

SECURING MARINE AGGREGATE RESERVES FOR THE LONG TERM

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ABSTRACT

This paper charts the development of the mineral reserve base of the UK marine aggregate industry over the past twenty five years. It contrasts past uncertainty surrounding the environmental effects of extraction, mineral reserve scale and tenure and central Government regulation with the comparative security of the present.

A range of initiatives enabled the industry to address weaknesses in its position, including inter-company co-operation over marine environmental impact assessment and monitoring. At the same time the regulatory climate improved with the introduction of a statutory licensing process and new Production Agreements with the mineral owner, The Crown Estate. Knowledge of and confidence in the environmental effects of aggregate dredging increased through a major research programme funded by the Aggregates Levy. The industry's trade body, the British Marine Aggregate Producers Association (part of the wider Mineral Products Association) played a major part in these developments. As a result, most marine aggregate licences are now valid until the late 2020s and beyond with reasonable expectations that most if not all will be renewed again. The UK Government's first formal Marine Policy Statement recognises the 'crucial' role of marine aggregates for construction and coastal defence, providing the sector with its 'licence to operate' into the future. The Marine Management Organisation's newly created marine plans for the eastern and southern UK offshore areas include policies intended to safeguard marine aggregate resources where they occur. Most significantly, The Crown Estate and Industry have identified 350 million tonnes of total current primary aggregate reserves within existing licence areas, with substantial additional reserves present subject to future licensing.

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INTRODUCTION

This paper charts the development of the mineral reserve base of the UK marine aggregate industry over the past twenty five years. Reflecting over this period, it is striking how much has changed for the better – major new strategically important deposits have been located and licensed and at the same time numerous environmental uncertainties have been addressed. In fact questions over the longer term viability of the industry in the early 1990s (with uncertainty over environmental, mineral reserve and regulatory matters) contrasts with the sectors now established position of comparative security, underpinned by a viable long term licensed mineral reserve base.

There are currently well over fifty separate aggregate extraction areas off southern Britain, licensed to eleven operating companies (Figure 1), with many of these licences remaining valid well into the 2020s and beyond. Almost all areas lie on seabed owned by The Crown Estate, which issues modern production agreements to individual operating companies allowing extraction (chiefly by suction dredging) to take place to agreed

commercial and legal terms, subject to the operator securing the necessary regulatory consents. Statutory environmental permissions (Marine Licences) are now granted over pre-determined application timescales by newly created specialist Government agencies: the Marine Management Organisation (MMO) in English waters and Natural Resources Wales (NRW) within Welsh sea limits in the Bristol Channel and Irish Sea. The picture is significantly brighter now than a generation ago.

The sector is currently responsible for over 10% of all primary construction aggregates consumed in England and Wales, with marine representing some 25% of the natural sand and gravel supply in England and 49% in Wales. In London and the South East of England, where some £48 billion of construction activity takes place each year (representing one third of the total construction activity in Great Britain), marine aggregates provide one third of all the primary aggregates that are consumed (BMAPA, 2016). In 2016 over 14 million tonnes of marine sand and gravel was landed by purpose built dredgers to dedicated wharf facilities in England and Wales (Figures

