High specification aggregates

Mineral Planning Factsheet

This factsheet provides an overview of high specification aggregate supply in the UK. It is one of a series on economically important minerals that are extracted in Britain and is primarily intended to inform the land-use planning process. It is not a statement of planning policy or guidance; nor does it imply Government approval of any existing or potential planning application in the UK administration.

December 2025

Introduction

High Specification Aggregates (HSA) used in the construction and maintenance of road surfaces with the need for higher levels of skid-resistance are specialised products available from a limited number of sources. These are primarily crushed rock quarries within the northern and western parts of the UK, together with a limited amount of artificial aggregate produced as a by-product of steel making. Such aggregates are of fundamental importance in meeting both national and local policies on skid resistance. This, combined with their scarcity, means that they are often transported long distances for use in areas which do not have indigenous sources of suitable material — as is the case in most of southern and eastern England.

HSA properties

High Specification Aggregates have been defined, in previous studies[1, 2] as:

> *"natural and artificial coarse aggregates that meet the physical test criteria set out in this report and that are suitable for use in road surfacing (including surface dressing) applications at the more difficult and/or heavily trafficked sites where high levels of skidding resistance and aggregate durability are required."*

HSA stockpiles, Arcow Quarry © Cuesta Consulting.

In order to be considered suitable for use in road surface applications, HSA are required to be *'clean, hard and durable'* materials. They are also required to possess high resistances to **polishing** (as measured by the Polished Stone Value); **abrasion** (Aggregate Abrasion Value); **fragmentation** (Los Angeles coefficient); and **weathering** (Magnesium Sulfate value). The thresholds used to define HSA for this factsheet (and previous studies) are set out in the following table which, while widely utilised, does not constitute a formal specification requirement.

Property	Limiting value
Polished Stone Value (**PSV**)	≥ 58
Aggregate Abrasion Value (**AAV**)	≤ 16
Los Angeles coefficient (**LA**)	≤ 30
Magnesium Sulfate value (**MS**)	≤ 25%

It is important to recognise that some of these individual properties may be mutually incompatible: rock types with a very high resistance to polishing (such as weakly-cemented sandstones) may also have relatively poor resistance to abrasion, fragmentation and weathering, and thus are unlikely to be sufficiently 'durable' for use on heavily trafficked roads. Durability — in the sense of maintaining compatibility with the specified design criteria over time — is of major importance. HSA may therefore be considered as aggregates which have the optimum combinations of these properties, and which are capable of maintaining them for the expected design life of the materials and applications in which they are used.

Of the key HSA properties, **Polished Stone Value** (PSV) is critical in classifying an aggregate's potential contribution to skidding resistance. The PSV test achieves this by simulating and then measuring

[1] Thompson, A, Greig, J R, and Shaw, J. 1993. ***High Specification Aggregates for Road Surfacing Materials***. Technical Report to the Department of the Environment. Travers Morgan Limited, East Grinstead. (264pp).

[2] Thompson, A, Burrows, A, Flavin, D, and Walsh, I. 2004. ***The Sustainable Use of High Specification Aggregates for Skid Resistant Road Surfacing in England***. Report to the Office of the Deputy Prime Minister and the Mineral Industry Research Organisation. Published by Capita Symonds Ltd, East Grinstead. (130pp + Appendices).

the way in which the surface roughness or ***micro-texture*** of the aggregate particles is maintained as they become worn on the surface of a road. High PSVs indicate good resistance to polishing and **minimum** values are therefore stipulated in highway specifications. A high resistance to polishing is achieved by materials which have a 'rough' micro texture that is maintained by a variety of mechanisms: the differential wear of mineral constituents of different hardness; the continual plucking out of mineral grains; or the presence of inter-granular voids or vesicles. Skid resistance also depends, however, on the ***macro-texture*** of the road surface, which is affected by the size of the aggregate particles and the gaps between them. Whilst PSV provides a good indication of an aggregate's ability to provide and *maintain* skid resistance, it is far from perfect as significant variations can sometimes be found between successive tests on the same material, and between different laboratories. Actual skid resistance also depends on a variety of other site-specific conditions and factors. A definitive assessment of an aggregate's in-service performance can only be obtained from *in-situ* measurements once the material has been laid, for example using Sideways-force Coefficient Routine Investigation Machine ('SCRIM') or 'GripTester' data. Such data are routinely collected by national and local highway authorities and are used among other things, as part of the specification requirements for specific types of surfacing material. This can sometimes justify the use of aggregate with a lower PSV than would traditionally be used (see specifications section, below). However, given the high degree of variability between different sections of road, and the current uncertainties regarding the length of time for which the measured performance is capable of being maintained at any given site, a great deal of caution is needed before reliance is placed on *in-situ* measurements alone. For this reason, and despite its inherent limitations, the PSV test is likely to be an essential requirement for the foreseeable future.

Aggregate Abrasion Value (AAV) provides a reliable measure of the resistance of aggregate particles to the effects of abrasion, resulting from the grinding effects of sand, dust and other detritus under the action of vehicle tyres. The degree of resistance of aggregate particles to this process is influenced by the hardness of their constituent minerals, their grain size, the strength of inter-granular bonds and the susceptibility to chemical alteration. High values of AAV indicate poor resistance to abrasion, and **maximum** values are therefore stipulated in highway specifications. Equally important, however, is that HSA must be capable of being sufficiently susceptible to abrasion that they maintain a 'fresh' micro-texture throughout their life, rather than becoming progressively more polished. To a large extent, however, this is addressed by the PSV requirement — emphasising the need for both tests to be used.

Los Angeles Coefficient (LA) provides a measure of the resistance of an aggregate to fragmentation by both crushing and impact, and it has replaced two separate tests (Ten percent Fines Value and Aggregate Impact Value) that were previously used in UK specifications. Resistance to fragmentation is important for all types of road aggregates, to ensure that they have sufficient strength to bear the load imposed on them by heavy traffic. It is especially important for the aggregate within modern asphalt surfacings, because the size and shape of individual particles are important to the overall design and performance of these materials. High values of LA indicate a poor resistance to fragmentation and **maximum** values are stipulated in highway specifications.

The resistance to weathering of coarse aggregate material (especially to disruption by the effects of freezing and thawing) correlates closely with its degree of susceptibility to salt crystallisation, as measured by the **Magnesium Sulfate** (MS) test and, more loosely, with its degree of water absorption. The water absorption test is quick and inexpensive and is therefore routinely used as a screening test for resistance to weathering. MS is the more definitive indicator and is required for initial source approval but, thereafter, is normally only carried out on aggregate which has a high water absorption value (more than 2 per cent).

HSA rock types and resources

The specification requirements for HSA can only be met by a limited range of rock types and geological formations; those which possess the necessary intrinsic properties of hardness, strength, durability and micro-texture. In order to understand the differences, consideration needs to be given to the ways in which different types of rock have been formed. Rocks can be classified into **sedimentary** (formed by the deposition or precipitation of sediments); **igneous** (formed from the crystallisation of high temperature molten material); and **metamorphic** rocks (sedimentary or igneous rocks which have been altered by high temperatures and/or pressures within the earth's crust). Each of these groups include a range of individual rock types, all of which possess different characteristics, in terms of their suitability to provide skid resistant properties in road surfacing aggregates. The following summary is derived from the detailed analysis of test results, as presented in the Capita Symonds report (Thompson *et al*, 2004).

