Advice on
Wind turbines and equestrian access

The British Horse Society

This advice note relates to wind turbine installations and their effect on horses ridden or driven on public bridleways, byways, unsurfaced roads and commons with a right to ride – 'off-road access'. It does not comment on the effect on horses kept on premises for personal or commercial use, or on general purpose roads, although many of the points may be relevant.

The law and management of public access rights vary widely between the four countries of the United Kingdom. Practical elements of the following advice apply in all of them but the legal requirements in Scotland and Northern Ireland may differ from those in England and Wales.

Riders and drivers of horses are referred to generically as equestrians.

More advice is available on www.bhs.org.uk/accessadvice.

IMPORTANT This guidance is general and does not aim to cover every variation in circumstances. Where it is being relied upon, The Society strongly recommends seeking its advice specific to the site.

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Definitions

Equestrian route: includes all classes of highway available for public use with horses — bridleway, restricted bridleway, byway open to all traffic, unsurfaced roads ('green lanes'), general purpose road — commons with a right to ride and permitted routes (e.g. local authority rail trail or 'greenway').

Informal or non-definitive access: not recorded on a Definitive Map of public rights of way as a bridleway or byway, or List of Streets as a road.

Commercial turbine: as typically installed as part of a wind farm, from 90 to 150 metres tall, though taller turbines may be installed in future.

Microgeneration unit: single domestic, community or small business turbine.

BHS Policy January 2025

The BHS has updated its policy on wind turbines as wind farms and microgeneration units have become more common, so are more familiar to horses and equestrians, and with the experience that appropriate mitigation can reduce adverse reaction of horses.

The Society now recommends a separation distance of blade tip height plus 10% — 'fallover distance' or 'fallover' — between a commercial turbine and any route used with horses;[1] and a separation distance of twice tip height for microgeneration units. The greater distance for the micro units is because they are closer to the ground, with faster moving blades and more noise, and these factors may be the cause of horses reacting more than to commercial turbines. However, micro units are becoming more like small versions of commercial turbines, so the proposed model and its operational character should be considered.

The separation distance may not be appropriate in all situations, such as where land is undulating, and as turbines increase in height. Every site should be considered independently to assess all factors which affect the separation distance (below) and emphasis is placed on provision of alternative off-road routes for equestrians where existing bridleways, byways or minor roads are affected.

For a separation distance less than fallover (tip height plus 10%) to be considered for a specific site, there **must** be an alternative convenient **off-road** route available to equestrians which does maintain separation. That route may be a new or diverted restricted byway or bridleway, or a temporary route for the duration of the development.

If not a public bridleway or byway, provision of and maintenance of the route for the lifetime of the development must be a condition of the planning application, and enforced by the planning authority. Promises of informal access[2] are commonly not implemented or not maintained and the Society will not accept a non-bridleway/byway route without a binding commitment.

[1] Includes all classes of highway available for public use with horses — bridleway, restricted bridleway, byway open to all traffic, unsurfaced roads ('green lanes'), general purpose road — commons with a right to ride and permitted routes

[2] Defined by the Society as not recorded as bridleway or byway on a Definitive Map of Public Rights of Way

Why might horses react to turbines?

All horses are individual and react to circumstances and structures in different ways. They are flight animals whose instinct is to run from a perceived danger. Some will ignore turbines, others may show some initial apprehension, and some may instantly flee.

People with experience of horses will agree that anything from a leaf to a double decker bus can appear terrifying to horses at any time for no obvious reason, even being playful. Equally, horses over the centuries have proved adaptable as they have learned to accept gunshots, drums, trains, motorbikes, flags, umbrellas and many other inventions of daily life.

The BHS has received more reports of horses being undisturbed by turbines than of adverse reactions, and few where the horse's response was not eased with familiarity and sensitive handling, so do not assume that wind energy projects will have a negative effect on your horse or your access opportunities or business. Equestrians who believe their horses have reacted to wind turbines have assumed the source to have been noise, movement or shadows.