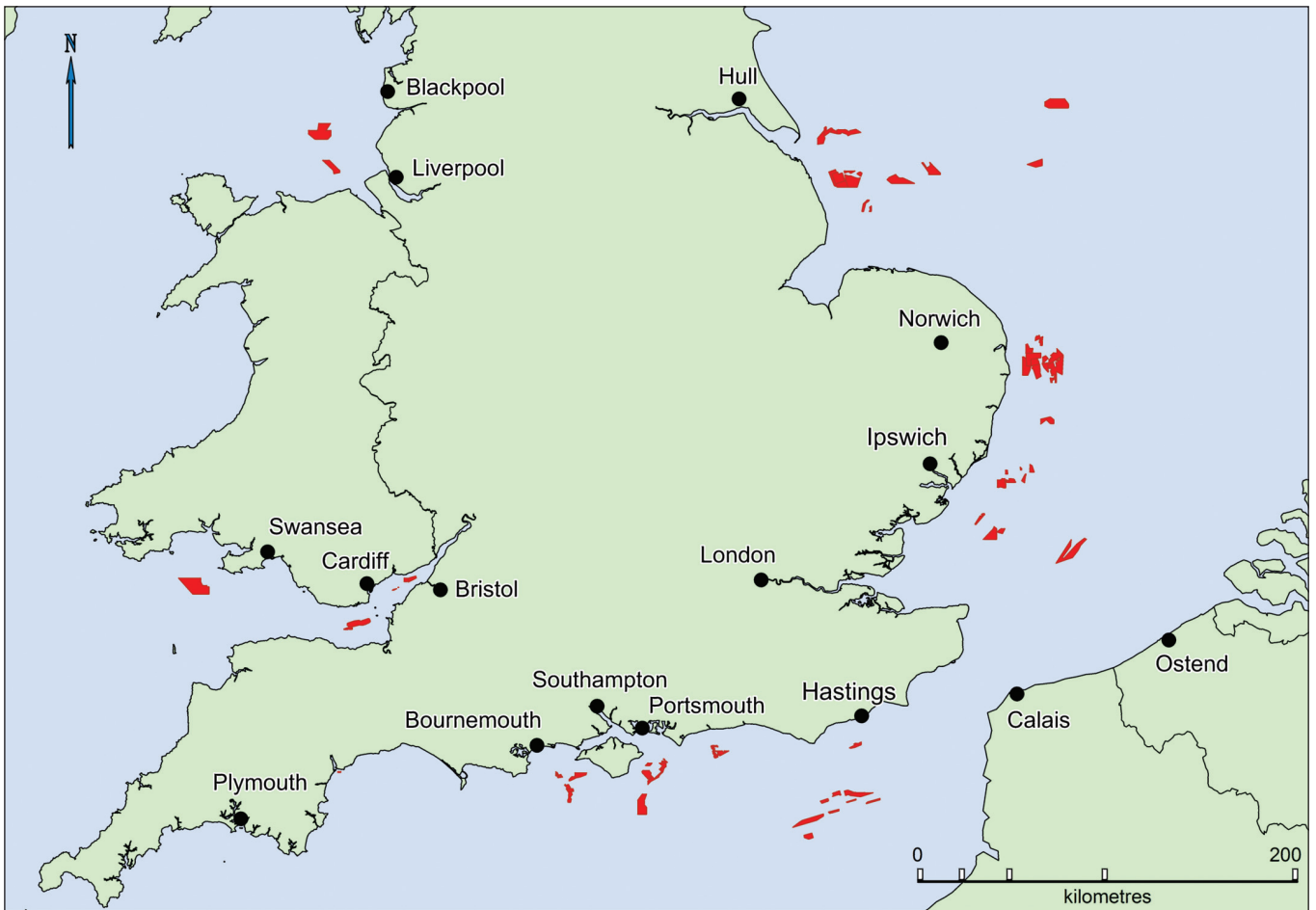


Figure 1. Aggregate dredging licence areas (in red) off the UK in 2017

2 and 3), largely for use in ready mixed concrete and concrete products, but in addition marine aggregates are also exported by these dredgers to the near continent. In 2016 some 2.8 million tonnes was landed at wharves in the Netherlands, Belgium and northern France for use in construction (The Crown Estate, 2016). Coastal defence, port developments and reclamation schemes also regularly require marine aggregates, be it for beach replenishment, infill of dock structures or land reclamation in port expansion. In 2016 almost two million tonnes was used from the licensed areas for this purpose around the coast of Great Britain (Figure 4).

HISTORICAL CONTEXT

The marine aggregate industry is an integral part of Britain's maritime cultural heritage, with origins that can be traced back to the 1700s. Sand and gravel was taken from sand banks at low water for use as ballast in unladen sailing ships. This arrangement was licensed by Trinity House and for a period the royalties they received represented their principal source of income, which in turn helped to fund the development of the nation's network of lighthouses and buoys.

The commercial extraction and use of marine aggregates for construction in Britain dates back to the early twentieth century, mainly in the Bristol Channel and Thames Estuary. Since the 1950s the industry increased the number of ships and obtained more licence areas and to date a total of one billion tonnes of sand and gravel

has been extracted from the UK seabed. Through the second half of the twentieth century, licensing was a non-statutory process with access to the aggregate deposits granted primarily by The Crown Estate as the mineral owner and the Department of Transport as the authority for navigational safety at sea. 'Production licences' were granted by The Crown Estate subject to a favourable 'Government View' following environmental impact advice on coastal issues by the Government-owned Hydraulics Research Station (now HR Wallingford Ltd) and on fishing by the Ministry of Agriculture Fisheries and Food (MAFF). The limited scope of this advice began to broaden in the late 1980s with the advent of the European Union (EU) Environmental Impact Assessment Directive in 1989, rapidly followed by the EU Habitats and Birds Directives in the early 1990s. MAFF and the then Department of the Environment (DoE) expected all new aggregate dredging licence applications to be accompanied by a full environmental impact assessment with public consultation before the Government View would be issued on whether extraction was permissible.

