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# Aggregate dredging and the coastlines of Dorset, Hampshire, the Isle of Wight and Sussex:

## a regional perspective of marine sand and gravel off the coast of central southern England since the Ice Age

# Perceptions about coastal erosion and aggregate dredging

**Modern marine sand and gravel extraction takes place well offshore the south coast of England and this pamphlet provides information to explain why there are are no physical processes that link it to the natural erosion of the coastline that has happened since prehistory.**

The pamphlet has been produced by the British Marine Aggregate Producers Association and The Crown Estate in response to perceptions that extracting marine sand and gravel off the south coast of England may be contributing to impacts on the coastline.

The UK marine aggregates industry is highly regulated, and coastal impacts are amongst a range of environmental issues that have to be thoroughly assessed before dredging is licensed by the Marine Management Organisation. Dredging of sand and gravel aggregates is only permitted to take place in precisely defined licence areas, if no significant environmental impacts are predicted. Marine aggregates are used to supply the local construction industry by wharves located along the south coast and elsewhere. Marine aggregates are also used for beach replenishment, coastal defences and reclamation. Once dredging is permitted, the environmental effects will be continually monitored and reviewed throughout the lifetime of any licence. To ensure that dredging activity only takes place where it has been licensed, all dredging vessels operating in UK waters are required to have a "black box" electronic monitoring system that uses GPS positions to record their activities, administered by The Crown Estate.

Whether undertaken for aggregates or for other purposes, dredging has the potential to result in changes to the physical processes which interact with the coastline – but only if it is allowed to take place in an inappropriate location such as in shallow water or too close to the shoreline. Such changes could be in the wave climate, tidal streams or interactions with sediment transport processes.

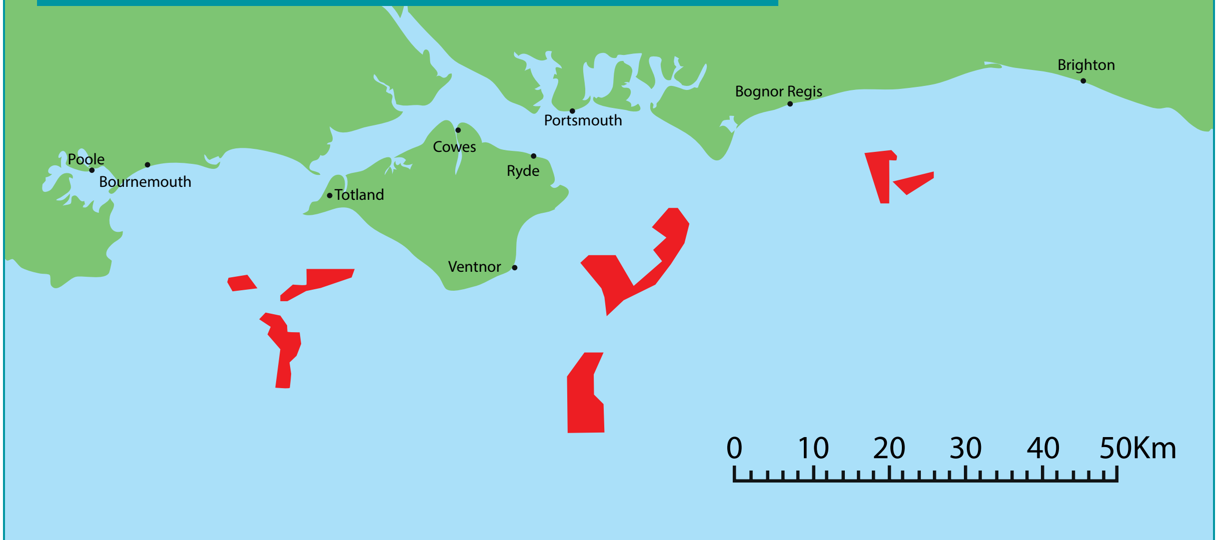
The most commonly cited example of this is at Hallsands in Devon where, following the dredging of beach sediments for use in constructing Devonport Naval Dockyard in the late 19th century, the village was tragically destroyed during storms in 1917. This remains the only example in the UK where aggregate dredging resulted in an impact on the coastline.

In contrast, modern marine aggregate extraction takes place much further offshore. This document explains the relationship between the offshore dredging areas and the coastlines of Dorset, Hampshire, the Isle of Wight and Sussex.

Information is presented on the evolution of the south coast of England, the geological origins of the sand and gravel deposits that are being extracted and the influence of the modern-day waves and tides on both these deposits and the coastline.

# Dredging off the south coast

## Marine aggregate licence areas off the South coast




Up to date information on licence and application areas can be viewed on The Crown Estate website:
www.thecrownestate.co.uk/en-gb/what-we-do/on-the-seabed/minerals-dredging/regional-dredging-area-charts

**In 2020 a total of 1054.84 km² of seabed was licensed for marine aggregate extraction around the UK, of which only 101.04 km² was actually dredged due to targeted extraction and zoning of the dredging activity.**

A total of 18.05 million tonnes of marine aggregate was extracted during 2020, of which 12.08 million tonnes was used for construction aggregate in England and Wales, 4.34 million tonnes was exported to the Continent for use as construction aggregate, and 1.62 million tonnes was used for beach replenishment, reclamation and infill to support construction and civil engineering at locations across the UK.

Off the south coast of England (Dorset, Hampshire, the Isle of Wight and West Sussex), 129.72 km² of seabed area was licensed for marine aggregate extraction during 2020. Within this, dredging actually took place in 16.77 km², producing 3.18 million tonnes of marine sand and gravel. Some 2.37 million tonnes of marine aggregate dredged from licensed areas in the south coast region was landed at wharves in Poole, Cowes, Southampton, Portsmouth and Shoreham for use as construction aggregate. A further 0.81 million tonnes was landed at wharves along the Thames Estuary and in the near Continent, also to be used as construction aggregate.

Marine aggregate is also commonly used to support beach nourishment schemes, providing additional benefits to communities, local economies and the environment. Since 1999 over four million tonnes of marine sand and gravel has been used to support schemes at Bournemouth, Hayling Island, Selsey, Elmer, Eastbourne and Pevensey.

The dredging process involves the dredger trailing a pipe along the seabed while moving slowly forwards (c.3-5km/h). Powerful centrifugal electric pumps draw a mixture of sand, gravel and seawater through a draghead which rests on the seabed, up the dredge pipe and into the hold of the vessel. The sand and gravel settles into the base of the vessels hold, while the excess water is returned to the sea via overflow spillways. The dredging process typically results in a cut of sediment 0.3m deep and 2m wide being removed as the vessel uses GPS positions to navigate within the defined licence area.

