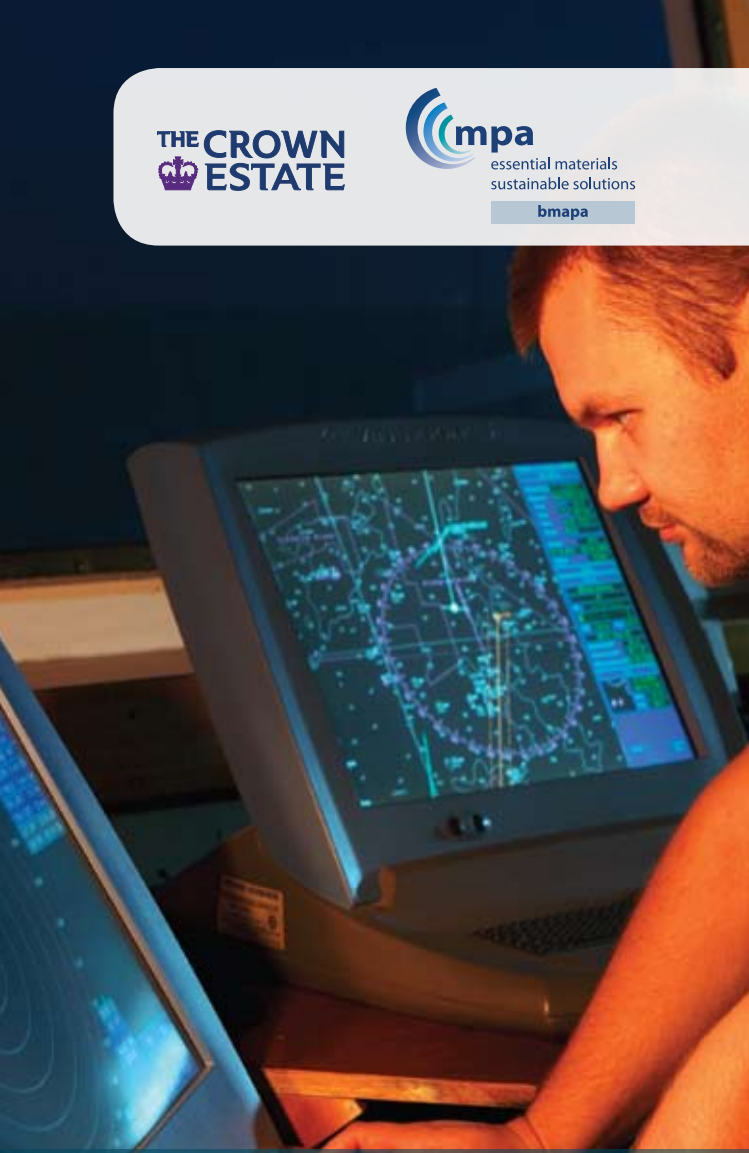
THE CROWN ESTATE

mpa
essential materials
sustainable solutions
bmapa



Marine aggregate terminology

A GLOSSARY

Contents

Photo opposite courtesy D Reibbit, Hanson Aggregates Marine Ltd

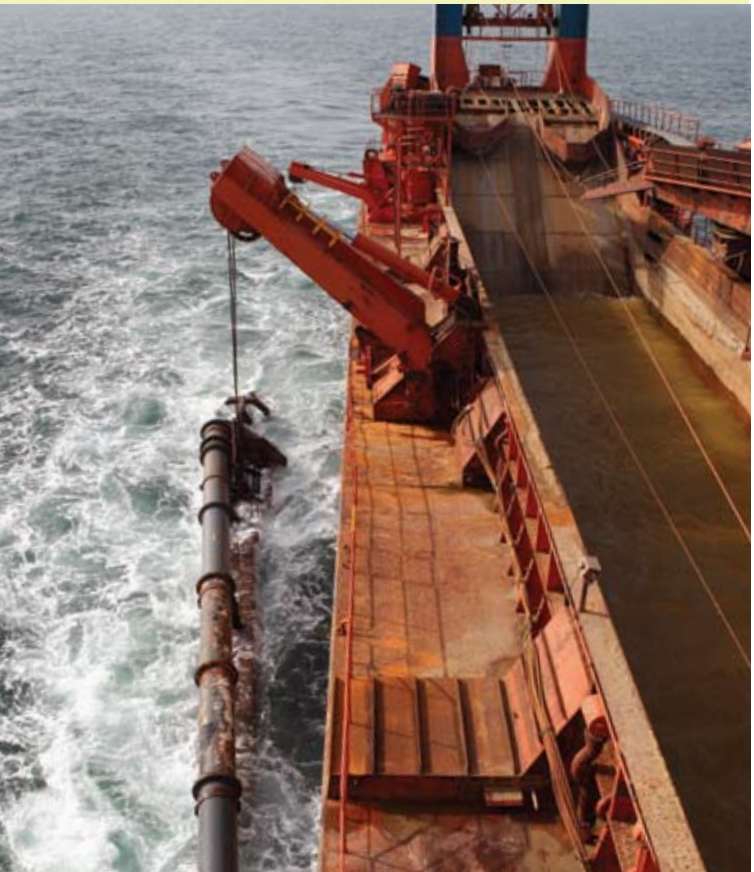
ISBN: 978-1-906410-13-1

Introduction

Even those who work inside the marine aggregate industry are sometimes confused by the sheer range of technical terms used to describe its activities. As with most other industries, it also abounds with a host of acronyms. This glossary recognises the need for clarity amongst stakeholders who, to various degrees, interact with the industry. Our hope is that it will serve as a useful reference for regulators, government advisers and others.

An "intelligent pdf" version of this guide is available from the websites of both BMAPA and The Crown Estate with links to supporting information.

The descriptions provided in this glossary are deliberately generic. The precise definitions for individual terms may alter when used for a specific purpose, such as an environmental impact assessment.



Industry acronyms

Active Dredge Zone, Active Dredge Area	**ADZ, ADA**
Archaeological Exclusion Zone	**AEZ**
Aggregates Levy Sustainability Fund, Marine Aggregates Levy Sustainability Fund, Marine Environment Protection Fund	**ALSF, MALSF, MEPF**
Anglian Offshore Dredging Association	**AODA**
Automatic Identification System	**AIS**
Ballast as Dredged	**BAD**
British Marine Aggregate Producers Association	**BMAPA**
Direct Impact Zone	**DIZ**
East Channel Association	**ECA**
Electronic Monitoring System	**EMS**
Global Positioning System	**GPS**
Government View	**GV**
Humber Aggregate Dredging Association	**HADA**
Indirect Impact Zone	**IIZ**
International Safety Management Code	**ISM**
Marine Aggregate Regional Environmental Assessment	**MAREA**
Regional Environmental Assessment	**REA**
Regional Environmental Characterisation	**REC**
Resource Management Association	**RMA**
Secondary Impact Zone	**SIZ**
South Coast Dredging Association	**SCoDA**
Thames Estuary Dredging Association	**TEDA**
The Crown Estate	**TCE**
Trailing Suction Hopper Dredger	**TSHD**

A > C

50:50

A term used to describe an aggregate cargo that is composed of approximately 50 per cent sand and 50 per cent gravel.

Active Dredge Zone, Active Dredge Area

Acronyms: ADZ, ADA

A defined zone within a production licence where dredging is permitted to occur.

Production licences are usually zoned to ensure that the area available to be dredged is minimised as far as possible - thus minimising the environmental footprint of the dredging operation and the potential for spatial conflict with other marine users. The definition of such zones, commonly termed Active Dredge Zones, can either be required as part of the conditions attached to a dredging permission, or may be employed on a voluntary basis by operators. Active dredge zones represent the only area where dredging is permitted in a licence at any given time and are therefore enforced by analysis of Electronic Monitoring System (EMS) data. Changes to zones may be possible, depending on the constraints of the conditions attached to a dredging permission. If the licensee wants to modify their active dredge area zones, advance notification will be required - typically 4 weeks. While individual operators are responsible for notifying any site specific changes, BMAPA and The Crown Estate produce summary zoning charts in January and July of each year which show the extent of active dredge area, and any changes that have taken place since the last issue.

For more information:
http://www.bmapa.org/issues_other01.php

A > C

Aggregate

A mixture of sand, gravel, crushed rock or other bulk minerals used in construction and civil engineering.

Aggregates are used in the construction industry in many ways but principally as a component of concrete. Marine aggregates are sands and gravels dredged from the sea bed but aggregates may also be obtained from quarrying on land, from the recycling of demolition waste and from secondary sources like blast furnace slag and pulverised fly ash from power stations. Quarried and dredged aggregates are known as "primary" aggregates.

For more information:
http://www.bgs.ac.uk/downloads/start.cfm?id=1355

Aggregates Levy

Tax imposed on the sale of primary aggregate resources.

The Aggregates Levy is a tax on the sale of sand, gravel and rock that is dug from the ground or dredged from the sea in UK waters. The levy has been introduced to address the environmental costs associated with quarrying that are not already covered by regulation, including noise, dust, visual intrusion, loss of amenity and damage to biodiversity. The levy aims to bring about environmental benefits by making the price of aggregates better reflect these costs and encouraging the use of alternative materials such as recycled materials and certain waste products.

For more information:
http://customs.hmrc.gov.uk/channelsPortalWebApp/downloadFile?contentID=HMCE_PROD_008552

A > C

Aggregates Levy Sustainability Fund, Marine Aggregates Levy Sustainability Fund, Marine Environment Protection Fund

Acronyms: ALSF, MALSF, MEPF

The Aggregates Levy Sustainability Fund is a scheme developed that uses some of money generated by the Aggregates Levy to reduce the environmental impacts of the extraction of aggregates, both on land and from the sea, and to deliver benefits to areas subject to these impacts.

The Aggregates Levy Sustainability Fund (ALSF) was introduced in April 2002 with the following specific objectives.

1 To minimise the demand for primary aggregates extraction.

2 To promote more environmentally friendly aggregates extraction and transport.

3 To address the environmental impacts of past aggregates extraction.

4 To compensate local communities for impacts of aggregates extraction. The Marine ALSF programme is currently delivered by two programmes, one administered by Cefas (the Marine Environment Protection Fund) and the other by English Heritage.

For more information:
http://www.defra.gov.uk/environment/waste/aggregates/index.htm
http://www.alsf-mepf.org.uk

Anchor Dredging

Also see: Static Dredging - page 85

Dredging activity, usually undertaken over thick, spatially constrained aggregate deposits, whereby the dredging vessel remains stationary.

Anchor dredging is employed when the dimensions of an aggregate deposit prevent trailer dredging. This technique is usually employed either when the natural dimensions of an aggregate deposit prevent trailer dredging, or if significant unwanted seabed debris is present, or if licence conditions require the area dredged to be as small as possible. In such circumstances the dredger will anchor over the deposit and deploy its dredge pipe whilst stationary. Extraction by anchor dredging results in deep conical depressions in the seabed.

Anglian Offshore Dredging Association

Acronym: AODA

The Association of marine aggregate extraction companies with interests in the Anglian/East Coast Region.

For more information:
http://www.marineaggregate.info

Application

The documentation submitted to the Regulator by a dredging company seeking permission to extract marine aggregate from the seabed.

An application for a dredging permission consists of a wide variety of information that describes the extraction proposals, the findings of a focused environmental impact assessment, the results of consultations and details of proposed monitoring, mitigation and management conditions.

A > C

Application Area

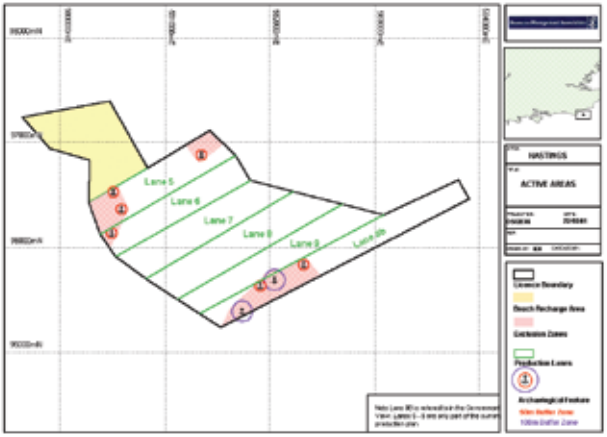
An area within which a marine aggregate producer has identified commercially viable aggregate resources, has secured an exclusive option with the mineral owner (normally The Crown Estate) and for which a permission to dredge is being sought.

An application for a dredging permission is made following a prospecting phase when a dredging company has located a potential resource deposit. The application area defines the area within which the potential resources exist and for which a permission to dredge will be sought.

Archaeological Exclusion Zone

Acronym: AEZ

A defined zone within a dredging licence where extraction is excluded to protect archaeological features – including wrecks.



The use and application of archaeological exclusion zones is defined in the Archaeology Reporting Protocol produced by BMAPA and English Heritage in 2005. While such zones can be introduced and defined in licence conditions, a more common application is for them to be used as an emergency mitigation measure in the event that a previously unidentified archaeological feature, e.g. ship or aircraft wreck is encountered. AEZ's may be modified or even withdrawn if the operator is able to demonstrate to the appropriate heritage advisors that no heritage assets are at risk.

Archaeological Reporting Protocol

A > C

A protocol developed by BMAPA and English Heritage for reporting items of archaeological interest found as a result of dredging.

The Protocol was prepared for BMAPA and English Heritage by Wessex Archaeology and came into effect in August 2005. It applies to the wharves and vessels of all BMAPA companies so that if a find is discovered at a wharf, onboard vessel or on the seabed it can be reported to ensure that marine heritage resources are understood and protected.

