The marine aggregates business is one of Britain’s largely unrecognized industries; mention aggregates and people generally think of quarries on land. The reality is that a substantial proportion of Britain’s sand and gravel is extracted from the seabed around England and Wales.

In London, half of all sand and gravel comes from marine sources, while in the wider South East a third of the aggregate is dredged. In South Wales, aggregates from the seabed make up 90% of the sand used in construction. Marine sand and gravel is no different to its land-based equivalent, having been laid down by the same processes but at a time when sea levels were much lower than today.

Based on a five-year average of mineral extraction data from the Office for National Statistics, marine aggregates provide around 17% of the sand and gravel used in England and Wales. This vital contribution represents 6% of the UK’s total primary aggregate needs — equating to some 50 medium-sized land-based quarries.

Marine aggregates, therefore, are part of a much bigger economic picture created by the wider UK quarry products industry and by the construction sector that it feeds. With a construction boom clearly under way — think of Heathrow Airport’s T5, the £3 billion worth of building work for the 2012 London Olympics and the Thames Gateway development — the marine aggregates sector will have a greater part to play in supplying the construction materials needed for such major building projects.

According to industry figures, in 2005 the total area of the seabed licensed for dredging was 1,179km². Of this, only 137.6km² were dredged but this provided a total of 21.2 million tonnes of marine aggregates, nearly two-thirds of which were used for construction in the UK.

Over the next few years the marine aggregates industry faces a number of unprecedented challenges, and the biggest hurdle for the sector at present is being able to prepare and adapt to the fundamental changes anticipated in UK marine policy, planning and regulation. Last month, the new Statutory Dredging Regulations for England and Northern Ireland was introduced, which saw the industry’s non-statutory consenting system change to a statutory regulatory regime for the first time.

‘It is certainly a step in the right direction,’ said Kevin Seaman, chairman of the British Marine Aggregate Producers Association (BMAPA), which represents over 90% of the industry. ‘The Government’s commitment to implementing a statutory system is important for us because it increases the likelihood of having a national planning policy in place that will define the future need and requirement for marine aggregates.

‘This would ensure a more certain operating environment, which in turn would give greater confidence for long-term investment decisions relating to fleet replacement, and the substantial investment required to gain new permissions through the consents process. Land-based quarrying has such a system but at present we do not have one for offshore. We expect this to change over the next five years.’
with the introduction of the Marine Bill by the Government.

Indeed, the aim of the Bill is to provide a legal framework to regulate and ensure the sustainable development of the marine and coastal environment, addressing both the use and protection of marine resources.

The most important aspect of the Marine Bill is marine spatial planning, which will clearly set out priorities, guidance and environmental standards for the development and protection of marine resources.

‘We hope it will give developers a smoother process when it comes to getting consents, ensuring more effective and integrated planning of the UK’s seas,’ continued Mr Seaman.

‘All marine sectors and interests will need to have detailed policy positions developed, and our objective will be to ensure that the strategic importance of the marine aggregates industry is brought forward.’

Much is talked about whether marine aggregates dredging contributes to coastline erosion. Environmental group MARINET, part of Friends of the Earth, have heavily criticized the industry’s offshore activities, claiming that dredging causes coastal impact, damages long-term biodiversity and is responsible for the decline of commercial fisheries.

Mr Seaman is quick to refute such claims. ‘There is very strong scientific evidence that demonstrates modern aggregate dredging does not lead to erosion,’ he said. ‘We are a very highly regulated industry and one of our key objectives is to ensure that marine aggregates extraction does not affect coastal processes, such as interfering with seabed sediment transport and changing the wave climate.

‘All licence areas are subject to extremely comprehensive management, mitigation and monitoring conditions. Before permission to dredge is granted, careful analysis of waves and currents in the area is carried out using hydrodynamic models. Permission would never be given if the experts felt that there was the slightest threat.’