A key misconception about the marine aggregate dredging process is that it results in large holes in the seabed. By using the total tonnage dredged over a given period together with the area of seabed where dredging takes place it is possible to calculate the average lowering of the seabed that has resulted. In the case of the licences off the South coast, over the 20-year period between 1998 and 2017, 86.31 million tonnes (52 million m³) was dredged from an area of 87.8km². This equates to the seabed across the area dredged being lowered by an average of 0.59m, although in reality the intensity of dredging activity will be more uneven. Further information on marine aggregate dredging is available on The Crown Estate and BMAPA websites (see back cover).

# Evolution of the eastern English Channel

## From cold climate river basin to Atlantic inlet

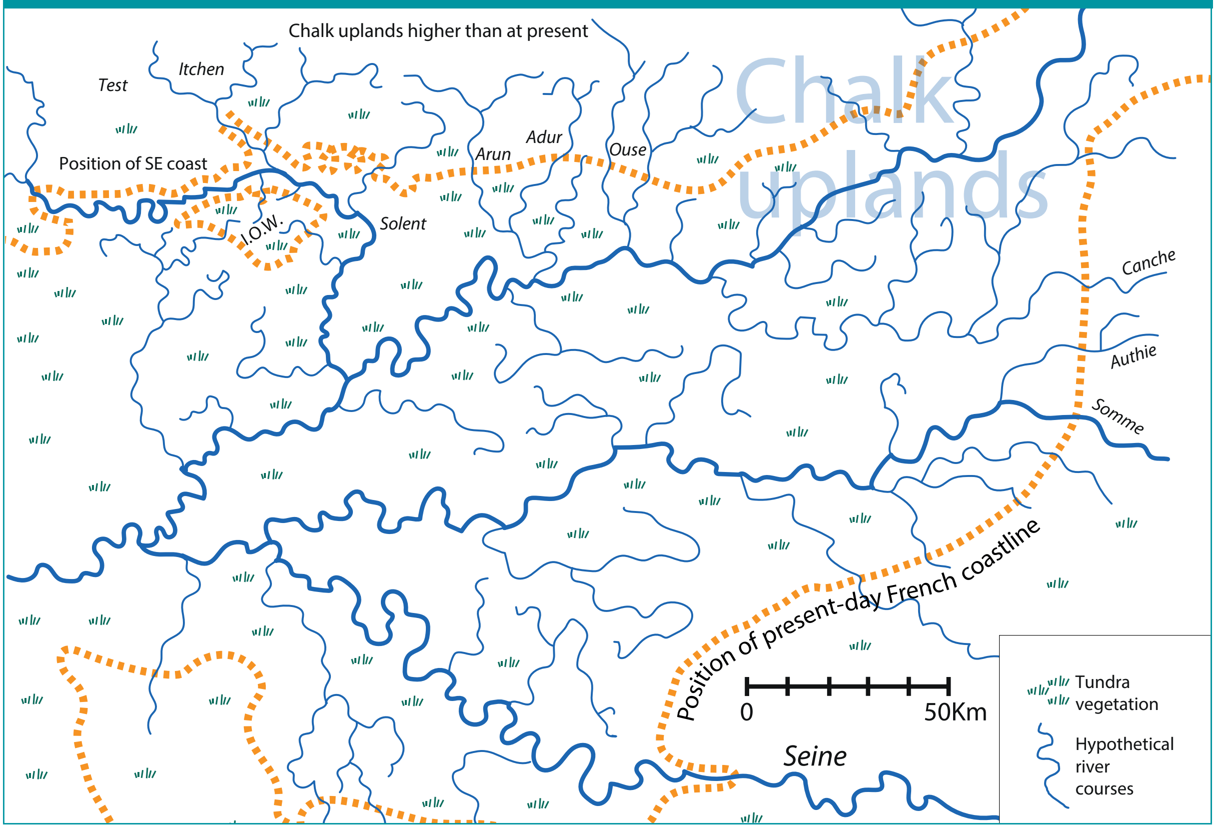
**The sand and gravel dredged off the south coast originated in the "Ice Age," or Pleistocene. This is a geological time period (epoch) that lasted over two million years and ended about 10,000 years ago. It was characterised by cold "glacial" stages and intervening warmer "interglacials" similar to the present-day.**

A sequence of three diagrams illustrates the formation of the aggregate deposits, starting in the last cold stage in the region, that began around 100,000 years ago.

The cold stages of the Pleistocene were times of lower than present global sea level when what is now seabed off the south coast was exposed as dry land, for tens of thousands of years at a time. The fall in sea level was caused by a gradual increase in global ice volume as vast ice sheets expanded and advanced over mid and high latitude continents including North America and northern Europe, "locking" water out of the oceans. With a falling sea level, rivers gradually extended on to exposed continental shelves, eroding valleys and depositing sediments across their floodplains.

The English Channel was a great expanse of frozen treeless tundra during the coldest episodes of the Pleistocene, akin to present day arctic Siberia and northern Canada. Quartz-rich sand and flint gravel were transported and deposited by rivers that were repeatedly swollen by the seasonal melting of snow and ground ice. These rivers drained and eroded rocky, sparsely vegetated uplands that extended across the counties of south-western and southern England, notably the Chalk down-lands of Wiltshire, Dorset, Hampshire, Sussex, Surrey and Kent. These uplands attained a higher elevation than at present with a continuous cover of Chalk and overlying sands. In a cold climate, water beneath the ground surface was permanently frozen, greatly reducing the porosity of the Chalk and the permeability of other sedimentary rocks in the region. Consequently, spring and summer melt water flowed freely and widely over the surface of the Chalklands, in contrast to the present day where rainwater mainly sinks into the porous Chalk. The impressive dry valleys of the North and South Downs are a legacy from the Ice Age of former streams and rivers where now there are none.

**Diagram 1: The eastern English Channel when it was dry land in cold stages of the Pleistocene**



High energy rivers carried water and sediment off the uplands, which in the east of the region included an elongated Chalk "dome" well over 300 metres high, but now almost completely removed by erosion. This "dome" extended from the Weald of Sussex and Kent into north-eastern France, across what is now the Strait of Dover. The North and South Downs are the only remnants of this former high ground in south-east England and much of the flint gravel found in the now submerged Pleistocene river floodplains offshore of the south coast was derived from the Chalk beds of this once extensive feature.

We know that there were rivers flowing across what is now the seabed by carrying out high resolution geophysical, or seismic, surveys that reveal the extent of the "palaeovalleys" and associated infilling sediments left by these rivers. In addition, the bones and teeth of large animals like woolly mammoth, rhinoceros and reindeer that lived on the former land surface near these rivers are sometimes found in aggregates dredged off the south coast, as the photograph shows.

