Advice on **Bound Rubber-crumb Surfaces** in England and Wales

The British Horse Society

The law and management of public access rights vary widely between the four countries of the United Kingdom. This advice note is written for England and Wales and although elements of the advice may be applicable in Scotland and Northern Ireland this cannot be assumed.

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The British Horse Society recommends use of bound rubber-crumb surfaces for multi-user[1] routes as an alternative to compacted stone or stone mastic asphalt because it is much safer and more comfortable for use by horses and is equally comfortable on foot, cycle, wheelchair or mobility scooter.

Motor vehicles in the UK produce 100,000 waste tyres a day. Fortunately, tyres can be recycled, taking out metal and fibre to leave the rubber. The rubber can be reduced to crumbs which can be combined with fine aggregate and bound with resin or polymer to form a resilient surface material which is ideal for horses and all other users. There is an environmental benefit to using a surface with a recycled element. It is also inert and neutral which can be advantageous at sensitive sites.

The proportion of aggregate will vary depending on required outcome, from low quantity of aggregate for a softer surface with no motor vehicle use to a high level of aggregate for heavy goods vehicle traffic. The proportions for surfaces used by horses usually fall in the mid-range where there is sufficient rubber for resilience and aggregate for longevity.

Bound rubber-crumb has many advantages for surfaces used by horses, primarily:

- Non-slip to shod or unshod hooves
- Flexible so providing a surface with 'give' to reduce impact on joints
- Porous so less slippery in icy conditions
- Able to be used comfortably at trot without jarring
- Lower injury rate from concussion or a fall
- Porous so dung will wash through

All of these points benefit pedestrians, cyclists and users of mobility vehicles and pushchairs as well as horses.

[1] We define multi-user as riding, driving or leading a horse, cycling, walking, with a wheelchair or other mobility aid or pushchair..

None of the benefits are true of asphalt ('tarmac'). Even a high proportion of aggregate, to withstand turning lorries for example, retains many advantages over tarmac.

Tarmac is very unpleasant and often dangerous for use by horses because the criteria which make it ideal for motor traffic mean it is inherently slippery for horses and although surface treatments can improve its safety for horses without detriment to vehicles, they can be contraindicated for other reasons such as noise generated by tyres. Treatments can be expensive and may lose their effectiveness so need repeating, which is not cost-effective.

Tarmac can cause repetitive impact injuries. This is true for pedestrians, runners and dogs as well as horses.

Generally horses are kept to a walk on tarmac to avoid slipping or concussive injury; a constraint which is equivalent to motorists in icy conditions keeping to twenty miles an hour. Notably a diversion of a bridleway was confirmed despite incurring an additional two miles on a tarmac road because "it wouldn't matter because the horses could trot on to make up the time"; a decision which failed to take account of the road surface that meant trotting was potentially injurious to the horse.

Tarmac should be avoided on routes where dominant use is non-motorised—bridleways and byways—as it reduces the quality of the way to the unpleasant and unsafe surface condition of a road. The problem is often worse than on a road because tarmac laid off public carriageways might be to a specification which is even more hazardous to horses.

Numerous businesses in Britain supply and install surfaces using bound rubber-crumb. This solution is recommended for non-motorised user routes where the suggested surface has been tarmac or even compacted stone. The initial cost may be higher, but not necessarily—cost is coming down as it becomes more popular and was recently supplied for less than the cost of using tarmac—but it is guaranteed for several years longer than tarmac and, due to its porosity[2] and flexibility to ground movement or tree root growth, is likely to have a reduced maintenance commitment as well as a significantly improved amenity value for all users.

Rubber-crumb compound can be coloured to visually define the route. On a shared use route, it could be used for part of the surface between tarmac strips or alongside a tarmac length although it may be cost-effective to make the whle width rubber.

The cost per square metre varies widely, as it would on tarmac, depending on the site conditions, but several bridleway and multi-user track applications in 2019-20 were installed at similar price to asphalt but with far higher benefits.

One product, Flexi-Pave, supplied and installed by KBI UK, is described as:

- Versatile surfacing material made up of recycled car tyre rubber, stone aggregate, and a unique polyurethane binder.

[2] The sub-surface must take account of porosity and prevent washing out of the sub-surface.

- Highly porous: a void capacity of 17%–23% within the material allows a flow rate of up to 41,000 litres per m2 per hour.
- Built-in flexibility (hence the name) allowing it to expand and contract with changes in temperature, as well as loading, and therefore does not crack.
- Installed by hand so does not require large equipment and can be laid in areas with difficult access.
- Unlike tarmac, no edging is required: edges are chamfered to 45 degrees and are self-retaining.
- Due to the rubber content, Flexi-Pave is slip resistant.
- Colour options are available for the stone element.
- Some example applications can be seen in Case Studies (www.kbiuk.co.uk).

The BHS has experienced Flexi-Pave successfully in use on routes used by horses in Wokingham and Barnsley. KBI UK (Flexi-Pave) has a useful list of projects on its website (go to Projects tab).

Other known suppliers (there are more):

Nu-flex (www.nu-flex.co.uk) claims to have the same attributes and is successfully in use by horses and other users.

Trailflex (www.sudstech.co.uk/trailflex/)

Conipave RA (https://epoksidinesgrindys.lt/wp-content/uploads/2017/08/Conipave_-_RA_tds.pdf)

Example Sites

- Folly Lane on the Trans Pennine Trail in Barnsley (Flexi-Pave) has a significant gradient where the substrate and surface were always washing out. The grips dug across the slope and backfilled with the rubber mix, which is porous, act as both drains and sumps and have been successful in slowing down the water and protecting the structure. The initial installation in 2010 is on a public bridleway with high level of horse use.
- York City Council, city centre cycleway where there were problems with waterlogging (Flexi-Pave).
- Wokingham Borough Council, on greenways (Flexi-Pave), tested by BHS ABO Nicola Greenwood with approval in 2015-16. Wearing well and popular except with some cyclists who think it is slower than asphalt.
- Lancashire County Council, two lengths of disused railway, Stacksteads bridleway 676 (Bacup) and part of the Britannia Greenway (Bacup) (Nu-flex).

- Milton Keynes Council-Network Rail changed from concrete 'stairs' which many horses used to jump or slip on, to rubber-crumb in 2019-20 at SP 91205 35940. Steep ramp with one low riser step, surface means it is non-slip. Well-used important link. Big improvement according to local riders.
- Stretch Gate, Shepley, Yorkshire. Nov 2020 Bridleway SE 1964 1031 to SE 1999 1080, link between villages past railway station so semi-urban surfaced with flexipave 50-50 "quite bouncy". Previously patches of tarmac, mud and gravel.
- Kent County Council bridleway in Burham, wet site and product standing up well to use, including with horses.
- Gloucestershire County Council trail at Nailsworth.
- Kirklees Council have used for several years on footpaths and now on bridleways,

All sites are, so far as we are aware, standing the test of time and use. Maintenance has been minimal even on the Barnsley site which has now been in heavy use for nearly ten years. Satisfaction of users and councils has been high.

IMPORTANT This guidance is general and does not aim to cover every variation in circumstances. The Society recommends seeking advice specific to a site where it is being relied upon.

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