



Mapping marine sand and gravel

Aggregates – sands and gravels – are essential for building and maintaining our houses and infrastructure, so we need to be sure we have a reliable supply. Tom Bide and Joseph Mankelow explain how geological mapping is taking us in the right direction.

Aggregates are a range of coarse particles that add strength to building materials and are widely used for foundations and drainage. The term includes recycled building materials like concrete, but the raw material comes from geological deposits of sand, rock and gravel.

They may not be beautiful, but aggregates are the most mined materials in the world, both on land and at sea. Demand for these offshore mineral resources is only likely to increase in the UK, as elsewhere, with major new infrastructure projects ranging from housing to coastal defences.

Marine aggregates are extracted by dredging – sand and gravel are sucked up a pipe trailed along the sea floor, normally 10 to 40 metres below the sea surface. These

specially designed vessels vary greatly in size, but large ships can extract up to 2600 tonnes of sand and gravel an hour and hold up to 8000 tonnes of material. The UK has one of the largest dredging fleets in the world, providing important resources for its construction sector, which is valued at £120 billion per year.

Major urban areas on the coast or on navigable rivers, such as London, particularly benefit from marine aggregates as they can be landed at wharves very near to the market, avoiding the energy and other impacts of long-distance road transport from inland quarries. Half of all construction aggregates used in London come from the sea.

Demand for aggregates is growing, but so are other demands on the seabed, for example from fishing, oil and gas pipelines

and renewable energy installations. If the supply is interrupted, rising aggregates prices would have a direct impact on the UK's plans for growth. So it is more important than ever that our offshore aggregates are managed effectively and their extraction is carefully planned.

While the environmental regulations and restrictions on aggregate extraction are well established, a new planning system has been implemented for UK waters to reduce conflict over space on the seabed while protecting marine ecosystems. The Marine and Coastal Access Act 2009 and the Marine (Scotland) Act 2010 specifically outline the need to safeguard mineral resources to ensure future supplies, an approach which is already well established in onshore land-use planning. A new body, the Marine Management Organisation (MMO), has been tasked with balancing

offshore England, while the Scottish and Welsh governments are responsible for this task in their respective marine areas.

The MMO issues environmental permits for dredging and is drawing up spatial plans to ensure dredging activities are balanced against other national and regional activities. To do this, they need a clear picture of where the UK's aggregates resources are, and which are the most economically valuable and viable. So BGS was commissioned by the Crown Estate (which holds the rights to all non-energy mineral resources on and under the UK Continental Shelf) to map the distribution of UK marine sand and gravel.

Mapping the resource

Marine aggregates have similar origins to their onshore counterparts, and are the products of glaciers and rivers at a time