Each wharf or vessel has a Site Champion, a single person who is responsible for reporting discoveries to a Nominated Contact within the company. The Nominated Contact uploads discoveries onto the secure web-based reporting system designed for this purpose. Wessex Archaeology staff are alerted to the presence of new discoveries and every find is investigated through the Implementation Service. Where necessary, this includes reporting finds to the Receiver of Wreck in accordance with Merchant Shipping legislation. The reporting protocol includes management options, including archaeological exclusion zones (AEZ's), which may be used to mitigate the impact of marine aggregate operations on previously unidentified features.

For more information:
http://www.wessexarch.co.uk/projects/marine/bmapa/arch-interest.html

Archaeology Guidance Note

A Guidance Note produced by BMAPA and English Heritage for considering marine aggregate dredging and the historic environment.

In April 2003, BMAPA and English Heritage published a Guidance Note entitled 'Marine aggregate dredging and the historic environment', produced by Wessex Archaeology. This document provides guidance to operators, regulators, advisors and curators on assessing, evaluating, mitigating and monitoring the archaeological effects of marine aggregate dredging.

For more information:
http://www.wessexarch.co.uk/projects/marine/bmapa/dredging-hist-env.html

Area Involved Initiative

An annual programme that has been undertaken by BMAPA and The Crown Estate since 1999 to report the area of seabed licensed and dredged by the marine aggregate industry.

The area dredged initiative collates a variety of marine aggregate industry information to describe the spatial 'footprint' of activities. Included in the reporting initiative is information describing the area of seabed under licence, the area of seabed dredged, the intensity of dredging activity and the tonnage of aggregate produced. Data are described on a national and regional basis and enable annual comparison of changes in the location and intensity of dredging to be carried out.

For more information:
http://www.bmapa.org/issues_area01.php

As-dredged/All-in

An aggregate cargo that has been loaded without on-board processing (i.e. no screening conducted).

Where aggregate resource deposits are of suitable quality (i.e. the sand:gravel ratio is suitable for use at the wharf without ship borne processing) a cargo can be dredged without screening. In such circumstances, all sediment dredged from the seabed is loaded into the hold of the dredger and only the very fine suspended sediment is returned to the sea via overflow spillways.

Automatic Identification System

Acronym: AIS

The Automatic Identification System (AIS) is a system used to track a ship's location.

The Automatic Identification System (AIS) is a short range coastal tracking system used on ships and by Vessel Traffic Services (VTS) for identifying and locating vessels by electronically exchanging data with other nearby ships and VTS stations. Information such as unique identification, position, course and speed can be monitored through an AIS display. AIS is intended to assist the vessel's watch keeping officers and allow maritime authorities to track and monitor vessel movements.

For more information:
http://www.aislive.com/
http://www.marinetraffic.com/ais/

Ballast as Dredged

Acronym: BAD

A term used to describe unprocessed aggregate as delivered by a dredger to the wharf.

When a dredger discharges its cargo onto the wharf it is held in a primary stockpile. This is unprocessed aggregate and is referred to as ballast as dredged (BAD). Following discharge from the dredger, BAD may be sold direct to market for low specification end uses such as fill, or may be processed into particular aggregate products (e.g. 10-20mm gravel, 4-10mm gravel, sand etc). The processed products can then be used for high specification end uses such as concrete.

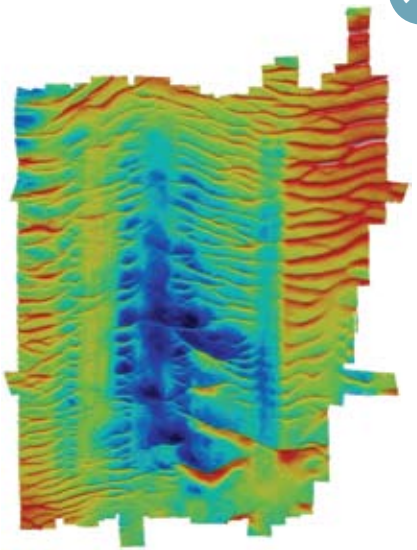
Ballasting

The process by which a dredger fills its hopper with water to increase vessel stability and to allow dredged material to be loaded in solution.

Ballasting is achieved by drawing seawater through the dredge pump to fill the cargo hopper. No sediment is loaded during the ballasting process. Ballasting may sometimes trigger the onboard EMS into dredging mode giving the impression that dredging is occurring. Such data can be discounted by considering the velocity of the vessel as this is typically much higher during ballasting than during dredging. Additionally, a ballasting track-plot looks distinctly different to dredging track, and this is taken into consideration during the monthly analysis of EMS data.

Bathymetric Survey

The measurement of water depth over a defined area.

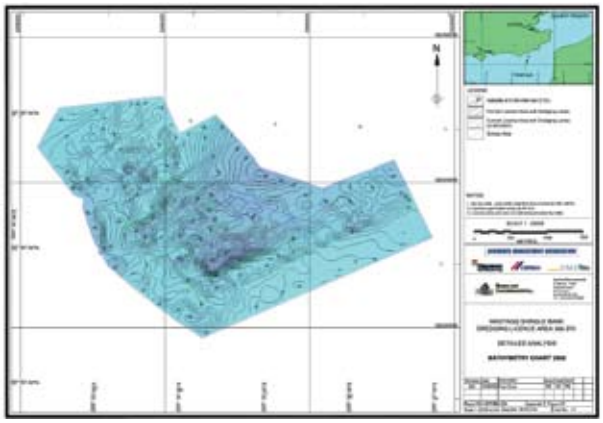


Bathymetric measurements are acquired by measuring the time taken for a sound wave to travel from a transmitter at the sea surface, down to the seabed and back to a receiver at the sea surface. This measurement is called a sounding. By measuring the physical characteristics of the sea water through which the sound has travelled (density, temperature) it is possible to calculate the speed at which the sound would have travelled and by deduction the distance travelled (as velocity = distance/time). In this way the distance from the sea surface to the seabed can be calculated. Depending on the density of sounding data across any given area, it is possible to accurately represent the surface of the seabed, and repeated bathymetric surveys over time allow accurate measurements of change in seabed levels to be determined.

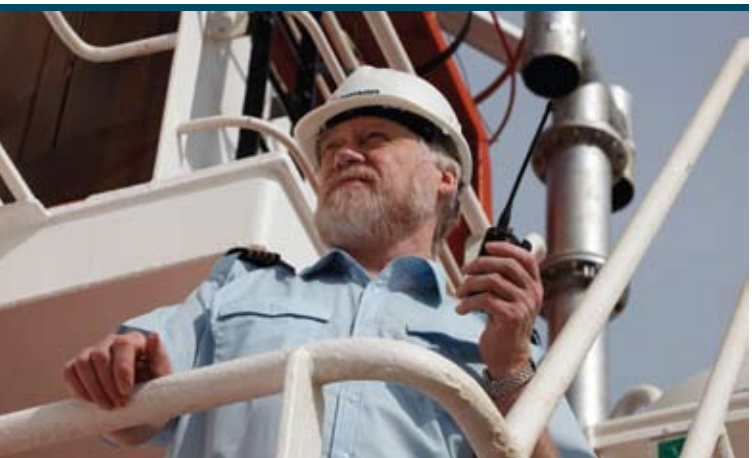
A > C

Bathymetry

The depth and topography of the seabed, usually measured from the sea surface.



Bathymetry describes the water depths of an area and the shape of the sea floor and is usually measured in metres below sea surface chart datum (CD) which is the level of lowest astronomical tide. Knowledge of bathymetry is needed by marine aggregate operators to ensure that an area of seabed is not too deep for dredging and to allow safe, efficient dredging operations.



A > C

Beach Replenishment, Beach Nourishment

The process of placing new sediment onto beaches to replace sediment lost through erosion.

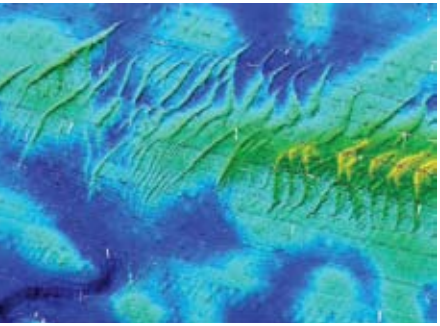
The action of waves and tides can result in erosion of coastal and beach sediment. Much of the sediment released by these processes will then be transported along the coastline through a process termed long shore drift. In the past, before the advent of man-made defences, the ongoing erosion of coastal frontages would have supplied sediment to beaches located down drift, allowing them to be maintained naturally. More recently, coastal defences have been constructed that can interrupt or slow the natural sediment erosion, transport and deposition processes and as a result some of the natural balances of sediment input and loss have been disturbed. Beach recharge/nourishment is a method of introducing new sediment into the coastal zone where natural sediment inputs have been interrupted or reduced. Recharge can also slow natural coastal retreat and can help prevent flooding where there is a long history of such problems, for example along the East Anglian coast. Sand and gravel are typically dredged from licence areas offshore, beyond the coastal zone, and deposited on beaches via pipelines, barges or a process termed 'rainbowing' (where the dredger sprays the sediment) to help protect and maintain the position of the coastline.

A>C

Bedform

A morphological (physical) feature formed on the seabed by the action of tidal and/or wave currents on mobile sediment.

In marine science, "bedform" is a generic term used to describe a variety of sediment features that are created on the seabed due to the action of wave and tidal currents. They are usually formed of sand and vary in shape and size. Typical bedforms include ripples (wavelengths of 0.1-0.5m), waves (wavelengths of 0.5-10m) and dunes (wavelengths >10m). Bedforms can also take the form of sand sheets and streaks that may be of variable thickness and span 100's of metres. Depending on the constituent sediment and hydrodynamic conditions, bedforms, and the sediment that forms them, may be mobile or immobile. Migration of bedforms over the seabed is possible, as is transfer of sediment between individual bedforms whilst the features themselves remain stationary.



Bedload

Mobile sediment that is transported by tidal and wave currents on or just above the seabed surface.

In marine science, "bedload" is a term used to describe mobile sediment that is transported by tidal and wave currents either on, or just above, the seabed. Bedload sediment transport can occur in several ways as sediment grains are forced to roll, skip and jump (saltate) across the seabed surface.

Bedrock

A consolidated or lithified geological succession that underlies superficial unconsolidated sediment.

Bedrock is a generic term for any basal sediment or rock succession overlain by superficial sediments.

Blended Supply

The process of combining different aggregate resources located in more than one licence area to obtain the required physical properties for a specific end use.

As with any geological deposit, the character and quality of marine aggregate resources varies considerable from licence to licence, and even within the licence area itself. In some areas, resources contain high proportions of gravel whilst in others, resources are targeted for their coarse sand content. The character of the in situ resources and the requirements of the wharf and construction market are rarely the same and as such blending resources from different licence areas is often required to match demand. In a typical case, a cargo with a high gravel content may be blended at the wharf with a predominantly sand cargo from a different area to produce the required quality of aggregate.

Boomer

Also see: Shallow Seismic - page 82

Apparatus that emits a seismic (acoustic) signal, used to survey sub-seabed sediment and rock structures.

Borrow Area

Specific area from which aggregate is extracted for a particular purpose, often for contract fill or beach nourishment.

A borrow area is generally a specific area within a licence which has material suitable for a particular use. Such areas are often reserved for sole use as a resource for contract fill or beach nourishment. Access to such areas may sometimes require specific permission from the regulator and the mineral owner under a 'call off' arrangement.

Boulder

A discrete grain size in sediments which under the Wentworth scale has a diameter >256mm.

A > C

British Marine Aggregate Producers Association

Acronym: BMAPA

The representative trade body for marine aggregate producers in the UK.

BMAPA is a constituent body of the wider Mineral Products Association, the trade association for the aggregates, cement and concrete industries.

For more information:
http://www.bmapa.org/

Bucket Wheel

Equipment used to unload an aggregate cargo from a dredgers hold, consisting of buckets attached to a large rotating wheel linked to a system of conveyor belts.

Bucket wheel discharge systems are operated on larger dredgers. The system employs a large wheel fitted with buckets which, as it rotates, scoops cargo from the hold of the vessel and then empties it onto a conveyer belt that directs the aggregate to the wharf. Bucket wheel equipment is designed to move along the cargo hold from bow to stern removing a layer of cargo. When a layer is removed the bucket wheel is lowered and the process is repeated to remove another layer of cargo. This continues until the hold is emptied - a process that can typically take 4-6 hours.

A > C

Bulk Sample

A process by which a dredger will load a cargo for the purposes of determining the physical characteristics of a new or unproven resource.

When a new area is being investigated for aggregate extraction, it is necessary for the operating company to determine the nature of the resources that are present. With appropriate permission, bulk sampling is sometimes undertaken to achieve a better understanding of the nature of the resources than can be gained solely from core and grab sampling.

Call Off

Also see: Beach Replenishment - page 15
Contract Fill - page 25

A permission from regulator and mineral owner to allow additional tonnage and/or a defined area of an existing licence area to be dredged for a particular end use – normally contract fill or beach nourishment.

A call off arrangement allows additional tonnage or area within an existing dredging permission to be accessed to support specific projects – normally large scale beach nourishment or contract fill projects. Such arrangements have to be agreed in advance with both regulators and the mineral owner.

Capacity

Also see: Dredger - page 33
Cargo - page 20
Hopper - page 49

The tonnage or volume of cargo able to be retained by a dredging vessel.