As dredging operations are subject to strict control and enforcement, all vessels are equipped with a black box Electronic Monitoring System (EMS), which records the time, date and location of all dredging activity via an encrypted computer system and GPS satellite navigation. All EMS data is then analysed by The Crown Estate, the UK marine minerals owner, to ensure that dredging only takes place within the areas permitted within each licence area.

Although the extraction of marine aggregates involves less than 1% of the UK continental shelf, the marine aggregates sector recognizes that it works in a highly sensitive environment and, as such, accepts its responsibility to operate with care and concern for other users of the sea.

Regular fishing liaison meetings, for example, take place to facilitate the exchange of information and views, with the aim of encouraging co-operation with the fishing industry. The needs of fishermen are usually considered at the early stages of a licence application and if unacceptable impacts are predicted or the proposed licence lies in a sensitive area, such as a spawning ground, a dredging consent will not be issued.

BMAPA have also been active in helping to protect the UK’s marine heritage, having developed archaeology guidance (in tandem with English Heritage) for developers, regulators, consultants and heritage professionals. In addition, the Association has an Area Dredged Initiative in place with The Crown Estate to minimize and monitor the areas of seabed actually being worked.

Above all, in late 2006 the industry published its first sustainable development strategy (a baseline report is due later this year), as Mr Seaman explained: ‘A major advantage of marine-dredged aggregates is the ability to transport large volumes of...’
Most modern vessels are capable of dredging at depths of over 35m and can self-discharge in 3-4h.

Kevin Seaman, chairman of BMAPA, is also managing director of United Marine Aggregates (UMA) - a joint venture between Tarmac and Hanson.

a low-cost bulk material over large distances, and to deliver the aggregates close to where the market demand exists. This, of course, requires the use of large vessels delivering cargoes, while smaller vessels operate over shorter distances.

‘However, the industry consumes fuel and emits carbon emissions to the atmosphere through the production and transportation of marine aggregates. As a result, it is important for us to minimize the consumption of energy as far as possible by making the most efficient and effective use of the dredging fleet available.’

Mr Seaman believes the new strategy will provide the industry with a better understanding of the overall carbon footprint associated with marine aggregates production, and sets out in clear terms how the marine sector is tackling environmental and resource management issues – both now and in the future.

Arguably the most important issue in all corners of the wider aggregate industry is health and safety. The marine aggregates sector employs a total of 600 people, of whom 450 operate a fleet of 25 dredgers, while the remainder are employed in shore-based marine operations and management roles.

As a constituent member of the Quarry Products Association (QPA), BMAPA have been an active participant in the QPA’s Hard Target initiative, which successfully set out to reduce accidents by half between 2000 and 2005. It is now committed to the new target of a further 50% cut by 2009. Each BMAPA member has also put in place a rigorous procedure to comply with the International Safety Management (ISM) Code – an international standard for the safe management and operation of ships and for pollution prevention.

‘When it comes to raising the awareness of health and safety, one of the advantages is that we are a reasonably small sector with 10 member companies,’ said Mr Seaman. ‘That means we can quickly share best practice and experiences, particularly near-miss incidents, across the industry as a whole.’

The UK aggregate dredging fleet is believed to be the largest of its kind in the world; a typical vessel would cost over £20 million today and is equipped with the latest dredging/discharge equipment and has a working lifespan of 25 years.

There are two types of dredging technique – trailer and static. The former is a widely used technique within the industry requiring the dredger to trail its dredge pipe along the seabed at speeds of up to 1.5 knots. This application is ideal for dredging more evenly distributed deposits. The latter technique involves the vessel anchoring over a deposit at speeds of up to 1.5 knots. This application is ideal for dredging more evenly distributed deposits. The latter technique involves the vessel anchoring over a deposit and is effective for loading thick, localized aggregates.

At the heart of any dredging process are powerful pumps which, on large vessels, are capable of drawing up to 2,600 tonnes of material an hour from depths of up to 50m. But with dredging production expected to move to deeper water sites in the near future, most notably in the Eastern English Channel, how would current dredging technology and techniques cope with the unexplored range of depths?