Certain types of 'clastic' sedimentary rock (such as **sandstone** and **siltstone**, made of individual grains of material eroded from older rocks, cemented together by weaker minerals) are particularly important for use as HSA. This is because their component grains generally have differing degrees of hardness and because they can quite easily be 'plucked' from the aggregate surface. This maintains a rough, sandpaper-like micro-texture that is important for skid resistance. The term **'gritstone'** has often been applied by the industry as a generic label for a range of sandstones and siltstones which have traditionally been used as HSA. Geologists use more specific technical terms such as **'quartzite'**, **'arkose'** or **'greywacke'**, depending on their precise mineralogy. Not all sandstones and siltstones are suitable for use as HSA, however. Upper Carboniferous and younger age sandstones are generally weaker and have unacceptably low levels of resistance to abrasion, fragmentation and weathering. Conversely, some of the oldest sandstones, whilst being more durable, are less able to resist polishing. Optimum combinations of properties are found in the Carboniferous 'Pennant' Sandstones of South Wales, which frequently have PSVs in the low 70s.

HSA from the Pennant Sandstone, Gilfach Quarry © Cuesta Consulting.

Fine-grained 'clastic' sediments — particularly **claystones** and **mudstones** — can sometimes have moderately high PSVs (63–65) but are mostly unsuitable for use as road surfacing aggregates as they are generally weak and easily broken into thin fragments when crushed, due to their thinly laminated structure. They also commonly exhibit relatively poor adhesion to bituminous binders, due to the high proportions of fine-grained dust produced by crushing.

Other sedimentary rock types, such as **limestone** and dolostone (produced by the accumulation and/or chemical alteration of organic particles) are composed almost entirely of calcite and/or dolomite respectively. These minerals are relatively soft and easily polished. For this reason they tend to have PSVs of less than 50 in most cases and are generally unsuitable for road surfacing.

Igneous rocks such as **granite**, **gabbro**, **micro-granite**, **dolerite**, **rhyolite**, **andesite/dacite**, and **basalt** exhibit variations in hardness of their constituent minerals. Unlike sandstones, they have a much stronger, interlocking crystalline structure that makes it more difficult for individual grains to be plucked out of the aggregate as it is worn down on the road surface. For this reason, they are less able than clastic sedimentary rocks to provide a 'renewable' rough micro-texture. They tend to polish more easily (especially granite, granodiorite and gabbro) and generally have PSVs less than 58. Recent work by Transport for Scotland[4] and the Welsh Government[5] has shown that certain aggregates with PSVs of 55 or 56 are capable of providing *in-situ* skid resistance comparable with higher PSV materials, though it is not yet known whether this can be maintained over the preferred (20+ year) lifetime of the road surface. Current test data for use of these materials, over a 16-year period, in working road surfaces in Scotland are promising. However, granite (in particular) is a rock type known to be susceptible to polishing and, as such, further research is needed to establish the longevity of skidding resistance achieved.

[4] Scottish Road Research Board, 2020. Providing appropriate levels of skid resistance. https://www.transport.gov.scot/media/48196/providing-appropriate-levels-of-skid-resistance.pdf

[5] D R Millar Consultants Ltd. The early performance of Stone Mastic Asphalt in Wales. 2023. Wales Inspection Panel Report.

Igneous rocks with higher PSVs, often above 58, include dolerite - especially **quartz dolerite**, and some sources of **microgranite**. **Volcanic tuffs**, whilst being of igneous origin, can often resemble clastic sedimentary rocks in that they comprise fragments of pre-existing rocks and mineral grains set in a matrix of finer-grained material. As a consequence, they can have similar aggregate properties, with PSVs in the high 60s.

Metamorphic rocks, such as **schist**, **pelite**, **psammite** and **gneiss** tend to have similar characteristics and aggregate properties to igneous rocks such as granite, with PSVs of less than 58. Others, such as **slate** and **marble**, are not likely to be suitable for use in road surfacing because of their high fissility (slate) or high susceptibility to polishing (marble). Slate aggregate is explicitly **not** permitted in road surfacing materials by the Specification for Highway Works, though it is permitted in the underlying binder course and base course layers.

The geological formations[6] which are capable of yielding High Specification Aggregates are limited in number and confined largely to the western and northern parts of the UK, as illustrated in Figure 1. The classification by PSV relates only to the sites for which testing data are available and may or may not be representative of the geological outcrop as a whole. Formations which, whilst having high PSV, are also characterised by high AAV or have other drawbacks, making them unsuitable for use as HSA are not included. Although the threshold for HSA has been earlier defined as a PSV of over 58, geological formations which have PSVs of between 55 and 57 are also included on the map. Whilst such values fall below the HSA threshold, individual sources within these formations might be capable of achieving higher PSVs, whilst others may yield aggregates that, in certain circumstances, are capable of achieving higher levels of skid resistance than their PSV would suggest (see section on specifications, below). Figure 1 is not intended, therefore, to be a precise map of available resources but only to provide a broad indication of where such resources might be found.

[6] A more comprehensive review of all such 'litho-stratigraphic units' is provided in the Travers Morgan and Capita Symonds reports and is not repeated here.

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British Geological Survey

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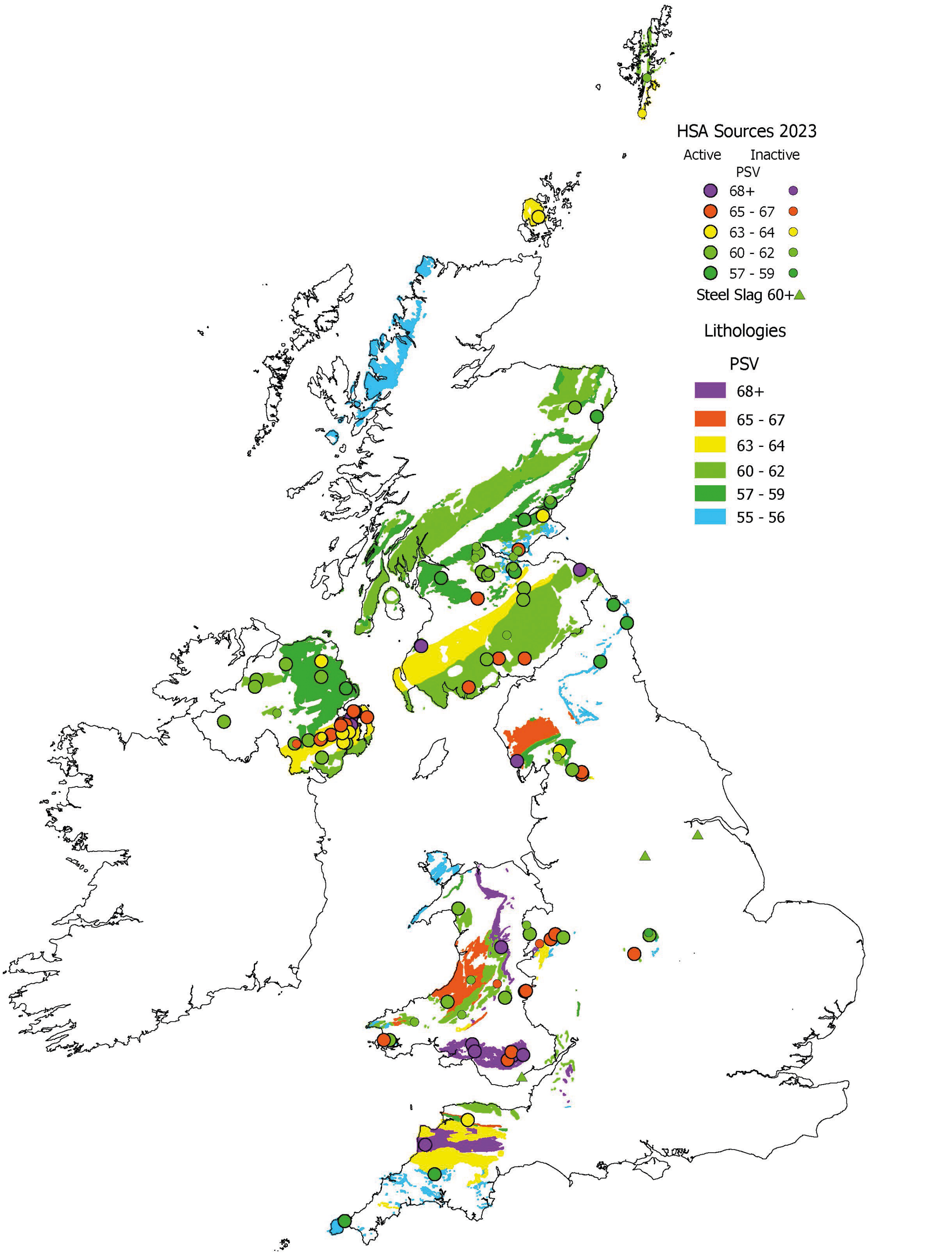