The capacity of a dredging vessel is determine by the size of its hold. During dredging, water and aggregate are pumped into the hold where the aggregate settles out of suspension and the water and fine sediment flows back into the sea. When the level of the settled aggregate reaches the top of the hold, the dredger has acquired a full capacity cargo. Typical UK marine aggregate dredger capacities range from 1250 tonnes (700m^3) to 8800 tones (5100m^3)

A > C

Capital Dredging

The act of removing sediment from an area of seabed as part of an engineering or navigational project, usually for a port development or approach channel.

For regulatory purposes, capital dredging is defined as the act of excavating of the seabed, generally for construction or navigational purposes, in an area or down to a level (relative to Ordnance Datum) not previously dredged during the preceding 10 years.

Cargo

A volume of sediment loaded by a dredging vessel for delivery to a wharf.

Cargo is the term used to describe the sediment retained in the dredger when dredging has been completed.

A > C

Chalk

Porous rock principally composed of the consolidated calcareous detritus from marine algae.

Chalk, as forms the White Cliffs of Dover, was formed in the Cretaceous Period, through the deposition of plankton skeletal matter in warm water. The skeletal debris was formed of calcium carbonate and the subsequent burial and consolidation of the sediment formed chalk rock. Chalk, which can occur as bedrock offshore and may also be found in eroded fragment form within aggregate deposits, is considered a contaminant in construction aggregates on account of its weak structural qualities and chemical instability and will therefore be actively avoided during marine aggregate dredging.

Clamshell Grab

Seabed sediment sampling apparatus used to acquire large volume samples capable of describing the sediment constituents and structure of the seabed surface.

Clay

Very fine cohesive sediment with a particle diameter <0.002mm.

Clay is considered a contaminant in construction aggregates on account of its weak structural qualities and will therefore be actively avoided during marine aggregate dredging.

Coarse Aggregates

Also see: Gravel - page 47

The gravel fraction of construction aggregates.

In the construction industry, coarse aggregate is defined with a grain size over 4 mm, as required by European Standards. A wide variety of durable rock types constitute coarse aggregate but UK marine aggregates are dominated by flint off southern Britain and by more mixed lithologies off the Humber and in the Irish Sea.

Cobbles

Sediment with a particle diameter between 64- 256mm on the Wentworth Scale.

Concrete

A > C

Construction material made through the combination of cement, sand, gravel and water.

Concrete is a fundamental component of most if not all construction projects, and around 80 per cent of all marine sand and gravel landed for construction is used for this purpose. It is made by mixing cement (primarily composed of anhydrous calcium silicate compounds) with water, sand, gravel and chemical admixtures to improve workability. Concrete is used to construct, for example, foundations, building frameworks and also large engineering structures such bridges and dams. In addition to these uses, concrete is also used to manufacture pre-formed construction products such as drainage pipe work and building blocks. Despite a move away from large scale use of concrete in construction, as seen in the 1960s and 1970s, it remains a vitally important material in modern day construction projects.

Concurrent Dredging

Dredging operations carried out by two or more dredgers simultaneously in a single licence area or two licence areas that are in close proximity.

Concurrent dredging is permitted on some licences allowing two dredgers to work simultaneously. Concurrent dredging may also be used to describe simultaneous dredging activities on two licences that are in close proximity to each other, typically when the location of the licences means that combined impacts may result.

A > C

Construction Aggregate

Sediment of specified quality that is used for specific end-uses in the construction industry.

Aggregate can be used for a variety of purposes including high specification uses, such as concrete, and lower specification uses such as road sub-base and fill. Construction aggregate describes that which has been graded as per European standards and that is suitable for use for specific construction tasks.

For more information: http://www.bgs.ac.uk/downloads/start.cfm?id=1355

Contamination

Also see: Cargo - page 20

Unsuitable physical materials included in a dredged cargo.

Clay, chalk, peat and shell can, in sufficient quantities, render a marine sand and gravel cargo unsaleable. This occurs because the physical and chemical composition of these materials are unsuitable for use in construction aggregates. Dredging operators will actively seek to avoid contact with such contaminants during dredging operations.

Contract Dredger

A > C

A dredger operating on a licence area under contract to the licensee.

Any dredger operating on a licence area which is not owned or under the control of the licensee can be considered a contract dredger. However, the term is more normally applied to larger capacity vessels which dredge on a licence to fulfil a particular contract – for example a beach nourishment or contract fill project. Contract dredgers are required to adhere to the same licence conditions, and will be required to have an approved EMS.

Contract Fill

Sediment that is used to infill areas in ports and harbours or to reclaim land from the sea prior to engineering works often of a lower quality specification than that required for construction aggregate.

Occasionally, a construction project will require a large volume of sediment to provide infill of a basin or backfill to a structure. In such circumstances, and where the location of construction project is close to suitable wharf or pump ashore facilities, unprocessed marine aggregate can be supplied to fulfil the requirement.

Conversion Factor

Numerical value used to convert a volumetric cargo measurement (m^3) to mass of aggregate dredged (tonnes).

The conversion factor used to convert from cubic metres of material to metric tonnes is dependent upon the type of material. Conversion factors for mixed sand/gravel aggregates are 1.66 tonnes/m^3 for older licences and 1.73 tonnes/m^3 for newer licences and 1.50 tonnes/m^3 for sand resources.

Cumulative Impacts

Additive impacts resulting from dredging at more than one site.

If dredging is undertaken at more than one site in close proximity, impacts may develop that result from accumulation of effects from the individual licence areas. Such impacts are described as cumulative.

Cycle Time

The period of time required for a dredger to leave port, transit to a licence area, load a cargo, transit back to port and discharge the cargo to the wharf.

Cycle time is an important consideration for marine aggregate companies when planning dredging programmes. As access to most wharves is tidally constrained, cycle times generally revolve around the timing of high water. Vessels therefore will be able to complete a cycle in 12, 24, 36 or 48 hours depending upon distance to travel and time taken to load/discharge. Changes in vessels cycle time can have a significant impact on its productivity - a vessel changing from a 12 hour production cycle to a 24 hour production cycle will effectively halve its productivity over any given period. Typically larger capacity vessels (>4500t) will undertake longer cycle times (24-48 hours), while smaller capacity vessels (<3000t) will operate on shorter cycles (12-24 hours).

Datum

Cartographic reference used to describe the shape of the earth's surface onto which a geographic position can be plotted.

GPS navigation equipment uses a datum to describe the shape of the earth's surface (projection), of which the three most commonly employed are WGS84, OSGB36 and ED50. Navigation charts relate to specific datums, and GPS receivers have to be switched between datums so the positions accurately correspond. The differences in projection between individual datums mean that there can be a significant spatial variation in the geographic position presented by a GPS receiver depending upon the datum selected – over 130m in some instances.

Dead Rent

A standing minimum annual fee payable by a Licensee to The Crown Estate in the event that no dredging occurs on a licence within the previous 12 months.

Depending on market demand, situations may occur whereby a licence area is not used for a prolonged period. If a licence remains undredged for a 12 month period, a standing minimum annual fee known as a 'Dead Rent' is payable to The Crown Estate.

Density Meter

A sensor on-board a dredger that measures the density of the sediment/water mixture being drawn from the seabed up to the dredger.

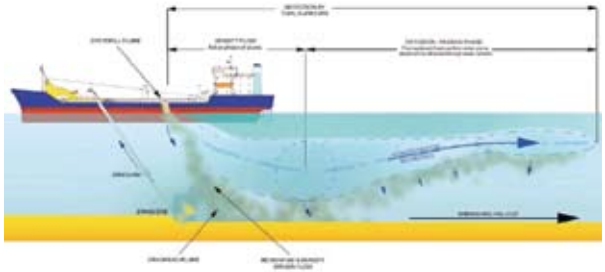
A density meter is used on dredgers to detect when sediment is being pumped through the dredge pipe and to monitor productivity of the dredging process based on the density of the sediment/water mix being loaded. The density of the mix can be influenced by the sediment being dredged, the morphology of the seabed and the characteristics of the draghead, but typically the dredge mix will comprise 9 parts water to 1 part solid. If the mix becomes too dense, the draghead, dredge pipe and dredge pump can become choked. Density meters can be used as a sensor for the Electronic Monitoring System (EMS) to differentiate between when a vessel is loading a sediment/water mix and just water.

D v F

Density Plume

A flow of water and sediment created by a dredger's overflow and screening returns that travels rapidly back to the seabed by virtue of its higher density compared with the surrounding seawater.

The process of aggregate dredging creates a plume of fine sediment in the water around the dredger. This plume is generated by the water and sediment returned overboard as overspill from the hopper and also from discharges from the screening apparatus. Close to the dredger, where the concentration of suspended sediment in the rejected water/sediment mix will be greatest, a density plume will form. The high concentration of sediment in the returns close to the dredger means that it has a greater density than the surrounding seawater. As a result, the plume will rapidly settle to the seabed. This feature is sometimes also referred to a dynamic plume.



Devensian

The most recent British glacial stage prevailing from c.73,000 – 10,000 years before present (BP).

Direct Impact

Also see: Primary Impact - page 65

Impacts resulting from the passage of the draghead over the seabed surface and the associated removal of sediment from the seabed.

Impacts from dredging occur in two main ways; impacts from passage of the draghead over the seabed and impacts resulting from settlement and deposition of sediment rejected from the dredger during dredging. Impacts that occur within the boundary of the licence area due to passage of the draghead and removal of resource sediment, are described as direct/primary impacts. Such impacts are the result of removal of the upper layers of resource deposits and will be spatially constrained to the extent of the area of seabed that has been actively dredged.

Direct Impact Zone

Acronym: DIZ

Also see: Primary Impact Zone - page 65

The zone within which impacts resulting from the passage of the draghead over the seabed surface occur.

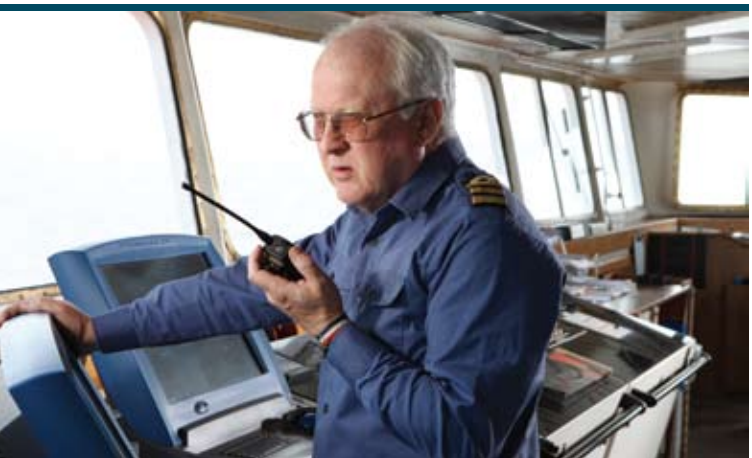
Impacts from dredging occur in two main ways; impacts from passage of the draghead over the seabed and impacts resulting from settlement and deposition of sediment rejected from the dredger during dredging. While within the licence area both types of impact may occur, the direct/primary impact zone is generally defined as the area of seabed that has been (or will be) actively dredged, and therefore subject to the impact of the passage of the draghead.

D v F

Discharge

The act of removing a dredger's cargo from the hopper/ hold and depositing on a wharf or other receiving location.

Discharge of a cargo is achieved in a variety of ways depending on the design of the dredger and the intended use of the cargo. For dry discharge at a wharf buckets wheels, scrapers, and grab buckets may be used to deposit the cargo onto conveyors which transport the aggregate ashore. For discharge to beach recharge/nourishment projects, the dredged cargo can be re-fluidised on the dredger and pumped/sprayed onto the shore.



Draghead

Equipment on the end of a dredge pipe that is in contact with the seabed during dredging.

A draghead is fitted to the end of a dredge pipe, and represents the articulated point at which the dredge pipe comes into contact with the seabed. The draghead will rest flat on the seabed during dredging and a sediment/water mix will be drawn through it, up the dredge pipe and into the hold of the dredger. Dragheads vary in size depending on the type of dredger they are fitted to but in UK marine aggregate dredgers they are typically between 1-4m wide. The base of the draghead through which sediment is drawn has a heavy steel grid fitted to increase rigidity and to prevent large pieces of rock or debris entering the dredge pipe. The depth of sediment removed by a passage of the draghead will vary depending upon the compaction of the seabed sediments and the power of the dredge pump, but typically 30cm of sediment will be removed in a single pass.

D > F

Dredge Pipe

Equipment through which water and sediment is drawn from the seabed to the dredger.

Dredge pipes are normally aft facing, with the draghead mounted towards the stern of the vessel. Their diameters range from 0.75-1.0m for UK aggregate dredgers.

Dredge Pump

Equipment that generates the suction required to draw sediment from the seabed into the dredger.

Dredge pumps are electrically powered centrifugal pumps, with a pump bowl containing an impellor that spins to create a vacuum into which water and sediment are drawn at high velocity. Dredge pumps can either be mounted inboard within the hull of the dredger, or overboard mid way down the dredge pipe. The dredge depth of vessels with inboard mounted pumps will be limited to about 30m below the base of the pump, while vessels with overboard pumps will be limited mainly by the length of their dredge pipe.