By the end of the last Ice Age 11,000 years ago, global sea level had begun to rise with the gradual melting of the great continental ice sheets in a warming climate. River catchments became more densely vegetated, woodland developed, and rivers deposited predominantly finer-grained sediments over their floodplains, burying the older gravels. As the marine influence gradually increased, the river valleys off the present south coast became estuaries and tidal inlets and ultimately were completely submerged by the rising sea as the modern coast of southern England that we recognise today evolved. Sea level stabilised at about its current position around Great Britain some 5000 years ago, however smaller-scale climatic fluctuations have occurred since then and global sea level is currently rising in response to global warming.

**Mammoth tooth recovered from relict ("fossil") sand and gravel deposits dredged from a South coast marine aggregate licence**

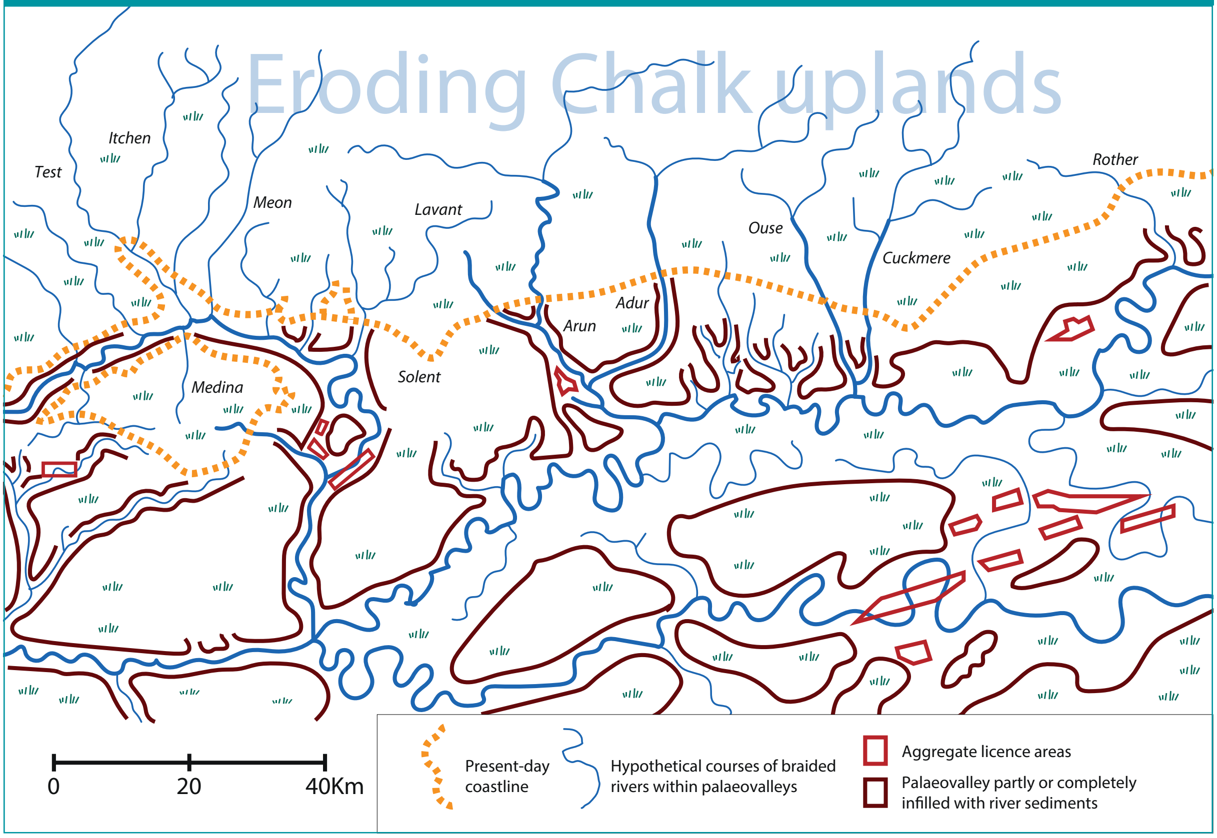
# Geological origins:

## Stage 1: Rivers crossing a tundra landscape

**Between 100,000 and 11,000 years ago was a period of global cooling and rivers drained a periglacial tundra landscape in southern Britain. The reconstruction below shows that during the last cold stage of the Pleistocene a network of rivers extended onto the continental shelf. Most of these were the precursors of familiar rivers in the region, such as the Arun, Adur, Test, Itchen and the Hampshire Avon.**

The rivers of Hampshire, Dorset and the Isle of Wight converged to form the Solent River, which flowed east and then south in an arc over a wide floodplain to the east of a prominent upland, the remnant of which now forms the Isle of Wight. In addition, the Rivers Arun and Adur drained a large area of the Pleistocene South Downs and Weald, over what was then a much more extensive and elevated Chalk cover. The rivers formed wide floodplains on the continental shelf, as did several smaller rivers flowing south-west of the present-day Isle of Wight. Flint gravel and quartz sand was deposited over these floodplains, notably during seasonal river floods induced by the melt of snow and ground ice during spring and early summer, as occurs today in Arctic regions. At lower flow levels, the rivers likely adopted a braided pattern (as below), flowing between gravel bars. All these Pleistocene rivers were tributaries of large trunk streams (including a "Channel River") which flowed generally to the south-west towards a vanished coastline near the edge of the continental shelf bordering the Atlantic Ocean.

