







Marine aggregate dredging 1998 - 2022 A twenty-five-year review

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Executive summary



This publication provides a twenty-five-year overview of an initiative launched in 1999 as a means of reporting the dredging footprint of the UK marine aggregate industry. It reflects the commitment by members of the British Marine Aggregate Producers Association and The Crown Estate to review both dredging activity and licence areas on an annual basis, and to surrender those areas no longer containing economic sand and gravel resources.

Over two and a half decades, the 'Area Involved' initiative has generated high-quality, high resolution data analysis which provides valuable environmental performance indicators for the marine aggregate sector. The reporting of dredging activity is made possible by an Electronic Monitoring System, developed by The Crown Estate and industry, and required on all vessels dredging on licensed extraction sites.

The review reports data and highlights trends across three key indicators:

- Area of seabed licensed focusing not just on changes to the area but also on the location of licences.
- Area of seabed dredged assessing the area actually dredged and the distribution of dredging effort.
- Cumulative dredge footprint the overall footprint gives an indication of the scale and intensity
 of dredging effort over a long-term period.

Technological advances have enabled the industry to develop a better understanding of its licensed resources which in turn has allowed the spatial footprint of its activities to be managed more efficiently.

As a consequence, the overall reduction in both the area of seabed licensed and the area of seabed dredged over the period 1998-2022 has helped to minimise the environmental footprint of the sector's operations.

This approach has also allowed the industry to limit the potential for spatial conflicts with other marine users, providing valuable evidence to help inform the development and implementation of marine planning.

Summary information

The figures below relate to changes in the period 1998 to 2022

Total amount of sand and gravel dredged from Crown Estate licences:

Reduction in licensed footprint:

504 million tonnes

-355 km²

Additional area of seabed licensed:

 1124_{km^2}

Area of licensed seabed surrendered:

1477 km²

Annual area of licensed seabed dredged reduced to:

10%) (15% in 1998) Cumulative area of seabed dredged:

605 km²

of which 222 km² occurred within licensed area that has now been surrendered

Background



Area of seabed licensed

The area of seabed licensed for marine aggregate extraction continues to form a cornerstone of the 'Area Involved' initiative. The period covered by this report has seen various changes to the licensing regime under which marine aggregate extraction may take place. The most significant of these has been the Marine and Coastal Access Act 2009 (MCAA) which introduced a new marine licensing system from 6 April 2011.

To ensure those areas licensed prior to the mid-1990's were fully compliant with the new Marine Licensing regime, Short Term Marine Licence (STML) applications supported by Environmental Impact Assessments were necessary to ensure the continuation of dredging operations. As part of this process, many licensed dredging operations were limited to the historic dredge footprint (since 1993), resulting in a temporary reduction of the permitted area.

The reduced licensed area described in this report between 2012 and 2014 reflects these arrangements, and the increase in licensed area thereafter largely reflects the award of new full-term marine licences for historic dredging areas.

As licences approach the end of the current term (typically 15 years) operators are now reviewing remaining resources and potential areas to relinquish, where resources are exhausted or are no longer required.



Area of seabed dredged

Accurate information on the extent and intensity of dredging operations on The Crown Estate licence areas is possible through analysis of data recorded through the Electronic Monitoring System (EMS). Since 1993, The Crown Estate has required all vessels dredging on licensed extraction sites to be fitted with such systems.

The EMS automatically records the date, time and position of all dredging activity at 10 second intervals (thirty second intervals prior to the introduction of the most recent version of EMS in 2017) and automatically transmits this information back to The Crown Estate's managing agents.

The area of seabed dredged is calculated using a Geographic Information System, which overlays the data points onto a standardised grid of 50m x 50m cells. Relative dredging intensity can be established by calculating the total number of data points which fall within each cell. Such dredging intensity information is made available by The Crown Estate and BMAPA in the annual 'Area of Seabed Dredged' reports.



Background





Cumulative dredge footprint

The cumulative dredge footprints shown in this report are generated by layering each year's complete dredging grid cells on top of one another in a Geographic Information System. By analysing the annual dredge data in this way, it is possible to identify the total area of seabed affected by marine aggregate extraction since 1998.

Using this overlaying method it is also possible to calculate:

- The number of years in which each grid cell has been dredged. The charts included in this report show the results of this analysis and enable the cumulative dredge footprint to be presented, based on the frequency of year-on-year dredging activity.
- The area of seabed which was dredged for the first time in any given year. For the purposes of this review, a 1998 baseline was adopted, from which point onwards all area dredged was assumed to be newly dredged. (The majority of licence areas will have been dredged for a number of years prior to this date however).