Figure 1 UK resources with potential for HSA (based on average test results, at that time, for each of the identified litho-stratigraphic units), updated from figures 6.1 and 7.1 from Thompson et al. 2004, and HSA sites which were active or inactive in 2023, classified by their declared PSV.

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Markets

High Specification Aggregates are used primarily in road construction and maintenance, but also for other paved areas such as airfield runways. They may also be used in the lower layers of road construction and for surfacing lightly-trafficked roads where high PSV is not a requirement. Such cases are most likely to apply for contracts that are close to HSA sources and where the supply of lower specification material from more distant sources would be inconvenient and/ or more expensive.

An increasingly wide range of different road surfacing types and treatments are available for use in the UK, with each one having different requirements in terms of aggregate sizes and the rate of HSA consumption. These include:

- **Hot Rolled Asphalt** (HRA) **with chippings**: This was the preferred method of surface course construction on major roads up until 1993 (at the time of the original HSA report (Thompson et al, 1993)), before being displaced by the introduction of thin surfacings. More recently, it has seen something of a revival, particularly on Local Highway Authority 'County' roads in certain parts of the country and is still used on such roads throughout Scotland and Wales. HRA typically has a 20-year service life and is often seen as a cost-effective option. The asphalt itself is generally characterised by a dense, gap-graded mix of (30–35 per cent) coarse aggregate (which need not be high PSV) and fine aggregate (natural sand or crushed rock fines), with a bituminous binder and with mineral filler added to provide additional stiffness. Temperatures required for these mixes are typically around 150–190°C, with associated high energy requirements and emissions. Single-sized (20 mm or 14 mm) high PSV pre-coated chippings are rolled into the surface immediately after laying to provide the necessary skid resistance with a positive macro-texture. This is an efficient way of utilising scarce high PSV aggregate, by comparison with most other forms of surfacing. One downside is that an HRA surface generates much higher levels of traffic noise, compared to other forms of surfacing.

- **High Stone Content HRA**: Similar to conventional HRA but with 50–55 per cent coarse aggregate content and without the separate application of chippings. When used as a surface course with a skid resistance requirement, all of the coarse aggregate within the mix is therefore required to be of the specified PSV — a much higher rate of use, compared to HRA with chippings.

- **Stone Mastic Asphalt** (SMA): This comprises an interlocking coarse aggregate skeleton that is made up largely of single-sized rather than graded coarse aggregate, all of which is required to be of the specified PSV, together with a 'mastic' mortar comprising bitumen, filler and cellulose fibres with little or no fine aggregate. It provides a 'negatively textured' surface which combines noise reduction with good texture depth and durability. Recent modifications include the use of additional 'grit' (e.g. 1–4 mm or 1–2.8 mm graded aggregate) rolled into the surface after laying. The grit provides additional friction and accelerates the wearing-off of excess binder, in order to generate an effective exposed aggregate surface more quickly. The grit, which can be renewed periodically, if necessary, also helps to abrade the stone over time, thus maintaining the aggregate's microtexture. SMAs are currently the preferred surface type for trunk roads in both Wales and Scotland and, during 2025, National Highways have introduced an SMA specification for application on the English Strategic Road Network.

Hot Rolled Asphalt Road Surface © Cuesta Consulting.

- **Asphalt Concrete** (AC) (coated macadam): This is characterised by an interlocking 'skeleton' of continuously graded coarse and fine aggregates. It provides limited texture depth compared with other options and is primarily used in the lower layers of road construction. Certain types may be used as surface courses when, as with High Stone Content HRA, all the coarse aggregate in the mix is required to be of the specified PSV.

- **Thin Surface Course Systems** (TSCS): As for Stone Mastic Asphalt, these rely on a skeleton of interlocking coarse aggregate particles, all of which are required to be of the specified PSV. They provide a negative surface texture but generally use smaller-sized coarse aggregate (with the benefit of greater noise reduction). Thin Surface Course Systems use enhanced performance binders to allow them to be laid at reduced thicknesses (usually between 20 mm and 50 mm). They include proprietary Thin Asphalt Concrete systems, Thin Stone Mastic Asphalt systems and Paver-Laid Surface Dressing systems. Durability problems with thin surfacing have been experienced on major roads in both Scotland and Wales, with surfaces lasting considerably less than the expected 12 year lifespan (in some cases 8 years or less). This appears to have had a variety of different causes, including climatic factors. For this reason, higher binder content SMA materials are now preferred on trunk roads and motorways in both countries. TSCS typically use 6 mm and 10 mm material, this may require additional crushing and waste compared to HRA, where coarser (14 mm or 20 mm) material is more typical.

- **Porous Asphalt**: This was introduced as a surface course option in the 1990s, offering the advantages of low noise and reduced spray on wet roads, but proved to be less durable than other options — primarily due to increased operational costs to maintain porosity — and is now rarely used.

- **Warm Mix Asphalt** (WMA): Developed initially in response to the Kyoto Protocol to reduce greenhouse gasses in the late 1990s, these are a range of technologies applied as a means of reducing costs, energy consumption and carbon emissions in the asphalt production process (the reductions are reported to be in the region of 7–8 per cent compared to HRA). WMA technologies can typically be deployed in AC, SMA and TSCS mixture types. Temperatures required for these mixes are typically around 120–150°C. WMA may be less suitable for laying in cold conditions.

- **Concrete Surfacings**: These use cementitious rather than bituminous binders, thus creating a rigid, rather than flexible pavement. Concrete pavements have been widely used in southern and eastern England, as they allow locally available natural gravel to be used in place of crushed rock HSA materials imported from elsewhere in the UK. Skid resistance is generally achieved by texturing the concrete before it cures (thus creating a noisy running surface) or, in the case of 'whisper concrete', by using exposed HSA. As with several of the materials noted above, all of the coarse aggregate within 'whisper concrete' is required to be of the specified PSV. To address noise issues new concrete pavements now typically have an asphalt surface course.

- **Surface Dressing**: Applied as a thin overlay to a structurally sound existing surface in order to prolong its life and restore skid resistance by renewing the surface layer of aggregate, all of which must be of the required PSV.

- **High Friction Surfacing** (HFS): HFS conforms to Clause **924** or the new CC 204 of the **Specification for Highway Works** and uses artificial aggregate - usually calcined bauxite — an imported, manufactured material. It is required to have a PSV of 70+ and is used specifically at high-risk sites such as the approaches to pedestrian crossings and roundabouts. It has a grading between 1 mm and 3 mm and is used in conjunction with epoxy resin, polyurethane, or thermoplastic binders.