D > F

Dredger

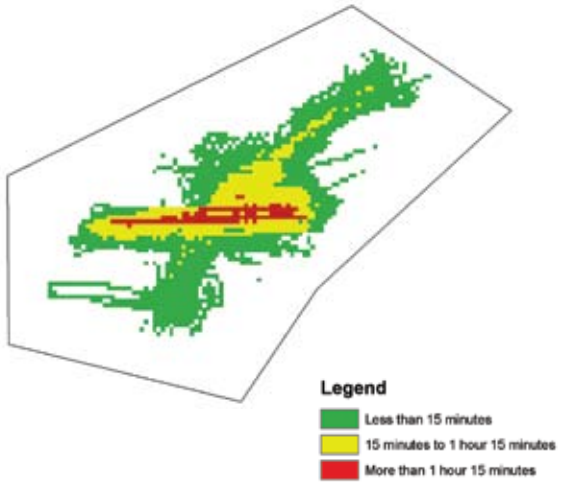
A generic term describing a ship capable of removing sediment from the seabed.

Dredging Intensity

Also see: Variable Grid Analysis - page 92
Area Involved Initiative - page 10

A measurement that describes the length of time dredging has occurred within a defined area.

Dredging intensity can be calculated using data from the Electronic Monitoring System (EMS) fitted to all aggregate dredgers. EMS data is used to plot the location and activity of dredgers over time, and this can then be used to calculate the time vessels spent dredging on a 50mx50m grid basis. Intensity plots are produced in this way as part of the BMAPA/Crown Estate area involved annual reports.

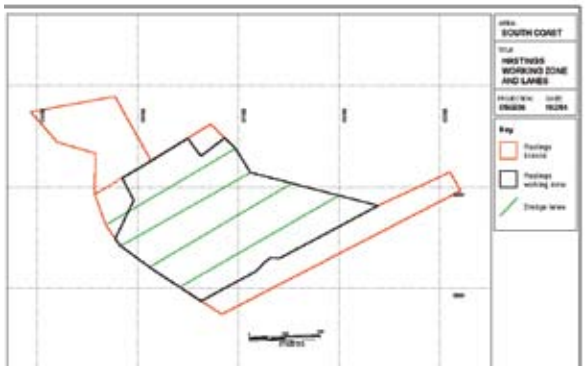


D V F

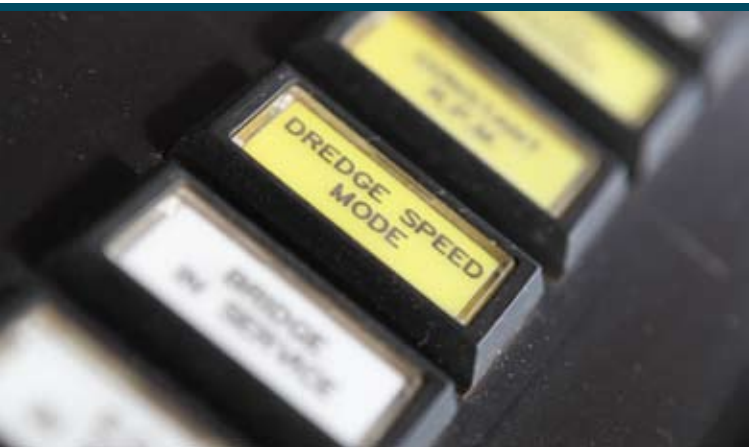
Dredging Lane

Also see: Active Dredge Zone - page 4

A sub-division of an active dredge area sometimes used by marine aggregate companies to manage dredging operations.



As well as reducing potential environmental impacts, dredging licences are managed carefully to ensure that the best use of resources is achieved. As part of management procedures, aggregate companies may sub-divide licence areas into lanes (typically 50-100m wide) which allow production operations to be focussed on precise areas of the aggregate deposit. This approach allows the resource to be extracted in a more controlled manner, which can assist the quality and consistency of cargoes over time. In conjunction with the active dredge area, this approach also helps minimise the footprint of operations, thus reducing the potential environmental impact and also the likelihood of interference with other activities.



Dredging Permission

Also see: Government Permission - page 46

The environmental consent that allows dredging on a production licence area to take place.

A dredging permission will only be awarded by Government regulators (the Marine & Fisheries Agency/Marine Management Organisation in England and the Welsh Assembly Government) following detailed environmental impact studies. The permission itself will define the geographical extent of the area permitted to be dredged, along with the term, the maximum tonnage to be dredged during that term and the maximum tonnage to be dredged in a single year. Permissions are typically accompanied by a Schedule of Conditions which define the management, mitigation and monitoring controls.

Dredging Sensor

Also see: Electronic Monitoring System - page 37
Density Meter - page 27
Vibration Sensor - page 92
Swell Compensator - page 86

Equipment on board a dredger that determines whether the vessel is dredging or not, the output of which feeds into the Electronic Monitoring System.

A dredging sensor provides additional data into the Electronic Monitoring System to determine when a vessel is actively dredging sediment. The use of such sensors allows dredgers to lift their dragheads off the seabed as they turn and manoeuvre while their dredge pumps remain running. If the vessel leaves the active dredge area while doing this, the dredge sensor data recorded by the EMS can demonstrate that dredging was not taking place. A range of different sensors are currently employed, depending on the specification and class or type of dredger.

Dump Valve

Hydraulic doors in the base of the cargo hold of a dredger that allows dredged sand and gravel to be returned back to the seabed.

Dump valves are principally a safety feature, should heavy weather or overloading result in the vessel becoming unstable. However, dump valves can also be used where a cargo heavily contaminated with fine sediment (silt/clay), needs to be disposed of at sea rather than landed at a wharf. Disposal can only take place at specific sites which have been licensed for that purpose.

During Pleasure Licence

A production licence issued by The Crown Estate with no fixed term attached.

During Pleasure licence areas still require a Government View permission for extraction to occur. However, the duration of the licence term is the controlling factor rather than the permission. During Pleasure Licences are no longer issued. All Crown term licence areas will expire at the end of 2013 at the latest. For dredging to continue at these sites beyond this date, a Production Licence must be obtained.

East Channel Association

Acronym: ECA

The Association of marine aggregate extraction companies with interests in the East Channel Region.

For more information:
http://www.eastchannel.info

ED50

Also see: Datum - page 27

ED 50 is a geodetic datum, used to describe the shape of the Earth's surface onto which a geographic position can be plotted.

Electronic Monitoring System

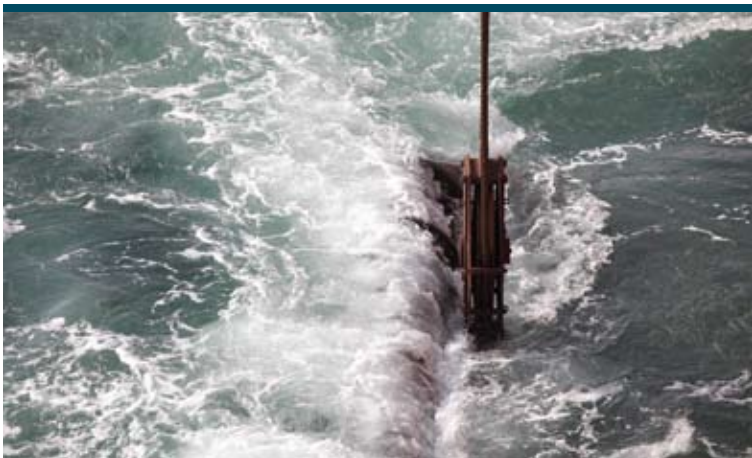
Acronym: EMS

D > F

The 'black box' monitoring system on board a dredger that records the vessels position and activity to ensure that dredging is only undertaken within permitted zones.

An EMS has been required on all aggregate dredging vessels operating on areas licensed by The Crown Estate since 1993. This requirement is reflected in both The Crown Estate licence and the Dredging Permission for a site. The system utilises data inputs from several sensors on board the dredger and satellite positioning data to record the position and activity of the vessel. EMS data is remotely transmitted back to The Crown Estate and to Government regulators where it is analysed to ensure that the system is functioning as required, and that dredging has only occurred within permitted areas. Irregularity Notices are issued to operators should analysis determine unexplained gaps in data or apparent unauthorised dredging. In the event that these are not able to be explained satisfactorily, operators can be subject to prosecution or permissions and/or licence areas can be withdrawn.

For more information:
http://www.thecrownestate.co.uk/electronic_monitoring_system



D v F

EMS Irregularity Notice

Also see: Electronic Monitoring System - page 37

EMS Irregularity Notices are issued to operators should analysis determine unexplained gaps in data or apparent unauthorised dredging. In the event that these are not able to be explained, operators can be subject to prosecution or permissions and/or licence areas can be withdrawn.

EMS Irregularity Notices are issued on a monthly basis as part of the regular data analysis carried out by The Crown Estate's Offshore Managing Agents. Time Gap Notices are issued for all gaps in data greater than five minutes during active mode (when dredging or pumping) and greater than 90 minutes during standby mode. All incidences of suspected unauthorised dredging are investigated, with the exception of where previous explanation has already been given. Acceptable evidence which may be supplied to demonstrate vessel activity includes legally binding Master's statements, copies of vessel deck logs and Microplot track plots. In the case of more modern dredgers, detailed company monitoring information may also be available. Confirmed transgressions which are identified by the Irregularity Notice procedure are immediately highlighted to The Crown Estate and the appropriate regulatory body.

D v F

EMS Time Gap

Also see: Electronic Monitoring System - page 37

A gap in the recorded EMS data.

EMS data is recorded in a data file onboard each dredging vessel. During the monthly analysis routine carried out by the Offshore Managing Agents for The Crown Estate any gaps in this data are highlighted and investigated to check for any potential unauthorised dredging that may have occurred during the period in question.

EMS Vessel Approval in Principle

Also see: Electronic Monitoring System - page 37

In order for any vessel to dredge on a Crown Estate licensed dredge area, details of the vessel EMS must be checked and approved by the Offshore Managing Agents for The Crown Estate. If the configuration is deemed acceptable, an Approval in Principle Certificate is issued, and dredging may commence.

The first step for a dredging company to obtain an Approval in Principle for a vessel is to submit an EMS Information Sheet to the Offshore Managing Agents which details the important aspects of the EMS configuration (primarily the type and number of dredging status indicators used, and details of other hardware). The decision to issue an Approval in Principle Certificate is based on this information, as well as test data emailed from the vessel being found to be satisfactory. Once an Approval in Principle certificate is issued and dredging commences data from the first or second load is typically also analysed to make sure there have been no unforeseen problems. The Approval in Principle for any vessel may be removed if the EMS or actions of a vessel are deemed unsatisfactory. Vessels which have an Approval revoked may not dredge on areas licensed by The Crown Estate until further notice.

EMS Vessel Validation

Also see: Electronic Monitoring System - page 37

A review inspection of the EMS setup on a dredger operating on Crown Estate licence areas.

An EMS Vessel Validation is undertaken during a site visit to a dredging vessel by a representative of the Offshore Managing Agents for The Crown Estate. The inspection reviews the EMS specification and systems implemented on board the vessel. An EMS Validation Certificate is issued if the EMS configuration is seen to be acceptable. Typically the vessel has already been issued with an Approval in Principle, and the Validation is a subsequent audit.

European Standard

Rules specifying the quality of, among other products, aggregates across Europe.

European aggregate standards require different aggregate products to have specified particle size distributions, composition and strength to ensure high standards of building products. They allow producers and consumers to work within agreed specifications.

For more information:
http://www.mineralproducts.org/prod_agg01.htm

Exclusion Zone

Also see: Archaeological Exclusion Zone - page 8

An area around a defined seabed feature within which dredging is not permitted in order to prevent disturbance.

The seabed is highly variable in terms of its composition and also has wreck and archaeological debris upon it. Dredging companies undertake extensive studies to determine the exact location of resource deposits and also to identify areas of potential debris, to ensure that dredging is only undertaken in suitable areas. In some circumstances, where wrecks, debris or important habitats/species exist, exclusion zones may be employed to prevent damage to seabed features and ensure safe operations. Exclusion zones can take the form of simple circular/elliptical boundaries around specific items, or may be employed around areas where resources are not suitable for dredging or where dredging depth limits have been reached. Where exclusion zones are defined as part of a dredging permission, their effectiveness will be enforced by EMS data, and their limits may be subject to more detailed monitoring surveys. Exclusion Zones may be seasonal or permanent.

Exclusive Option

A commercial agreement between The Crown Estate and a marine aggregate company for exclusive rights to search, seek permission for and extract sand and gravel within a defined geographical area for an agreed term.

Option agreements form part of The Crown Estate's tendering process for marine aggregate licences.

Exports

Aggregate resources landed outside of the UK.

UK marine aggregate producers export construction aggregates to European countries including Belgium and the Netherlands. The exports represent a valuable resource to these countries where coarse aggregate (coarse sand and gravel) for construction is not readily available. Exports also provide a significant contribution to the UK's balance of payments.

Far-field

Dredging impacts or related processes that influence the environment at distances typically >500m from the dredging location.

Impacts related to dredging are broadly divided into two types; near field and far field. Far field impacts occur at distances >500m from the dredge site and are principally the result of the settlement, deposition, resuspension and transport of fine and very fine sediment that is mobilised by the dredging process.

Fine Aggregates

Also see: Sand - page 76

The sand fraction of a construction bulk mineral

In the construction industry, fine aggregate is defined with a grain size of between 0.063mm and 4mm, as required by European Standards. Fine aggregate commonly comprises quartz but flint, shell fragments and other rock types may occur within the sand fraction.