There is a difference between large commercial turbines and single microgeneration units. The latter may be more likely to cause a reaction, perhaps because the blades are closer to the ground, may move faster, and make more noise.

Noise and movement

Horses are more likely to react to unusual noises and sudden movements. The rhythmical normal movement of turbine blades, which is slow for commercial turbines even in windy conditions, are less likely to be perceived as a threat, though microgeneration units are more of a problem being much faster and noisier.[3]

Blades which start to turn while in a horse's sight might provoke more reaction than turbines which are already moving as a horse approaches them, but start-up movement of commercial turbines is gradual, and will not affect most horses. Microgeneration units may start more quickly so could be more alarming and the speed and noise of start up would be factors to check in proposals for a microgeneration unit installation.

Horses' vision allows them to see to a certain extent behind them, so they may be disturbed by something a rider or handler has not noticed. If a horse is on ground higher than the turbine so the blade movement appears to be at ground level, whether in front or behind, this might be seen as more of a threat by some horses.

Large turbines will adjust to changes in wind speed and direction slowly which will not be apparent unless watching closely. The smaller turbines that work with a tail fin can move

[3] This is becoming less of an issue as micro turbines improve, so always consider the age and model and its character in operation

more quickly, which is more evident in fitful gusting wind conditions, when they may appear noisier. However, although the quicker movement and sound are more likely to startle a horse, they are less than other hazards in windy conditions such as flapping plastic or flying litter. A horse rider or driver out in such conditions is likely to know the location of a micro-turbine and plan their route accordingly, as they would consider other hazards which are increased in wind.

Horses have a greater range of hearing than humans, especially for higher pitched sounds, and they also hear sounds from further away because the large cup shape of the external ear enables them to pick up sound that the small flat human ear will miss. However, they are not good at locating the source of a sound and this may be the cause of some unexpected reactions, because if a horse hears a threatening noise, looks in what they think is the right direction and do not see a source, they may simply run in the opposite direction, which may not be what a rider or handler is expecting.

The type of noise produced by large turbines may not be easy for some horses to pinpoint and the sound of the blades through air, which humans know is unthreatening, might sound soft and stealthy to a horse, the type of sound made by a creeping predator, from which a horse has a strong instinct to run.

Different sounds from several directions when among a group of commercial turbines could be the source of some horses' distress as it will not be easy to identify the source of a sound and whether it is a threat.

Noise changes with distance and angle from the turbines, speed of rotation and ambient noise. On a calm day, the ambient noise will be less, and the turbines may be more audible; on windier days, the ambient noise may be greater than that of the turbines. The latest commercial turbines have lower noise generation than older models, so the implications of noise should not be judged on past levels, except by applying safeguards against noise levels increasing with ageing components. This also applies to microgeneration units with improved technology, though they may still be noisier, faster and closer to horses than commercial units.

Shadows

In sunshine, the turbine blades will cast a shadow on the ground of varying distance depending on the time of day and year. Shadows are longest early in the day and during the evening when the sun is at its lowest. Some horses may hesitate if the shadows extend across their path, especially if the shadow is moving towards them. Some horses ignore the shadows, but others may perceive them as a threat, especially if they are horses who are also troubled by conditions such as long grass being rippled by the wind. Moving shadows may seem more threatening to some horses when they fall on a hard surface than on vegetation, perhaps because their shape and movement is more obvious. Turbines positioned north of a route will not cast shadows over it unless close, so this is a consideration for mitigation of impact of turbines, even if it means diverting a bridleway or byway.

Shadows in summer light will be most obvious but will not extend far from the turbine because of the angle of the sun, so although in winter and early or late light, the shadow may reach a horse's path, it will be less obvious.

Factors affecting separation distance

Reminder of BHS Policy (see page 1)

The Society recommends (January 2025) a minimum separation distance of blade tip height plus 10% — 'fallover distance' or 'fallover' — between a commercial turbine, one of multiple on site, and any route used with horses;[4] and a separation distance of twice tip height for microgeneration units.