HSA specifications

In England, **National Highways** is responsible for the Strategic Road Network (SRN), comprising all trunk roads and motorways. These amount to just 2.4 per cent of the overall road network in England, but they carry a third of all motor vehicle miles in the country and two-thirds of all HGV miles. Similar responsibilities in Wales rest with the **Welsh Government**; in Scotland with **Transport Scotland**; and in Northern Ireland with **NI Department for Infrastructure**. The common specifications and design guides developed for these roads by all four nations are well-researched and are often adopted by local highway authorities in setting out their own requirements for the rest of the road network (however this is not always the case as substantially different approaches may be used to suit local circumstances).

For all Strategic Roads, the main specification requirements for bituminous-bound road aggregate materials are set out in **Clause 901**[7] of the old **Specification for Highway Works** (SHW) or **CC 202 in the new SHW** and in section **CD 236** of the **Design Manual for Road and Bridges**. The design requirements used to determine appropriate levels of skid resistance on the network are set out in document **CS 228**. These apply throughout the UK and are published by **Standards for Highways**.

SHW **Clause 901** (***'Bituminous Mixtures'*** — July 2021) (Or in the new SHW CC 202[7]) specified that *"natural, recycled unbound and manufactured (artificial) aggregates shall be clean, hard and durable and comply with BS EN 13043 and be CE marked and have a declared performance which demonstrates that the aggregate meets the requirements of the specification"*. The CE marking declaration applies to all of the key properties which define HSA (i.e. PSV, AAV, LA and MS).

CD 236 (***'Surface Course Materials for Construction'*** — revision 4.1.0 issued in December 2022), describes the appropriate surfacing options for new roads and maintenance activities including the minimum PSV and maximum AAV requirements for different categories of site and levels of traffic.

CS 228 (***'Skidding Resistance'*** — revision 2 issued January 2021) describes the requirements for provision and management of appropriate levels of skid resistance, including requirements for making and interpreting *in-situ* measurements, using the 'SCRIM'. *In-situ* skidding resistance can also be measured using the Grip Test MK2 brake wheel fixed-slip device in accordance with BS 7941-2.

In Wales, the Government's Procedure and Advice Guidance (PAG) 112/20 for SMA surfacings used on trunk roads and motorways specifically requires such measurements to be used for compliance testing as an alternative to specifying the minimum PSV of coarse aggregate used. This is to enable the use of local sources of lower PSV aggregate in situations where adequate in-service performance can be demonstrated and make the best use of limited HSA reserves. A similar, performance-based approach, also with respect to SMA surfaces, has been used for a longer period in Scotland (TS Interim Amendment No. 35/18, 2018), based on substantial research on the relationships between PSV and in-service skid resistance on a large number of trunk roads and motorways, throughout Scotland. That research found there was a broad correlation between the two, with higher PSVs (especially above PSV 65) tending to give the best results. There was also a large degree of scatter in the data, offering considerable scope for the increased use of lower PSV aggregates in well-designed SMA mixtures.

These approaches are clearly beneficial in terms of reducing the demand for scarce HSA materials and reducing carbon emissions by minimising the need for transport of HSA over long distances. Test data over 16 years of using these SMA surfaces in parts of Scotland indicate the maintenance of good skid resistance using this approach. More generally, however, such test data are limited at present, and a much better understanding is needed before performance specifications are likely to be more widely adopted. Given the concerns about the skid resistance of certain types of aggregate, such as granite, repeated measurements of in-service performance over the intended design life of new road surfaces would be needed for each individual SMA mixture and source of aggregate used.

Supply and demand

Despite its importance, the demand for HSA materials is not routinely monitored. The Aggregate Minerals (AM) surveys, conducted every four years, contain limited data for PSV and do not distinguish HSA from other types of crushed rock aggregate. The only existing data are those presented in the Travers Morgan report (Thompson *et al*, 1993), which were based on a comprehensive survey in 1992 and the Capita Symonds' report (Thompson *et al*, 2004), in which demand was assessed on the basis of aggregate sales data for 2002. The

[7] SHW was revised in September 2025 and is now issued as construction (CC) documents. The Clause numbering differs in the new versions.

latter provided reliable information for the demand in England but only partial information (from units which export to England) for other parts of the UK.

An important observation made in comparing those two surveys was that, whilst the demand for PSV58+ HSA in England increased substantially over the intervening 10-year period, the overall rate of HSA supply from the same sites (irrespective of specified requirements) hardly changed. The latter, which represents the rate at which HSA reserves are being consumed is arguably the more important, in planning terms, and has therefore been the focus of the latest (2023) survey, carried out specifically for the preparation of this factsheet.

Figure 1 illustrates the geographical distribution of all the HSA quarries identified within the UK that either produced HSA during 2023 or were capable of doing so, with permitted reserves of HSA material at the end of 2023. The sources are classified by declared (or average) PSV range.

The 2023 survey aimed to capture similar data to that collected by previous surveys for permitted reserves, total sales, the declared values of testing for PSV, AAV, LA and MS for individual sites and sales for a range of specific end-uses for all sites producing material with a PSV greater than 58. In total, 111 sites were included in the survey, of which responses were received from 63. Although this overall response rate of 57 per cent seems low, it masks substantial differences between different parts of the UK. In England, the response rate was 94 per cent, in Wales it was 70 per cent and in Scotland it was 66 per cent. In each country, all sites with significant production were included in the results. Many of the non-respondents were small or inactive quarries with very limited or no sales of HSA and the majority of non-returns were from Northern Ireland. This is perhaps due to the structure of the industry there, with a much higher proportion of relatively small-scale, independently-owned operations.

Tables 1 and 2 summarise the main findings of the 2023 survey in terms of permitted reserves and sales, with figures presented separately for units with declared PSVs of 65 or above (Table 1) and those with declared PSVs of 60 to 64 (Table 2). The latter group include four sites (three in Scotland and one in England) where the declared PSV is only 58 or 59 but which, nevertheless, are capable of supplying HSA, albeit in relatively small quantities. For each group, figures are given for total sales, total permitted reserves and the 'lifetime' of supply represented by those figures.

As in the two previous surveys, the questionnaire also requested information on the proportions of sales to HSA specifications (i.e. to contracts where the specified PSV was greater than 58). However, the responses to this were very inconsistent, with some operators claiming that 100 per cent of their sales were to such requirements. In reality, a considerable proportion of HSA material is utilised in contracts where the PSV requirement is either lower or not specified — even though the material itself has a high PSV. More reliable figures for the proportion of sales to HSA specifications, as provided by other operators, were commonly between 40 per cent and 70 per cent but ranged from 20 per cent (for sites with little demand and a high proportion of interbedded shale, for example) to 90 per cent (for sites with consistent HSA material and high demand).

As noted earlier, the figures obtained for total reserves and total sales at HSA sites are regarded as the most important, as these indicate the overall rate at which the HSA reserves are being consumed and the need or otherwise for replenishment. The figures shown in Tables 1 and 2 for the 'Lifetime' of reserves in each category provide a useful measure of this. This is similar to the concept of a 'landbank' but is based only on a single year of sales figures, rather than a longer-term average, as would normally be used. Nevertheless, it provides a useful way of comparing the supply situation in each of the countries/regions shown in the table.

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Table 1 Reserves and sales information for sources with declared PSVs of 65 and above.

