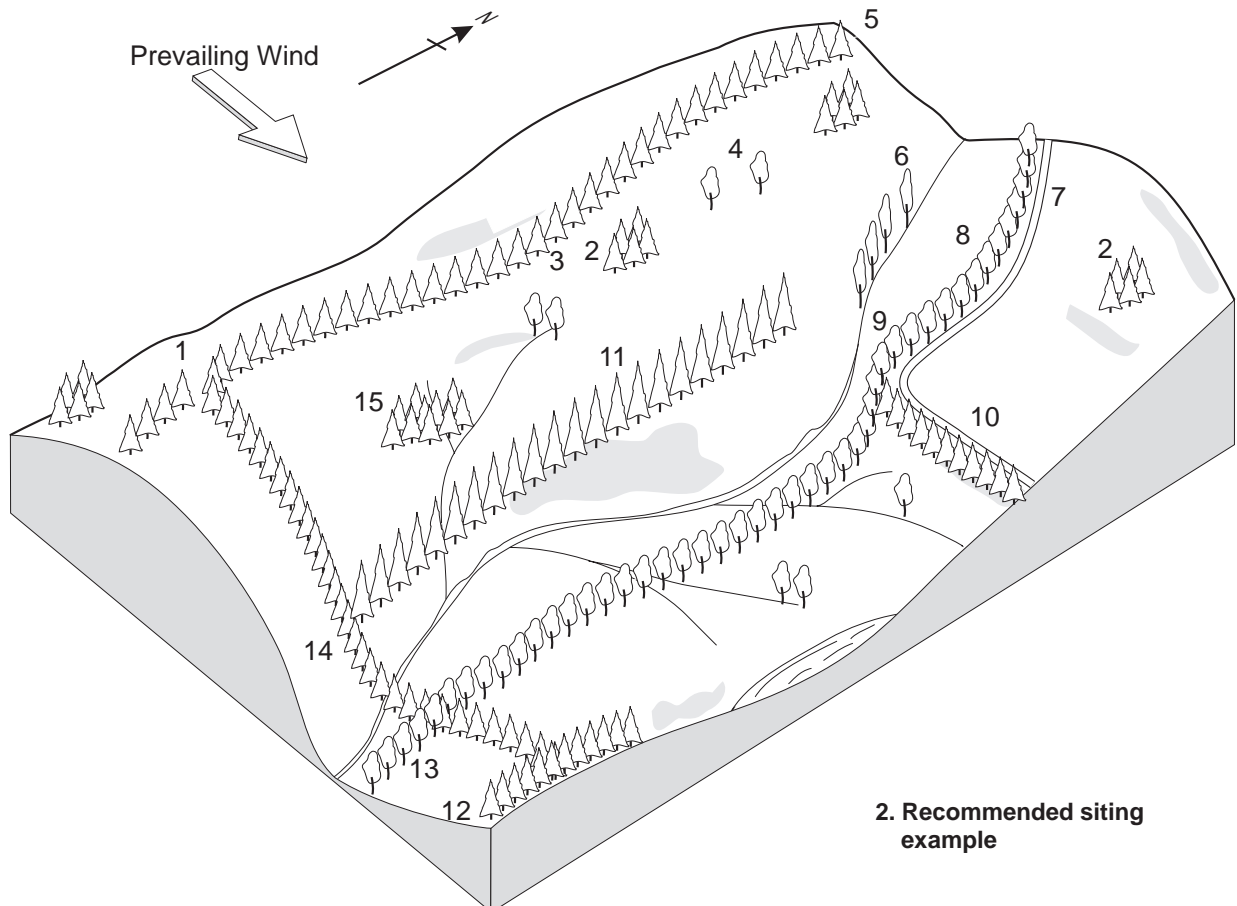


**1. Poor siting example**

Diagram Two – Recommended Siting for best shelter effects

1. Openings sheltered by screening or by making them oblique.
2. Small plantings like this on a lee slope can give areas of shelter in each paddock.
3. Shelter is very desirable in saddles.
4. Scattered shade trees in open areas.
5. Shelter belts near ridge crests where wind speeds are high. For landscape value, avoid the actual ridge crest.
6. Poplars or willows along streams also give useful shade.
7. Roadway sheltered from main winds by planting on western side.
8. Production loss close to plantings is minimised by using location beside roadway.
9. Trees on the outsides of bends warn drivers of changing road direction.
10. East to west shelter could be a deciduous belt or evergreen belt of medium density to reduce shading.

11. Tall shelter is concentrated in the most productive areas.
12. This planting may be valuable if southeast winds are particularly cold.
13. Bare stemmed species such as eucalypts are often supplemented with a shrubby second row.
14. Deciduous trees minimise cold air building up in frosty weather, and don't cast excessive shade in winter. Closely planted, they can give shelter even when leaves are absent.
15. Woodlots on sites favourable for tree growth give more produce for less outlay than ones planted on hill tops.



**2. Recommended siting example**

**For further information**

For further information on shelter design for hill country farms, ask for the other titles in this series or contact Hawke's Bay Regional Council Land Management staff for advice.

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