THE CROWN ESTATE

Marine Aggregates

Annual Review 2025

Contents

Click the titles to jump ahead

National overview

Why are marine aggregates important to Britain?

Britain has one of the world's most developed marine aggregate industries, extracting 15 to 20 million tonnes from the seabed annually. Much of this is used for building houses, transport infrastructure, replenishing beaches and improving coastal defences.

Onshore resources are becoming increasingly constrained, particularly in the South East of England and London. In 2018, marine aggregates satisfied 22% (13.7 million tonnes) of the total construction needs for sand and gravel in Great Britain*.

The Crown Estate owns almost all of the sand and gravel resources lying off of the coast of England, Wales and Northern Ireland and we award and manage commercial agreements for companies to extract it.

This document is designed to help planning officers in local authorities understand the contribution that marine aggregates can make, by identifying offshore sources and providing information on supply routes. In turn, this is intended to support local authorities in complying with the National Planning Policy Framework, which requires mineral planning authorities to demonstrate they have a steady and adequate supply of aggregates for their requirements through Local Aggregates Assessments.

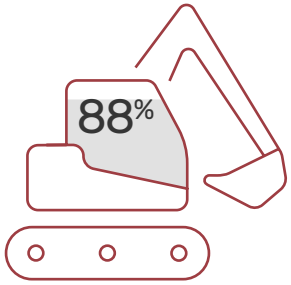
Unless otherwise stated, all figures in this document are correct as of March 2025.

The seven dredge regions marine aggregate is sourced from.

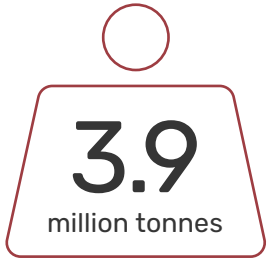
Note that dredging does not currently occur in Northern Ireland. Scotland is the responsibility of Crown Estate Scotland.

* Source: Mineral Products Association: Profile of the UK Mineral Products Industry 2020 Edition

There is potential for demand to increase to **29 million** tonnes per year by **2030**



88% of marine aggregates landed in England and Wales are used by the **building industry**



3.9 million tonnes of marine aggregate was exported to **Europe** in 2024 (**23%** of all marine aggregate landed)

Sustainability and stewardship

The Crown Estate has a commitment to being a responsible landlord, which includes minimising the impact that marine aggregate dredging has on the natural environment, helping local communities and preserving archaeological finds.

Although the quantity of sand and gravel potentially available from marine sources is vast, the industry is aware that it is extracting from a large but ultimately finite natural mineral resource and is keen to ensure that these valuable minerals are used in the most efficient and effective manner possible.

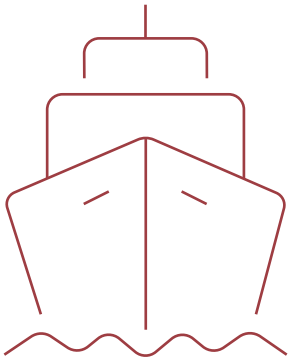
We work in partnership with industry, regulators and stakeholders to improve the sustainability of the sector, in particular reducing the area of seabed licensed that is dredged year on year.

Via our Electronic Monitoring System, we ensure all dredging is undertaken in the correct locations, and every licence application must be supported by a full Environmental Impact Assessment including a Coastal Impact Study to determine whether a marine licence (essentially the planning consent) can be granted, a process governed by the Marine Licensing process.

To deliver 8,500 tonnes takes:

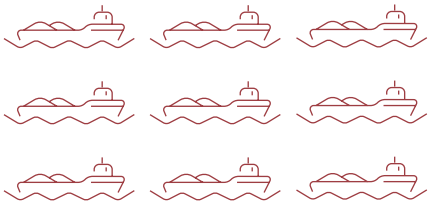
1 dredger

(of 8,500 tonnes)

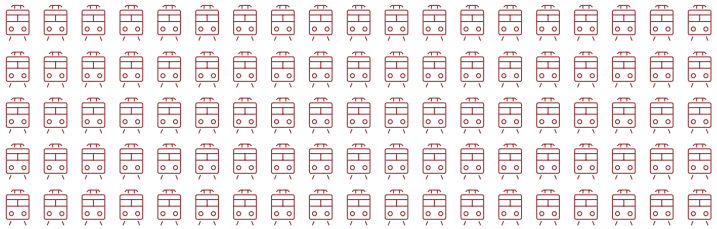


9 barges

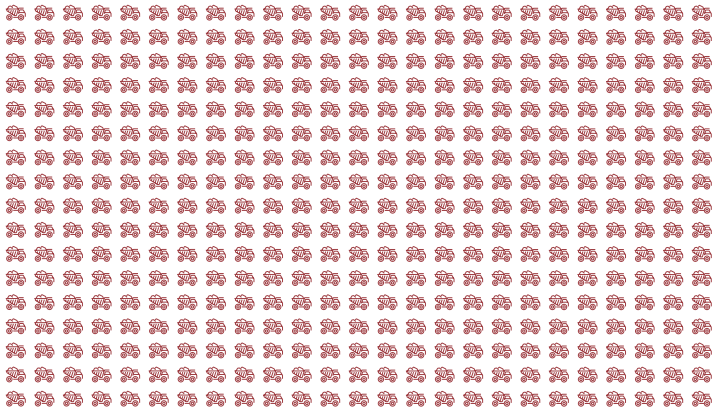
(of 1,000 tonnes)



95 train hopper wagons (of 90 tonnes)



425 aggregate lorries (of 20 tonnes)



Reserves and resources

Reserves and resources

The PERC code defines **"reserves"** as the proportion of a mineral **"resource"** that can be mined for economic purposes

22

Current national estimates suggest there are **22 years** of primary marine aggregate production permitted

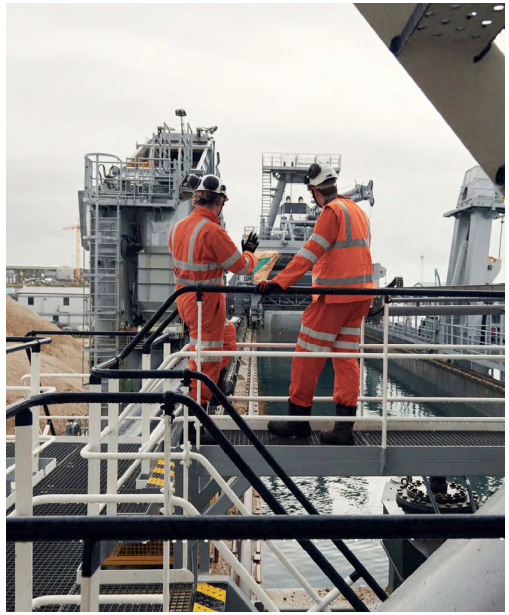
386

million tonnes

Estimated national total current primary reserves

Region	Total current primary reserves	10-year average annual offtake*	3-year average annual offtake*	Peak annual offtake during 10-year period*	Annual permitted offtake (as March 2024)	Regional reserve life at 10-year average annual offtake
		Primary (construction aggregate)				
Humber	36.76	2.83	3.49	3.69	6.88	12.97
East Coast	28.27	3.77	3.37	4.48	7.13	7.51
Thames Estuary	29.24	1.59	1.54	1.94	4.70	18.34
East English Channel	195.05	4.11	3.97	4.65	11.97	47.46
South Coast	60.64	3.53	3.83	4.02	7.58	17.16
South West	26.96	1.30	1.30	1.43	2.80	20.82
North West	9.20	0.26	0.25	0.32	0.90	35.93
Total	**386.12**	**17.39**	**17.74**	**18.10**	**41.94**	**22.20**

All figures are in millions of tonnes
Totals are national averages and peaks, not the sum of regional figures



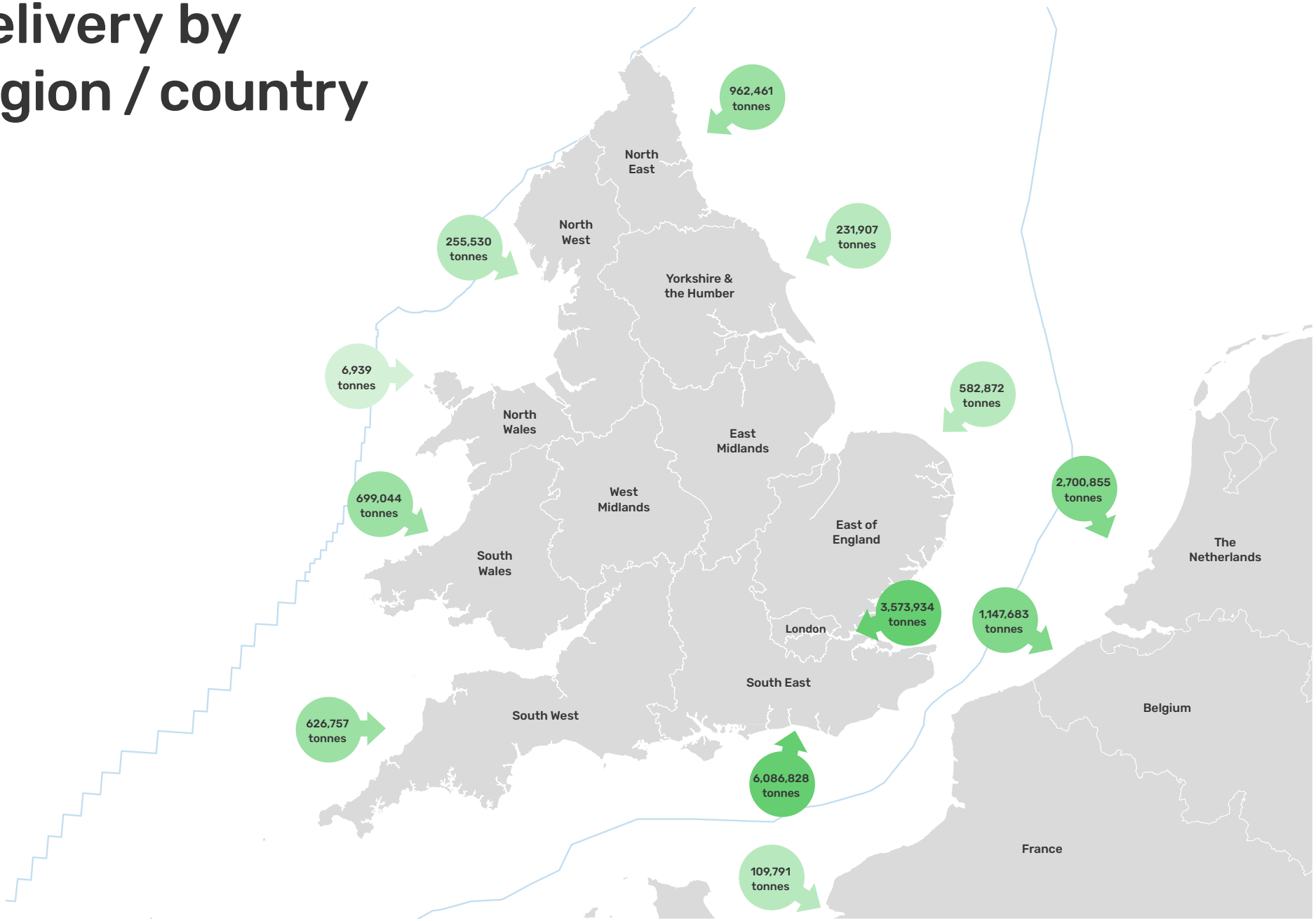
252

million tonnes

London and the Thames Estuary are supplied by the East Coast, Thames Estuary & East English Channel. These hold consented reserves of 252m tonnes, giving **London** and the **Thames Estuary** 23 years of production*