Country/ region	Active and *Inactive* sites in this group	Operator in 2023**	Total Permitted Reserves in this group (December 2023) (tonnes)	Total Sales of aggregate in this group in 2023 tonnes	'Lifetime' of reserves (Reserves /Sales) (years)
North of England	Dry Rigg Ghyll Scaur (Millom) Horton	Tarmac Holcim Heidelberg Materials	12,839,000	588,794	21.8
Midlands & South West England	Bayston Hill *Callow Hill* Haughmond Hill Mancetter Pigsdon	Tarmac *Tarmac* Holcim Tarmac E & JW Glendinning	46,137,000	1,509,794	30.6
Wales	Bryn Craig yr Hesg *Cwm Nant Lleici* Dolyhir & Strinds Gelligaer Gilfach Gore Hafod Fach *Rhayader* Syke* Tan-y-Foel	Bryn Aggregates Heidelberg Materials *Hygrove Aggregates* Tarmac Heidelberg Materials Breedon Tarmac Tarmac *Tarmac* GD Harries & Sons Breedon	133,746,000	2,548,796	52.5
Scotland	Barbae/Tormitchell Dunduff Glenfin Grange Jericho Bridge Tongland	Breedon Patersons Quarries Tynedale Roadstone Grange Quarry Ltd Tarmac Breedon	35,853,000	1,008,602	35.5
PSV65+ Totals, GB			**228,575,000**	**5,655,986**	**40.4**
Northern Ireland	Ballybarnes* Ballymagarrick* Ballystockart Cairnhill* Carrickmannon Carrowdore* Cashel (Lisdoonan) Craigantlet* Edentrillick Temple Tullyraine*	Northstone Materials MW Johnston & Sons Breedon Ireland Northstone Materials Conexpo NI Ltd Northstone Materials. Conexpo NI Ltd. Northstone Materials Edentrillick Quarries Breedon Ireland Tullyraine Quarries	at least 51,856,012	at least 2,307,468	22.5
PSV65+ Totals, UK			**>280,431,012**	**>7,963,454**	**35.2**

* Sites marked by asterisks did not respond to the survey. The totals for those groups will therefore be underestimates.
** Aggregate Industries rebranded to Holcim in 2025.

Table 2 Reserves and sales information for sources with declared PSVs of 60-64.

Country/ region	Active and *Inactive* sites in this group	Operator in 2023	Total Permitted Reserves in this group (December 2023) (tonnes)	Total Sales of aggregate in this group in 2023 tonnes	'Lifetime' of reserves (Reserves /Sales) (years)
North of England	Arcow Ingleton Roan Edge *Holmescales* Stanton wks Templeborough wks**	Tarmac Heidelberg Materials Breedon *Holcim* Tarmac Steelphalt	10,992,000	1,231,562	8.9
Midlands & South West England	Bardon Hill *Blodwell* Brayford Leaton	Holcim *Heidelberg Materials* Heidelberg Materials Breedon	111,241,629	5,124,190	21.6
Wales	Alltgoch* Bolton Hill* Builth Wells Cardiff wks** Criggion *Dinas* *Garn Wen** Minffordd *Ystrad Meurig*	GD Harries & Sons GD Harries & Sons Heidelberg Materials Steelphalt Heidelberg Materials *Tarmac* *GD Harries & Sons* Breedon *Heidelberg Materials*	48,312,314	1,123,000	43.0
Scotland	Ardownie** Balmedie** Balmullo *Blairhill* Bonnington** Cairneyhill Clatchard** *Coatsgate* Cowieslinn *Cruicks* *Cunmont*** Cursiter** Duntilland Edston *Goat* Goathill Hillend *Hillwood* Morrinton *Murrayshall (East)*** *Murrayshall (West)* Northfield	D Geddes contractors Aberdeenshire Cl. Breedon *Tarmac* Breedon Tarmac Breedon *Tarmac* Breedon *Tarmac* *Breedon* Orkney Islands Cl. Holcim Tillicoultry Quarries *Tarmac* Collier Quarrying Tillicoultry Quarries *Tarmac* Tarmac *Patersons Quarries* *Tillicoultry Quarries* Tillicoultry Quarries	156,873,872	3,754,062	41.8

Table 2 Continued.

Country/ region	Active and *Inactive* sites in this group	Operator in 2023	Total Permitted Reserves in this group (December 2023) (tonnes)	Total Sales of aggregate in this group in 2023 tonnes	'Lifetime' of reserves (Reserves /Sales) (years)
	Pitcaple** Tam's Loup *Vatster***	Aberdeenshire Cl. Tillicoultry Quarries *Garriock Brothers*			
PSV60-64 Totals, GB			**327,419,815**	**11,232,814**	**29.1**
Northern Ireland	Aughafad* Ballynahinch* Ballyrickard* Castlenavan* *Cavanagrow** Clinty* Corkey* Doran's Rock* Drogan* Edendarriff* Glassdrummond* Glebe Hill* Kilhoyle* Leod Letterbrat* *Lurganeden** Magherally* Outlack* *Tullyhenan**	AS Ballantine CES Quarry Products FP McCann Ltd. CES Quarry Products *unknown* J Stevenson Quarries P Keenan Quarries CES Quarry Products P Keenan Quarries Perry Quarry Prods Northstone Materials Collen Bros Ltd. R Hogg & Sons Peter Fitzpatrick Ltd. P Keenan Quarries *Geotech Construction* Gibson Bros. WJ & H Crozier *Northstone Materials*			
PSV60-64 Totals, UK			**Insufficient data available for UK totals**		

* Sites marked by single asterisk did not respond to the survey. The totals for those groups will therefore be underestimates.
** Consultant estimates for reserves and sakes are included.

The results show that Great Britain as a whole, and both Wales and Scotland individually, appear to be in a healthy position with regard to the ongoing supply of High Specification Aggregates, in both the PSV65+ and PSV60-64 categories. In each case there are multiple sources, worked by a number of different operating companies and the permitted reserves (at the end of 2023) were sufficient for three or more decades of future production (at the rate suggested by sales in 2023).

The situation is different for sources in England, however, and most especially in the case of PSV60-64 aggregates within the North of England (that is, Yorkshire and the Humber, and North West England, combined), where the 'lifetime' represented by permitted reserves currently stands at 8.9 years which is less than is the case for the other groups noted above.

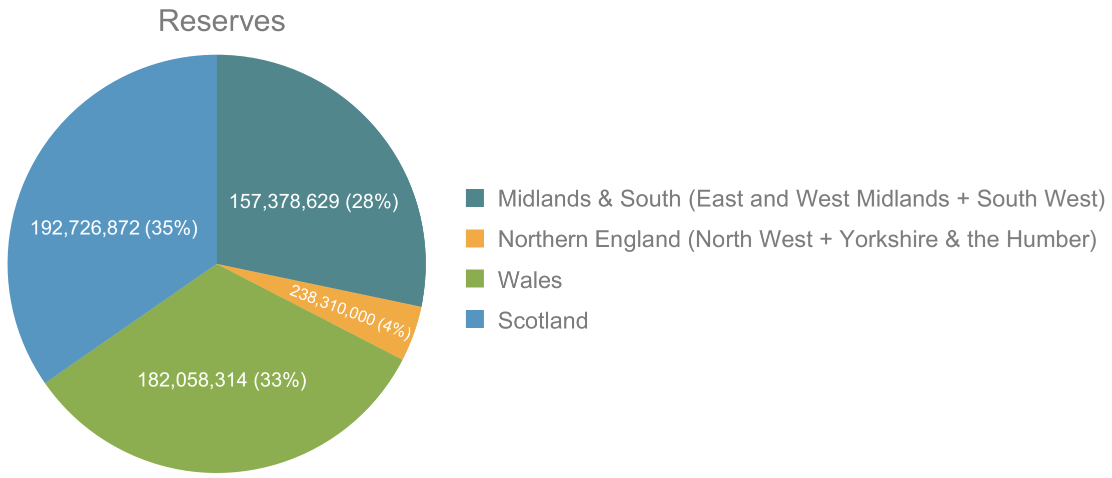

Figure 2 Total permitted reserves (tonnes) at HSA sites in Great Britain, 2023.