Key figures 1998 - 2022





Area licensed

Change in area of seabed licensed:

-355 km²

Additional area of seabed licensed:

1124 km²

Area of licensed seabed surrendered:

1477 km²

Area dredged

Change in annual area of seabed dredged:

 -115 km^2

Maximum annual area of seabed dredged:

223 km²(1998)

Minimum annual area of seabed dredged:

83 km² (2015)

Cumulative footprint

605 km²

of which 222 km² occurred within licensed area that has now been surrendered

The area of new seabed dredged annually decreased from:

76 km² (1999) to 10 km² (2022)

Breakdown by distance from the coast

Distance	Change in area of licensed seabed (km²)	Change in area of dredged seabed (km²)
Within six nautical miles	-152	-60
Between six and 12 nautical miles	-329	-65
Beyond 12 nautical miles	126	10

Tonnage

Amount of sand and gravel dredged from Crown Estate licences

End use	Million Tonnes
Construction	455
Beach nourishment	39
Contract fill	10

Key figures 1998 - 2022





UK newly dredged and previously dredged area 250 200 **Area (km²)** 100 50 0 2012 2014 2016 2018 2020 2022 1998 2000 2002 2004 2006 2008 2010 Year

Previously Dredged Area

Newly Dredged Area



06

07

Extraction depths across the cumulative dredge footprint

An indication of the intensity of marine aggregate dredging activity can be derived from analysing the total tonnage of sand and gravel that has been removed from the dredged area.

Over the twenty-five-year period from 1998 to 2022, 504 million tonnes of marine sand and gravel was extracted from The Crown Estate licence areas for use as construction aggregate (in the UK and overseas), for beach nourishment and for reclamation fill.

By converting this tonnage to cubic metres (1m³ being equivalent to 1.66 tonnes of sand and gravel or 1.5 tonnes of sand), the volume of sediment removed can be averaged across the cumulative dredge footprint for the same period, providing a useful estimate of seabed lowering across the dredging areas.

On this basis, across all regions, the average volume of sediment extracted was 506,755 m³ per square kilometre dredged, which is the equivalent of the seabed level being lowered by an average of 0.51m across the entire area dredged, the equivalent of less than two passes of a draghead.

In reality, of course, the extraction activity will not be spread evenly across the dredged area given the 50m x 50m resolution of the grid analysis.

Consequently, the thicknesses of sediment removed per given unit area will vary according to the intensity of dredging operations and the depth limits of the sand and gravel deposits being targeted. Nevertheless, the relationship between dredged area and extraction tonnage provides a further indicator of the relative scale of dredging intensity, both over time and between regions.

Region	Tonnage (million tonnes)	Volume *1 (million m ³)	Cumulative footprint (km²)	Volume extracted (m ³) per km ²	Approximate depth removed (m) across cumulative footprint
Humber	83	50,217,386	148	339,996	0.34
East Coast	160	96,178,505	204	471,232	0.47
Thames Estuary	37	22,343,731	68	330,126	0.33
East English Channel	71	42,838,748	35	1,217,010	1.22
South Coast	104	62,788,327	91	686,063	0.69
South West	35	23,367,620	44	527,486	0.53
North West	14	9,012,338	15	608,942	0.61
UK	504	306,746,656	605	506,755 * ²	0.51* ²

*1 Volume conversion based on 1.66 tonnes/m3 for all regions except South West and North West, where 1.5 tonnes/m3 is used to reflect the sand resource extracted

*² Derived from a UK analysis, rather than the summed total of the regions

Breaking down the national picture

The location of production licences around England and Wales and their grouping into seven distinct geographical regions reflects the discrete distribution of the sand and gravel deposits that are targeted by the dredging industry. In total, the licences cover only about 0.14 per cent of the UK Exclusive Economic Zone, and of that area only about 10 per cent is dredged in any year. In this section of our review, we break the national statistics down by region. Within each region, we reference the area dredged, licensed and cumulative footprint. Changes in area dredged and licensed are also considered in relation to standardised six and twelve nautical mile limits (based on 2005 extent).