Flint

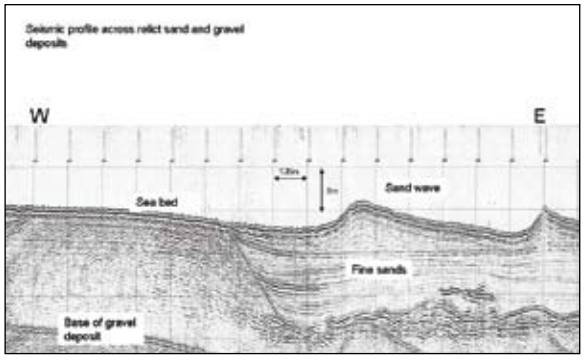
A variety of silica, similar to chert, common in gravel deposits in southern Britain.

Flint is a fine-grained, hard, brittle black or dark grey rock occurring in nodules or bands in Cretaceous Chalk. It originated mainly from the remains of silica bearing marine micro-organisms which accumulated with the calcareous muds on the seabed of the Chalk Sea. The silica percolated in solution beneath the seabed and reprecipitated around a core, for example the remains of sea-urchins or in burrows, where chemical conditions were favourable. The newly formed flint nodule then enlarged by accretion within the chalk sediment. Great thicknesses of chalk accumulated and the effect of intense pressure gradually lithified the sediments. In geologically more recent times, chalk has been rapidly weathered, dissolved and eroded at the earth's surface and flint has remained as a durable, stable rock which slowly breaks down into gravel and sand. Flint gravel commonly has a white or light brown weathered surface called a patina.

Fluvially Derived Marine Aggregate

Marine aggregate that was deposited by a river associated with a former land surface and now submerged.

Throughout the various ice ages, (ie. cold stages of the Quaternary Period), global sea-level was much lower than at present because of the volume of water frozen in large continental ice sheets. In NW Europe, with the exposure of the continental shelf as land, rivers extended out across what is now the seabed and deposited large volumes of sand and gravel in their valleys. Some of these rivers were enlarged by glacial meltwater whilst others drained large unglaciated catchment areas including present-day northern France, southern England and the exposed English Channel and southern North Sea. Repeated episodes of sea level rise and fall during the Quaternary have produced complex and extensive valley infills on the continental shelf which contain large volumes of sand and gravel. Sediments originating in these environments occur in the eastern English Channel for example.



Geophysical

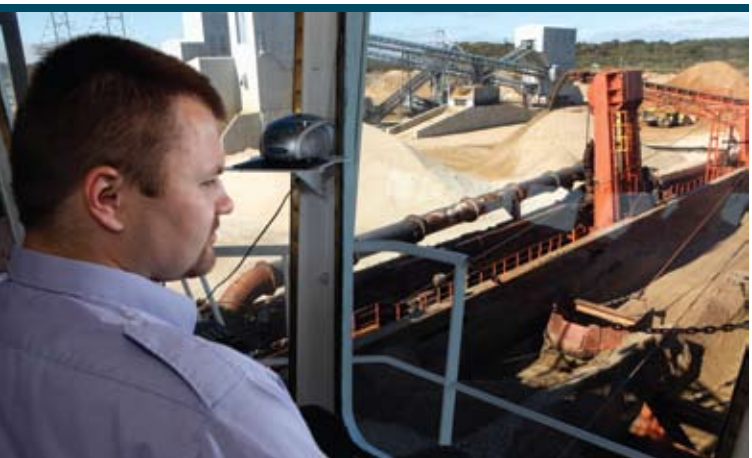
Of or relating to survey methods that investigate the physical properties of the environment through remote methods utilising sound, light, magnetism or electricity.

Geophysical survey methods detect and measure the physical properties of the earth. Geophysical survey techniques are used for marine aggregate site investigation and have the advantage of being remote and non-intrusive. Geophysical surveys include bathymetric, sidescan sonar, shallow seismic profile and magnetometer investigations.

Geotechnical

Of or relating to survey methods principally focussed on measuring the in situ physical properties of the seabed.

Geotechnical surveys are undertaken to measure the physical properties of the seabed. Typically, the methods employed provide data describing the sediment particle size distribution, sediment depth, compaction, porosity, water content, behaviour under stress and stratigraphy (layering).



G > I

Glacially Derived Marine Aggregate

Marine aggregate that was deposited by a glacier or ice sheet.

Throughout the various ice ages of the Quaternary Period, central and northern Britain and large areas of the continental shelf have been covered by extensive ice sheets. As ice sheets expanded and flowed from uplands to lowlands, they eroded underlying rocks and sediments, depositing them at their bed and margins, commonly far from the sediment source . With ice margin retreat during deglaciation, reworking by glacial meltwater led to removal of the fine muddy fraction with coarser sediment deposited as sheets and channels of sand and gravel. Further reworking occurred when sea level rose to submerge these deposits. Sediments originating in these environments occur in the North Sea off the Humber Estuary for example.

Global Positioning System

Acronym: GPS

A method of geographical location that utilises satellite signals.

A GPS uses fixes acquired from a number of satellites to calculate the position of the system antenna on the Earth. Modern systems are very accurate and capable of resolving position to an accuracy of 10cm. GPS is used on all UK aggregate dredgers.

Government Permission

Also see: Dredging Permission - page 35

Government View

Acronym: GV

The non-statutory process by which the regulators of aggregate dredging activity previously determined applications for permission to dredge.

The Government View procedure was introduced in the 1960's as the regulatory process whereby the environmental impacts and consequences of marine aggregate extraction were controlled. Before The Crown Estate would issue a production licence, operators were required to have a Government View permission. The process went through several changes, including the requirement for environmental impact assessment introduced in 1989, before being replaced by the Dredging Permission as introduced by the Dredging Permission as introduced by the statutory Marine Mineral Dredging regulations in 2007.

Grab Sample

A mass of sediment acquired from the seabed by deployment of suitable apparatus from a survey vessel.

Grab samples are acquired during surveys to describe and characterise the nature of the seabed. The sample is processed to provide date describing the constituent sediment particles and resident biological organisms. Repeated acquisition and analysis of grab samples from a location affected by dredging provides useful data describing the nature of dredging effects.

© Gardline Environmental

Grab Sampling

A survey method, used to acquire data describing the character of the seabed and its resident biological organisms, that employs a mechanical grab system.

Many different types of grab sampling apparatus are available for use during seabed surveys, however, during surveys related to marine aggregate licence monitoring two main types are employed; a Hamon grab and a clamshell grab.

Grain Size

Of or relating to the size of individual particles in a sedimentary assemblage.

Gravel

Sediment with a particle diameter between 2-64mm on the Wentworth Scale.

In the construction industry "gravel" is any particle >4mm in size, as stipulated by European Standards.

Ground-truth

The process of acquiring a sample of the seabed to inform the results of a geophysical survey.

Much of the survey work carried out to characterise the seabed is done remotely i.e. the survey employs sensors that measure seabed characteristics from the surface. To help inform the results of remote survey techniques a process of ground-truthing is undertaken. Ground-truthing involves acquiring a physical seabed sample by means of a grab or core and can also be achieved by acquiring a photographic image of the seabed. Sample sites are chosen within the boundaries of the remote survey area in order to determine what the seabed is made of so the results of the remote survey can be interpreted correctly. A combination of remote data acquisition and ground-truthing provides the most flexible and cost-effective way of describing seabed physical properties, habitats and faunal communities.

Hamon Grab

Seabed sediment sampling apparatus used to acquire small, undisturbed volume samples capable of being analysed to describe both the nature of seabed sediment particles and the organisms that live within and attached to the surface of the seabed.

Historic Wreck

A wreck that has special significance and that as a result may have a specific designation or protection status.

Holocene

Epoch that covers the last 10,000 years of Earth's history following the end of the last glaciation.

Hopper

The void within a dredgers hold into which aggregate is loaded during dredging.

G > I

Humber Aggregate Dredging Association

Acronym: HADA

The Association of marine aggregate extraction companies with interests in the Humber Region.

For more information:
http://www.marineaggregate.info

Immobile

Relating to seabed sediment that is unable to be moved by the prevailing tidal or wave driven currents.

Inboard Dredge Pump

Also see: Dredge Pump - page 32

In-combination Impact

Additive impacts resulting from marine aggregate dredging and other marine activities such as fishing, shipping etc.

If dredging is undertaken at a site in close proximity to areas where other marine activities are taking place, impacts may develop that result from the combined effects of the different activities. Such impacts are described as in-combination. An example of in-combination effects is when dredging and trawling are carried out in the same area as both activities may result in impacts on seabed faunal communities.

Indirect Impact

An impact extending beyond the boundaries of a direct impact zone within a licence area, resulting from both the initial settlement and subsequent transport of fine sediment generated by dredging.

Impacts from dredging occur in two main ways; impacts from passage of the draghead over the seabed and impacts resulting from settlement and deposition of sediment rejected from the dredger during dredging. Impacts that extend beyond the boundary of the direct impact zone within a licence area i.e. sediment deposition, are described as indirect/secondary impacts. Such impacts are the result of deposition of sand and silt/clay on the seabed and can temporarily affect seabed habitats and animal communities. The secondary impact footprint is generally more extensive than the footprint associated with direct impacts.

Indirect Impact Zone

Acronym: IIZ

The zone, within and extending beyond the boundaries of a direct impact zone within a licence area, within which impacts resulting from the settlement of fine sediment generated by dredging occur.

Impacts from dredging occur in two main ways; impacts from passage of the draghead over the seabed and impacts resulting from settlement and deposition of sediment rejected from the dredger during dredging. Indirect/secondary impacts result from settlement and deposition of fine sediment within and extending beyond the boundaries of a direct impact zone within a licence area. This process occurs due to the tidal current conditions at a site that transport suspended sediment away from the point of production. The indirect/secondary impact zone is usually described by a boundary called the tidal excursion which is calculated by plotting tidal current data to identify the maximum potential distance that suspended sediment may be transported by flood and ebb tide currents.

International Safety Management Code

Acronym: ISM

An international regulatory control developed by the International Maritime Organisation (IMO) designed to provide a global standard for the safe management and operation of ships and for pollution prevention.

For more information:
http://www.imo.org/humanelement/mainframe.asp?topic_id=287

Joint Venture

A commercial arrangement whereby several companies jointly fund and control a separate business entity (company).

Joint Venture (JV) arrangements are common in the UK aggregate sector, as a means for companies to share investment risk and to provide complimentary skill sets. Marine aggregate resources require significant investment to obtain the necessary dredging permissions while investing in a new dredger requires significant funding (a.£30m) and a long term business plan (20 years plus). For this reason, JV arrangements have been a common undertaking in the UK marine aggregate sector.

Landowner

Also see: The Crown Estate - page 89

For more information:
http://www.thecrownestate.co.uk/marine_aggregates

Last Glacial Maximum

The period of time approximately 18,000 years before present, prior to the onset of the Holocene period, when ice-sheet coverage of the northern hemisphere was at its greatest.

Sea level fell to over 100 m below present level at this time, exposing much of the English Channel and southern North Sea as land, connecting Britain to the rest of Europe.

Licence

Also see: Exclusive Option - page 41
Tender Round - page 87
Prospecting - page 66
Application Area - page 8
Production Licence - page 66

The legal commercial agreement whereby the landowner provides permission to a dredging company to extract aggregate from a prescribed area of seabed.

Magnetometer

Survey apparatus capable of detecting minute changes in the Earth's magnetic field caused by the presence of ferrous objects.

Magnetometers are towed behind survey vessels to detect the presence of ferrous metal debris on the seabed. The magnetometer constantly records the strength of the Earth's magnetic field and the changes to the field induced by the presence of ferrous metal objects. Large objects will induce a proportionally larger change that small objects.

Marine Aggregate Regional Environmental Assessment

Acronym: MAREA

Also see: Regional Environmental Assessment - page 70

For more information:
http://www.marineaggregate.info

Marine Aggregate

Sand and gravel extracted from the seabed for use in construction or beach nourishment projects.

Microplot

Computer-based navigation and dredging management system on board a dredger.

Microplot provides detailed visual information to the ships crew regarding vessel position, licence area boundaries, active zones and dredging exclusion zones. The system allows the dredge track to be recorded, assisting licence management.

Mineral Products Association

The trade association for the aggregates, asphalt, cement, concrete, lime, mortar and silica sand industries in the UK.

The Mineral Products Association was formally known as the Quarry Products Association.

For more information:
http://www.mineralproducts.org/

Mobile Sediment

Sediment particles on the seabed that can be mobilised and transported under the prevailing hydrodynamic conditions i.e. tidal and wave driven currents.

Sediment mobility is controlled by the size of the sediment particles and the strength of the hydrodynamic conditions that prevail in an area. In simple terms, larger sediment particles are less mobile than smaller particles and strong tidal/wave currents will be capable of moving larger sediment particles than weak currents. Around the UK, the strength of the prevailing tidal and wave energy varies and as a result the nature of the seabed will alter. The interplay of sediment mobility factors results in 'sorting' of mobile sediment so that gravel/shingle is concentrated in high energy environments (high energy beaches, exposed coastlines), sand particles are concentrated in intermediate energy environments (sheltered beaches/coast, offshore sand bars, banks and waves) and clay/silt in the lowest energy environments (estuaries, deep ocean).

Monitoring

The process by which the actual impacts of dredging are investigated and assessed through acquisition of empirical data from within and surrounding a licence area, by means of a variety of survey techniques and methodologies.