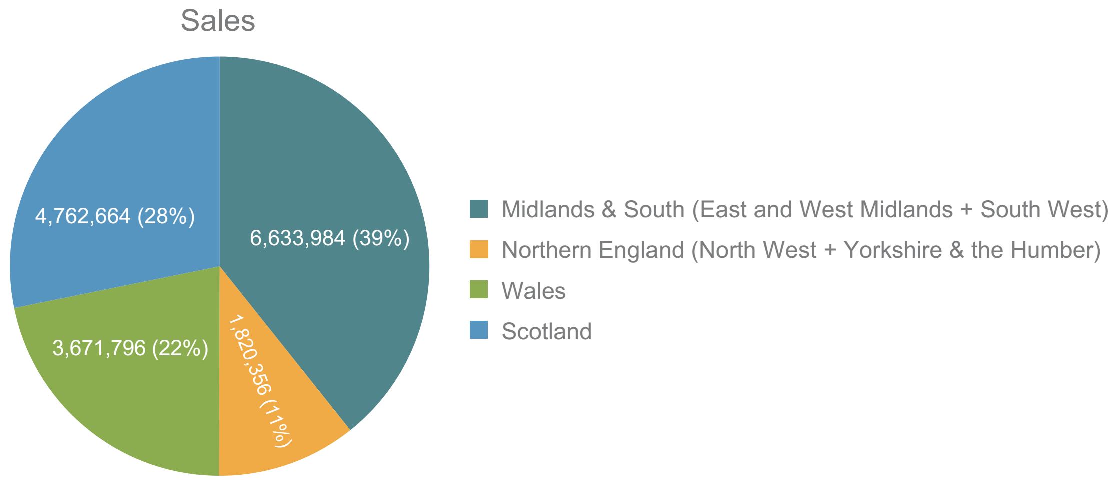

Figure 3 Total sales (tonnes) from HSA sites in Great Britain, 2023.

Comparison with historical data/trends

The figures in Tables 1 and 2 can be compared, at a basic level, with the results of the two previous surveys, in 1993 (using data for 1992) and 2004 (using data for 2002)[9]. Tables 3 and 4, set out this information for total permitted reserves at HSA sites within Great Britain and total sales from those sites, respectively. For consistency, the sources (quarries and steel slag production units) allocated to each group for 2002 are the same as those identified in the most recent (2023) survey, even though some individual units were previously allocated to lower PSV categories. The data for quarries in Wales and Scotland for 2002 is limited to those sites which

[9] In the case of the 2002 survey, this has been done using the unpublished source data, recompiled into the groups of sites identified in 2023. For the 1992 survey, the data cannot be split into the same PSV categories.

supplied at least some of their of their output into England. For those sites, however, the figures quoted here still relate to total reserves and total sales, not just exports. In Wales, only a few smaller quarries were excluded in the 2002 survey, but in Scotland, many HSA quarries — particularly in the north of the country — were unavailable for inclusion. In the most recent survey, a number of new quarries entered the market in southern Scotland, whilst others had become inactive.

With regard to permitted reserves, these comparisons reflect the combined effects of many different factors, ranging from the substantial re-estimation of reserves at one or two sites, between successive surveys, and the closure of some previously active quarries where reserves have been exhausted, to the periodic replenishment of reserves elsewhere through the granting of new planning permissions.

In England, the overall level of permitted reserves at HSA sites appears to have increased, from 177 Mt in 1992 to 181 Mt in 2023, despite a drop to only 128 Mt in 2002. However, this masks a fall in reserves in the north of England — especially at PSV60-64 sites, and a substantial increase in reserves in the Midlands.

In Wales, the data suggest an overall fall from more than 212 Mt in 2002 to 182 Mt in 2023, but with an apparent rise in between, to more than 304 Mt in 2002. Without more detailed analysis it is difficult to understand why this happened, though it would seem that it relates to a very marked recent decline in the figure for PSV60-64 reserves, balanced only partially by an increase in PSV65+ reserves.

Table 3 Comparative data on total reserves (tonnes) at HSA Sources in Great Britain, 1992 to 2023.

Region / Year	1992	2002	2023
North of England PSV65+	31,300,000	13,010,000	12,839,000
North of England PSV60-64		18,194,215	10,992,000
Midlands and S. England PSV65+	145,700,000	36,315,000	46,137,000
Midlands and S. England PSV60-64		79,217,470	111,241,629
England Total PSV65+	-	47,185,000	58,976,000
England Total PSV60-64	-	81,141,685	122,233,629
England Total	**177,000,000**	**128,326,685**	**181,209,629**
Wales PSV65+	-	78,250,000	133,746,000
Wales PSV60-64	-	226,630,000	48,312,314
Wales Total	**212,600,000**	**304,880,000**	**182,058,314**
Scotland PSV65+	-	*6,585,000	35,853,000
Scotland PSV60-64	-	*43,838,000	156,873,872
Scotland Total	**87,100,000**	***50,423,000**	**192,726,872**
Great Britain PSV65+	-	*132,020,000	228,575,000
Great Britain PSV60-64	-	*351,609,685	327,419,815
Great Britain Total	**476,700,000**	***483,629,685**	**555,994,815**

* 2002 data excludes many Scottish quarries which did not supply to England.

Table 4 Comparative data on total sales (tonnes) from HSA sources in GB, 1992 to 2023.

Year / Region	1992	2002	2023
North of England PSV65+	1,850,000	955,078	588,794
North of England PSV60-64		1,726,504	1,231,562
Midlands and S. England PSV65+	6,390,000	1,711,260	1,509,794
Midlands and S. England PSV60-64		4,023,367	5,124,190
England Total PSV65+	-	2,666,338	2,098,588
England Total PSV60-64	-	5,749,871	6,355,752
England Total	**8,240,000**	**8,416,209**	**8,454,340**
Wales PSV65+	-	3,114,809	2,548,796
Wales PSV60-64	-	1,080,280	1,123,000
Wales Total	**3,430,000**	**4,195,089**	**3,671,796**
Scotland PSV65+	-	*269,161	1,008,602
Scotland PSV60-64	-	*3,180,000	3,754,062
Scotland Total	**5,420,000**	***3,449,161**	**4,762,664**
Great Britain PSV65+	-	*6,050,308	5,655,986
Great Britain PSV60-64	-	*10,010,151	11,232,814
Great Britain Total	**17,090,000**	***16,060,459**	**16,888,800**

* 2002 data excludes many Scottish quarries which did not supply to England.

In Scotland, there are further uncertainties, not least because of the limited data from the 2002 survey but there appears to have been a very substantial overall increase in reported reserves from 87.1 Mt in 1992 to 192.7 Mt in 2023. This appears to be due in part to the inclusion of a number of new HSA sites in the 2023 survey.