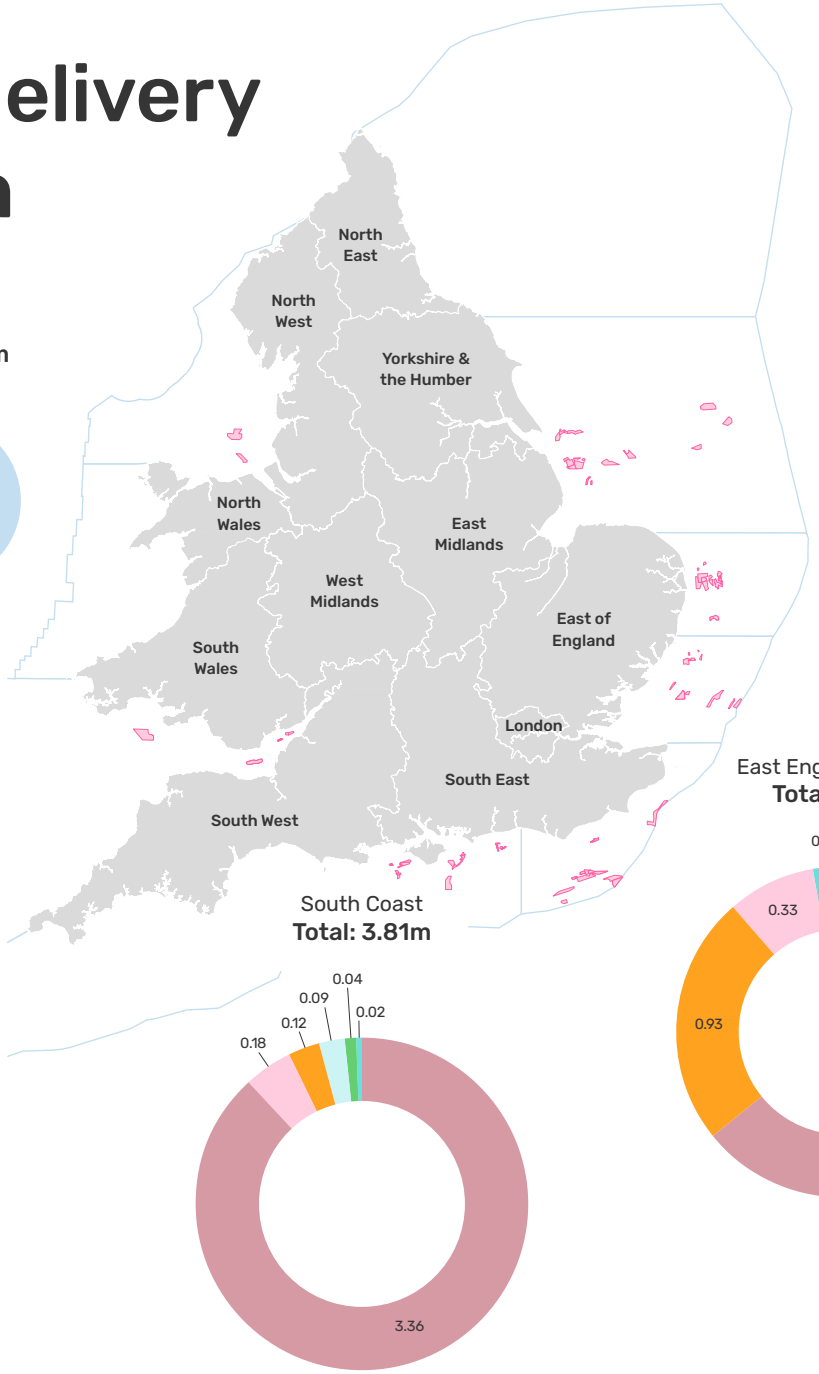
* Based on 10 year annual offtake

Delivery by region / country

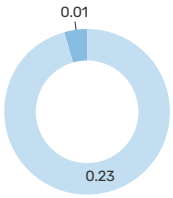


Extraction and delivery by dredge region

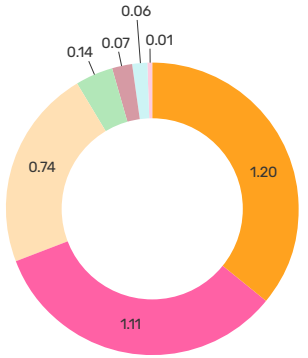
- Belgium
- East of England
- France
- London
- The Netherlands
- North East
- North Wales
- North West
- South East
- South Wales
- South West
- Yorkshire & Humber



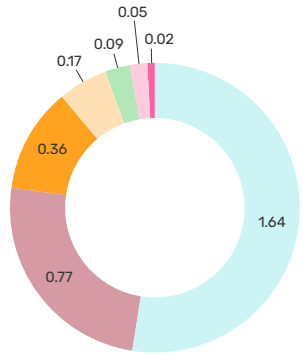
North West
Total: 0.23m



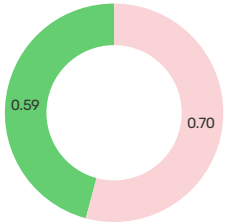
Humber
Total: 3.32m



East Coast
Total: 3.10m

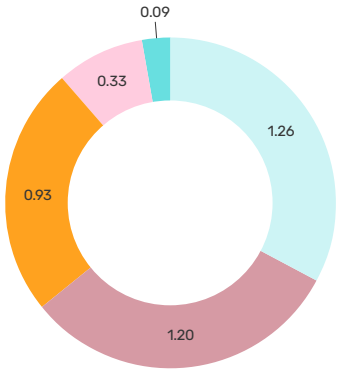


South West
Total: 1.29m

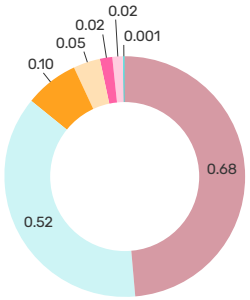


South Coast
Total: 3.81m

East English Channel
Total: 3.81m



Thames Estuary
Total: 1.39m



The Humber region

6.9

million tonnes can be extracted from **10 licences** annually

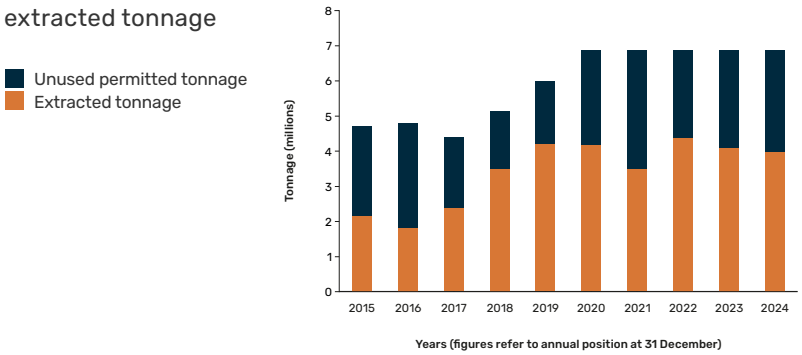
13

Current estimates suggest there are **13 years** of primary marine aggregate production permitted

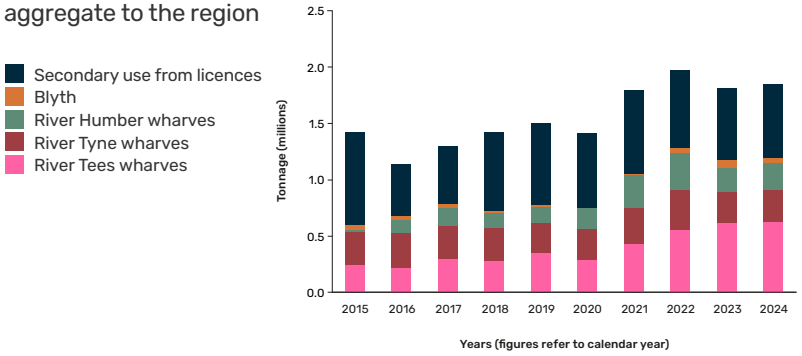
5

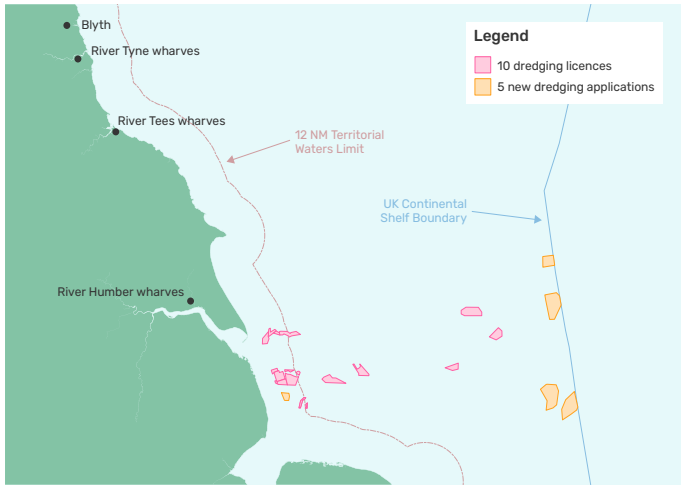
applications for a licence could, if approved, increase the permitted tonnage by **5.8 million** tonnes