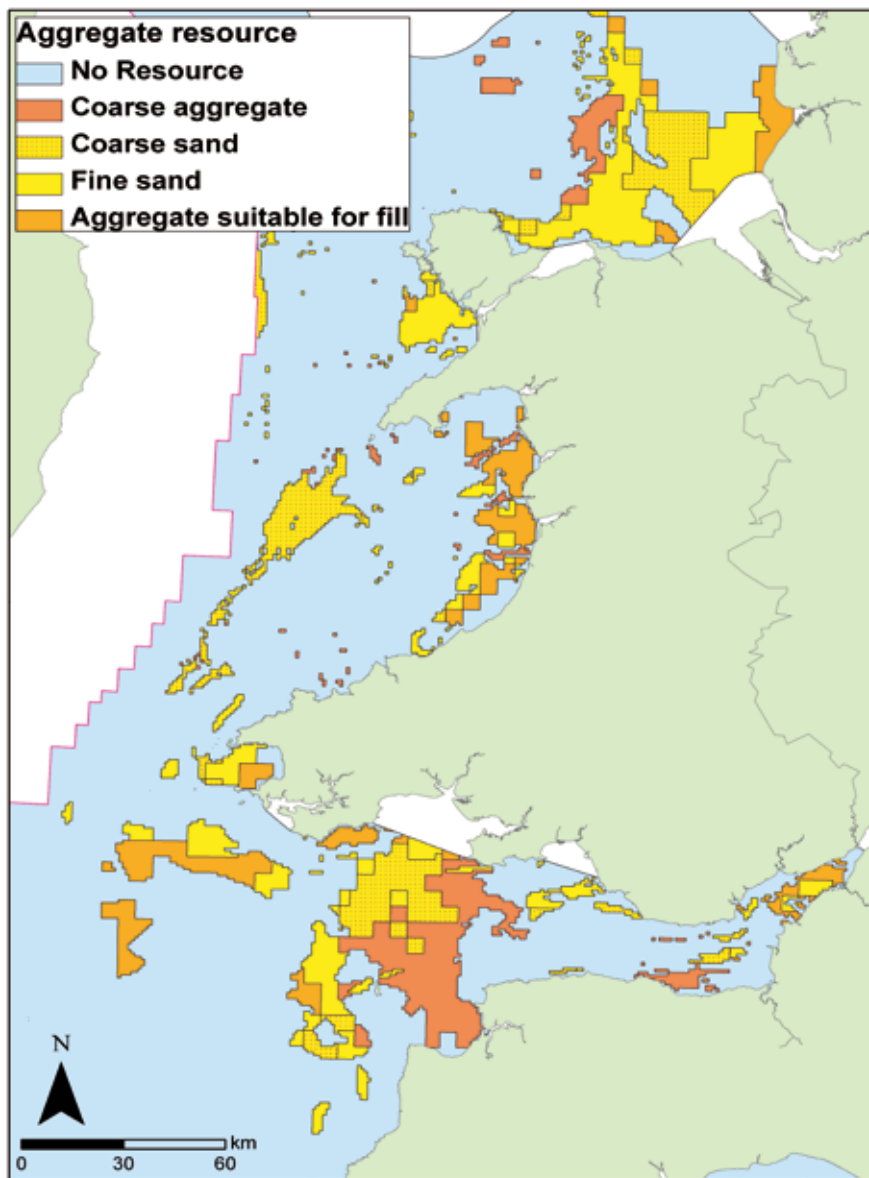
UK coast extended far out into the sea. Many of these deposits are often covered by more recent marine sediments and working out where they now lie requires a high degree of geological interpretation, using borehole information, geophysical data and modelling.

Producing the maps didn't require new geological survey, but rather a lengthy desk-based exercise to combine information from all BGS existing sources of information. This included a series of 165 offshore geological maps, a database of almost 95,000 seabed sediment samples and seismic data taken over more than 350,000km of seabed, as well as data gathered for more recent regional studies.

All these data sources were combined digitally to produce a model of sand and gravel resources. These can be widespread but are not always present in sufficient concentrations to be extracted economically. So aggregate resources were defined as areas where the sediment was thick and had low mud content compared to the sand and gravel. Areas of coarse sand were identified from the average grain size; this is particularly important because coarse sands are currently in high demand for concrete but are in short supply onshore.

The results are presented as four regional maps: English Channel and Thames Estuary; Welsh Waters and the Irish Sea; East Inshore and East Offshore Marine Plan Areas; and Scottish Waters and the Central North Sea. They are already having a direct impact on the planning process. For example in its plan for the East Inshore and East Offshore area, the MMO has earmarked for protection important deposits – such as the coarse sand needed for concrete – that BGS has identified.

These data on mineral resources mean the new planning process can help ensure the UK balances its need for a steady supply of these essential raw materials with the need to protect fragile marine environments.



i

Tom Bide and Dr Joseph Mankelov are in the Mineral Resources and Policy Team at NERC's British Geological Survey.

Email: tode@bgs.ac.uk

The maps and accompanying reports can be downloaded from www.thecrownestate.co.uk/energy-infrastructure/aggregates/