All factors which affect the separation distance (below) should be considered.

Factors which affect the separation distance

- Availability of alternative routes and their desirability compared with the affected route. An assessment of routes and use patterns in the location may be needed. The fewer alternatives available, the more the impact on the affected route should be mitigated by increasing separation distances or providing an alternative route for the duration of the development.
- The number of turbines and their location relative to the route:
    - One turbine is easier to cope with than many: the more turbines encountered along a route, potentially the greater the risk.
    - Turbines to one side only create an easier situation than to both sides.
    - Several turbines to both sides of a route mean that the longer the corridor, the greater the risk.
    - Clear ahead or clear behind is better than turbines visible both in front and behind at the same time. A horse has nearly 350 degree vision and may react to a threat from behind that their rider has not seen.
    - Location north of a route is better than south as it will not cast shadows across the route. Turbines both east and west of a north-south route is the worst situation for incidence of shadows at any time of day. However, on some sites this instance may be occasional, and it may be feasible for a turbine to be turned off in such circumstances but able to generate at all other times

[4] Includes all classes of highway available for public use with horses — bridleway, restricted bridleway, byway open to all traffic, unsurfaced roads ('green lanes'), general purpose road — commons with a right to ride and permitted routes

- Other hazards on the route so that the addition of turbines to existing hazards creates an unreasonable situation, because a horse reacting to a turbine will move away from it, which could increase the risk of other hazards present, such as a deep ditch or barbed wire fence to the side, gates, reduced width or uneven ground. This is also true for turbines near a road, where an equestrian on the road is contending with motor traffic and a horse's response to the turbine might affect other road users.
- Undulating ground which alters the height at which moving blades are in view is different from flat ground where all movement is well above eye level from any approach.
- Encountering a moving turbine at close quarters because it was obscured on approach by a hill, wood or building is a greater risk than approaching a turbine clearly in view from several hundred metres.

Depending on local variation caused by prevailing wind and day length, the separation distance to avoid shadows will be greater where a turbine is south of a route, between west southwest and east southeast of a horse's position on the route.

Provision of alternative routes or improvement of existing facilities may reduce the impact of a wind farm, for example if a path can be provided off-road so that equestrians are not coping with traffic and slippery tarmac as well as potential response to turbines. Even if the separation distance between the turbines and the alternative route is less than to the road, it may be preferable and safer for some users.

Anemometers should be separated from an equestrian route by fallover distance. Cables must not cross an equestrian route, including during erection of the mast. Their ground points should be at least 3m from an unfenced equestrian route and cables should be wrapped or sleeved to a height of 1.5m to increase their visibility to a loose horse.

Access for construction purposes should avoid bridleways or byways as it is incompatible with public use of the highway and routes should not be closed to equestrians to facilitate construction, there are too few off-road routes available. Alternative routes for construction traffic will be required, or alternative routes for use with horses throughout the construction period.

Commercial developments take several months from the start of construction to commissioning so there are many opportunities for horses to become accustomed to the new structures by degrees during the process: first the changes to the site, then the towers being erected, then with blades but static, then moving slowly while tests are made. With attention during the planning process, all these stages can be advertised to local equestrians, through a website or notices on site and at livery yards, or continued liaison with the project manager.

With microgeneration projects, the period from preparing the site to the turbine working is much shorter, sometimes accomplished within a day, which makes it more difficult to

expose a horse to them gradually. However, like commercial installations, liaison should make it feasible for horses to become accustomed to the static turbine before it starts generating.

For both a commercial or domestic development, if there is felt to be a risk from a new turbine while on roads, a bridleway or byway, it may be possible to liaise with the developer, the landowner or an adjacent landowner for a 'familiarisation day' promoted locally, when horses can be accommodated in a field close by to experience the turbines (perhaps static, then turning very slowly, then in normal operation) while in an environment that is safer than a public highway (including bridleways and byways).