In terms of sales (Table 4), i.e. the overall rate of consumption of HSA resources, the totals in England have remained consistent across all three surveys: 8.24 Mtpa in 1993; 8.42 Mtpa in 2002; and 8.45 Mtpa in 2023. Within these figures, consumption of PSV65+ material has reduced by 22.2% since 2002 (from 2.7 Mtpa to 2.1 Mtpa), whilst that of PSV60-64 material has increased by 10.4% (from 5.8 Mtpa to 6.4 Mtpa). This is despite the fact that the Declared PSVs for a significant number of sites appears to have steadily increased over this time[10]. This trend further highlights the growing importance of the PSV60-64 range within the overall market.

Similar trends, in terms of the growing importance of the PSV60-64 range, are seen in Wales, where the overall HSA market appears to have risen initially (from 3.43 Mtpa in 1992 to 4.20 Mtpa in 2002, before falling back to 3.67 Mtpa in 2023).

Similar analysis cannot be completed for Scotland because of the incomplete data available for 2002, but the overall HSA market there appears to have shrunk by 12.2%, from 5.42 Mtpa in 1992 to 4.76 Mtpa in 2023.

With regard to trends, consideration also needs to be given to future supply, particularly given that the current end-date of many extant planning permissions (just over 20% of all GB reserves from HSA producing sites) coincide, in February 2042. These are 'old mineral permissions', granted in

[10] PSVs declared by operators in the 2023 survey were often significantly higher than the long-term averages of test results for the same sites recorded in the Capita Symonds survey (Thompson et al., 2004). In many cases, these figures are higher than the average PSVs of the corresponding geological outcrops, which are based on a much larger number of older test results, from 1993.

many cases in the 1940s, originally without end dates being specified until imposed by subsequent legislation. In each of these sites, the continuation of supply will only be possible if planning permission to extend the duration of operations is obtained.

Future demand

The future demand for HSA depends, in part, on future road building and maintenance plans, at both national and local levels, as well as on specifications relating to the provision and maintenance of skidding resistance. The risk of litigation against authorities which fail to maintain adequate skid resistance on their roads is likely to ensure an ongoing demand for suitable materials, with councils often erring on the side of over-specification because of this. However, the materials used may change as empirical evidence is gathered on the in-situ performance of different types of aggregate and different types of surfacing. This might see a gradual shift towards a greater use of slightly lower PSV aggregates in certain, suitable, situations.

The overall demand, however, will always be strongly influenced by available budgets. With regard to new road construction, there is currently a declining trend with Figures from National Highways in England show a decrease in demand over the next 5 years, falling from around 850,000 tonnes of HSA per annum at present to around 730,000 tonnes for the period up to 2030. It has not been possible to obtain equivalent figures for other parts of the UK. Maintenance budgets have also been declining, often leading to an increase in the use of surface dressing as a short-term alternative to more comprehensive reconstruction of damaged surfacing on local authority roads. Whilst surface dressing still requires HSA, the quantities involved are generally less than for reconstruction, although the frequency of intervention will generally be greater and the longer-term implications are therefore less clear. Where reconstruction is essential, a number of local authorities are preferring to retain the use of hot-rolled asphalt with high PSV chippings, rather than using more modern, but often shorter-lived, thin surfacing systems. As noted earlier, HRA surfacing has a lower demand for HSA than most other types of construction.

Climate change, in general, and the increased frequency of extreme weather events, in particular, has the potential to degrade road surfacing. Extreme heat softening of bituminous binders can give rise to deformation and rutting of the pavement, and increased heavy rainfall can accelerate the breaking up of road surfaces. These effects will increase the need for maintenance and (subject to available budgets) the consumption of HSA material. They may also influence the choice of construction methods used, i.e. away from TSCS which, at present, seem more susceptible to extremes of both temperature and rainfall as well as failure and movement of the underlying layers.

The carbon footprints associated with different materials and road surfacing systems are increasingly relevant to decisions around road construction and maintenance, and the specifications used can affect the demand for HSA. Individual county councils will commonly have requirements for lowering carbon emissions built into their materials procurement and road maintenance plans. National Highways set out carbon reduction targets in its Net Zero highways plan, and similar plans are being implemented in Wales and Scotland. Such policies may affect the sources of aggregate used, focusing on more local sources to reduce transportation, as far as possible, without compromising safety. They may also give rise to increased rates of recycling and encourage a move away from high heat applications (such as required for HRA) in the future.

Economic importance/value

High Specification Aggregates are essential, in the UK, for the construction and maintenance of safe (relatively skid-resistant) roads. The UK's Strategic Road Network (encompassing motorways and major A roads) is one of the largest national assets, with an asset value of £157 billion. Figures from Highways England indicate that its network alone generated over £409.7 billion of Gross Value Added (GVA) in 2022. As a result of road construction policies, the relative scarcity of the resources and the high cost of production to meet the exacting specifications and performance standards required, HSA is considered a premium product. This, together with the necessity (in many cases) for long distance transportation, ensures that it commands relatively high prices, compared with more general-purpose aggregates. For all of these reasons, HSA quarries are of major importance to the UK minerals and road construction industries.

High specification aggregate

Transport issues

The disparity between HSA source locations (mostly in the west and north of the UK) and the geographical distribution of demand (primarily in the south and east), necessitates longer distance transportation than is the case for most aggregates. In most cases, the transportation is by road haulage. Rail is utilised by only a few HSA quarries. Three of those in England have their own, dedicated rail sidings (Arcow, Horton and Bardon Hill), whilst two others (Dry Rigg and Ingleton) are able to utilise nearby railhead facilities. Some of the HSA quarries in South Wales (principally Cwm Nant Lleici, but also Craig-yr-Hesg, Hafod and Gilfach, on occasions) have also supplied material by rail utilising nearby railheads, though none of them is directly rail-linked.

Within the UK there is a significant transport of high PSV sandstones from Wales to England, around 1.6 million tonnes in 2023, accounting for 44% of all sales from HSA sites in Wales. A small amount of material is transported in the opposite direction. Some production from southern Scotland is also transported to England, though the quantities are limited (161,512 tonnes in 2023). Northern Ireland also supplies a significant proportion of HSA to England, 521,000 tonnes of PSV65+ aggregate, all to wharfs in the South East. Within England there is also significant interregional trade in HSA. The majority of quarries serve a diverse range of geographically widespread markets and over 30% of all sales from HSA quarries in England are consumed outside the region they were produced in.

Trade

There is little if any export of HSA from the UK to other countries. This is partly because aggregates (even HSA) are a low-cost, high-volume bulk commodity which are generally not economic to transport long distances. It is also partly due to differences in road construction techniques and skid resistance policies in other European countries, where PSV is not such an important requirement.

There are, however, some imports of HSA into the UK from the Republic of Ireland and from Norway. Granite with a PSV of 58 is also imported from Norway into wharfs around London (serving markets across the South East and East of England). A small amount of HSA sandstone is shipped to wharfs on the south coast of England from the Republic of Ireland. There is also trade between Northern Ireland and The Republic of Ireland, however, figures are not available.

Structure of the industry

Almost all HSA quarries in Great Britain are owned and operated by a handful of the country's largest aggregates operators — Holcim UK (formerly Aggregate Industries), Tarmac (a CRH Company), Breedon Group and Heidelberg Materials. As transport is a key factor in supplying HSA to where it is needed, most of the main suppliers also operate a high degree of vertical integration, with the quarries, transportation, coating plants and sales depots all operated by the same company. There are, however, also a number of independent surface dressing companies which obtain aggregate from the main suppliers.

There are a small number of independent HSA producers operating important sites with regard to national supply, for example, Tillicoultry Quarries, Grange Quarry Ltd, Tynedale Roadstone, Patersons Quarries, Collier Quarrying in Scotland; Steelphalt (steel slag producers in South Yorkshire and Cardiff), E & J W Glendinning Ltd in South West England and both Bryn Aggregates Ltd and Hygrove Aggregates in South Wales.