Permitted and extracted tonnage

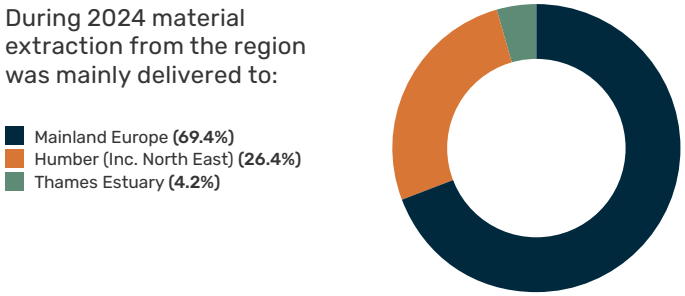


Delivery of marine aggregate to the region





During 2024 material extraction from the region was mainly delivered to:



Sediment and indicative grain sizes

Fine sand
0.063 – 0.25mm

Medium sand
0.25 – 0.5mm

Coarse sand
0.5 – 2mm

Very coarse sand
2 – 4mm

Fine gravel
4 – 20mm

Medium gravel
20 – 40mm

Coarse gravel
40 – 63mm

The East Coast region

7.1

million tonnes can be extracted from **11 licences** annually

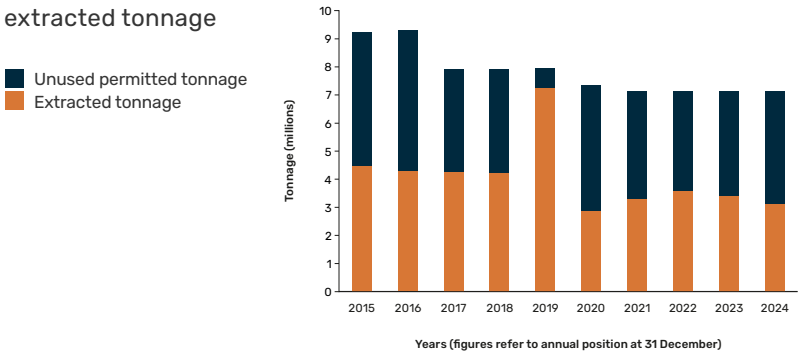
8

Current estimates suggest there are **8 years** of primary marine aggregate production permitted

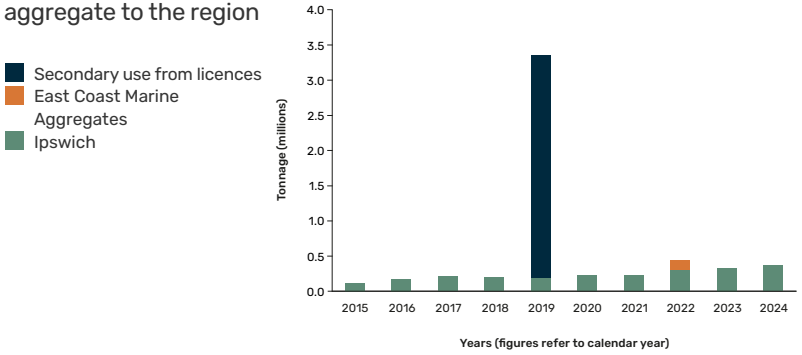
1

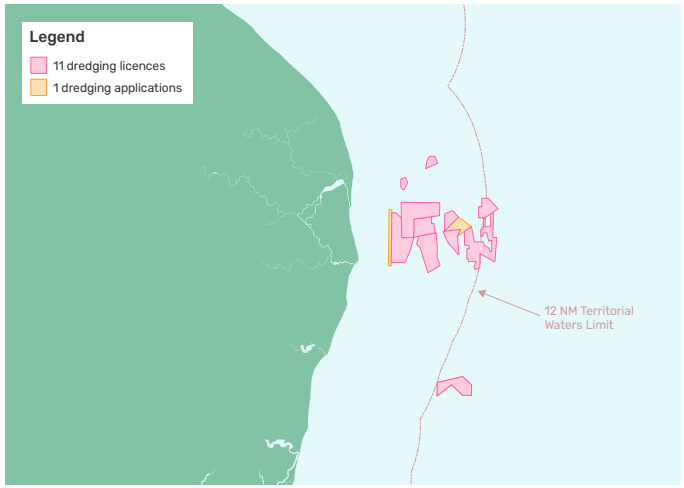
application for a licence could, if approved, increase the permitted tonnage by **0.65 million** tonnes

Permitted and extracted tonnage

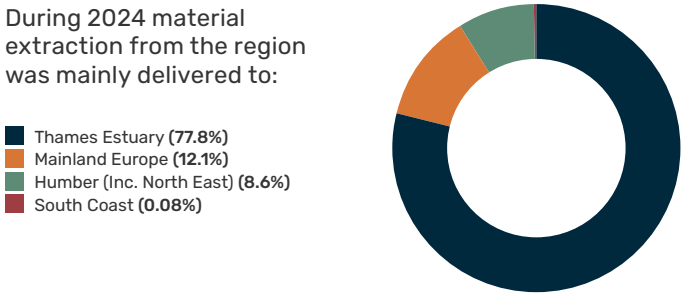


Delivery of marine aggregate to the region





During 2024 material extraction from the region was mainly delivered to:



Sediment and indicative grain sizes

Fine sand
0.063 – 0.25mm

Medium sand
0.25 – 0.5mm

Coarse sand
0.5 – 2mm

Very coarse sand
2 – 4mm

Fine gravel
4 – 20mm

Medium gravel
20 – 40mm

Coarse gravel
40 – 63mm

The Thames region

4.7

million tonnes can be extracted from **8 licences** annually

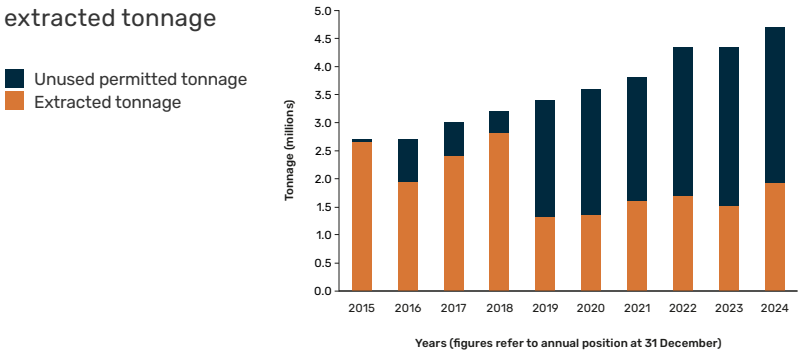
18

Current estimates suggest there are **18 years** of primary marine aggregate production permitted

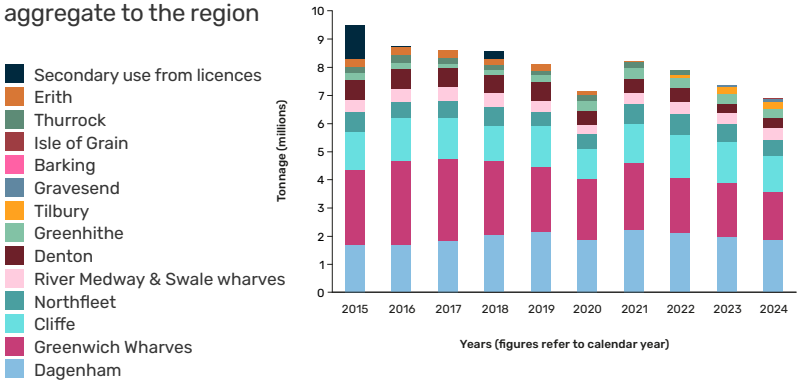
1

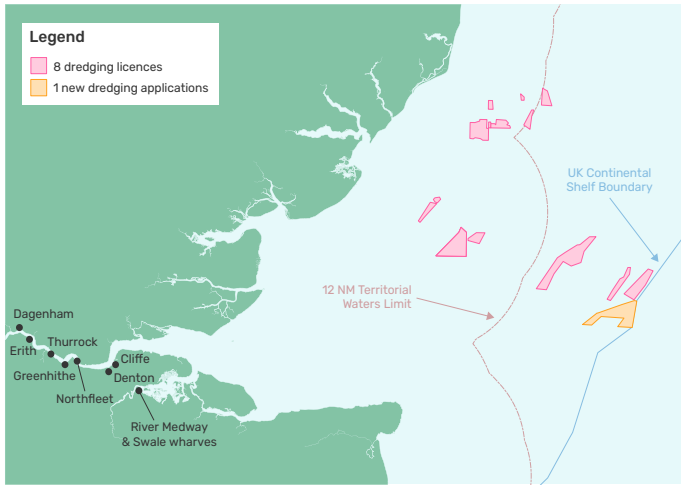
application for a licence could, if approved, increase the permitted tonnage by **0.7 million** tonnes

Permitted and extracted tonnage

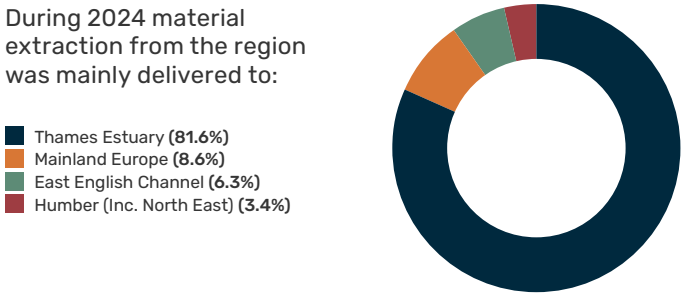


Delivery of marine aggregate to the region





During 2024 material extraction from the region was mainly delivered to:



Sediment and indicative grain sizes

Fine sand
0.063 – 0.25mm

Medium sand
0.25 – 0.5mm

Coarse sand
0.5 – 2mm

Very coarse sand
2 – 4mm

Fine gravel
4 – 20mm

Medium gravel
20 – 40mm

Coarse gravel
40 – 63mm

The East English Channel region

11.9

million tonnes can be extracted from **12 licences** annually

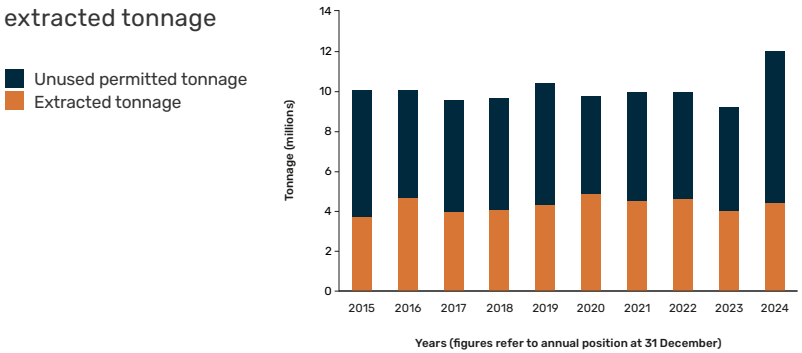
47

Current estimates suggest there are **47 years** of primary marine aggregate production permitted