Total tonnage: geographical distribution



25 year footprint - geographical distribution



Humber region 1998 - 2022





Area licensed

Change in area of

seabed licensed:

-138 km²

Additional area of seabed licensed:

308 km²

Area of licensed seabed surrendered:

448 km²

Area dredged

Change in annual area of seabed dredged:

-19 km²

Maximum annual area of seabed dredged:

Minimum annual area of seabed dredged:

53 km² (1998 & 1999)

9 km² (2015)

Cumulative footprint

148 km²

of which 47 km² occurred within licensed area that has now been surrendered

The area of new seabed dredged annually decreased from:



Breakdown by distance from the coast

Distance	Change in area of licensed seabed (km²)	Change in area of dredged seabed (km²)
Within six nautical miles	26	4
Between six and 12 nautical miles	-110	-22
Beyond 12 nautical miles	-54	-1

Tonnage

Amount of sand and gravel dredged from Crown Estate licences

End use	Tonnage (million)
Construction	67
Beach nourishment	16
Contract fill	0.3

Humber region 1998 - 2022





Newly dredged and previously dredged area



Newly Dredged Area

Previously Dredged Area

Construction Beach Nourishment



East Coast region 1998 - 2022





Area licensed

Change in area of

seabed licensed: -181 km²

Additional area of seabed licensed:

106 km²

Area of licensed seabed surrendered:

287_{km²}

Area dredged

Change in annual area of seabed dredged:

204 km²

-72 km²

Cumulative footprint

that has now been surrendered

of which 66 km² occurred within licensed area

Maximum annual area of seabed dredged:

Minimum annual area

97 km²(1998)

of seabed dredged: **23** km² (2016 & 2020)

The area of new seabed dredged

annually decreased from:

27 km² (1999) to 1 km² (2022)

Breakdown by distance from the coast

Distance	Change in area of licensed seabed (km²)	Change in area of dredged seabed (km²)
Within six nautical miles	-44	-33
Between six and 12 nautical miles	-129	-34
Beyond 12 nautical miles	-8	-5

Tonnage

Amount of sand and gravel dredged from Crown Estate licences

End use	Tonnage (million)
Construction	152
Beach nourishment	6
Contract fill	2

East Coast region 1998 - 2022





Newly dredged and previously dredged area 120 100 80 Area (km²) 60 40 20 0 2010 1998 2000 2002 2004 2006 2008 2012 2014 2016 2018 2020 2022 Year Newly Dredged Area Previously Dredged Area



East Coast region 1998 - 2022





Thames Estuary region 1998 - 2022



Area licensed

Change in area of

Additional area of seabed licensed:

177 km²

Area of licensed seabed surrendered:

215 km²

Area dredged

Change in annual area of seabed dredged:

Maximum annual area of seabed dredged:

25 km² (1999)

Minimum annual area of seabed dredged:

3 km² (2012)

Cumulative footprint

68 km²

of which 19 km² occurred within licensed area that has now been surrendered

The area of new seabed dredged annually decreased from:



Breakdown by distance from the coast

Distance	Change in area of licensed seabed (km²)	Change in area of dredged seabed (km²)
Within six nautical miles	-84	-13
Between six and 12 nautical miles	-50	-2
Beyond 12 nautical miles	96	1

Tonnage

Amount of sand and gravel dredged from Crown Estate licences

End use	Tonnage (million)
Construction	28
Beach nourishment	4
Contract fill	5

Thames Estuary region 1998 - 2022





Newly dredged and previously dredged area







Thames Estuary region 1998 - 2022





East English Channel region 1998 - 2022





Area licensed

Change in area of

seabed licensed:

69 km²

15 km²

35 km²

Additional area of seabed licensed:

119_{km²}

Area of licensed seabed surrendered:

50 km²

Area dredged

Change in annual area of seabed dredged:

Maximum annual area of seabed dredged:

Minimum annual area of seabed dredged:

18 km² (2022)

2 km² (2005)

The area of new seabed dredged annually decreased from:

3 km² (1999) to **1** km² (2022)

Breakdown by distance from the coast

Distance	Change in area of licensed seabed (km²)	Change in area of dredged seabed (km²)
Within six nautical miles	-3	-
Between six and 12 nautical miles	-6	-
Beyond 12 nautical miles	78	15

Tonnage

Amount of sand and gravel dredged from Crown Estate licences

of which 6 km² occurred within licensed

area that has now been surrendered

End use	Tonnage (million)
Construction	68
Beach nourishment	2
Contract fill	1

East English Channel region 1998 - 2022









Newly Dredged Area

Previously Dredged Area

Construction Beach Nourishment

East English Channel region 1998 - 2022



South Coast region 1998 - 2022





Area licensed

Change in area of seabed licensed:

-121 km²

Additional area of seabed licensed:

194 km²

Area of licensed seabed surrendered:

 314 km^2

Area dredged

Change in annual area of seabed dredged:

-**19** km²

Maximum annual area of seabed dredged:

35 km²(1998)

Minimum annual area of seabed dredged:

14 km² (2015)

Cumulative footprint

91 km² of which 46 km² occurred withi

of which <mark>46 km²</mark> occurred within licensed area that has now been surrendered

The area of new seabed dredged annually decreased from:

11 km² (1999) to 1 km² (2022)

Breakdown by distance from the coast

Distance	Change in area of licensed seabed (km²)	Change in area of dredged seabed (km²)
Within six nautical miles	-37	-10
Between six and 12 nautical miles	-85	-9
Beyond 12 nautical miles	1	-

Tonnage

Amount of sand and gravel dredged from Crown Estate licences

End use	Tonnage (million)	
Construction	97	
Beach nourishment	7	
Contract fill	0.01	

South Coast region 1998 - 2022









Previously Dredged Area

Construction Beach Nourishment

Contract Fill

South Coast region 1998 - 2022



South West region 1998 - 2022





Additional area of seabed licensed:

135 km²

Area of licensed seabed surrendered:

67 km²

Minimum annual area of seabed dredged:

5 **km**² (2014)

18 km²(1999)

The area of new seabed dredged annually decreased from:

6 km²(1999) to 1 km²(2022)

Breakdown by distance from the coast

Distance	Change in area of licensed seabed (km²)	Change in area of dredged seabed (km²)
Within six nautical miles	24	-9
Between six and 12 nautical miles	43	-
Beyond 12 nautical miles	-	-

End use	Tonnage (million)
Construction	34
Beach nourishment	0.4
Contract fill	0.5

South West region 1998 - 2022









Construction Beach Nourishment Contract Fill

South West region 1998 - 2022



North West region 1998 - 2022



Area licensed

Change in area of

seabed licensed:

-12 km²

Additional area of seabed licensed:

85 km²

Area of licensed seabed surrendered:

96 km²

Area dredged

Change in annual area of seabed dredged: $\mathbf{3}_{km^2}$

15 km²

Maximum annual area of seabed dredged:

Minimum annual area of seabed dredged:

4 km²(2022)

0.3 km²(2010)

The area of new seabed dredged annually decreased from:

2 km²(1999) to **0.1** km²(2022)

Breakdown by distance from the coast

Distance	Change in area of licensed seabed (km²)	Change in area of dredged seabed (km²)
Within six nautical miles	-34	-
Between six and 12 nautical miles	9	3
Beyond 12 nautical miles	13	-

Tonnage

Amount of sand and gravel dredged from Crown Estate licences

of which 6 km² occurred within licensed area

that has now been surrendered

End use	Tonnage (million)	
Construction	9	
Beach nourishment	3	
Contract fill	2	

North West region 1998 - 2022





Newly dredged and previously dredged area

5





Newly Dredged Area

Previously Dredged Area

Construction

Beach Nourishment Contract Fill

North West region 1998 - 2022





England and Wales have one of the largest and most efficient dredging industries in the world, extracting 15 to 20 million tonnes of sand and gravel from the seabed each year for a variety of uses. These range from housebuilding, to major infrastructure projects like the Thames Tideway Tunnel and Liverpool 2 container terminal, to coastal protection such as the innovative Bacton to Walcott Sandscaping scheme.

The Crown Estate manages the seabed around England, Wales and Northern Ireland, and the sand and gravel resources in these waters. We take an active approach to managing this natural asset effectively and sustainably to deliver value over the long-term, including awarding and managing commercial agreements for extraction. We also award and manage leases for the extraction of other minerals, such as potash from undersea deposits that extend several kilometres offshore.

Marine aggregates have played an important role in the building industry since the 1960s and today meet over 20 per cent of sand and gravel demand in England and Wales.

The British Marine Aggregate Producers Association (BMAPA) was formed in 1992 and comprises members of the Mineral Products Association with a marine interest. Marine sand and gravel is supplied to home construction markets, as well as contributing to the balance of payments through exports to Continental Europe. In addition, marine aggregates are fulfilling an increasingly important role by supporting beach replenishment schemes. The marine aggregate industry operates an average of 30 vessels on 66 production licences around the UK as of November 2024.

BMAPA membership (as of 2024) is comprised of: Aggregate Industries, Britannia Aggregates, Breedon Group, Brett Group, CEMEX UK Marine, DEME Building Materials, Heidelberg Materials Marine, Norwest Sand & Ballast Co, Sea Aggregates, Tarmac Marine and Volker Dredging.



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