Extraction and processing

Due to a combination of the need for crushing to produce single sized aggregates of a suitable particle shape, and geological factors (i.e. fine sand/silt particles in sedimentary rocks), the production of HSA often results in the production of large volumes of fines (a term used interchangeably with 'dust'). The proportion of fines to product will be highly dependent on both the crushing process and the geology, but sandstone-derived HSA may generate up to around 40% fines, in some cases, whereas igneous rock sources will generate less but still up to around 30%. In some cases, this material may constitute a saleable product (see by-products section) but in others it cannot and will need to be stored and landscaped within the site. Such material can be used constructively for quarry restoration, but it can cause issues regarding site management/access to resource due to the large volumes and stockpiles involved whilst sites are in operation. Additionally, some HSA lithologies, such

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Fines at Roan Edge Quarry BGS © UKRI.

as gritstones, consist of alternating sedimentary units of sandstones and mudstones. These need to be separated, or sandstones preferentially worked, giving rise to large volumes of non-saleable material.

The demand for specific size fractions of aggregate also has implications for processing. The current high demand for 6–10 mm single size material for use in thin surface courses and surface dressing requires a high level of crushing, this will in turn increase the amount of fines produced.

By-products

In some cases, the fines produced in the crushing process may either be used within various aggregate products or processed to a saleable form. Although it is highly dependent on local geological properties, typically fines from igneous HSA sources can be used as a filler in asphalt binders or subbase material. Fines from clastic sedimentary rocks generally contain a greater proportion of silt and clay material, making them unsuitable for most applications. There is the potential for washing of such fines to produce a single size fine aggregate, however this is seldom done due to the expense of the washing plant. If the silt and clay content is too high the process will result in the production of material which needs to be managed in lagoons/dedicated facilities.

HSA can also be sold into non HSA applications. This is often the case for gradings where demand may be low or where HSA material forms the dominant local supply of aggregates (for example gritstone in Northern Ireland). Gritstones are generally not used in concreting applications as their high silica content can promote adverse alkali silica reactions but can be used for fill, road sub-base, armourstone and other applications for graded aggregates. Many quarries will have some degree of supply into these markets, dependent on both the local demands and products produced.

Alternatives/recycling

There are several manufactured materials and industrial by-products that act as alternatives to HSA in some applications. Although several manufactured alternatives have been explored in the past only four are used commercially, these being blast furnace slags, steel slag, from either Basic Oxygen Steel furnaces (BOS) or Electric Arc Furnaces (EAF) and calcined bauxite.

The UK steel industry has substantially declined in recent years, but several facilities remain that produce by-product slags which are capable of being utilised as HSA materials. In many cases, the skid-resistant properties of these materials are claimed to be preserved for much longer periods of time compared to most conventional natural aggregates. Blast furnaces currently remain operational at Scunthorpe but the last remaining furnace in South Wales, at the Port Talbot steel works, shut in 2024, though this is destined to be replaced by an Electric Arc Furnace (EAF). The UK currently has EAF facilities at Rotherham (Templeborough Works), Cardiff and (to a lesser extent) from two sites in Sheffield. Continued supply of HSA material from slag is reliant on the continued operation of steel making facilities.

Another commonly used material is calcined bauxite. This is imported from China and Guyana and has very high PSV values of around 70–75 combined with excellent strength and durability characteristics. However, the properties depend to some extent on the manufacturing process and PSVs as low as 58 have been recorded. Calcined bauxite is not used in the same way as conventional aggregates but is mixed with resin or thermoplastic binders as part of a specialist high-friction surface dressing used at locations where very high levels of skid resistance are critical, such as approaches to roundabouts and road junctions.

High PSV material can be recycled in the form of Recycled Asphalt Planings (RAP) where old road surfaces are removed, disaggregated and re-used as part of asphalt mixes for TS and SMA type surfaces. The amount of material that can be recycled in this way depends on the composition of the old surface, the method of surface removal and the capabilities of the asphalt plant. For high levels of recycling the top layer with high HSA content is required to be separated. The current content of recycled material in TS applications varies around the UK but is typically between 5-20%. This can be increased with modern plant and careful processing of the road planings.

Effect of economic instruments

The Aggregates Levy was introduced in April 2002 and is currently £2.08 per tonne. It applies to sand, gravel and crushed rock subjected to commercial extraction in the UK, including aggregates imported from overseas. It is intended to address the environmental costs associated with quarrying operations (noise, dust, visual intrusion, loss of amenity and damage to biodiversity) in line with the Government's statement of intent on environmental taxation. Its objective is to reduce demand for virgin aggregates and encourage the use of recycled materials and secondary aggregates. Due to their higher value, the Aggregates Levy represents a lower proportion of the overall cost of a tonne of HSA compared to other aggregates.

Relationship to environmental designations

The increasing number and extent of landscape, nature conservation and other designations of international, national and local importance, in conjunction with constraints relating to other factors (groundwater, market location, airports, archaeology), has significantly reduced the choice of potential sites for the extraction of HSA. Like all other minerals, however, HSA can only be extracted where the resources exist.

The hard and resistant nature of the rocks that are suitable for use as HSA can mean that they also give rise to attractive and spectacular upland scenery. Some of these areas are also valued for their nature conservation importance. In particular, The Yorkshire Dales National Park, which hosts the Horton, Ingleton, Arcow and Dry Rigg quarries, all significant sites in terms of HSA supply.

Planning issues

Government planning policy on the provision of construction aggregates in England is set out in the National Planning Policy Framework (NPPF), last revised in 2025. This does not specifically mention HSA but does include provisions for aggregates of a 'specific type or quality'.

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Dry Rigg Quarry © Cuesta Consulting.

Comparable planning policy for Wales is set out in Section 5.14 of Planning Policy Wales, supplemented by Minerals Technical Advice Note 1 (Aggregates). The former document specifically refers to skid resistant aggregates and states:

> *"The UK and regional need for such minerals should be accorded significant weight provided environmental impacts can be limited to acceptable levels."*

MTAN 1 adds:

> *"The Pennant Sandstone outcrop in South Wales has been identified as one of the main prospects for development and the UK importance of the resource should be recognised by relevant planning authorities. Such material is a special case that may well justify transportation over long distances because of the national need for the provision of the specific type of material with limited availability."*

In Scotland, minerals planning policy is set out in the Scottish Planning Policy and Supplemental Planning Guidance documents published by individual regions of Scotland. Northern Ireland has a Strategic Planning Policy Statement, with specific mineral related policies contained within Regional Planning Policies. These do not have specific policies regarding HSA.

All of these documents recognise that an adequate and steady supply of aggregates is essential to support sustainable economic growth and quality of life. The policies aim to ensure that this steady and adequate supply is achieved with minimum impact on the environment.

Landbank policies have been an important element of aggregates planning for many years, throughout the UK. Landbanks are stocks of permitted reserves within a given geographical area and are measured in years at a specified rate of supply (such as recent average annual sales). Minimum landbank requirements are set out in national policies and

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individual mineral planning authorities are required to ensure that these are maintained within their areas. Separate landbanks are not specially required for HSA, although they can be used where there is an identified need for a 'specific type or quality' of aggregate, as stated in paragraph 226 h of the NPPF, for example.

Further Information

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Mineral Planning Factsheets for a range of other minerals produced in Britain are available for download from https://www.bgs.ac.uk/mineralsuk/