Challenges arising in the 1990s

The raising of the expectations of Government regulators ahead of licensing decisions exposed gaps in the understanding of both environmental impacts and long term mineral reserves within the industry and Government. These deficiencies stimulated public opposition to dredging, notably over concerns around coastal erosion and fisheries impacts. To compound



Figure 2. Two aggregate dredgers extracting gravelly deposits on the Hastings Shingle Bank licence area, seven miles off Hastings, east Sussex. The view is from the bridge of Tarmac Marine's City of London, a 4750 tonne cargo capacity vessel, looking towards CEMEX UK Marine's Sand Fulmar, with a cargo capacity of 6300 tonnes.



Figure 3. Aerial photograph of Tarmac Marine's dedicated marine aggregate wharf and processing plant at Greenwich on the River Thames, looking west towards central London. Note the plant's rail freight loading facility and the close proximity to the site of the newly constructed residential flats in the foreground.



Figure 4. Examples of coastal protection projects that have used marine dredged aggregates in large volumes over the past thirty years.

matters, regulators in MAFF and the DoE were under-resourced and applications within the non-statutory system took protracted timescales to determine with no certainty of a timely outcome. Unlike the provisions for terrestrial aggregates, there was very little policy context to support marine aggregate development with no formal planning regime or any formal safeguarding provisions to protect marine aggregate resources from other forms of development. The latter two points were particularly important, given that the common ownership of the marine environment invariably meant it was subject to multiple uses that were being managed and regulated on an entirely sectoral basis.

From a commercial mineral ownership perspective, the rights of seabed tenure were unclear and inconsistent, with the content of The Crown Estate production licence in need of review. Most of the existing licence areas were based on either a 10 or 25 year tenure term from a base year of 1989, but with no prospect of Government View continuity or renewal without substantial progress on addressing marine environmental questions. Uncertainty over mineral reserve replacement grew while at the same time demand for marine aggregates remained strong. This demand increased with the growing trend for 'soft' coastal defence works, which by the mid-1990s accounted for millions of tonnes of sand and gravel on top of base construction demand at home and overseas.

ADDRESSING THE UNCERTAINTY AFFECTING THE INDUSTRY

Inter-company co-operation and the development of a regional approach

By the late 1990s, companies were encouraged to co-operate more commonly over licensing issues as regulatory expectations and licensing costs inexorably rose. This co-operation was assisted with the growing number of new application areas clustered within existing dredging 'blocks' off East Anglia, the Humber Estuary and off the south coast, east and west of the Isle of Wight. The industry's response to regulatory demands was facilitated by the sector's trade association BMAPA (the British Marine Aggregate Producers Association) that formed a respected link between the interests of the member companies and the regulators of the offshore zone. BMAPA, formed in the early 1990s, had become a credible voice for the aggregates industry on marine environmental matters.

One result of co-operation was the first Regional Environmental Assessment (REA) for a group of new licence applications in 'green-field' waters in the eastern English Channel south of Beachy Head and close to the UK's territorial limit. The East Channel Region REA, completed in early 2003, was an approach conceived, developed and led by industry that sought to address in

a more strategic manner the background evidence and impact assessments needed for a group of ten applications covering over 200km², avoiding duplication of effort by each applicant company. The REA also assisted Government regulators in consulting stakeholders about the dredging proposals and in determining the cumulative effects of dredging in multiple sites where extraction zones were close together. In addition the REA helped to set an appropriate level of extraction tonnage for the region, supported by a set of regionally based marine environmental monitoring conditions.

Regional assessment – a promising way forward with Industry as part of the solution

The success of the regional approach in the eastern English Channel led to further Marine Aggregates Regional Environmental Assessments (MAREAs) for the South Coast, Outer Thames, Anglian and Humber regions where there were clusters of existing licence areas in need of renewal, together with new licence application areas. The distribution of industry licences meant that there were common environmental issues between them and the co-operation that had begun to characterise the sector in the 1990s was extended to the formation of new regional associations of dredging companies that commissioned and funded the voluntary MAREAs. Industry members recognised that they were more effective addressing common regional issues collectively rather than individually in isolation. The extraction licence renewal programme ran from 2005 to 2015 and was an industry driven regional approach with companies working jointly to negotiate single outputs to save time, effort and cost. There was the added reassurance of a consistent impact assessment to present to regulators and their advisors. By the end of 2014, this approach had addressed many of the environmental questions surrounding aggregate dredging and had supported the issue of over 100 consents by the MMO and NRW, all within a newly established statutory regime, discussed below.