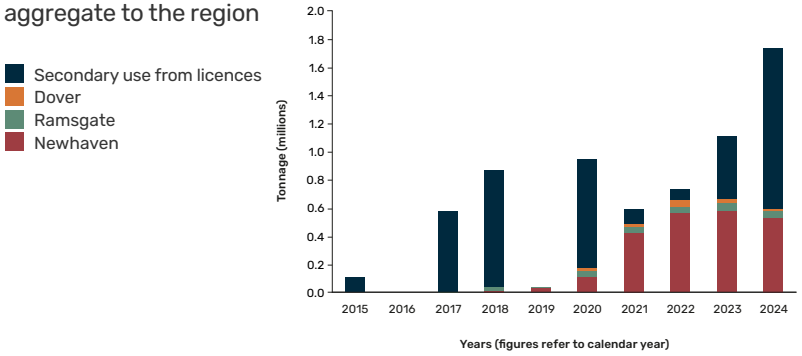
4

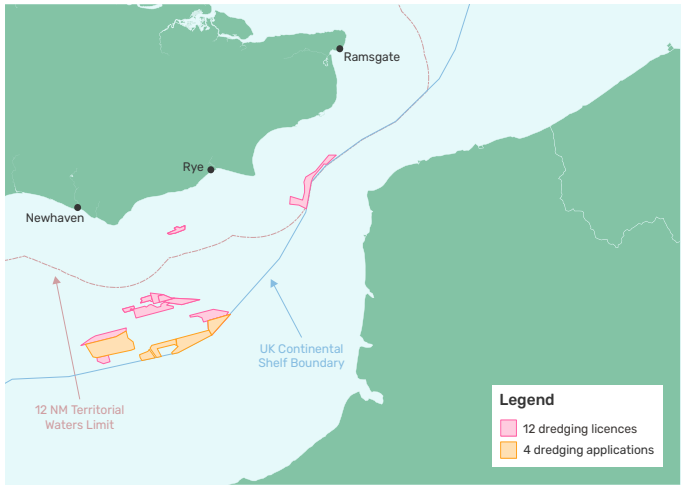
applications for a licence could, if approved, increase the permitted tonnage by **4.5 million** tonnes

Permitted and extracted tonnage

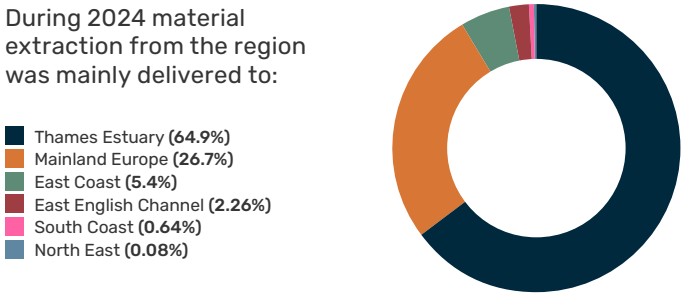


Delivery of marine aggregate to the region





During 2024 material extraction from the region was mainly delivered to:



Sediment and indicative grain sizes

Fine sand
0.063 – 0.25mm

Medium sand
0.25 – 0.5mm

Coarse sand
0.5 – 2mm

Very coarse sand
2 – 4mm

Fine gravel
4 – 20mm

Medium gravel
20 – 40mm

Coarse gravel
40 – 63mm

The South Coast region

7.6

million tonnes can be extracted from **15 licences** annually

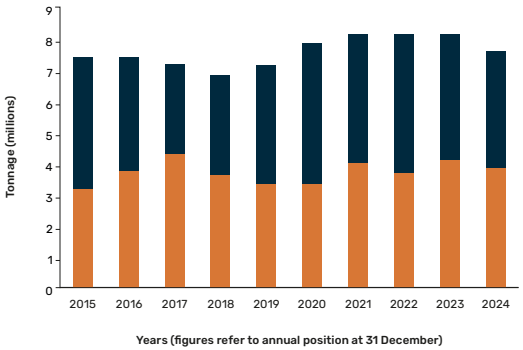
17

Current estimates suggest there are **17 years** of primary marine aggregate production permitted

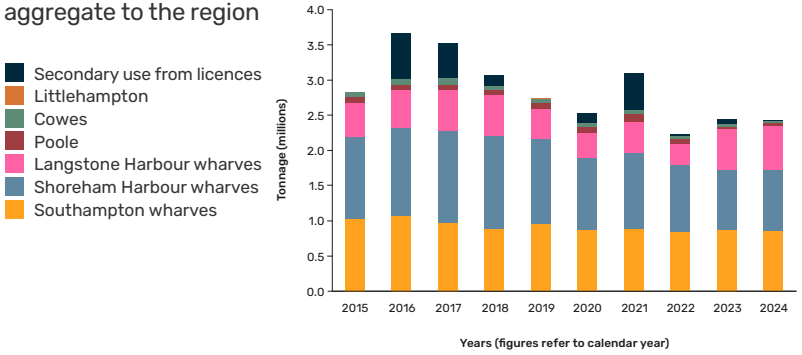
2

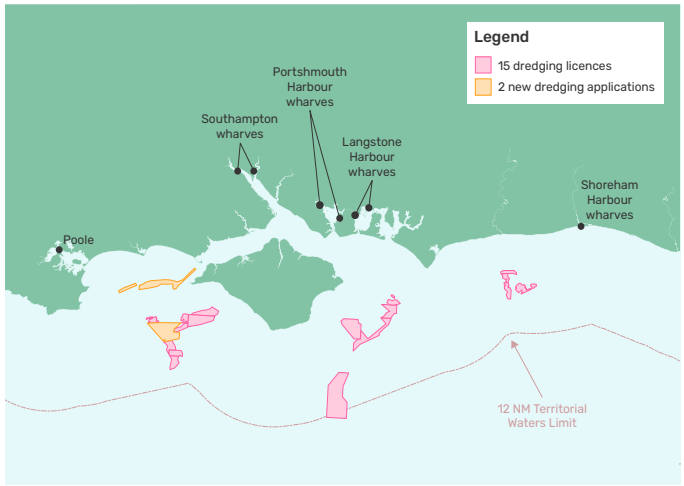
applications for a licence could, if approved, increase the permitted tonnage by **1 million** tonnes

Permitted and extracted tonnage

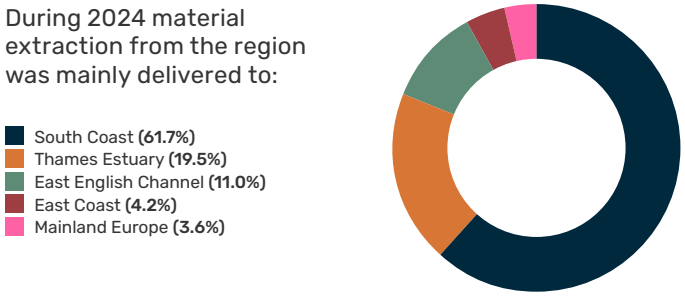


Delivery of marine aggregate to the region





During 2024 material extraction from the region was mainly delivered to:



Sediment and indicative grain sizes

Fine sand
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Medium sand
0.25 – 0.5mm

Coarse sand
0.5 – 2mm

Very coarse sand
2 – 4mm

Fine gravel
4 – 20mm

Medium gravel
20 – 40mm

Coarse gravel
40 – 63mm

The South West region

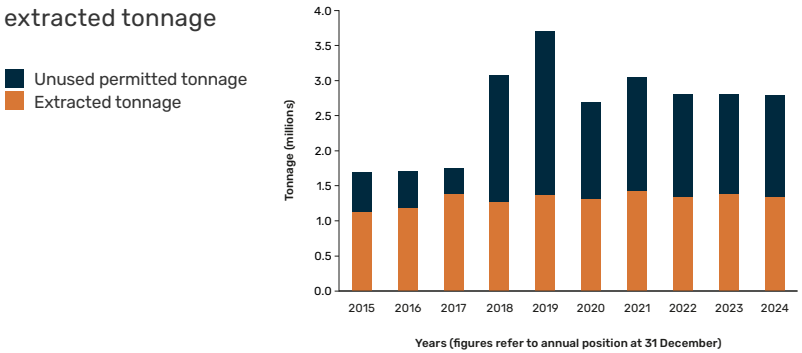
2.8

million tonnes can be extracted from **9 licences** annually

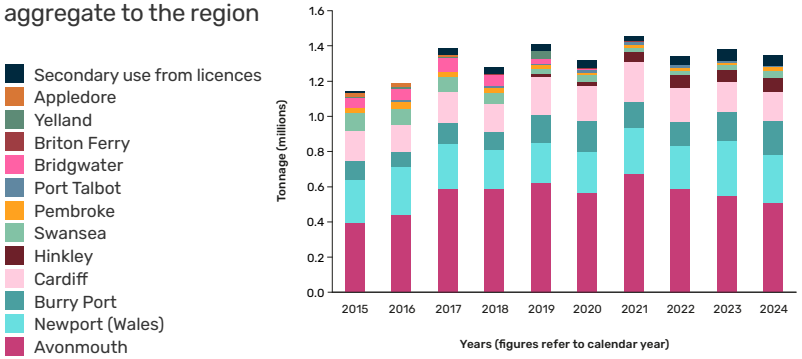
21

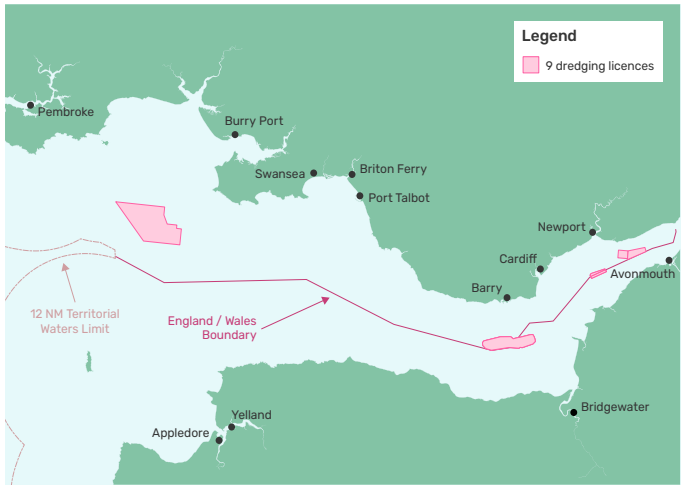
Current estimates suggest there are **21 years** of primary marine aggregate production permitted