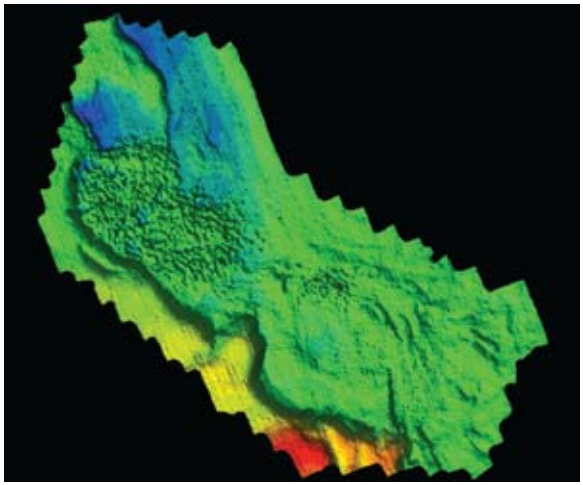
Monitoring refers to survey work that is undertaken to describe changes in environmental conditions due to a defined activity. In the case of dredging, monitoring is concentrated on detecting how seabed sediment composition changes and also how animal communities are affected. For monitoring to be effective and valid, three principle stages must be carried out;

1. Pre-dredge monitoring to describe the seabed before dredging takes place,
2. Monitoring during dredging to describe the development and nature of impacts that result from dredging and,
3. Post-dredge monitoring to determine how the seabed recovers after dredging.

Monitoring programmes will normally be designed to validate impact predictions made during the environmental impact assessment process. Where monitored impacts are significantly greater than those predicted, dredging permissions and associated conditions can be varied, or even withdrawn. Conversely, where impacts are considerably less, monitoring requirements or management controls may be reduced.

Multibeam

Also see: Bathymetry - page 14



A method of bathymetric survey whereby multiple sonar signals are used to measure water depth at multiple points across a swathe of seabed.

A multibeam sonar system emits numerous acoustic 'beams' that radiate from a point at the sea surface. The beams arrive at the seabed across a wide path called a swath. As the survey vessel advances along its survey line the individual swath data are accumulated to form a corridor of bathymetric data.

Munitions

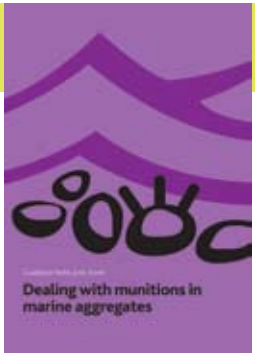
Military material including weaponry and ammunition.

Munitions may be found on the seabed around the UK as a result of warfare, training and deliberate disposal. Official disposal sites are well documented, however, random items may be dredged and identified onboard dredgers or delivered to wharfs where they pose a significant safety risk and have to be dealt with by properly trained Explosive Ordnance Disposal personnel. A Guidance Note for managing and responding to munitions incidents, developed jointly with the Health and Safety Executive, the Association of Chief Police Officers and Joint Services EOD is in place to prevent damage to facilities and injury/death to dredger crew, wharf staff and the general public.

Munitions Guidance Note

Also see: Munitions - page 57

For more information: www.thecrownestate.co.uk/aggregates_munitions



Near-field

Dredging impacts or related processes that influence the environment at distances typically <500m from the dredging location.

Impacts related to dredging are broadly divided into two types; near field and far field. Near field impacts are those that occur at distances typically <500m from the dredge site and are principally the result of passage of the draghead, and the settlement, deposition, resuspension and transport of fine that is rejected from the dredger and that flows rapidly to the seabed as part of a density plume.

Non-Crown

Areas not within the ownership of The Crown Estate.

Within the marine environment, Non Crown relates to areas of foreshore and seabed which are outside of The Crown Estate's ownership. This includes areas owned by the Duchies of Cornwall or Lancaster, or Harbour Authorities such as the Port of London Authority.

Non-exclusive Sampling

Permission given by The Crown Estate to undertake exploration, prior to tendering. This is carried out at the companies own risk.

Initial exploration of potential areas prior to a tender exercise undertaken on a non exclusive basis. The information obtained informs subsequent tender bids.

Non-mobile Sediment

Also see: Immobile - page 49

Sediment particles on the seabed that are unable to be mobilised and transported under the prevailing hydrodynamic conditions i.e. tidal and wave currents.

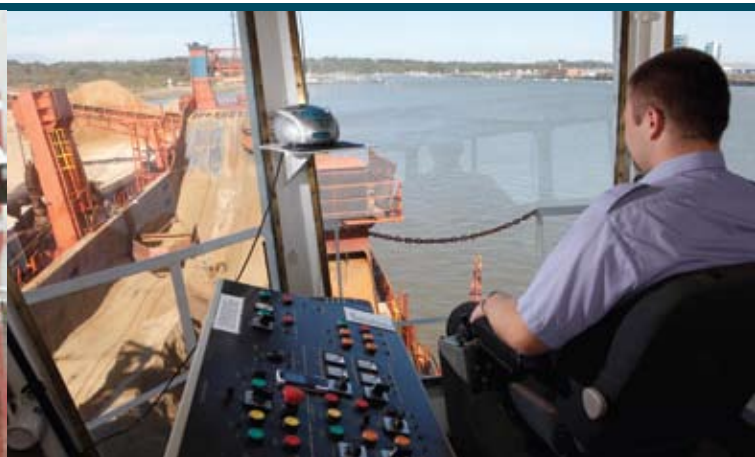
Non-mobile sediment is that which cannot be moved by the prevailing hydrodynamic conditions. The factors that control sediment immobility include particle size, sediment compaction, tide/wave current strength and the cohesiveness of the sediment particles. In simple terms, very large sediment particles (boulders/cobbles) will be immobile under all but the strongest hydrodynamic conditions as inertia prevents movement. Very compact sediment may also be immobile as currents cannot dislodge particles from the deposit. Where hydrodynamic forces are weak, even small sediment particles may be immobile for example in salt marshes where clay/silt is deposited.

Offshore Managing Agent

The Crown Estate's Offshore Managing Agent is a dedicated team of specialists from Royal Haskoning who provide technical advice and commercial management of the licences issued by The Crown Estate for marine aggregate extraction.

Offtake

The volume/tonnage of aggregate resource removed from a licence area or region over a given period of time.



Option Agreement

Also see: Prospecting - page 66
Tender Round - page 87

A limited duration licence issued by The Crown Estate for the rights to develop an aggregate licence within an accepted tender area.

Following acceptance of a tender area, The Crown Estate, alongside the issuing of a prospecting licence, will also issue an Option Agreement. The Crown Estate Option Agreement provides exclusive rights to develop a production licence, following the successful completion of the application process under the relevant environmental consent process. The Option Agreement is for an initial period of 5 years from the date of the tender, and can be extended for a further 5 years if the application process has been unduly delayed and progress is still expected.

Ordnance

Also see: Munitions - page 57

Military material including weaponry and ammunition.

OSGB36

Also see: Datum - page 27

OSGB36 is a geodetic datum, used to describe the shape of the Earth's surface, onto which a geographic position can be plotted.

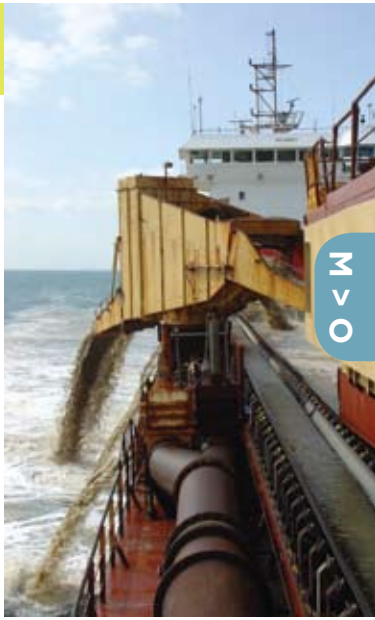
Over Size

Discrete particles within aggregate cargos that are too large for use as aggregate without processing (crushing) at the wharf, typically greater than 63mm in size.

Overboard Dredge Pump

Also see: Dredge Pump - page 32

Overflow Spillway



An opening at the top of a dredger's hopper that allows excess water and associated suspended sediment to flow back into the sea during cargo loading, thus maintaining vessel stability.

It is normal procedure before sailing for a dredger to flood its cargo hold with seawater in order to ballast the vessel and maintain its stability. During dredging operations a mixture of sediment and water is pumped into the ship's hold and as the hold fills with sediment the excess water overflows through openings called spillways. This continues until the hold is full of sediment.

Overspill, Overflow

The discharge of water and associated suspended sediment that occurs through spillways at the top of a dredgers hold.

Overspill of sediment through spillways results in a plume on the sea surface and in the water column.

Palaeochannel

A channel feature formed by an ancient river system.

Palaeochannel Deposit

Sand and gravel deposited in an ancient river channel feature that has since changed course or been flooded and submerged by sea-level rise and land subsidence.

For more information:
http://www.wessexarch.co.uk/projects/marine/alsf/seabed_prehistory/eastenglishchannel.html

Peat

Also see: Contamination - page 24

Organic rich sediment formed mainly of slightly decomposed or undecomposed plant matter that originally accumulated in a waterlogged environment.

Peat can occur in association with muddy sediments within submerged infilled palaeovalleys. Peat can be used to determine various palaeo-environmental characteristics, such as age (through carbon content) and associated plant life (through analysis of pollen). Peat and lignite (highly compressed organic sediment) are contaminants in construction aggregates on account of their weak structural qualities and chemical instability. Peat deposits will therefore be avoided during marine aggregate dredging with such deposits also representing potential archaeological interest.

Permission

Also see: Dredging Permission - page 35

The environmental consent that prescribes the location and nature of dredging permitted in a dredging licence area.

Permitted Tonnage

Tonnage that may be extracted from an area within a year, as defined by the licence and/or Government Permission.

Permitted tonnage is the annual take allowed from the licence area as defined within the Government Permission and/or The Crown Estate licence. The tonnage is subject to permissions and available reserve. In certain circumstances, up to twice this tonnage may be extracted within a single year where rollover tonnage may also be taken.

Plume – Passive/ Active

Also see: Density Plume - page 28

A feature formed during dredging from the suspended sediment in the water column discharged from spillways and screening towers.

While dredging, water and suspended sediment is released from spillways and screening towers. This water and sediment forms a feature around the dredger called a plume. The plume is defined as an area where suspended sediment from dredger discharge is noticeably higher than the naturally occurring suspended sediment concentrations at the site. The plume has two main components; an active phase and a passive phase. The active phase of a plume is that which occurs close to the dredger where high sediment concentrations result in rapid flows of discharged water/sediment to the seabed. Further away from the dredger, the passive phase of the plume is characterised by finer suspended sediment spread over a larger area, the concentration of which gradually reduces with mixing and dispersal into the surrounding seawater.

Port

Relating to the left hand side of a ship when facing the bow.

Post-dredge

Of or relating to activities carried out at a site following cessation of dredging.

Post dredge activities occur once dredging has ceased at a site. Typically, the operator will be required to undertake some form of post dredge monitoring work to describe the effects of dredging and also to determine the recovery of the seabed over time.

Pre-dredge

Of or relating to activities carried out at a site prior to dredging commencing.

Pre-dredge activities occur before dredging has begun at a site. Typically, an operator is required to complete a number of baseline surveys to describe the condition of the seabed and the nature of seabed habitats and species that inhabit the area and its surrounding environment. The results of these surveys will be used throughout the lifetime of the licence to provide valuable context data when describing the impacts that result from dredging.

Primary Aggregate

Minerals of a suitable quality, extracted from the earth for the specific purpose of use as aggregate.

Primary aggregate describes mineral resources extracted from quarries or marine aggregate licences for the specific purpose of use in construction, engineering or coastal management projects. The word primary relates to the fact that these resources are virgin and have not previously been used for any other purpose.

For more information:
http://www.aggregain.org.uk/terminology/primary.html

Primary Impact

Also see: Direct Impact - page 29

Primary Impact Zone

Also see: Direct Impact Zone - page 29

P > R

Primary Reserve

Also see: Reserve Statement - page 73

The total permitted tonnage of proven aggregate reserve able to produce a 50:50 sand:gravel cargo following screening (if required).

For more information:
http://www.thecrownestate.co.uk/dredge_areas_statistics

Production Licence

A licence to dredge a defined area that has been exclusively granted by the landowner to an operator from which marine aggregate is being produced.

A Production Licence area will only be released by The Crown Estate if the operator is also in possession of a dredging permission issued by the regulator.

Prospecting

The act of investigating, through survey techniques, for commercially viable aggregate resources within a defined area of seabed.

Prospecting is undertaken by aggregate companies to search for new deposits of commercially viable sand and gravel. Exclusive prospecting licences will be awarded by the land owner following a commercial tender process which typically will apply to a large area (150km^2). Over time, this area will be refined as understanding of the location and quality of resources improves. Once the prospecting phase is complete, and operator may apply to the landowner to seek a production licence for a prospecting area, subject to obtaining the necessary dredging permissions, at which point it will become an application. A range of survey techniques are employed during prospecting to locate, define and describe potential resource deposits. Sidescan sonar and bathymetric surveys are used to describe the water depths and character of the seabed surface, whilst seismic and vibrocore surveys are undertaken to chart the geometry, thickness and quality of marine aggregate deposits.

Prospecting Licence

Also see: Prospecting - page 66

A limited duration licence issued by The Crown Estate for exploration (prospecting) of the seabed within an accepted tender area.

Following acceptance of a tender bid, The Crown Estate issues a licence to explore/prospect the seabed for a limited period of time to gain more information concerning the resource within the area. The licence lasts for a period of 12 or 18 months, and is issued commencing 1 April in the year following the tender. After completion of the prospecting a decision whether or not to proceed to application is made.