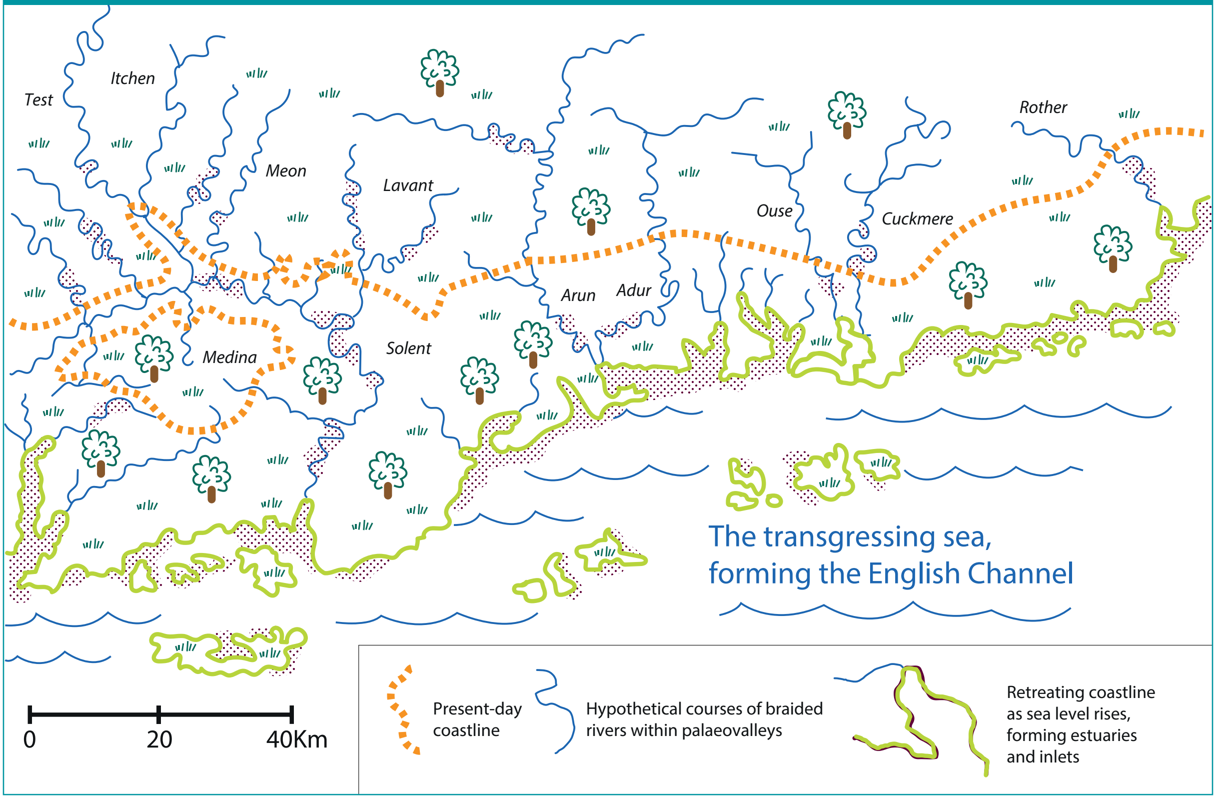
**Diagram 2: Reconstruction of the English Channel off Sussex, Hampshire and the Isle of Wight during the 'Ice Age'**



# Geological origins:

## Stage 2: Lost rivers and sea level rise

**Diagram 3: Reconstruction of the English Channel off Sussex, Hampshire and the Isle of Wight at the end of the 'Ice Age'**




### Global warming: a rising sea level, forests off Sussex, estuaries and marine submergence, 11,000 to 5,000 years ago.

As average global temperature rose further at the end of the last cold stage, some 11,000 years ago, the great continental ice sheets completely melted and so sea level began to rise relatively rapidly. In the south coast region ice within the remaining cover of Chalk began to thaw, increasing the rock's porosity and allowing water to sink into and percolate through the rock as it does today. Dry valleys resulted as many small rivers disappeared from the landscape. As a denser carpet of vegetation colonised river catchments, rates of landscape erosion reduced and rivers like the Adur, Arun and Solent stopped transporting flint gravel and instead carried only fine-grained muddy sediments that accumulated over their floodplains. Meanwhile, as sea level continued to rise, estuaries formed and these gradually retreated towards the present coastline, leaving extensive deposits of mud and fine sand which commonly blanket the older sands and gravels.

Contemporaneous well-preserved peat deposits exist on the present seabed along the former course of the River Arun in water some 20 metres deep. Seabed sampling during aggregate prospecting surveys has revealed that 18 km off Littlehampton these peats are locally over two metres thick. Pollen from oak, hazel, elm and birch trees has been recorded together with pollen from grasses, sedges and other herbs and shrubs, suggesting there was temperate woodland and scrub in this area during post glacial times. Further work has been carried out on the palaeo-geography and archaeology of the submerged Arun, funded from the Marine Aggregates Levy Sustainability Fund: https://archaeologydataservice.ac.uk/archives/view/seaprehist_eh_2009/index.cfm Peat deposits are also found further inshore, for example those at Bouldnor cliff in the western Solent just off the coast of the Isle of Wight.

The relentlessly rising sea drowned the wooded landscape and the coastline retreated until around 5000 years ago when the sea broadly stabilised to its present level. Now familiar coastal features formed, including the Solent seaway and the white cliffs of Tennyson Down, the Needles, Culver Cliff, Beachy Head and Dover, still eroding where the relatively high Chalk downs meet the sea: the last remnant of the Ice Age Chalk upland that connected Great Britain to the continent for so many thousands of years.

# Geological origins:

## Stage 3: Present-day preservation of the lost rivers

### The post glacial period to the present-day: Relict ("fossil") river sediments, immobile beneath the seabed.

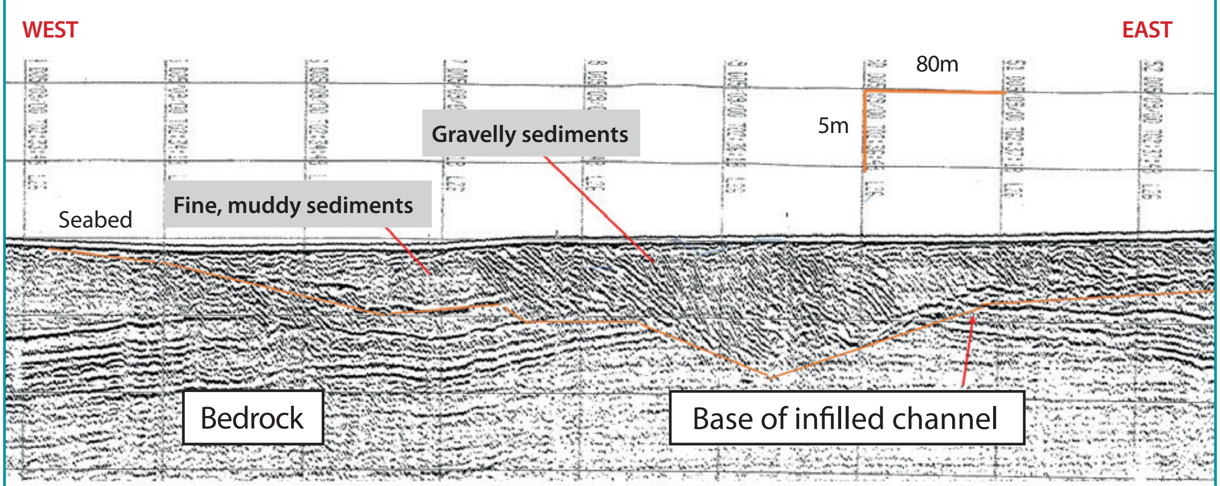
In the modern marine environment, the ancient river floodplains and their gravelly sediments can be detected using geophysical equipment allowing their geology to be better understood.

Seismic devices emit regular pulses of sound that penetrate below the seabed. These pulses reflect off buried geological horizons to reveal sedimentary structures beneath the seabed. Seismic profile records are interpreted to define the thickness, geometry, composition and extent of sub-surface features including the submerged river deposits (see figure below). In addition, boreholes, or cores, taken from these deposits recover sands and gravels as well as muds and peat. These samples assist seismic data interpretation and tell us a great deal about former Ice Age environments.