Permitted and extracted tonnage

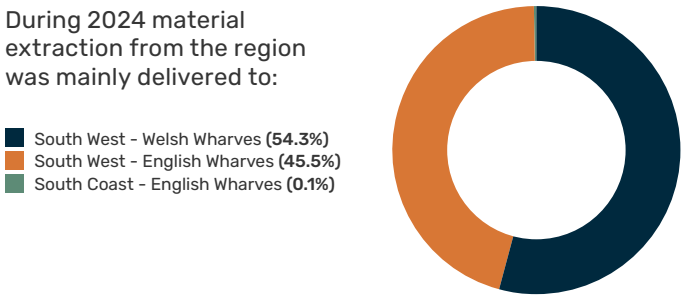


Delivery of marine aggregate to the region





During 2024 material extraction from the region was mainly delivered to:



Sediment and indicative grain sizes

Fine sand
0.063 – 0.25mm

Medium sand
0.25 – 0.5mm

Coarse sand
0.5 – 2mm

Very coarse sand
2 – 4mm

Fine gravel
4 – 20mm

Medium gravel
20 – 40mm

Coarse gravel
40 – 63mm

The North West region

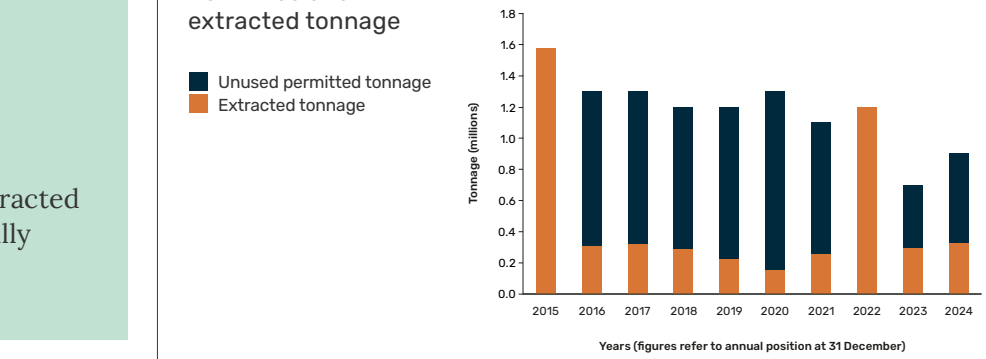
0.9

million tonnes can be extracted from **2 licences** annually

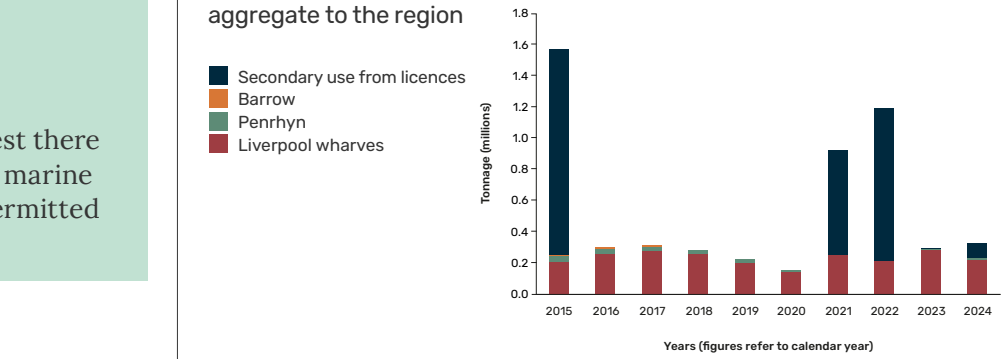
36

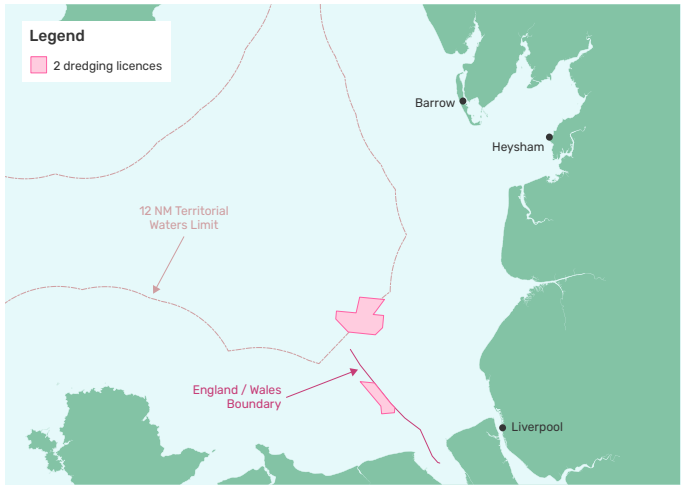
Current estimates suggest there are **36 years** of primary marine aggregate production permitted

Permitted and extracted tonnage

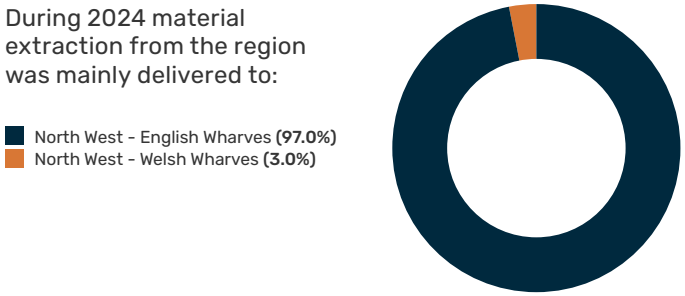


Delivery of marine aggregate to the region





During 2024 material extraction from the region was mainly delivered to:



Sediment and indicative grain sizes

Fine sand
0.063 – 0.25mm

Medium sand
0.25 – 0.5mm

Coarse sand
0.5 – 2mm

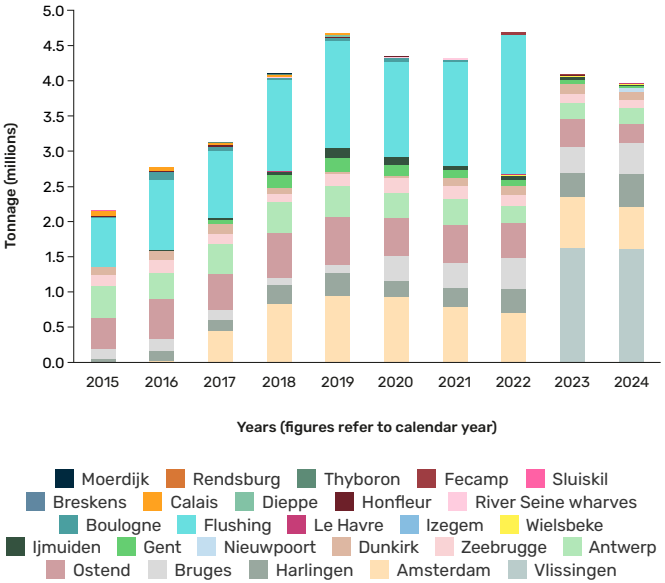
Very coarse sand
2 – 4mm

Fine gravel
4 – 20mm

Medium gravel
20 – 40mm

Coarse gravel
40 – 63mm

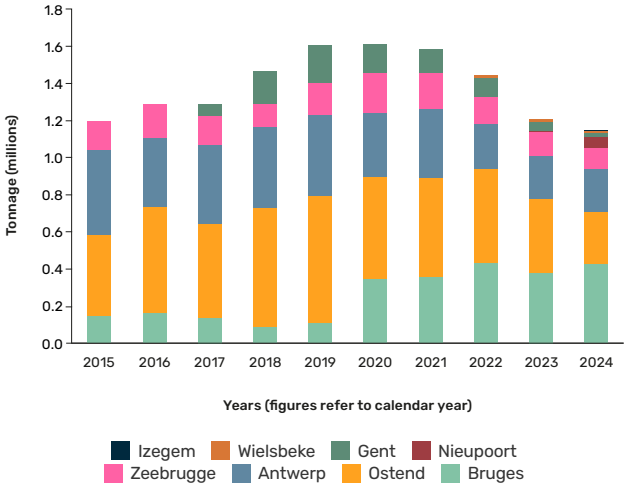
Export to mainland Europe from the UK



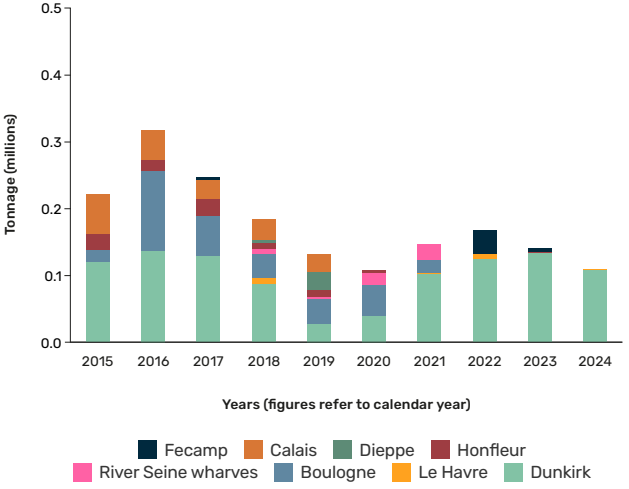
During 2024 material extracted from Crown Estate licensed areas was exported to:

- The Netherlands **(2.7m)**
- Belgium **(1.15m)**
- France **(0.11m)**

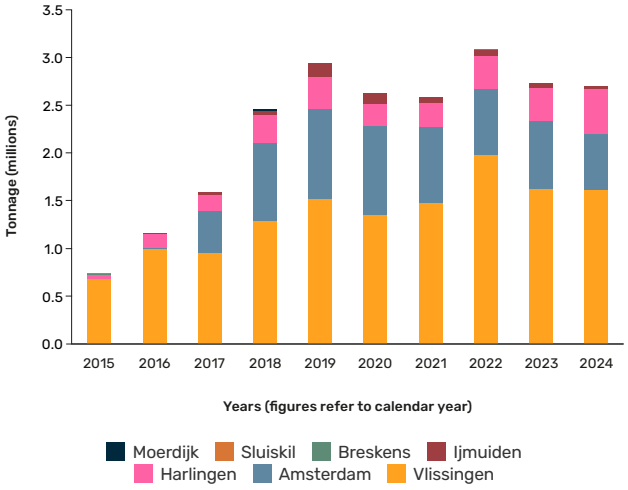
Delivery of marine aggregate to Belgium



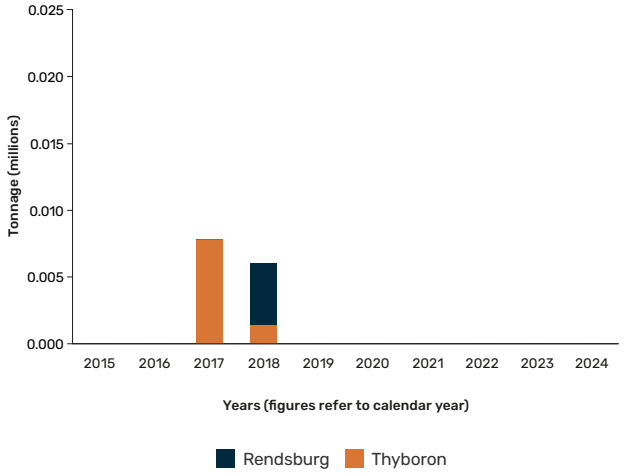
Delivery of marine aggregate to France



Delivery of marine aggregate to The Netherlands



Delivery of marine aggregate to Northern Europe



Uses of marine aggregates around the UK

The below projects have all used marine aggregates in their construction.

Coastal & flood defences

1. Minehead Beach
2. Sea Defences (reefs), Sea Palling
3. Thames Barrier, London
4. Clacton Beach
5. Colwyn Bay Beach
6. Pevensey Bay Beach
7. Lincshore Beach
8. Dawlish Warren Beach
9. Bacton to Walcott Sandscaping scheme
10. Bournemouth Beach
11. Hythe to Lydd Coastal Defence scheme

Commercial development & regeneration

12. 1 New Burlington Place W1, London
13. 20 Fenchurch Street (Walkie-Talkie), London
14. Cardiff Bay Barrage
15. Canary Wharf & Docklands Developments, London
16. Central St Martins, London
17. Spinnaker Tower, Portsmouth
18. Superstore site raising, Seaton
19. Land reclamation, Rochester Riverside
20. Dover Western Docks Revival
21. St James's Market, London

Energy & utilities

22. Energy Recovery Facility, Newhaven
23. Wastewater Treatment Plant, Birkenhead
24. London Array Wind Farm
25. Nuclear Power Station, Dungeness
26. Thames Tideway Tunnel, London
27. Hinkley Point C Nuclear Power Station, Bridgwater

Community & leisure

28. Principality Stadium, Cardiff
29. National Botanic Gardens of Wales, Great Glasshouse, Carmarthenshire
30. The Darwin Centre, Natural History Museum, London
31. Northumberland Development Project, Tottenham Hotspur FC, London
32. British Airways i360 Observation Tower, Brighton
33. Everton Football Ground, Bramley Moore docks

Port development

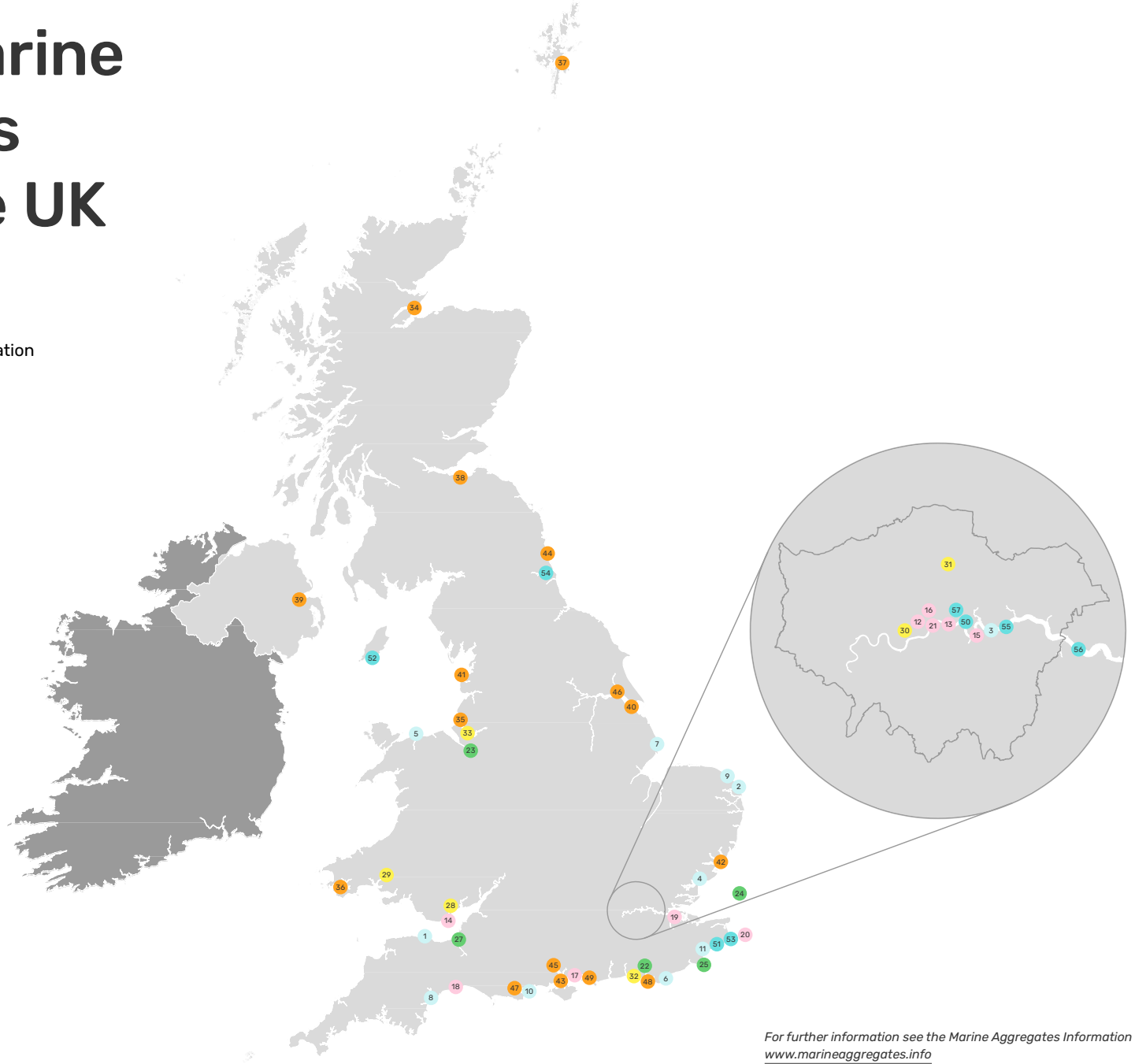
34. Nigg Yard, Cromarty Firth
35. Liverpool2 Container Terminal
36. Oil Terminal, Milford Haven
37. Lerwick, Shetland Islands
38. Leith Docks, Edinburgh
39. Belfast
40. Grimsby
41. Fleetwood
42. Container Terminal, Felixstowe
43. Breakwater, Cowes
44. Blyth
45. Container Terminal, Southampton
46. Green Port Hull
47. South Quay, Poole
48. Brett Wharf, Newhaven
49. Brett Wharf, Portsmouth

Transport infrastructure

50. Canary Wharf Underground Station, London
51. Channel Tunnel Rail Link
52. Ronaldsway Airport Extension, Isle of Man
53. Ferry Terminal, Dover
54. Gateshead Millennium Bridge, Newcastle-upon-Tyne
55. City Airport, London
56. Queen Elizabeth II Bridge, Dartford
57. Crossrail, London

Uses of marine aggregates around the UK

- Coastal & flood defences
- Commercial development & regeneration
- Energy & utilities
- Community & leisure
- Port development
- Transport infrastructure



For further information see the Marine Aggregates Information Centre website: www.marineaggregates.info

Bacton sandscaping

Uses of marine aggregates for beach nourishment

Bacton beach following the sandscaping scheme

The innovative Bacton to Walcott sandscaping scheme was implemented in August 2019 to protect the Bacton Gas Terminal and buy time for adaptation for the villages of Bacton and Walcott.

Five years later, Haskoning, commissioned by The Crown Estate, produced an overview of its actual outcomes thus far.

The scheme placed 1.8 million cubic metres of sand on the Norfolk coast. The nourishment was designed by Haskoning for North Norfolk District Council and the Bacton Terminal Companies, aiming to work with natural processes to provide resilience against erosion and flooding, as well as economic opportunity, social value and environmental benefits.

No flooding or erosion has occurred since placement, but Haskoning's modelling suggests there would have been at least one major flood and a chance of seawall failure, so the scheme has prevented at least £3m in damages, plus associated disturbance.

The outcomes study also explored wider benefits. The scheme produced new evidence on working around breeding birds and managing archaeological finds on nourished beaches.

The outcomes study also found, through interviews with the local community, that there is an overwhelmingly positive perception of the scheme. Community well-being is enhanced because people are reassured that the scheme is working, and the restored beach enables reliable beach access, year-round destination value and diverse beach use, generating buoyancy in the property market and business uplift.

A linked Simetrica-Jacobs study was able to put a £4m wellbeing value on these benefits.

£3 million

Potential cost of damage which has been avoided

£4 million

Wellbeing value of benefits from sandscaping

Restoring nature's future

How the minerals sector powers a greener UK coastline

The UK stands among the most nature-depleted countries on the planet, but hope is on the horizon.

With ambitious targets for restoring and revitalising natural spaces enshrined in national and international law, the minerals sector is stepping up to play a pivotal role in shaping a nature-positive future.

For years, experts have recognised the incredible potential of dredged material to create resilient coastlines and vibrant habitats. Today, as the value of our natural assets grows and new nature market mechanisms unlock investment in nature-based solutions, this exciting approach is gaining real momentum.

Across the Blackwater Estuary in 2024 and 2025, cutting-edge projects are harnessing dredged materials to restore saltmarshes, protect coastlines, and create nesting habitat for vulnerable birds like ringed plovers and little terns.