AN IMPROVING REGULATORY CLIMATE

A statutory licensing process

It had been a long standing ambition of the UK Government to replace the non-statutory Government View procedure with a statutory licensing regime for marine aggregates and to adopt a more integrated approach towards regulating development activity in the marine environment, moving away from the sectoral approach that had previously characterised how the marine environment was managed. This was finally achieved by the Marine and Coastal Access Act of 2009 and with it the creation of the Marine Works Regulations, an agenda for Marine Plans and also a Marine Policy Statement. The Act allowed the creation of the MMO, NRW and similar bodies in the other devolved administrations of Scotland and Northern Ireland so as to regulate and manage marine development and industrial activities in UK waters. This was the first time in the UK that dedicated Government agencies had been formed with specific powers of regulation offshore, including making consenting decisions and monitoring compliance with marine licence conditions.

The pivotal role of the industry representative body

BMAPA was well placed to work with the new administrations on behalf of its members to develop approaches to managing the activities of the industry in partnership with regulators, advisors and stakeholders. A change in the working practice and relationship with regulatory advisors including Natural England, Historic England and Cefas (fisheries and environmental advisors) was co-ordinated through BMAPA, acting as an 'honest broker' on behalf of the individual operators. BMAPA also developed diverse industry initiatives in partnership with Government, such as an archaeological reporting protocol for dredgers and aggregate wharves with Historic England and a series of guidance documents on aggregate dredging and coastal processes, incorporating fundamental geological considerations for several specific coastal regions inshore of major aggregate grounds. Most recently BMAPA and The Crown Estate have produced a Good Practice Guidance note on the extraction by dredging of aggregates from England's seabed, in consultation with Defra, MMO, Natural England, JNCC, Historic England and Cefas (BMAPA and The Crown Estate, 2017). The document has taken the place of the former MMG1 (Marine Mineral Guidance Note 1, ODP, 2002), produced by the former Government Department, the Office of the Deputy Prime Minister in 2002, and reflects the significant developments that have taken place over the last 15 years.

The role of the ALSF

As a further factor in improving the climate in which the industry operated, the Marine Aggregate Levy Sustainability Fund (MALSF) ran from 2002, in tandem with its land-based equivalent, the ALSF. By the end of the MALSF in 2011, over £25 million had been invested by the Government in applied research and development, with the objective to improve the way that marine aggregate operations were planned for, assessed and managed. In so doing the aim was to reduce the impacts of aggregate dredging on the marine environment. Selection and oversight of the numerous research projects was provided by a steering group chaired by Defra with both BMAPA and The Crown Estate as members together with five Government advisory bodies. Outcomes of the programme have not only provided reassuring findings on the long term environmental effects of dredging the seabed but also have provided greater confidence to regulators and their advisors over evidence-led decision making in the future. A key component of this was the commissioning of six broad scale, multidisciplinary Regional Environmental Characterisation (REC) mapping surveys, which represented the most significant investment in marine data for several decades. Not only did these provided context for the MAREA studies, but the outputs also provided important evidence to support the emerging marine planning processes and the development of the nation's network of marine protected areas. Wider benefits have included greater co-operation between the industry, regulators and scientists and the development of new capabilities in the marine science community (Newell and Woodcock, 2013).

Tenure of the seabed

Marine aggregate companies in the UK do not own their extraction areas, but instead have specific commercial rights to the seabed granted by the mineral and seabed owner, The Crown Estate. In 2016, the development of a revised and updated standard Production Agreement was completed, following an extended period of negotiation between industry and The Crown. Significantly, this gives operators up to thirty (15 + 15) years tenure of licensed areas, subject to certain conditions. This period fits with the 15 year Marine Licence term and also with ship replacement cycles, allowing operators more certainty over their mineral reserve security when planning major investments.

A new approach to licence compliance

Since 2010, standard conditions for all marine aggregate licences have been devised and agreed between the MMO and NRW, their scientific advisors and the industry. As well as promoting consistency between different licence areas, the industry has moved to deliver standard environmental monitoring requirements on a regional basis, with seabed sampling and geophysical surveys taking place over all licence areas in a given region in one survey. The initiative is supported by the regulatory authorities who have altered the timing of site specific licence conditions to align at a regional scale, enabling compliance with marine licences to be streamlined. Different regions with licence concentrations are monitored each year, allowing effort and cost to be spread over time. As an example of the scale of this commitment, five regional baseline surveys across the marine aggregate dredging interests in the southern North Sea and the English Channel were commissioned by industry in 2014. The surveys, which totalled over 3,500 sample stations, represent one of the largest seabed sampling programmes ever undertaken on the UK continental shelf.