The seabed off the south coast is commonly smooth and flat where there were once river floodplains. The post glacial rising sea eroded the low-lying landscape and created a very flat seabed over most (but not all) of the area just offshore of the south coast. The submerged floodplains and river valleys off the coast have little or no seabed expression, being partly or completely infilled with river and estuarine sediments 2 – 20 metres thick. These features lie just beneath the modern seabed, with no modern sediments covering them as the seismic profile example demonstrates.

The rising sea reworked any sediments at the surface of the newly forming seabed. As a result, waves and tidal currents scattered extensive "veneers" of sand and gravel, covering the older geology, as is evident from seabed samples. It is likely that gravelly beaches formed during sea level rise, perhaps like Chesil Beach or Dungeness, but these were soon overtopped, submerged and reworked landwards as the sea continued to rise. There is now little, if any, evidence on the seabed of such coastal features off the south coast. In addition, sand waves were locally swept-up by tidal currents, where sand deposits had already accumulated. However sand waves are relatively uncommon off the south coast, as most of the seabed sediment is predominantly composed of flint gravel of varying thickness.

**Interpreted seismic profile across a section of the ancient submerged River Arun floodplain 12km south of Littlehampton**




Note the channel is completely infilled with over 8 metres of sediments in this example

# What does the geological history tell us about sand and gravel extraction?

**Marine aggregate dredging takes place in licensed areas centred on relict deposits of sand and gravel left by ancient rivers. These deposits are immobile and are not connected to the coastline. Instead the sand and gravel deposit is buried and "trapped" in exactly the same place where it was first laid down in the Pleistocene.**

Extensive research by several leading institutions over many years has demonstrated that there are no physical processes that link sediments forming beaches along the coast to the submerged river deposits buried in the offshore area where aggregate extraction takes place. Furthermore, the relict ("fossil") sediments being removed from the dredging areas do not form part of the modern sediment transport system and are completely unrelated to the sediments present along the coast and the processes acting upon them.

The preceding diagrams show that the areas now licensed for marine aggregate extraction were once cold climate tundra drained by large rivers, becoming estuaries and inter-tidal inlets and being finally submerged by the sea some 7,000 years ago. By this time the aggregate deposits had fully formed and they have remained in situ ever since. The Isle of Wight and South Downs form eroded Chalk bedrock highs, now just 200 – 250 m above sea level. These are separated by a low relief seabed, submerged in waters less than 30 metres deep.

Extraction of marine aggregates from licence areas will not interfere with natural coastal changes, either by altering waves and tides, or by interrupting modern sand and gravel movements along the coast. The coast is in effect "unaware" of the extraction of river gravels lying over 8 km (4.5 nautical miles) or more offshore. The licence areas east and west of the Isle of Wight lie in water depths of 12 – 40 metres and coastal impact studies have been carried out on all of these areas in recent years. These studies included numerical modelling of the effects of waves and tides on the seabed and they demonstrated that the extraction of sand and gravel will not cause changes to waves and tidal streams at the coastline.

Extraction of this immobile sediment by dredging leaves a shallow depression on the seabed which does not fill back in with sand and gravel, either from the surrounding seabed or from the beaches on the coast. This is because at depths of 12 - 40 metres the currents at the seabed are generally too weak to move the coarse palaeovalley sediments. Monitoring of the extraction together with regular and detailed surveys of the dredging areas over the past 25 years demonstrates that this is the case, as shown in the diagram on page 13.

The only way that the relict sands and gravels being dredged will find their way to the coast is if they are deliberately placed there. In this respect, the marine aggregate industry fulfils an important role in helping to protect the coastline of the south coast region by supplying sand and gravel resources from licensed areas in support of beach replenishment, for example at Bournemouth, Hayling Island, Selsey and Elmer.

Beach replenishment works in progress at Bournemouth

# Today's marine processes: South coast waves, tides and sandbanks

**Four geological cross sections from west of the Isle of Wight, across the Island into the eastern approaches to the Solent and beyond show the relationship between the coast and the ancient river floodplains, or "palaeovalleys," that contain the main aggregate deposits. Cross sections like these help to explain why there is no connection or feed between the ancient river deposits and sediments on the inshore seabed or at the coast.**

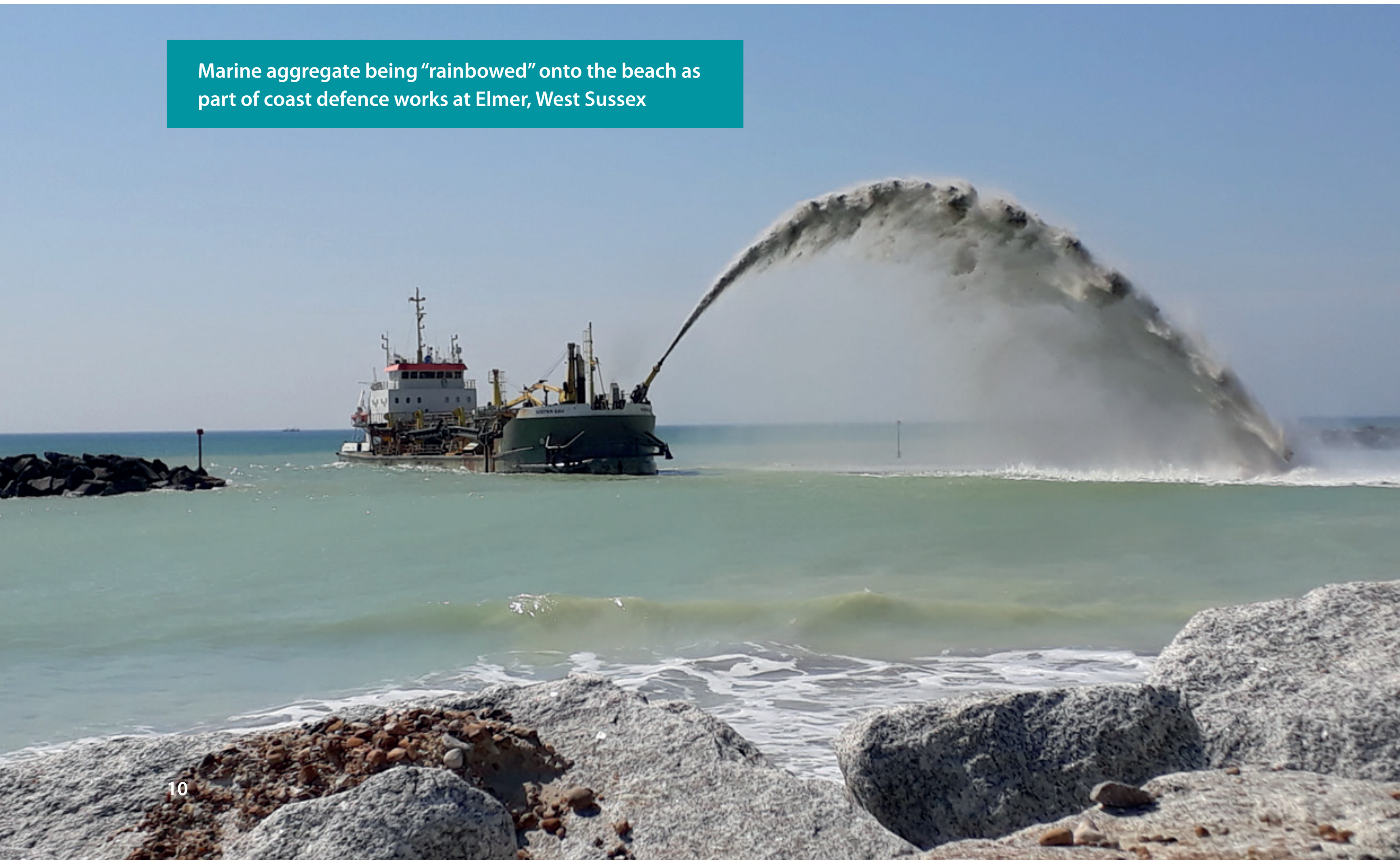
The palaeovalleys are separated from the coast by other marine features such as banks, deeps and extensive bedrock outcrops and they contain sediments laid down in environments and by geological processes that no longer prevail on the continental shelf. They are the remnants of a former landscape that connected southern Britain to continental Europe during the Pleistocene. Between the Isle of Wight and the dredging areas are expanses of exposed rock and thin seabed sediments.