Pump Out

A method to unload a vessel whereby water is added to the sand and gravel cargo in order to fluidise it and allow it to be pumped out using the dredge pump.

Pump out discharge allows large volumes of cargo to be unloaded very quickly, and is most commonly used for delivery to contract fill and beach nourishment projects. As the sand and gravel has been fluidised, it is able to be pumped over several kilometres through temporary pipelines.

Quaternary

Of or belonging to the geologic time, system of rocks, or sedimentary deposits of the second period of the Cenozoic Era, from the end of the Tertiary Period through the present, characterized by the appearance and development of humans and including the Pleistocene and Holocene epochs.

The Quaternary covers approximately the last 2 million years of Earth history. The Period is characterised by alternating glacial and interglacial stages and associated large-scale global climate and sea level changes.

For more information:
http://qra.org.uk/about/quaternary

Rainbowing

A method of direct discharge often used during beach nourishment schemes.

Material sprayed directly onto a beach, as part of the process of beach nourishment.

Recovery

The process by which species and faunal communities affected by dredging re-inhabit and re-develop following cessation of aggregate extraction activities.

Recovery of seabed animal communities begins when dredging ceases. The rate of recovery varies depending on the communities that existed before dredging began, the intensity of dredging undertaken and the nature of the surrounding seabed from where re-colonising animals will come from. Rates of recovery vary from 1-2 years in dynamic habitats with low levels of diversity (sand habitats) and up to 10 years in more stable habitats where the pre-dredge communities are more diverse (gravel habitats).

Recycled Aggregate

Construction materials that have previously been used for a specific purpose, and which has subsequently been reclaimed and reprocessed for re-use as aggregate.

Demolition of old buildings and resurfacing of roads produces large volumes of construction waste. In the past this waste was sent to landfill but increasingly it is being reprocessed and recycled to provide aggregates. They are used either on their own or combined with primary aggregates for a variety of end uses. Use of recycled and secondary aggregate reduces the need for primary aggregates, and Government policy is to maximise the use of such products. Currently (2009), around 25 per cent of all construction aggregate needs are met from recycled and secondary sources - representing around 70 million tonnes per annum.

For more information:
http://www.aggregain.org.uk/terminology/recycled_and.html

Regional Environmental Assessment

Acronym: REA

Also see: Marine Aggregate Regional Environmental Assessment - page 53

A process by which the potential cumulative and in-combination effects of regional marine aggregate extraction proposals are investigated.

Regional Environmental Assessment (REA) is a marine aggregate industry initiative whereby the potential cumulative and in-combination effects of multiple dredging licences within a region are considered at a regional scale. By pursuing the REA process, the industry can provide a more consistent and robust assessment of the potential impacts of marine aggregate over a large area which in turn provides important context data for assessing the significance of impacts on a licence specific scale. REA falls outside of the formal consent process, however the resulting outputs feed into the licence specific applications and their associated environmental impact assessments.

For more information:
http://www.marineaggregate.info

Regional Environmental Characterisation

Acronym: REC

A survey undertaken to broadly describe the nature of seabed habitats and associated species that exist within a region.

Using funding from the ALSF, REC surveys have been completed for 5 marine aggregate regions; the East Channel, South Coast, Thames, East Coast and Humber. The surveys employ a variety of survey methods to obtain coarse resolution data that provide a wide region view of the environment. The results of the REC surveys provide important context data that inform consideration of the significance of marine aggregate extraction and direct dredging management decisions.

For more information:
http://www.alsf-mepf.org.uk

Rejects

Sediment particles of unsuitable size (normally too large) for sale to the construction market.

P > R

Through access to reject material at wharfs that it may be possible to identify material of archaeological interest. For example, worked flint tools or other material associated with wrecked vessels (e.g. ships or aircraft), fossils or animal bones.

Relict Sediment

Sediment deposited by processes, and under physical conditions, that no longer exist. Also known informally as fossil sediment.

Relict describes a sediment deposit that was formed in geological history under conditions and by processes that no longer exist at that locality. An example of this is sediment deposited by a glacier (till). Large of areas of relict till exist off the coast of the Humber Estuary. The glaciers have long since melted and the till now forms part of the seabed sediment. Another example is the river gravel targeted for extraction by the marine aggregate industry. These sediments were deposited by large fast flowing rivers when sea-level was much lower than today. Following ice retreat and sea-level rise, this river deposited gravel is now located beneath the sea, subjected to natural processes unrelated to those that formed the deposit.

Reserve

The volume of accurately measured primary aggregate suitable for construction use that exists within a licence area and is permitted to be extracted.

For more information:
http://www.thecrownestate.co.uk/dredge_areas_statistics

Reserve Statement

Also see: Primary Reserve - page 66
Secondary Resource - page 80
The Crown Estate - page 89
British Marine Aggregate Producers Association - page 18

A Crown Estate and BMAPA report produced by collation of individual company data describing the total available aggregate reserves and resources.

Marine aggregate operators, in conjunction with The Crown Estate, have developed criteria for reporting marine reserves of construction aggregate based upon a global reporting code for mineral exploration, resources, and materials developed by The Institute of Materials, Minerals and Mining (IOM3). This code has been extensively adopted by the minerals industry as best practice. Operating companies submit reserve data to The Crown Estate which differentiates between primary reserves and primary/secondary resources on a licence-by-licence basis. This allows more accurate and relevant data on the available proven primary reserve to be reported – a true reflection of the volume of marine aggregate currently available for construction purposes.

For more information:
www.thecrownestate.co.uk/dredge_areas_statistics

Resource

An estimate of the volume of aggregate that exists within an area based on specific geological knowledge.

For more information:
www.thecrownestate.co.uk/dredge_areas_statistics

Resource Assessment

The process by which the location, volume and quality of marine aggregate resources in a specific deposit are determined.

A resource assessment survey utilised two main methods to acquire the data necessary to describe the resource deposit. The first method is a seismic survey which describes the structure of the sub-seabed sediment and provides and indication of the type and extent of resource sediment in the survey area. The second method uses seabed sampling methods, usually a vibrocorer, to acquire samples of the sub-seabed sediment. By combing the results of the two methods a resource map can be created that describes the quality and depth of sediment available for extraction. Resource assessments are undertaken prior to licensing, to ensure extraction plans are properly focused, and periodically repeated through the life of a licence to monitor the volume of resource remaining.

Resource Management

The process by which extraction is managed by dredging operators to ensure that the longevity and sustainability of the mineral deposit is maximised, while at the same time minimising potential environmental impacts.

Resource management is the responsibility of the marine aggregate dredging company that operates a licence. Bearing in mind the time and expense required to apply for a licence to extract marine aggregate, it is in the best interests of the dredging company to optimise the extraction process in order to maximise the longevity of the resources whilst ensuring that the environmental sensitivities of the area are properly accounted for. Properly considered extraction ensures that the best use of available resources is achieved with the minimum environmental impact.

Resource Management Association

Acronym: RMA

An Association of dredging companies (Hanson Aggregates Marine Ltd, CEMEX UK Marine Ltd and United Marine Dredging Ltd) that operates joint licences around the coast of England and Wales.

Roll-over Tonnage

Un-dredged permitted tonnage allocation that may be dredged in subsequent years.

In some circumstances the total permitted tonnage may not be extracted from a licence area within a 12 month period. This may be due to operational difficulties or lack of market demand. Where annual extraction tonnages are below the permitted annual tonnage, rollover tonnage may be accrued – subject to the terms of the dredging permission and licence conditions. Subject to availability of potential rollover tonnage and permission from both regulator and mineral owner, this accrued tonnage may be used within a single year up to a maximum of twice the annual permitted tonnage.

Royalty

Per tonne payment made by a marine aggregate licensee to The Crown Estate for removal of aggregate from the seabed.

Each dredging licence is managed under the terms of a commercial contract between the Licensee and The Crown Estate. The commercial agreement, initially defined through a competitive tender process, specifies a royalty rate that must be paid by the licensee for every tonne of aggregate produced from the licence in question. Royalty rates vary between licences and are commercially confidential. Royalties from marine aggregate extraction contribute around 40 per cent of the turnover of the Marine Estate of The Crown Estate (£17m in 2008/09)

Sand

Sediment with a particle diameter between 0.063-2mm on the Wentworth Scale.

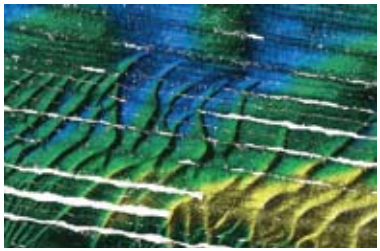
In the construction industry "sand" is any particle <4 mm and >0.063mm in size, as stipulated by European Standards.

Sandbank

Sandbanks and linear sand ridges are defined as all elongate coastal to shelf sand bodies that form bathymetric highs on the seafloor and are characterised by a closed bathymetric contour (Encyclopaedia of Coastal Science, 2005).

Sandbanks develop when mobile sand on the seabed is concentrated by tidal and wave forces in a large, distinct, morphological feature. Sandbanks are generally orientated parallel to the tidal streams and the surficial sand may circulate around the bank as sand waves whilst the bank itself remains in-situ. Sandbanks exist in a number of different locations around the UK coastline and may be isolated on open seabed or associated with coastal headlands.

Sand Wave



A seabed sediment dune formed by the action of wave and tidal currents on sand.

Sand waves are orientated perpendicular to the prevailing tidal currents and the wavelength or spacing of crests is 30 - 500 m and height is 3 - 15 m. Their morphology is identical to the smaller-scale ripple and mega-ripple bed forms. Whilst the sand that forms the waves is mobile, the waves themselves may be mobile or stationary depending on the balance of tidal and wave forces that prevail. Sand waves may exist in isolation or as groups of waves known as sand wave fields.

Scoping

A stage of the dredging licence application process whereby the scope of the EIA is determined.

Screening Box

Onboard processing equipment centrally located over the hold of a dredger where the proportion of sand and gravel to be retained in the hopper may be modified.

A static screening box represents the simplest form of onboard processing equipment. A series of mesh screens are mounted in a sloping bed, and the dredged water and sediment mix passes over the top before entering the cargo hold. The screens can be of various sizes, depending on the nature of the in-situ resource being dredged and the quality of cargo to be retained. A proportion of the water and finer sediment falls through the screens and is returned to sea, while the coarser sediment is retained. This process can also be reversed, to allow only sand to be loaded, or the screens can be completely blanked by rubber mats to allow the vessel to load all-in.

Screening Tower

Onboard processing equipment, comprising rotating towers located on the side of the hold where the proportion of sand and gravel to be retained may be modified.

Screening towers are more complex variations of the static screening box and are rotating structures on the side of the vessels hold within which the screening beds are located. They are more efficient at processing the dredged sediment/water mix as they have a greater screen bed area and adjustable slope angles, however their size means they are installed on larger vessels (>4500t capacity). Screening towers have two outflows - one that returns the unwanted water/sediment mix overboard and the other that directs the required sediment/water mix into the cargo hold. Screening towers can be rotated during dredging to ensure that sediment is loaded evenly.

S v U

Screening, Screened

A means to process the water/sediment mixture while loading marine sand and gravel in order to influence the sand and gravel mix retained in the hold.

Most aggregate dredgers can process dredged sediment while loading operations are underway through a process termed screening. This is particularly useful where the 'in-situ' composition of the seabed sediments falls outside that required for construction or beach replenishment. When screening, the sediment/water mix is passed over a steel mesh or plastic mat screen before entering the cargo hold. A proportion of the water and finer sediment falls through the screens and is returned to sea, while the coarser sediment is retained. This process can also be reversed, to allow only sand to be loaded. Two main techniques are generally employed - either a centrally located box screen system, or a more complex and efficient series of screening towers.

Seasonal Ban, Seasonal Exclusion

A condition placed on a dredging permission, in response to a specific sensitivity, that restricts dredging operations at specific times during the year.

Secondary Aggregate

Material generated as a by-product of another production process which may be utilised for lower specific end uses such as fill or road sub-base.

Secondary aggregate is produced as a by-product of an industrial process or production of primary aggregate that historically would have been considered waste. With the advent of more sustainable resource management practices, secondary aggregate is now used in low specification end uses such as road sub-base, fill and landscaping. Use of recycled and secondary aggregate reduces the need for primary aggregates, and Government policy is to maximise the use of such projects. Currently, around 25 per cent of all construction aggregate needs are met from recycled and secondary sources - representing around 70 million tonnes per annum.

S v U

For more information: http://www.aggregain.org.uk/terminology/recycled_and.html

Secondary Impact

Also see: Indirect Impact - page 50

Secondary Impact Zone

Acronym: SIZ

Also see: Indirect Impact Zone - page 51

Secondary Resource

Also see: Reserve Statement - page 73

Sandy gravel or sand not suitable for use in construction but which may be suitable for use for fill or beach recharge.

For more information:
http://www.thecrownestate.co.uk/dredge_areas_statistics

Sediment Transport

The process, driven by hydrodynamic forces (waves and tides), that mobilises and transports sediment particles.

Generally speaking, sediment transport occurs in two phases. During the first phase, sediment particles are mobilised and during the second phase the particles are moved from the location from which they mobilised. With the exception of processes in shallow water (e.g. beaches) wave currents are generally responsible for mobilising sediment particles, whilst tidal currents are capable of mobilising and transporting sediment. The sediment transport processes at a location result from a combination of wave and tidal forces and vary greatly from location to location.

Sediment Transport Pathway

The route along which sediment transport occurs.