The new approach was supported by research and evidence, some from the MALSE, which identified that the key long-term environmental consideration for aggregate extraction was the condition of seabed sediments post-extraction. This is now regarded by MMO and NRW as the key variable for successful faunal recolonisation of a dredged seabed, with the requirement being to leave a layer of sediment after extraction ceases which is comparable to the original sediment type. Compliance is measured using specific, quantifiable statistical approaches to sediment 'similarity' derived from grab samples taken from stations chosen by the regulatory authorities and obtained and analysed to a repeatable protocol determined by MMO's scientific advisors. The regulatory focus has shifted from monitoring site specific impacts to promoting faunal recovery by monitoring seabed sediments to ensure similar habitat conditions are maintained. The research leading to this new approach was partnership funded by Defra, Welsh Government, MMO, Crown Estate and industry, again through BMAPA.

MINERAL RESERVES SECURED: A SUMMARY OF OUTCOMES AND SOLUTIONS APPARENT BY 2017

The coming together of industry and regulators over

several years, with the aim of safeguarding the marine environment and providing a statutory basis for marine aggregate licensing has left a lasting legacy and a solid foundation for the future, including the following outcomes:

- A programme of licence renewals has been completed in a statutory licensing system – most licences are now valid until the late 2020s and beyond with reasonable expectations that most if not all will be renewed again;
- New Production Agreements with The Crown Estate have established a tenure framework for mineral resources and reserves which provides a firm foundation for future long-term business planning;
- The Crown Estate has invested in seabed mapping by the British Geological Survey to identify areas of likely aggregate potential in the future (Bide *et al*, 2011) ;
- UK Government's first formal Marine Policy Statement (HM Government *et al*, 2011) recognises the 'crucial' role of marine aggregates for construction and coastal defence, providing the sector with its 'licence to operate' into the future;
- MMO's newly created marine plans for the eastern and southern UK offshore areas include policies intended to safeguard marine aggregate resources where they occur;
- A Welsh marine plan is in development with aggregates featuring prominently as a key strategic resource;
- The Crown Estate and Industry have identified 350 million tonnes of total current primary aggregate reserves within existing licences, with additional reserves available subject to the renewal of existing licences.

CHALLENGES STILL TO OVERCOME

A successful marine aggregate industry needs not only mineral reserves but also ships and wharves. The fleet of purpose built dredging ships owned by the industry has a combined cargo capacity of 103,000 tonnes but many of these ships are over twenty years old. The average age of the fleet is 21 years, with the operational life of an aggregate dredger typically being 25 – 30 years. There is a need for investment in new ships over the next five years or so but this represents a significant long-term commitment, with a typical marine aggregate dredger costing well over £30 million. However, the more secure mineral reserve base, coupled with developments in marine policy, planning and regulation, will provide far greater confidence as to the prospects of the sector over the medium to long term and in so doing will be a major factor influencing decisions on replacement and additional shipping capacity within the industry.

A growing concern is around the ability for marine aggregates to be landed in the most economic locations in order to access the market. With increasing land and property values, competition for riverside and coastal space means established aggregate wharves increasingly adjoin new residential developments that boast views

over the water. Aggregate processing facilities, vital to the industry, will typically need to operate round the clock and consequently conflicts can arise if other forms of development are permitted nearby which may be incompatible with these operations (e.g. Figure 3). The National Planning Policy Framework (DCLG, 2012) recognises the strategic importance of aggregate infrastructure (wharves and railheads) and requires local plans to adopt appropriate policies to safeguard these facilities. However, if these policies are not effectively implemented in district plans or when determining planning applications, existing wharf infrastructure can be placed under pressure, with constraints placed on operation. Furthermore, despite forecasts for marine aggregate landings to rise over the next fifteen years, finding new wharf space complete with associated infrastructure (especially rail) in the southern UK can be difficult. BMAPA is working alongside its parent body, the Mineral Products Association, to help safeguard existing wharves from new developments by ensuring that the requirements of national policy are being consistently and effectively applied and implemented.

CONCLUDING REMARKS

Marine policy and plans have established a robust and secure 'licence to operate' for the sector – a sound background for investment in wharves and ships.

A regional approach to monitoring and management is already delivering more cost effective and consistent licence compliance data, in line with the Government's 'Better Regulation' agenda.

Some 400 million tonnes of permitted marine aggregate reserves exist under current licences, many of which have the potential to be renewed for a further 15 years, releasing new reserves.

The industry has the potential to sustain a growing contribution to overall mineral supply, especially in the SE of England, and so marine aggregates have a bright future as an essential part of the wider portfolio of UK mineral supply.

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