Ensure that:

- The authority's Access or Rights of Way Officer is aware of the application and the potential effect on equestrian routes.
- Local equestrians are aware of and involved in meeting and discussing plans with the developer.

Although equestrians may be understandably apprehensive about taking their horses near wind turbines, wind farms can provide welcome opportunities for off-road riding and driving where none previously existed and many developments provide an excellent opportunity for increasing or improving local access.

Mitigation

There are several actions which may benefit riders and carriage drivers or reduce the effect of turbines on them. They include:

- Provision of new definitive or permitted routes or improvement of existing routes in the locality to provide alternatives for those at risk for the duration of the wind energy project.
- Diversion of routes to a greater distance or with increased sightlines to avoid suddenly coming upon turbines within 200m.
- Consideration of potential impact on riders and carriage drivers should they be unable to continue using a route because of turbines, such as availability of alternative routes in the immediate vicinity.
- Consideration of the nature of the route in terms of space for a horse to shy, spin, jump or be manoeuvred on firm level ground; proximity of and access to roads if a horse were to bolt out of control.

On many developments it can be identified that a limited number of turbines will affect an equestrian route with over-sail or shadows under specific conditions. It is possible to model those conditions and to programme those turbines to switch off to abate the nuisance for the short periods when it will occur.

- Notification to equestrians of certain days during construction most likely to be a hazard, for instance concrete pouring creates many vehicle movements during a short period of time.
- Restriction of construction and construction traffic to 8am-6pm weekdays only so that routes can still be used during the construction period at the times of highest demand for equestrians at all seasons other than mid-winter.
- Notification of when turbine blades will be static, prior to commissioning, so that equestrians can familiarise horses by degree.
- Notification after commissioning of test days throughout the life of the turbine(s) which may produce increased or unusual noise or speed.
- Familiarisation days organised on site.
- Strategic hedge management to shield an equestrian route from the effect of moving shadows on a path or blades at eye level (this will be site-specific to location of turbine below ground level of the route).

Smaller turbines have greater potential for sudden movement as they adjust to wind speed or direction, which may be perceived by some horses as threatening but this is less with current models than in the past.

This guidance does not apply in Scotland, for which the BHS produces separate guidance. Variation in the two documents arises from different law relating to access and to patterns of land use between the countries.

Familiarising a horse

As with many hazards, a horse's reaction may be to its rider or driver, who is anticipating a response, rather than to the hazard itself, so it is important to ride or drive positively and confidently while remaining sensitive to a horse's response. By keeping calm and relaxed, and quietly reassuring the horse, a rider or driver can help minimise their reaction, as in any other situation. Horses are sensitive to their handler's emotions and can be unsettled by anticipation of an adverse reaction.

Horses are herd animals which find safety in numbers. This can be used to advantage in familiarising a horse with turbines. The same principles apply as introducing young horses to traffic; do it gradually, ideally in the company of an experienced horse. It may also be appropriate to consider involving a BHS coach, whether for a solo or group session on habituation.

Tips from equestrians who have ridden or driven among turbines include:

- Watch the horse's ears. A horse is most likely to run in the opposite direction from the ear that has turned towards what they think is the location of the sound. This may not be what a rider or driver perceives as the direction, especially as they

have additional information, such as knowing there is a turbine there. It may help to turn the horse in the direction of the turbine to help them identify the source of the noise.

- Different sounds from several directions when among a group of turbines could make it difficult for a horse to identify where a sound is coming from, and therefore to decide whether it is threatening. It may help to turn or circle so that the horse can check movement from all directions and relate the whole environment to the noise they are hearing. Circling can also help focus attention on you and your communication, rather than the environment.
- In certain conditions there may be a low hum. If a rider or driver thinks a horse will be upset by it, try talking or singing!
- The first time shadows across the route are likely, it may help to approach from a direction so that the shadows are moving away from the horse and are therefore less threatening. Whether this is possible will depend on the location of the turbines relative to the route, but initially it may be necessary to use the route as a training exercise, for habituation, rather than as part of a hack.
- Weather can change quickly, especially on high ground, with wind rising suddenly. If close to turbines, or even among many turbines on a large wind farm when the wind rises, although the movement or increase in movement of the blades will be gradual, the increase in sound from multiple directions may be unnerving for any horse, although it will be masked by the rising noise of the wind in trees, grass or fencing. The presence of turbines anywhere on a route means being alert to weather conditions and having alternative routes avoiding the wind farm if appropriate.