**1** Cross section WSW to ENE from west of the Isle of Wight across the Solent to the South Downs, showing how submerged palaeovalleys are eroded into older rocks and are completely infilled with sediments, forming part of the ancient geological succession west and east of the Isle of Wight.

**2** Cross section W to E from the western Solent to the Arun palaeovalley south of Littlehampton, showing how several separate infilled palaeovalleys are eroded into bedrock either side of the Isle of Wight where major rivers ran during the Ice Ages. The peat, mud, sand and gravel deposits infilling these valleys are relict, having no connection with present-day coastal sediments or processes.

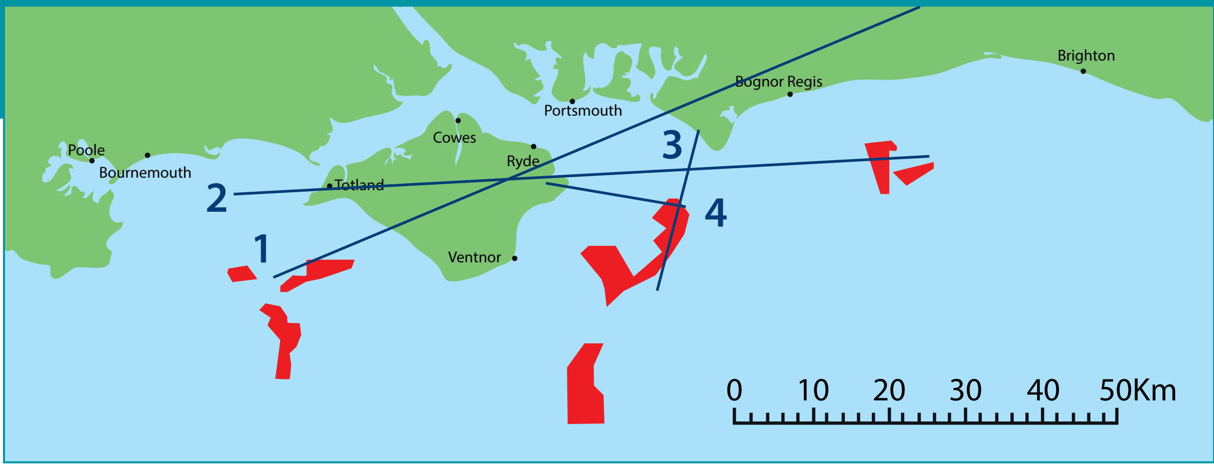
**3** Cross section N-S from Bracklesham to aggregates extraction areas 395 & 351 showing how the coast is separated from the dredge areas by Medmery Bank, smooth bedrock and seabed gravel veneers.

**4** Cross section W-E from Bembridge to area 351 showing how the coast is separated from the dredging area by rock outcrops, shoals and the deep draught vessel approach route to the Solent.

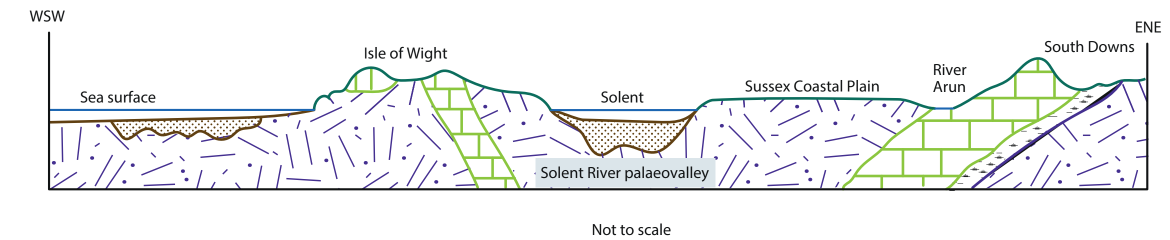


**Marine aggregate being "rainbowed" onto the beach as part of coast defence works at Elmer, West Sussex**

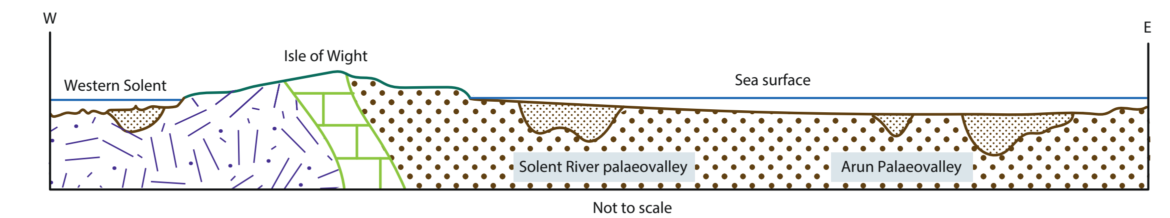
Shallow geology in cross section west and east of the Isle of Wight, drawn from aggregate industry and British Geological Survey data, assisted with water depths from published Admiralty charts.



