Advice on
Polymer-bound Aggregate-Rubbercrumb Surface

The British Horse Society

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 but the legal requirements in Scotland and Northern Ireland may differ from those in England and Wales.

More advice is available on 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.

The British Horse Society recommends use of polymer-bound aggregate-rubbercrumb surfaces for multi-user routes (which the BHS defines[1] as including all equestrians) as a better alternative to any sealed surface — asphalt, concrete or 'tarmac' — because it is much safer and more comfortable for use by horses and pedestrians (and their dogs), especially running, and is equally comfortable and safer on cycle, wheelchair or mobility scooter. It has many advantages over compacted stone or other unsealed surface and provides environmental benefit.

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 polymer to form a resilient surface material which is ideal for horses and all other users. It is chemically inert, which can be advantageous at sensitive sites as there are no leachates or pollution arising from it. There is also an environmental benefit to using a surface with a recycled element.

The proportion of aggregate to rubber is usually about 50:50 which provides sufficient rubber for resilience and a comfortable surface for all users and good longevity.

Bound rubbercrumb has many advantages for surfaces used with horses, and other users, primarily:

- Non-slip to shod or unshod hooves
- Flexible so providing a surface with 'give' to reduce impact on joints
- Porous so much less slippery in icy conditions and unlikely to form puddles
- Able to be used comfortably at trot without jarring joints

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

- Lower injury rate from concussion or a fall
- Porous so dung will wash through
- Lower temperature surface in hot weather, so more comfortable for any user, and benefiting the immediate environment by reducing heat retention and radiation

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

None of the benefits are true of asphalt ('tarmac').

Tarmac is very unpleasant and often dangerous for use with 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 generally lose their effectiveness so need repeating, which is not cost-effective.

Tarmac can cause repetitive impact injuries for pedestrians, runners and dogs as well as horses and is uncomfortable and tiring to walk on. It is a very high absorber of solar heat, which increases discomfort for users and is detrimental to the immediate environment.

Generally horses are kept to a walk on tarmac to avoid slipping or concussive injury; a constraint which is equivalent to motorists keeping to twenty miles an hour because of surface conditions. Notably, a diversion of a bridleway was confirmed despite incurring an additional two miles on a tarmac road 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 may be to a footway specification which is even more hazardous to horses. Some lethally slippery asphalt surfaces have been laid on bridleways and byways, rendering them unusable for the 'normal traffic of the neighbourhood' which is contrary to the highway authority's duty.

Numerous businesses in Britain supply and install surfaces using bound rubbercrumb although, as with asphalt, not all are equal and it is strongly recommended that a supplier is carefully checked.

The initial cost may be higher, but not necessarily — an example in 2018 was cheaper for rock-rubbercrumb than asphalt and bitumen costs are rising faster than rock-rubbercrumb.

Rock-rubbercrumb 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

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

reduced maintenance commitment as well as a significantly improved amenity value for all users.

The cost per square metre varies widely, as does asphalt, depending on site conditions, accessibility and groundworks 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, Flexipave, 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.
- 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, Flexipave is slip-resistant for horses as well as all other users.
- Colour options are available for the stone element.
- Some example applications are available from www.kbiuk.co.uk.

The BHS has experienced Flexipave successfully in use on routes used by horses in Wokingham, Barnsley and elsewhere

Example Sites

- Folly Lane on the Trans Pennine Trail in Barnsley (Flexipave) 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 (Flexipave).
- Wokingham Borough Council, on greenways (Flexipave), tested by BHS with approval in 2015-16. Wearing well and popular except with some cyclists who think it is slower than asphalt, however, the slower cycling speed is considered negligible and of benefit to other users.
- 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 steps which many horses used to jump or slip on, to rock-rubbercrumb in 2019-20. Steep ramp with one low riser step, surface means it is non-slip.
- 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. 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. It is possible to patch or repair as required.

Research on use of rock-rubbercrumb

A dissertation, Evaluation of the Properties of Rubber-Aggregate Pavements for Use in Multi-User Path and Tracks[3] makes the argument for use of bound rock-rubber-crumb on the basis of many factors, including cost. We have had independent reports from an engineer that the study is very well carried out and of high value.

If this is a saved or printed copy, please check www.bhs.org.uk/accessadvice for the latest version (date top of page 2).

[3] Samuel James Mullaney, School of Civil Engineering, Individual Research Project Dissertation submitted in partial fulfilment of the requirements for the degree of MEng in Civil and Environmental Engineering May 2019