The BHS has run several training rides at Whitelee Wind Farm near East Kilbride in Scotland offering riders an opportunity to familiarise their horse with turbines under the expert guidance of Rhoda McVey, an experienced qualified BHS coach. A video of the event is available www.youtube.com/watch?v=b0O1hZdaihI. If there is a wind farm near you, it is possible that a similar familiarisation event could be arranged, if a local coach is willing. The Society will assist as far as possible.

What to do about new wind energy projects

Planning regulations may give local communities some control over wind farm developments and the Government's current guidance[5] refers to set back distances and mitigation, depending on local factors. Individual planning authorities may have their own policies on placement of turbines in relation to highways.[6] Equestrians should be aware that a bridleway, byway or minor road are all highways, not just trunk roads, and they

[5] UK government planning guidance on renewable and low carbon energy
[6] A bridleway or byway is a minor highway, and much of the same law applies as to a road

may need to ensure that the planning officer is also aware, and aware of the impact on equestrians, who are legitimate users of any highway except a footpath.

Equestrians who are concerned about proposals for a wind farm may seek support of the local community to modify or oppose the proposal. If community benefit is sought, then creation of new bridleways or restricted byways can be included in the agreement and as a condition of planning permission.

The British Horse Society is not a statutory consultee for planning applications even where a bridleway or byway is directly affected, so may not be aware of proposals.

A large commercial project will be known locally from earliest stages, but microgeneration projects may not, and it is not practical for most people to go through the weekly lists of applications issued by planning authorities. Parish councils will be informed of applications and, usually, large proposals well before application stage, so it may be feasible to find out if they are aware of any applications being considered where there is concern and ask to be informed.

The planning process may start with an application for a temporary anemometer, a device for measuring wind, which is likely to indicate interest in using the site for a wind project. An anemometer is a mast supported by four sets of cables. Cables should not cross a bridleway or byway, during or after construction. Their ground points should be at least 3m from an unfenced bridleway or byway and they should be wrapped or sleeved up to 1.5m height so they are easily visible.

If there are new wind energy projects in your area, become involved at an early stage of the planning process to ensure that effects on horses are reduced wherever possible, such as temporary closures and use of equestrian routes for construction, and any potential for improved access is explored. It is also possible to ensure that key activities are advertised during construction and through the life of the project (for instance, notification of days of high numbers of vehicle movements, such as when pouring concrete, and tests that incur unusual noise levels).

Traffic Management Plans are produced as part of a development proposal and contain critical information about vehicle movements, frequencies and times. It will be necessary to ensure that equestrian activity has been considered in the Plan.

With early involvement, new or alternative routes for horses can be gained as developers may be willing to provide increased equestrian access. This may include new definitive bridleways, permitted access, or enhancement of existing bridleways to make them more useful. Examples have included new bridges, light-controlled crossings and surface improvements. There is also a fund for any commercial development comprising a sum for each megawatt produced each year which is intended for the benefit of the community. Benefits through the fund could provide improved access, not just on the wind farm, but anywhere in the area covered by the fund.

Discussions with developers are of primary importance and should include riding clubs, bridleway groups, livery yards and other businesses with horses and any local equestrians. Social media has been used successfully to notify people and encourage their involvement at such meetings. The result can be many actions to assist equestrians through the design, build and operation of the site.

Horses are most likely to be frightened by blade and shadow movement or sudden noise, so a proposed development should be considered with these issues in mind. Check the proposal or planning application for:

- Locations of turbines relative to an equestrian route
- Length of blades and how close they will be to an equestrian route in any conditions
- Extent of shadows from the moving blades in any conditions

If any of this information has not been provided, the planning officer can be asked for details.