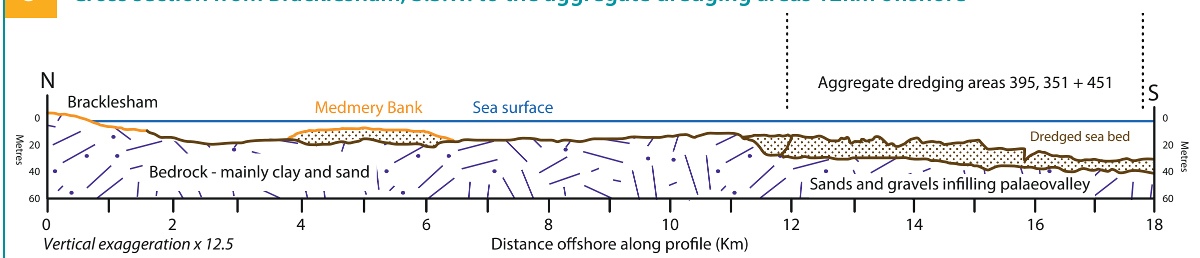

## 1 Cross section from south-west of the Isle of Wight, across the Solent to the South Downs



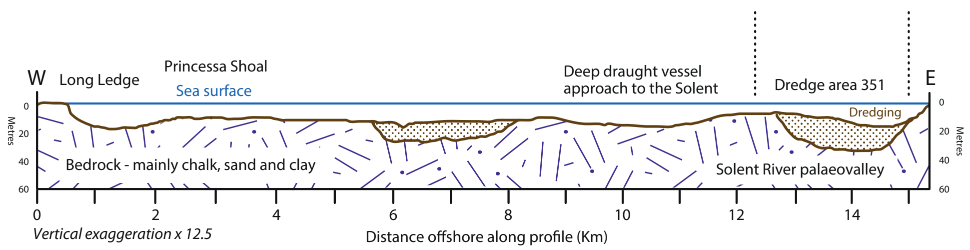

## 2 Cross section from the western Solent to the infilled palaeovalleys east of the Isle of Wight




## 3 Cross section from Bracklesham, S.S.W. to the aggregate dredging areas 12km offshore




## 4 Cross section from Long Ledge, Bembridge, Isle of Wight to aggregates extraction area 351, 12km offshore



# Regulation, assessment and monitoring

**Marine aggregate extraction is closely regulated to protect the environment. Expert studies are undertaken to help inform decisions and permission will be refused if there is any genuine concern about impacts on the coastline or any other environmental or economic interests.**

Marine aggregate dredging in English waters is regulated by a Government Agency, the Marine Management Organisation (MMO), that issues statutory marine licences under the Marine Works (EIA) Regulations 2017. Before dredging can be licensed, dredging applications are subject to a rigorous assessment process which takes several years to complete and includes various stages of consultation (1). Operators are responsible for commissioning detailed environmental impact studies, the scope of which are defined in technical guidance documents (2), including coastal impact studies (3) which use numerical modelling to consider the potential effects of the proposed dredging on waves and sediment mobility as well as coastal processes.

To ensure site-specific assessments fully consider the potential interactions with other nearby licence or application interests, the marine aggregate industry has also undertaken voluntary regional-scale studies, Marine Aggregate Regional Environmental Assessments (MAREAs), to assess potential cumulative impacts of current and planned extraction activities.

The outcomes of all these assessments are reviewed and scrutinised by government regulators and specialist scientific and statutory advisors including the Centre for Environment, Fisheries and Aquaculture Science (Cefas), Natural England and the Environment Agency. The regulator will also consult with other interested parties, including local planning authorities. At the end of this process, if any significant concerns remain about any of the potential impacts that may arise, including coastal impacts, then dredging will not be permitted.

Each marine licence that is issued will set out the precise area that may be dredged and define limits on the total volumes of sediment that may be removed. Each licence will also be accompanied by statutory conditions that define the management, mitigation and monitoring requirements for each site. Many of these will be standard requirements that apply to all licence areas, such as regular bathymetric monitoring surveys to record changes in water depths across dredged areas. This enables the extent of the shallow depressions that result from the removal of fossil resources to be accurately measured over time and also provides regulators and their advisors with evidence that the dredged depressions do not infill with new sediment, and that the natural sediment transport processes are able to continue uninterrupted.

To ensure that dredging activity only takes place where it has been licensed, all dredging vessels operating in UK waters are required to have a "black box" electronic monitoring system (EMS) that uses GPS positions to continually record their activities, administered by The Crown Estate.

Regulators and their advisors will check the results of monitoring data on a continual basis and a marine licence can be subject to variation or even be withdrawn at any time if an operator fails to adhere to its requirements or monitoring data suggests unexpected impacts.

Details of all marine licence applications, decisions and the conditions that apply to them can be found on the MMO Public Register (4). Further spatial information on marine aggregate interests is presented on the MMO's on-line Marine Information System (5).

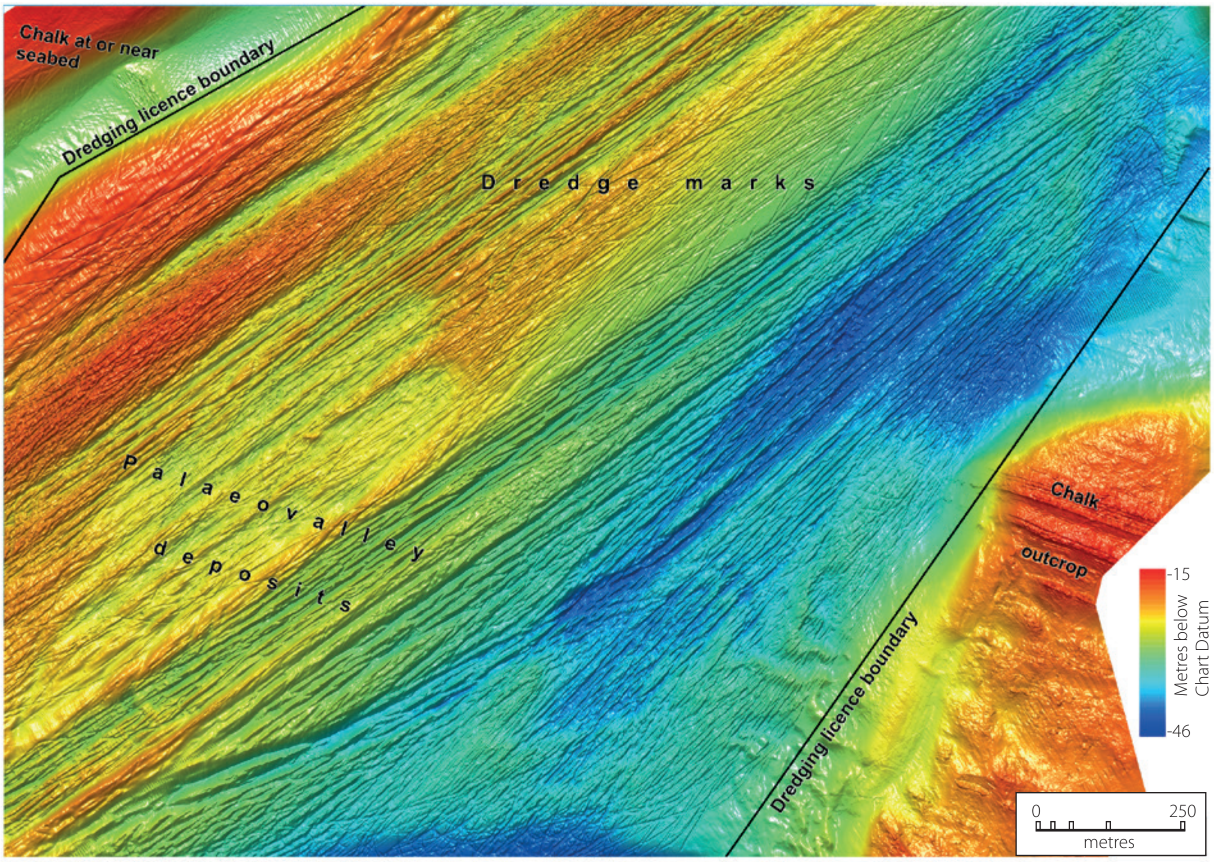
**(1) https://www.gov.uk/guidance/the-marine-licence-application-timeline**