Meanwhile, the Solent Seascape project is breaking new ground in Chichester Harbour, using innovative 'drag box' technology to maximise the reuse of dredged material. In Lymington, Hampshire, Environment Agency funding has underpinned trials of this technique on open coasts, with more ambitious projects lined up for 2025.

As the spotlight intensifies on nature recovery, our understanding of where and how to restore habitats has advanced dramatically. We now know which materials give restoration efforts the best chance to succeed. For instance, native oyster reefs thrive when given shells—particularly old oyster shells—for juvenile oysters to settle on, providing a lifeline for these important species. High-tide roosts for vital bird populations rely on pebbles or gravel, while sand dunes require, quite simply, sand.

Image courtesy of Paul Adams

Discarded shells from cargoes used in nature recovery

Only recently have we begun to realise the full potential of the minerals sector to drive habitat restoration. This opportunity goes hand-in-hand with greater circularity and efficiency: take shells, for example. Previously discarded from mineral cargo as waste because they diminish construction material value, shells are now finding new purpose in nature recovery. Redirecting these materials not only tackles supply chain gaps for restoration initiatives but also cuts emissions by reducing unnecessary disposal trips offshore.

The synergy between habitat restoration and innovative, nature-based coastal management is capturing the imagination and investment of the UK minerals sector. As 2030 approaches and the race to meet critical recovery targets heats up, marine minerals are set to remain at the forefront of the nation's journey toward a thriving, resilient natural environment.

Image courtesy of Land & Water

Marine archaeological guidance

Beach Replenishment and contract fill projects

In 2003, the British Marine Aggregate Producers Association (BMAPA) and English Heritage (now Historic England) jointly published a groundbreaking guidance document Marine Aggregate Dredging and the Historic Environment: Assessing, evaluating, mitigating, and monitoring the effects of marine aggregate dredging.

The guidance detailed the importance of the marine historic environment, the regulatory framework that existed, the possible effects of aggregate extraction on the marine historic environment, methods for archaeological assessment, and recommended mitigation measures.

Following on from this guidance, in 2005 BMAPA and English Heritage (now Historic England) published The Protocol for Reporting Finds of Archaeological Interest (the Protocol). The Protocol defined best practice for marine aggregate operators in dealing with unexpected archaeological finds encountered during their operations by enabling people working in the industry, either onboard dredgers, or at wharves that receive and process this material, to report their finds in a manner that is convenient and effective. Since the Protocol was introduced, nearly 2,500 individual finds have been reported by members of the marine aggregate industry, ranging from pre-historic finds such as mammoth teeth and hand axes, maritime artefacts including timber fragments and cannon balls and aircraft wreckage.

The Protocol is delivered through an annual implementation service provided by Wessex Archaeology, that is jointly funded by BMAPA and The Crown Estate. The service acts as the point of contact for reporting material, researching discoveries and forwarding information to Archaeological Curator(s), and by an Awareness Programme, which engages with wharf and vessel staff, ensuring that they understand the types of material to be reported and the reporting process.

Image courtesy of Wessex Archaeology

Examining finds at an aggregate wharf

As well as a regulatory requirement to report finds through the marine licence, the standard Crown Estate Production Agreement that confers the commercial right to extract marine sand and gravel to the holder of a marine licence requires “any object, marine wreck, or other item of actual or potential value” to be reported in writing to The Crown Estate as soon as practicable.

Having a single Protocol that covers all members’ dredging areas and wharves, instead of individual ones for each operator, dredging area, wharf, or vessel, has ensured consistency, encouraging participation by everyone in the marine aggregate industry and making it easier for archaeologists and other relevant parties to provide appropriate advice.

New guidance published

The existing guidance and reporting protocols very much focused on marine aggregate extraction for construction, where sand and gravel resources were landed at wharves to be processed. It was often during the processing of these resources that artefacts would be discovered by wharf staff, either screened off with oversize material or trapped on magnets used to remove metal objects.

There was another aspect of marine aggregate extraction that was not explicitly covered by the guidance, namely the supply of large volumes of marine sand and gravel to support beach nourishment projects.

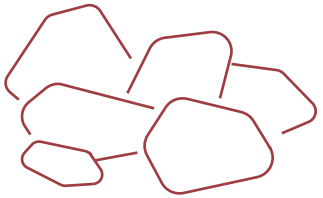
Since 1990, over 30 million tonnes have been dredged from licensed areas to improve the amenity value of beaches and to protect sensitive coastlines from erosion. These works involve large volumes of marine sand and gravel being removed over a relatively short period of time, often from areas of licences that are less frequently dredged because of the resources they contain.

Significant discoveries of prehistoric archaeological material – hand axes and faunal remains – made following major beach replenishment/nourishment projects at Clacton in Essex and Bacton in North Norfolk highlighted the need to connect these types of projects with the wider guidance in place to ensure that any impacts to the archaeological resource are managed appropriately.

To this end, The Crown Estate, BMAPA and Historic England have commissioned new guidance that takes the principles established in the original 2003 and 2005 documents and applies these to the unique operational circumstances associated with beach nourishment projects. Recognising that some of the stakeholders involved in such projects may not have encountered marine archaeological issues before, the guidance provides background to the archaeological potential of marine aggregate resources and explains how this can be assessed, mitigated and monitored as part of project planning and delivery. It also outlines the roles and responsibilities of marine aggregate licence operators, third party dredging contactors and most importantly the client who commissions and ultimately funds the works.

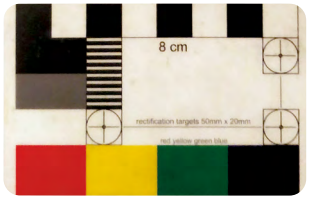
Importantly, it is the client who is primarily responsible for ensuring that any archaeological mitigation or monitoring is completed, even though delivery may be transferred to the Contractor appointed to complete the project.

Mammoth tooth from Area 240



2,500

Individual finds reported by industry



Strategic stewardship

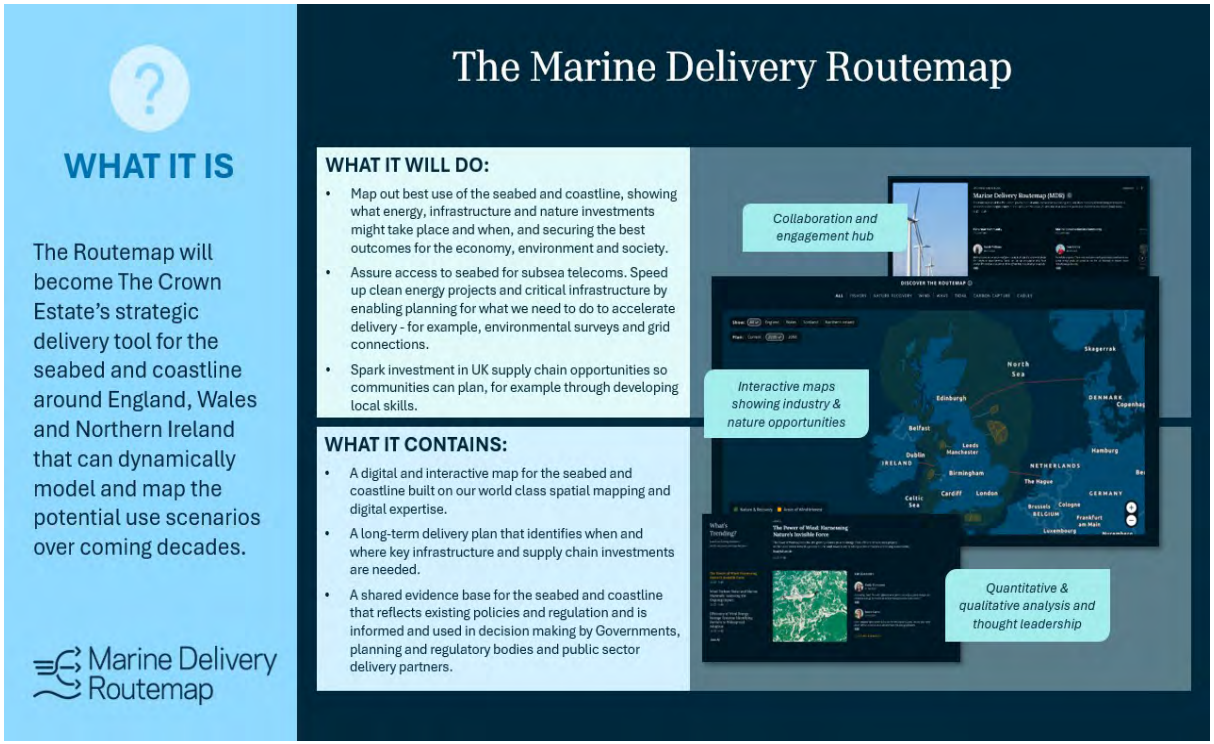
How the Marine Delivery Routemap will support the marine aggregate sector

As the UK intensifies its efforts to deliver clean energy, economic growth, and nature recovery, the pressure on marine space has never been greater.

The Marine Delivery Routemap (Routemap), developed by The Crown Estate in partnership with other key delivery bodies, is a strategic response to this challenge—offering a long-term, strategic delivery tool for how the seabed and coastline around England, Wales, and Northern Ireland can be used most effectively.

For the marine aggregates sector, the Routemap represents a major step forward. It ensures that vital seabed aggregate resources are considered as part of a systems approach, in combination with future leasing and licensing decisions for all sectors.

This will not only help safeguard access to critical sand and gravel resources but will also provide a clearer view of co-location opportunities and challenges—ensuring that decisions do not compromise the operational integrity or safety of dredging operations.



Hosted on an interactive digital platform, the Routemap will enable:

- Optimised use of marine space, balancing economic, environmental, and societal outcomes.
- Greater visibility and certainty for stakeholders, boosting market and supply chain confidence.
- Accelerated project delivery and reduced costs across sectors.
- Integrated offshore-to-onshore planning to support inclusive, place-based community development.

The Routemap will include interactive maps and dashboards that show where energy and industry projects could take place, identify areas that could be prioritised for nature, and provide both qualitative and quantitative analysis of future investment needs—such as ports, skills, and infrastructure—to support the UK's clean power and nature recovery goals alongside all other offshore sectors.

As demand on the seabed increases, the Routemap will offer a holistic, forward-looking approach to managing competing priorities. By dynamically modelling potential use scenarios over the coming decades, it will help ensure that we can make the most of our marine space—supporting sustainable development while protecting critical sectors like marine aggregates.