‘In the next 50 years marine aggregate resources will continue to be less than 50m deep,’ explained Mr Seaman. ‘Today’s technology, dredging techniques and style of ships are capable of dredging under these conditions. At depths of over 35m, underwater pumps need to be mounted on the dredge pipes, and many vessels already meet...’
Marine Aggregates

Gracing Portsmouth’s harbour, Spinnaker Tower has been built using marine aggregates.

The biggest change has been and will be the size of the ships. At present the bulk of the dredger fleet carries around 5,000 tonnes of sand and gravel. However, in the future the standard new-build vessels will carry 9,000 and 10,000 tonnes of marine aggregates. Such ships would further improve the sector’s resource management, dredging operations and wider environmental impact of reducing lorry miles.

Most vessels can self-discharge in 3-4h, thanks to sophisticated discharging systems for efficient unloading at aggregate wharves. The range of discharging techniques employed includes bucket wheels, scrapers and wire-hoisted grabs, which place the aggregate on to a conveyor system for delivery to the aggregate wharf or processing plant.

There are around 60 active wharves in the UK, the majority of which are located on the river Thames, along the east and south coasts and in the Bristol Channel. The industry also supplies marine aggregates to 30 other sites in Europe. The wharves themselves often have state-of-the-art facilities for screening, washing and manufacturing, although some aggregates are distributed without the need for processing. The greatest demand is for 0/4mm (sand) and for 4/10mm, 10/20mm gravel. Any oversized gravel is usually crushed before being re-screened into smaller grades.

The fact that most aggregate wharves are located close to major urban centres means that thousands of lorry journeys are removed annually. Every day around 18,000 tonnes of marine-dredged sand and gravel is delivered along the Thames by four large dredger cargoes – the equivalent to 900 lorry movements.

As the Government pushes for more sustainable buildings, roads and new ‘green’ homes, Mr Seaman believes the industry has a major part to play in the construction of the London Olympics infrastructure, as well as the development of 128,000 new houses as part of the Thames Gateway project. With construction activity focused heavily on east London, wharves along the Thames are well located to supply sand and gravel with minimal traffic impact. Marine aggregates are also fully recyclable and can be reused in new construction projects.

‘No single sector is going to supply all the materials required for these massive projects,’ said Mr Seaman. ‘The Government understands that there is a huge demand to meet in the next five to 10 years so it is vitally important for them to capitalize on all the available and feasible resources. That means aggregates from the marine sector, land-based quarries and recycled aggregate plants will be widely used to satisfy demand in the long-term. From our perspective this is obviously good news in that the industry will continue to be a vital component of supply for the London market.’

Good examples of marine aggregate use can be seen at Canary Wharf, Arsenal’s new Emirates Stadium, Spinnaker Tower in Portsmouth, Gateshead Millennium Bridge and the Channel Tunnel Rail Link.

Marine-dredged sands and gravels are also used to protect British coastlines from erosion, providing sandy beaches and supporting many coastal-defence schemes. According to BMAPA figures, between 1995 and 2005 over 25 million tonnes of marine aggregates were used to provide ‘soft’ defences. Major replenishment projects have included the east coast between Mablethorpe and Skegness, and between Happisburgh and Winterton. On the south coast schemes have taken place at Hythe, Eastbourne, Hurst Spit and Weymouth.

As the marine aggregates sector prepares for some vital changes to the policy and regulatory environment it operates under, Mr Seaman believes the new regime will help drive the industry forward. ‘The demand for marine aggregates shows no signs of slowing down, thanks to the billions of pounds of regeneration schemes and construction work taking place across the UK,’ he said. ‘To meet demand, there are plenty of consented resources; the last 18 months have seen new marine production licences, which were previously delayed, approved by the Government, and we are now looking at 40 existing production licence areas requiring renewal before 2013. But the most important change for us will be an overarching framework for marine spatial planning that will secure a more certain future for the industry.’