Turbines can be programmed to shut down under conditions which would affect a bridleway, whether over-sail, shadow-cast or ice-throw. This may be the solution on some sites where turbines are close to equestrian routes.

Large commercial developments with several turbines will have little scope for changing location of turbines unless the number on site is reduced, which may make the project unviable, and is likely to require strong evidence to substantiate it. At present, the evidence of adverse effect on horses is slight.

The site of a microgeneration unit will have been selected for optimum energy generation and may arise from a compromise so there could be scope for adjusting its location to reduce the effect on horses.

The area that will be affected by blades sailing over and moving shadows can be modelled and made available by the developer so that the effect on equestrian routes can be considered.

Common concerns about turbines

Some information in circulation about wind turbines causes alarm for equestrians, although some of it is misleading and many equestrians or horse owners find that their horses are not bothered by wind turbines when they do see them. It is always necessary to be alert with a horse in a public place, and aware that a horse may be disturbed by a wind turbine, just as it may react to common daily sights.

Here are answers to some common concerns about turbines and horses.

Soon there will be turbines all over the place and nowhere will be rideable any more

The existence of turbines does not make areas inaccessible to horses. With appropriate handling and training, many horses are not disturbed by turbines, although this will vary and some horses will be affected, just as some are more affected by many noises, movements, objects or conditions.

There are few sites in England that can accommodate wind farms of more than a few turbines because of the many constraints such as protected landscapes, flight paths, wireless transmissions, roads, communities, heritage, archaeology and ecology, all of which form a dense web of exclusion zones in most areas before even considering wind conditions and access to the national grid, which are crucial.

The size of current applications in England varies from three to twenty turbines depending on where in the country, although more than seven is increasingly rare except in northern England. It is unlikely that constraints leave space for larger numbers in the South or Midlands as many of those sites which can accommodate them are already going through the planning process or have been ruled out for other reasons.

Northern England, Scotland and Wales have sites where constraints leave a large enough area for more turbines and applications for sites with more than 20 turbines are common.

The potential for more microgeneration projects is greater but is still dependent on local factors which rule out many sites and planning authorities should be aware of the cumulative effect.

If one application is approved, there will be lots of others in the area

This is a valid concern, but it is a planning consideration, so each application will be judged on its merits and planning authorities should take account of the cumulative effect. In some areas it will be more significant for small wind systems, where if each property erects a single turbine, the effect will be equivalent to a wind farm; however, it is unlikely to occur. It is a consideration for commercial developments in northern England, Wales and Scotland where constraints do not rule it out; elsewhere, clusters are unlikely because the constraints leave few suitable sites in a locality where multiple projects would be feasible.

Construction traffic for wind farms will make roads in the area unsafe because of the number of vehicle movements and large vehicles

There will be construction traffic but, except on a large wind farm, it will usually be for short periods and restricted to normal working hours on weekdays, although there may be exceptions for delivery of large parts at any time, especially if transported overnight.

If sections of road are of concern, for example between two bridleways, crossing points, or close to livery yards or riding schools, they can be drawn to the developer's attention if

equestrians are involved during the planning process. Drivers can then be made aware of the increased risk and additional safety precautions undertaken, or temporary alternative routes put in place.

It is against a developer's interest for incidents to occur and the project manager will collaborate with communities and local authorities on the best means of notification of works commencing and delivery hours. However, what one group would prefer on delivery may conflict with another, such as avoiding school runs but also avoiding riding times, so compromise will be necessary. A Traffic Management Plan will be created during consultation with input from the planning authority and parish councils to facilitate road safety during construction. Equestrians should check with the planning authority for restrictions and working hours for construction traffic so that they can plan riding or driving accordingly.

The turbines will suddenly be erected without horses having time to get used to them

This can be true of domestic turbines and, unless equestrians know the landowner personally, it may be difficult to find out when the turbine will be erected. Commercial turbines are large machines and cannot be erected quickly and it is unlikely that local people will not be aware of the construction process and timetable.

