Finding a site

National Curriculum

Geography- understanding of places, application of geographical skills, patterns and processes.

Teacher's Notes

This activity is based on the day to day work that goes on at RES to identify suitable sites for wind farms. Either a landowner approaches RES and suggests he has a good site for a wind farm, or RES carries out a mapping study to find potential sites and approaches the landowner. We take wind measurements usually for at least a year and this gives us the average wind speed, prevailing wind direction and other wind patterns. In the past the Beaufort scale was used to measure and describe wind speeds. We tend to measure wind speeds more accurately today using an anemometer or a meteorological mast. The speed of the wind is measured in meters per second (m/s).

Once it is established that the wind speeds are adequate then we undertake an Environmental Impact Assessment (EIA).

We survey:

- Hydrology- turbines should not interfere with surface or underground watercourses (during construction sediment can be transferred if drainage is not designed properly; or increased hardstanding can increase the run-off rates)
- Landscape – the views in particular from designated areas such as National Parks or Areas of Outstanding Natural Beauty (AONB) need to be considered, as do the views from residential areas. 'Photomontages' are produced to show how the turbines would look from various locations.
- Ecology – identifying any impacts to animals and plants especially protected species such as bats, dormice, Great Crested Newts etc. Impacts assessed include loss of habitat – if this occurs animals might not have anywhere else to go; displacement – construction works or operating turbines might disturb animals and they may need to find another home; collision – e.g. birds / bats with turbines, newts being hit by vehicles.
- Geology of the site – peat, substrate type e.g. granite, sandstone or limestone.
- Socio-economic – like proximity of homes, potential for shadow flicker or nuisance. Turbines should be at least 0.5km from the nearest house, but the distance is typically 800m for modern turbines. Shadow flicker can be modelled and controlled by switching a turbine off if necessary at certain times of day.
- Bridle paths – turbines should be 200m away; footpaths – turbines should not be placed close to roads – turbines should be more than tip height (height to tip of the blades) away.
- Noise – modelling the potential increase in background noise levels to see how it could affect people living near a wind farm.

- Planning considerations – local council policies and designated land such as Sites of Special Scientific Interest (SSSI), Local and National Nature Reserves (LNR.NNR) where development is prohibited or restricted.
- Communication links – such as mobile phone mast signals, TV and radio signals and aviation radar.
- Archaeology & Cultural Heritage – like Scheduled Ancient Monuments (SAMs), nearby historical buildings, etc. May or may not build here depending on the 'setting' of the feature and the setback distance of the wind farm. Need to also consider sightlines between features.
- Transport and Access – we may need council approval for widening roads, constructing new bridges, etc, but also for the delivery route to avoid traffic jams or the need to close off roads. Blades are delivered to site whole and modern blades are about 45m in length.
- Grid Connection – where is the nearest substation and how easily could the electricity, once produced, be connected to the grid.

An Environmental Statement (ES) reports on the findings of these studies and consultations with various bodies such as the Local Authorities, Natural England, Environment Agency, MoD, Civil Aviation Authority, Ofcom, and the local community. This ES is then included in the planning submission for consent to construct the wind farm.

Aim
Students consider what a good wind farm site needs, and how it might affect the surrounding environment – ie the criteria a company like RES uses in its Environmental Impact Assessments.

Resources
Copies of the two contrasting maps (1 set for each group), set of cards on page 5 and 6 (1 for each group. These cards could be laminated and cut out for re-use)

Timing
1.5 to 2 hours

Outcomes
Each student will begin to understand the constraints placed on building onshore wind farms in the UK.

Task
Divide the class into groups of 3-5 students. Cut up one set of discussion cards for each group. Then set up the task up as follows:

i) Each group works for a company that develops wind farms. The students begin by considering the discussion cards and discussing with their group which factors are advantages on a site for building a wind farm, and which are disadvantages. They sort them into two piles.
ii) Each group has been approached by two landowners, suggesting they have a good site for a wind farm. The students then look at the two site maps. They discuss with their groups the pros and cons of each site.
iii) The company's board wants to know whether they should invest in either site. The students must present their findings to their board (teacher) and recommend which one they think would be best and explain why.
iv) Which group do you give an annual bonus to for good work done?

(For those who cannot imagine how fast 7 or 8 m/s is....
to convert meters per second into miles per hour, multiply by 2.24, so 7m/s is the same as 15.68mph – see also the Beaufort Scale below)

Answers

Site A: (Tydd St Mary's Marsh)

Advantages	Disadvantages
Good average wind speed	Proximity to small town, Sutton Bridge, and the villages of Tydd St Mary and Tydd Gote may lead to issues of visual impact, shadow flicker and noise
Access for any heavy machinery via road	Careful survey required of drainage as marsh land.
Good access for turbines via river or road	Setting turbines more than 0.5km from dwellings could be a problem
Power station nearby ensures local connection to grid (ie substation)	
Power station nearby suggests local population will understand the need to generate electricity.	
No woodland close to site to interfere with wind	
Flat site	

Site B (Kelburn)

Advantages	Disadvantages
Good average wind speed	Proximity to Country Centre
High winds likely due to steep hill	Road access via Raven's Craig Glen would need straightening
Good access for turbines and machinery to be transported via A class road (Fairly straight)	Cumulative effects with other wind farm – together the two projects might be considered too big?
No obstacles to wind from prevailing wind direction.	
Wind farm already to the south	
Easy link to substation and power lines	
Road access via Raven's Craig Glen	

Bridleways/paths	Access to a power station nearby
River access	Easy power grid connection
Aviation/Radar interference	Possibility of site flooding
Sharp bends in the roads leading to the site	Wind turbulence increased by trees or buildings nearby
Proximity to residential housing	Soft Ground

Flat landscape	Places of archaeological interest
Good average wind speed (6m/s minimum)	Presence of protected species
High ground at site	**Straight roads** leading to site
Local/national Nature Reserve	More than 0.5km from nearest housing

Finding a Site: WORKSHEET

For this activity, you need to think about what a good wind farm site needs, and how it might affect the surrounding environment.

1. Look at the different landscape feature cards and discuss in your group which are advantages and disadvantages of a potential site for a wind farm. Separate them into 2 piles.

2. You work for RES and need to find a suitable site for a new wind farm. Look at the 2 maps you have been given, and focus on the areas outlined in red. These have been offered to RES by two landowners for wind farm development. Compare the two sites and discuss the advantages and disadvantages of both sites. Use the decision making grid provided if it helps.

3. On the basis of what you have noticed, prepare to present to your manager your decision on which site is preferable for a wind farm.

Fill in the grid with all the factors that you need to consider. Mark each factor out of 10 for Site A and Site B. (1 is poor, 10 is excellent). The site with the highest score should be the best – but are some factors more important than others?

Decision Making Grid

Factor	Site A	Site B
Access for turbine carrying vehicles	9	5
Good average wind speed (marked on the maps)		