With its combination of strategic foresight, robust data, and stakeholder engagement, the Routemap is set to become a cornerstone of how we plan and deliver the future of the UK's marine space. We are looking to launch the first version in early 2026.

Electronic Monitoring System (EMS) update

Since 1993 The Crown Estate has required all vessels dredging on Production Agreement areas to be fitted with an Electronic Monitoring System (EMS) which automatically records the location of all dredging activities.

Since its launch, EMS has recorded over 700,000 hours and two million kilometres of dredging activity. The system plays a vital role in ensuring that marine aggregate extraction is conducted responsibly and in accordance with regulatory and commercial requirements.

EMS equipment and associated helpdesk and maintenance services are currently provided by Foreshore Technology, a specialist marine technology company with expertise in dredging and marine construction monitoring systems.

Historically, EMS has focused on spatial compliance—tracking where dredging takes place. The next logical step is to measure how much material is dredged. At present, this is reported manually by operators using ullage readings and displacement calculations.

Two lidar devices installed on railings above the hopper of a dredger

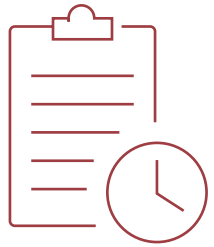
These figures are used by The Crown Estate for income forecasting and billing, but the process is labour-intensive and requires monthly declarations, audits, and periodic financial reconciliations. Automating this process could significantly improve accuracy, reduce administrative burden, and provide real-time data for operational and financial planning. It would also enhance health and safety by removing the need for manual measurements.

To explore this potential, a series of trial projects has been undertaken.

- **Stage 1** focused on enabling manual cargo data entry via keypads linked to the EMS. Trialled on several vessels, this approach allowed crews to input cargo tonnage directly into the system. While still reliant on manual input, this method represents a first step toward expanding EMS functionality and could serve as a fallback option for future automated systems.

- **Stage 2** explored automated cargo data collection using lidar sensors. Two configurations were tested: hopper-mounted lidar, which scanned the surface of the cargo hold, and conveyor-mounted lidar, which measured cross-sectional slices of material on the discharge belt. Both methods showed promise, but the hopper-mounted system was selected for further development as it is more consistent with current reporting methods.

- **Stage 3** focused on refining the hopper lidar setup, particularly by testing the use of multiple interlinked sensors to overcome line-of-sight limitations identified in earlier trials. The aim was to improve scan coverage, especially in obscured areas of the hopper, and to validate the system through independent surveys and comparisons with crew-reported data. The trials produced encouraging results, with lidar measurements generally falling within a few percent of crew-reported figures.



700,000 hours

of dredging activity recorded

2 million km

of dredge track recorded

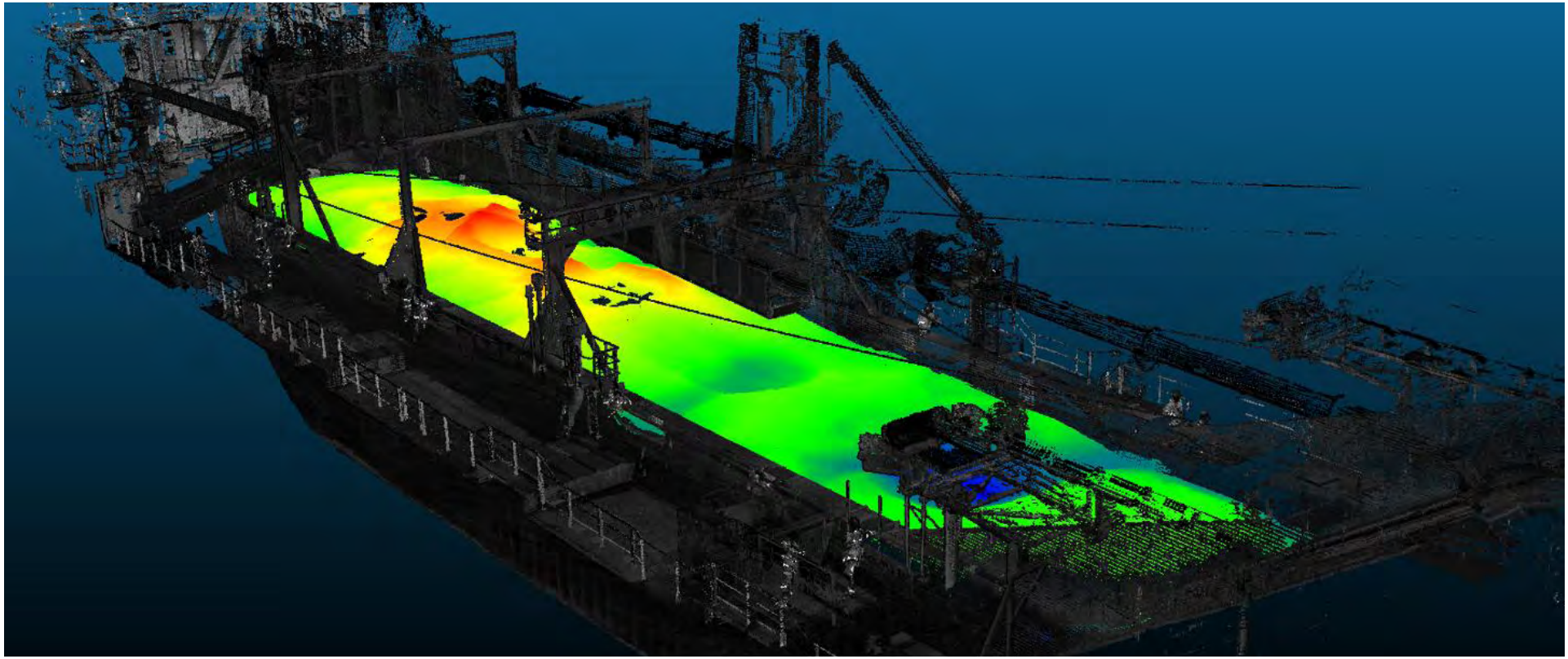
The findings from these trials are now being considered by The Crown Estate, and following consultation with the dredging industry will inform the specification of a new version of the EMS, scheduled for release in 2027.

This next-generation system could include cargo measurement as an add-on feature and support cradle-to-grave reporting. It will also be designed to capture a broader range of data types and offer greater flexibility in how information is collected and used.

In parallel with cargo measurement, The Crown Estate is investigating the integration of fuel usage and greenhouse gas emissions data into EMS.

This initiative supports the organisation's commitment to decarbonisation and reflects the growing importance of understanding greenhouse gas and pollutant emissions in the marine aggregates sector. The goal is to align EMS data collection with UK and EU reporting requirements, reducing duplication and improving efficiency. Data confidentiality is a key consideration, and implementation timescales are still being determined.

The future of EMS lies not only in tracking where dredging occurs, but also in understanding how much is extracted, how efficiently operations are conducted, and what environmental impact they have. With continued innovation and collaboration across the industry, EMS is set to become an even more powerful tool for sustainable marine resource management.



A lidar scan of a dredger and hopper, showing the cargo level, courtesy of Viewpoint Investigate Services.

The Marine Minerals Academy

In recognition of the vital role that knowledge and leadership play in the marine aggregates sector, The Crown Estate continues to champion a unique professional development initiative: the Marine Minerals Academy.

This programme is designed to nurture the next generation of leaders, decision-makers, and influencers across the industry. The academy delivers a structured series of seven intensive one-day workshops, spaced across a full calendar year. Each session is designed to promote active engagement, encourage open dialogue, and stimulate wide-ranging discussion among participants from diverse professional backgrounds. The format is deliberately interactive, creating a collaborative learning environment.

Since its launch in 2015, the Marine Minerals Academy has steadily grown in both reach and reputation. With over 150 alumni to date, the programme has become a recognised stepping stone for those seeking to deepen their understanding of the marine minerals landscape. Following a temporary pause due to the COVID-19 pandemic, the course made a successful return in 2022, reaffirming its value and relevance in a rapidly evolving industry.

The academy is particularly well-suited to emerging business leaders, regulators, consultants, and advisors who are looking to gain a comprehensive overview of the sector. It offers a panoramic view of the policy, regulatory and operational frameworks that underpin marine mineral extraction and management. In doing so, it also highlights the key risks, challenges, and opportunities that organisations must navigate to succeed in this space.

Delivered by a panel of respected experts drawn from industry, government, and consultancy, the course provides a high-impact, real-world learning experience. Participants benefit from the insights of those actively shaping the sector, as well as from peer-to-peer learning and networking opportunities.

Topics covered include:

- The historical development of the marine sand and gravel industry
- Market applications in construction and coastal resilience
- Techniques for identifying, evaluating, and managing marine mineral resources
- Marine policy frameworks and spatial planning processes
- Licensing regimes and regulatory compliance
- Commercial access to seabed resources and asset stewardship
- A site visit to an operational vessel and wharf for hands-on learning
- The impact of marine archaeology and unexploded ordnance on operations
- Dredger fleet management, including productivity, crewing, and safety
- Business performance strategies, operational optimisation, and cost efficiency
- Environmental sustainability, monitoring, and best practice implementation

By the end of the programme, it is hoped that participants emerge with a well-rounded, sector-wide perspective and the confidence to contribute meaningfully to strategic conversations and decisions within their organisations.

Nick Everington, Portfolio Manager for Marine Minerals, presented a trophy to the winners of the Business Scenario Workshop, which was held on the final event of the 2024 course

2025 delegates during Wharf and Vessel visit to Dagenham

About The Crown Estate

The Crown Estate has a diverse £15bn portfolio that includes urban centres and development opportunities; one of the largest rural holdings in the country; Regent Street and St James's in London's West End; and Windsor Great Park. We also manage the seabed and much of the coastline around England, Wales and Northern Ireland, playing a major role in the UK's world leading offshore wind sector.

We are a unique business established by an Act of Parliament, tasked with growing the value of the portfolio for the nation and returning all of our net profit to HM Treasury for the benefit of public spending. This has totalled £5bn over the last ten years.

THE CROWN ESTATE

The Crown Estate
1 St James's Market
London
SW1Y 4AH

020 7851 5000

www.thecrownestate.co.uk

Links and useful references

The Crown Estate
www.thecrownestate.co.uk/our-business/marine/mineral-resources

British Marine Aggregate Producers Association
www.bmapa.org

Marine Management Organisation
www.gov.uk/mmo

Natural Resources Wales
www.naturalresourceswales.gov.uk

British Geological Survey – Minerals UK
www.bgs.ac.uk