For commercial developments, there is a testing period of months before the turbines are commissioned during which time there will be many days when the blades are static or moving so slowly as to be almost imperceptible. This is an ideal time for horses to be introduced to something new in their environment and, if equestrians raise the request during the planning process, the developer can agree to give notice of times when turbines are likely to be static. Equestrians can be advised by consulting a website, by staying in contact with the developer or with local liaison.

In windy weather the blades will be moving fast and scare horses

Commercial turbines have an optimum rotation speed for energy generation which is not exceeded even if the wind increases beyond that level because there is a limit on how fast the tip of the blade can move. Moderation is achieved by angling the turbine blades with increasing wind speed, so there is less surface area against the wind. The larger the blades, the more slowly they will rotate. In high winds (or ice-forming conditions), turbines may be turned off to avoid damage, but otherwise the speed of rotation in a strong wind will be the same as in a strong breeze once it has reached maximum revolutions. Once the optimum rotation speed is reached, sound from the turbines will be constant but will tend to be masked by the general noise created by wind. Most people find the speed calm and sedate.

Small domestic units may appear to be turning faster because the blades are much shorter. The settings for optimum generation may differ from those of larger turbines.

The blades will suddenly start turning when a horse is near a turbine, and it will be frightened by the sudden movement

Horses are most likely to be scared by sudden unexpected movements or noises. Normally a turbine will start rotating when wind speed reaches 3-5m/s at hub height and increase only gradually because wind speed does not suddenly jump from still to windy. Sudden gusts may be apparent at ground level, but this is influenced by many factors creating local turbulence. Turbines are sited to avoid air turbulence and wind conditions at hub height are quite different from those at base level. This is also true of wind direction and large turbines will move slowly to accommodate a change in wind direction.

If a turbine has been shut down for any reason, it will not be put back into operation during windy conditions because of the strain on the machine; it will be re-started at low wind speeds and will take several revolutions to reach operating speed. However, the sound made as a turbine starts moving may be more spasmodic and could be more disturbing to some horses than when in full operation.

Riders and carriage drivers should be aware that static turbines may start up without obvious reason, but movement will be gradual for commercial turbines, almost imperceptible. For microgeneration units, horses may react differently to turbines which start moving at close quarters than those which are in constant motion. Turbines which start to turn behind a horse may also provoke a reaction.

Microgeneration turbines will adjust more quickly to variation in wind speed or direction but will not change instantly from static to rotating at high speed.

Tests will cause the turbine to make unusual frightening noise

The BHS has received reports of safety checks which run the turbine at high speed producing a noise that may frighten horses. This is unlikely with current installations.

Turbines might break and frighten a horse or cause injury

There is the possibility of structural failure and there are incidents of a blade breaking or tower collapsing, but overall the wind energy industry has one of the best safety records of any energy industry and the risk of structural incidents is low, most likely during a storm when an equestrian is unlikely to be out, or would choose a lower risk environment. The risk from falling tree branches or roof tiles is much greater.

Ice will be thrown from blades quite a distance and may frighten a horse or cause injury

The possibility of ice forming and subsequently shedding, especially during a rapid thaw, is rare because modern turbines have mechanisms to both prevent ice forming and to prevent rotation while ice is on the blades. However, during adverse weather conditions, all riders and carriage drivers need to think carefully about the risk of ice shedding from turbines before riding near turbines or through a wind farm, taking account of proximity

of equestrian routes to turbines. Some wind farms flag up ice risk on their websites during winter months.

The movement of the blades will scare a horse

New commercial wind turbines are increasing in size because taller turbines are more efficient so fewer are needed to generate more electricity and although visually the turbine may be more noticeable, fewer mean that noise and potential effects on equestrian access are likely to be reduced. From observation it appears that probably horses' vision, like humans, does not really take account of the height beyond the top of the tower and that the sweep area is not registered; it is likely that the larger sweep will be less evident because the blade movement will appear to be slower.