**(2) Good Practice Guidance – Extraction by Dredging of Aggregates from England's Seabed, April 2017 (The Crown Estate & BMAPA) https://www.bmapa.org/documents/BMAPA_TCE_Good_Practice_Guidance_04.2017.pdf**

**(3) Marine aggregate dredging and the coastline: a guidance note, December 2013 (The Crown Estate & BMAPA) https://www.bmapa.org/documents/Coastal_Impact_Study_Best_Practice_Guidance.pdf**

**(4) https://www.gov.uk/check-marine-licence-register**

**(5) http://mis.marinemanagement.org.uk/**




Seabed monitoring data for aggregate extraction area 351, 12 km east of the Isle of Wight, showing the results of a high resolution bathymetric survey over dredged seabed. There are over three million data points spaced just 0.5 metres apart recording water depths within the area shown. Criss-crossing grooves made by the dredging are clearly resolved, as are rock outcrops just outside the dredging area. This kind of detailed information is routinely used to monitor the effects of dredging on the seabed at regular intervals, to a specification set by the Marine Management Organisation.

# Dredging in Europe

**It is sometimes suggested that UK marine aggregates are exported to Holland and Belgium because those Governments do not allow dredging in their own waters.**

**The reality is that UK operators deliver construction aggregates to those countries as their continental shelves do not have deposits of coarse aggregate. Needs for fine and medium grained sand for construction and beach replenishment are met in large quantities from local sources off Holland and Belgium.**

Around 40 million tonnes of sand is dredged from licensed areas in Dutch waters each year, around double that dredged from all UK waters. A national environmental impact study undertaken by the Dutch government concluded that dredging in a depth of 20m or more on their continental shelf would not result in coastal impacts, subject to no more than 2m of sediment being removed. Consequently, operators are able to obtain a production licence to dredge in >20m of water by simply paying a licence fee, and without the need to undertake a site-specific impact assessment. This approach contrasts to regulation in English waters, where licence areas lie in water depths of between 10 – 50 m and detailed site specific assessments of dredging proposals have to be undertaken irrespective of the tonnage being dredged or the water depths involved.

For larger scale extraction requirements which require more than 2m of sediment to be removed from water depths >20m, site-specific assessments are required before the activity is permitted. One example of this is the Dutch authorities permitting over 360 million tonnes of marine sand to be removed over a five-year period to support the extension of Rotterdam harbour ("Maasvlakte 2" project). The dredging depths and volumes of sediment involved meant that a full Environmental Impact Assessment (EIA) was necessary before dredging began. This scale of dredging represents over 45 times that dredged off the south coast in a single year.

Another example of this is the "Sand Engine"2 project in the province of Zuid Holland. During 2011, around 30 million tonnes of marine sand was dredged from licence areas 10km off the Dutch coast to create a new hook shaped peninsula. This will naturally erode over 20 years to maintain and enhance beach levels, which in turn will ensure that the communities, infrastructure and environment located inland are protected.

This concept has subsequently been applied at Bacton, North Norfolk, during the summer of 2019. The "sand scaping" project involved a total of 3 million tonnes of marine sand being deposited along a 4km stretch of coastline to protect a gas import terminal, alongside coastal communities living along the eroding coastline to the south.

# Marine Aggregate Facts

**Marine aggregates are an essential part of our daily lives, satisfying over 20% of all the sand and gravel needed for construction in Great Britain. At a time when rising sea levels pose a growing threat, marine sand and gravel is also vital to coastal protection.**

Construction aggregates influence every facet of modern life – from the homes we live in and the transport infrastructure we use to get around, to the energy and fresh water that we take for granted. In order to maintain and develop the built environment in which we live, every person in Britain indirectly generates demand for three tonnes of aggregates every year – equivalent to around 200 million tonnes each year.

The majority of this need is met by material from either recycled or secondary sources (28%) or sand, gravel and crushed rock quarried from the land. A proportion of the demand is, however, met by sand and gravel dredged from the sea. In England and Wales, marine aggregates represent 25% of all the sand and gravel used in construction while in the south east of England, a third of all construction materials come from marine sources.

Marine dredged sand and gravel also have a strategic role in supplying large-scale coastal defence and beach replenishment projects – over 30 million tonnes being used for this purpose since the mid-1990s. With the growing threats posed by rises in sea levels and more frequent storms, the use of marine sand and gravel for coast protection purposes will become increasingly important.

The commercial rights to marine aggregates in English waters are administered by The Crown Estate. Operators are required to pay a royalty for every tonne of sand and gravel they dredge. In the financial year 2019/20, marine aggregate extraction generated royalty revenue of some £22 million, the surplus of which was passed to HM Treasury.

Image courtesy of Chris Lawrence of Shoreham Port

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This document has been produced by BMAPA and The Crown Estate, in discussion with technical officers from the Southern Coastal Group and SCOPAC. Local Authorities around England acknowledge the importance of marine aggregate dredging for economic regeneration which can include supporting critical needs for coast protection. They strongly support the use of a sound scientific evidence base with effective regulation and monitoring in determining from where material should be extracted. The coastal group have requested ongoing involvement with relevant future coastal impact studies and the MAREA updates to continue this dialogue as scientific evidence continues to develop.