Most horses appear unperturbed, possibly because of the height of the movement and because the horse as a species does not have aerial predators so its senses are directed to ground dangers or to an animal dropping from a tree. Although the actual sweep of the blades covers a large area, it is not one that is immediately apparent even to humans, and most horses do not seem disturbed by it.

Shadows cast by the blades will appear to be animals or snakes dashing towards the horse

From birth, horses become accustomed to moving shadows cast by clouds, passing birds, themselves, people or other animals. Movement of shadows over the ground will be slower than many other moving shadows they will encounter. Although the rhythmic shadow movement from a turbine is not natural, a horse may be as likely to ignore it as to react to it.

There are horses that are troubled by movement at ground level, such as wind through long grass, and they may respond similarly to a shadow of a turbine blade, but such sensitivities are probably already known to the rider or driver and considered, perhaps taking advantage of familiarisation days in a safer environment.

Any turbine north of a route will not cast shadows towards horses on the route. The incidence of shadow cast over a route can be predicted and defined for time of year, time of day and wind direction. Domestic turbines with shorter blades will not cast shadows very far from the turbine.

Shadow flicker through trees or hedges will scare horses

Shadow flicker is a term which often arises with reference to turbines and is frequently misused. Shadow flicker occurs within buildings where a turbine blade is passing between an opening, such as a window, and the sun. It does not affect bridleways or byways. The phenomenon is specific; it can be accurately predicted for a site and is a planning consideration. Because the phenomenon will only occur in certain conditions, the solution may be that the offending turbine is turned off in those conditions.

Shadows cast in strong sunlight can cause a flashing effect through spaced trees, like when passing at speed along a tree-lined road. This is not shadow flicker, but as with any shadow the effect will only be in certain conditions and within a distance about twice the blade tip height from the turbine. Beyond that distance, the shadow is diffused and less noticeable.

Flashes of light off the turning blades will distract horses, particularly when jumping or schooling

Commercial turbines have a non-reflecting finish on the blades and tower which is a manufacturing standard and can be a requirement of planning consent, so this phenomenon is unlikely. If it did occur, it would be unlikely to affect horses using public rights of way or roads as it would be like a flash of sunlight from any reflecting surfaces such as a car windscreen. Depending on its height, it could affect horses in a manège, particularly if jumping, or on a cross-country course, so should be considered for turbines close to an equestrian business. The periods when it could occur are few and could be defined.

Horses have more sensitive hearing than humans and will be disturbed by the noise

Noise from turbines is strictly controlled and well below noise from motor vehicles, farm machinery and many other commonly occurring noises which do not appear to disturb horses. Older turbines may produce more noise but can be turned off until remedial work has been undertaken if the noise level is inappropriate.

Modern turbine designs produce little noise from both the gearbox and from the blades through the air. Some models produce less sound than others and this is controlled by planning limits set by the local authority or council. For commercial developments, the quietest turbines available may be required by the planning authority as part of the planning conditions or may be stipulated following representation. Smaller turbines produce more noise, because the moving parts are closer to the ground, so the sound is more audible. As the head of the turbine moves into the wind, or with gusts of wind, sound may change.

Some sites may suffer unusual sounds in rare conditions, and these may be at some distance from the turbine(s) owing to the configuration of structures in producing standing waves. This is unlikely to be a problem to a horse on the move, though it could be an irritant in a stable or field in the weather conditions causing the effect.

Sound from commercial turbines will often be masked by the general noise created by wind unless in very close proximity.

Horses have a slightly greater range of hearing than humans[7] and they also hear sounds from further away, but many horses do not appear to be disturbed by the sounds made by turbines, particularly the more modern ones which are much quieter than older units.

Turbines keep getting bigger and bigger!

Turbines are more efficient at greater height because the air speed increases dramatically with height and turbulence reduces, so much more electricity can be generated, so they have increased in size.

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[7] Approximate range Hz: human 64-23,000; horse 55-33,500