The orientation of a sediment transport pathway is dictated by the wave and tidal currents that prevail at a location. A combination of hydrodynamic forces may result in sediment being driven in a particular direction at a rate directly related to the strength of those forces.

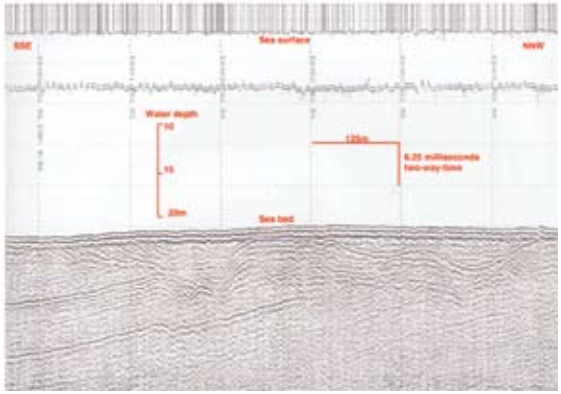
Self Discharge

The ability of a dredger to unload a cargo without the need for shore based unloading equipment.

Marine aggregate dredgers are equipped with dedicated machinery that enables then to unload independently of shore based equipment. Methods vary from vessel to vessel, but approaches include bucket wheel, scraper buckets and grab discharge systems. The efficiency of self discharge systems is important to ensure that the cargo can be removed from the hold in the shortest possible time, allowing the vessel to return to sea as soon as possible on the tide.

Shallow Seismic

Of or related to a survey method that uses regular pulses of sound to acquire information regarding the geological structure of the upper 50m of the seabed.



Seismic surveys are employed to acquire information about the sub-surface layers of the seabed. It is a remote survey technique utilising apparatus that transmits seismic energy (essentially a pressure wave) towards the seabed from the sea surface. The seismic energy penetrates the seabed and is reflected from different layers within the sediment. Changes in the physical properties between different layers of sediment can be distinguished by the amount of energy reflected at the layer boundaries. Depending on the apparatus used, shallow seismic surveys can penetrate up to 50m into the seabed and obtain a resolution of approximately 25cm.

Shell Content

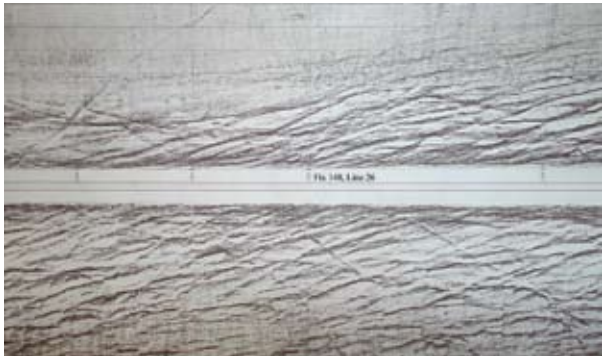
Also see: Contamination - page 24

The proportion, usually measured as a percentage, of shell material contained within marine aggregate resources.

Shell content is an important issue when considering the quality of marine aggregate resources as it can have a bearing on the potential end-use of those resources. High shell content may result in quality issues for the products that aggregates are used to manufacture (e.g. concrete).

Side Scan Sonar

Survey equipment that uses acoustic energy to generate information regarding the texture and characteristics of the seabed surface.



Using side scan sonar, it is possible to determine the texture, composition and features present on the seabed surface. Sound waves are projected towards the seabed and the reflected signals are processed and recorded. For example smooth soft sediment, like mud or sand, reflects less acoustic energy than rough rock or gravel and as a result the survey data can be used to distinguish between such deposits. Side scan sonar is a valuable tool when applied to monitoring of dredging activities as it can detect physical changes to the seabed caused by the passage of the draghead and fine sediment deposited as a result of dredging. It is also useful for detecting wrecks or debris.

Silt

Also see: Contamination - page 24

Fine sediment with a particle diameter between 0.002-0.063mm on the Wentworth Scale.

Marine aggregate deposits typically contain only small proportions of silt. If present in significant quantities, silt can contaminate marine aggregate cargoes.

Single Beam

Also see: Bathymetry - page 14

A method of bathymetric survey whereby a single acoustic beam measures water depth at a point on the seabed.

Single beam bathymetric data is acquired by a transducer that emits a regular pulse of acoustic energy to the seabed. The time taken for the sound to be transmitted to the seabed and reflected back to the receiver on the survey vessel is used to calculate precisely the water depth at a single point. This measurement is called a sounding. The survey vessel proceeds along a survey line repeatedly acquiring soundings data to provide bathymetric information.

South Coast Dredging Association

Acronym: SCoDA

The Association of marine aggregate extraction companies with interests in the South Coast Region.

For more information:
http://www.marineaggregate.info

Spillways

Also see: Overflow Spillway - page 61

Starboard

Relating to the right hand side of a ship when facing the bow.

Static Dredging

Also see: Anchor Dredging - page 7

Statutory Advisors

An organisation that has a statutory responsibility for providing advice to the Regulator on specific technical, environmental or legal issues.

Statutory Advisors provide advice to the Regulator when issues regarding the licensing and impact assessment of dredging are considered. In England and Wales, Statutory Advisors include, but are not limited to, Natural England, the Joint Nature Conservation Committee, the Environment Agency, English Heritage, the Countryside Council for Wales and the Maritime and Coastguard Agency.

Sub-bottom Profiling

Also see: Shallow Seismic - page 82

Submerged Dredge Pump

Also see: Dredge Pump - page 32

Submerged Landscape, Submerged Landsurface

Also see: Terrace Deposit - page 88

Part of seabed that was previously exposed during periods of lower sea-level.

An attractive living space until the most recent marine transgression (c.5,500) due to proximity of abundant natural resources.

Suction Pipe

Also see: Dredge Pipe - page 32

Swath

Also see: Bathymetry - page 14
Multibeam - page 56

Swell Compensator

Hydraulic equipment onboard a dredger that is used to compensate for the vertical motion of the vessel while dredging, ensuring that the draghead remains on the seabed.

The swell compensator is an essential piece of equipment that allows vessels to safely dredge even though the vessel may be pitching and rolling in waves and swell. A hydraulic ram damps out the relative motion of the vessel, automatically adjusting the angle of the dredge pipe to ensure that the draghead remains of the seabed. The swell compensator can adjust for around 2 metres of relative motion. Without the damping action of the compensator, or indeed in conditions beyond its limits, there is a significant risk of the dredging equipment becoming damaged, and even lost. As the swell compensator only activates once the draghead is on the seabed, it can be used as an EMS sensor to indicate whether dredging is taking place or not.

Tender Round

Also see: Tenders - page 87

The commercial process by which The Crown Estate invites marine aggregate companies to apply for the exclusive rights to prospect for and apply for a production licence to extract marine aggregate resources.

Tenders

The commercial process by which The Crown Estate invites marine aggregate companies to apply for the exclusive rights to prospect for and apply for a production licence to extract marine aggregate resources.

The Crown Estate tender exercise is run on a demand-led basis. The default frequency is an annual tender on a national basis, however subject to requirements the exercise may not occur annually and be limited to specific regions based upon need. Following an expression of interest and confirmation of a tender exercise, digital tender packs are provided and tender bids are submitted for potential new aggregate areas for assessment and decision by The Crown Estate.

Term Licence

Production licence issued by The Crown Estate in the late 1980's with a fixed term - in most cases 10 or 25 years.

Term Licence areas still require a Government View or Permission for extraction to occur. However, the duration of the licence term is the controlling factor rather than the Permission. Term Licences are no longer issued – see Production Licences. All Term Licence areas will expire at the end of 2013 at the latest. For dredging to continue at these sites beyond this date, a new dredging permission must be obtained and a Production Licence granted.

Terrace Deposit

River sediment representing a fragment of a former valley floor isolated by subsequent downcutting by the river.

Submerged river terrace deposits are a source of marine aggregates especially where there is a long history of fluvial deposition, for example in the eastern English Channel. These features, whilst forming would have represented attractive locations for settlement by the prehistoric human population and as such are of interest when considering marine archaeological heritage.

Thames Estuary Dredging Association

Acronym: TEDA

The Association of marine aggregate extraction companies with interests in the Outer Thames Estuary Region.

For more information:
http://www.marineaggregate.info

The Crown Estate

Acronym: TCE

The organisation responsible for management of assets owned by The Crown Estate including the seabed.

The Crown Estate is a landed estate including more than 120,000 hectares of agricultural land in England, Scotland and Wales, substantial blocks of commercial property and an extensive marine estate covering 55 per cent of the foreshore and virtually all of the seabed out to the 12 mile territorial Limit. The Crown Estate is part of the hereditary possessions of the Sovereign "in right of the Crown" managed under the provisions of The Crown Estate Act 1961 by The Crown Estate Commissioners. The Commissioners have a duty to maintain and enhance the value of the Estate while making a commercial return for the benefit of the taxpayer. The Crown Estate issues commercial licences to marine aggregate producers allowing them to extract resources from defined areas of the seabed, subject to Government granting permission.

For more information:
http://www.thecrownestate.co.uk/marine_aggregates

Track-plot

A visual representation of a dredger's position and status over time created by inputting EMS data to a GIS system.

Data acquired from a dredgers EMS system provide a record of the dredgers position and status at regular intervals. By inputting these data to a GIS system, a map of the location of the dredger can be created. Typically, such a map shows a track representing the course sailed by the dredger.

Trailer Dredging

A dredging technique whereby the vessel moves slowly forward, with the dredge pipe and draghead trailing behind.

During trailer dredging a vessel will move slowing across a dredging zone with its dredge gear deployed. As it does so, it removes, by suction, approximately 30-50cm of the uppermost layer of seabed sediment. This type of dredging is most commonly employed where resource deposits are shallow and/or extend over a large area. Trailer dredging results in shallow depressions in the seabed.

Trailing Suction Hopper Dredger

Acronym: TSHD

A dredger designed to remove sediment from the seabed through hydraulic suction whilst moving, and retain the dredged sediment onboard.

A TSHD is the standard type of dredger used by UK marine aggregate companies. This type of vessel operates by lowering dredge gear (draghead, dredge pipe) to the seabed and by using powerful suction pumps, it draws water and sediment into the ships cargo hold. Once in the hold the sediment settles, and the water and fine suspended sediment is returned to the sea. Normally, the vessel will operate whilst moving at slow speed but some vessels are also capable of anchoring and dredging whilst stationary. Capacity of UK marine aggregate TSHD vary from <2000 tonnes to >8000 tonnes and they are capable of operating in water depths of up to 50m.

Transgression

An advance of the sea to submerge land as occurred after the last glaciation to form the British Seas and isolate Britain as an island.

The melt of the ice sheets during the Quaternary led to sea level rises, or marine transgressions, over the continental shelf and the submergence of the low lying land surrounding the present British landmass. Much of the present day seabed off southern Britain is a submerged land surface.

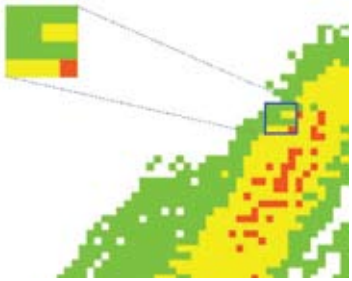
Turnaround

Also see: Cycle Time - page 26

The time taken for a dredger to discharge a cargo at a wharf.

Turnaround time is an important measure of efficiency for marine aggregate producers. As many wharves and ports are tidally restricted, time spent unloading at the wharf must be minimised, to ensure that cycle times (the length of time for a cargo to be dredged and landed) and vessel productivity remains cost effective.

Variable Grid Analysis



Variable Grid Analysis is a GIS method which allows dredging intensity data derived from EMS records to be displayed graphically.

Raw EMS data is used to measure the extent and intensity (minutes dredged) of dredging activity over a seabed area, using a spatial grid resolution of 50mx50m squares. Variable Grid Analysis data is used as the basis for the Annual Area of Seabed Dredged Reports published by The Crown Estate and BMAPA, as well as being used to support licence management and environmental monitoring.

Veneer

A thin layer of unconsolidated, occasionally mobile sediment, that lies on the surface of the seabed overlying bedrock.

Vibration Sensor

Equipment on board a dredger that measures the vibration associated with sediment and water passing through the dredge pipe.

Vibration sensors can be fitted to dredging vessels to provide input to the dredge management and electronic monitoring systems. Vibration sensors can differentiate between water alone and water and sediment passing through the dredge pipe. In this way these sensors can be used to determine whether a dredger's draghead is on the seabed and removing sediment, or raised from the seabed and only pumping water.

Vibrocore

Equipment designed to acquire a 10cm diameter core sample through the seabed for the purposes of determining the thickness of aggregate resource deposits.

Vibrocorers are deployed primarily during prospecting activities to determine the thickness of aggregate resources and to assist interpretation of seismic data. Core samples are acquired in conjunction with seismic survey data in order to describe the spatial extent and thickness of resources. Vibrocores up to 6m in length are possible where conditions allow. Following acquisition, the sediment in the core sample will be logged, photographed and subsampled to determine the exact nature of aggregate resources beneath the seabed surface.

WGS84

Also see: Datum - page 27

The World Geodetic System (WGS84) is a geodetic datum, used to describe the shape of the Earth's surface, onto which a geographic position can be plotted.

Wharf

A shore based facility where dredging vessels deliver cargos for processing and sale.

Wharfs are located around the coast of the UK mostly within urban centres. Their location means that marine aggregate can be delivered close to point of use at large construction projects without the need for significant road transport.

Wreck Exclusion Zone

Also see: Exclusion Zone - page 41
Archaeological Exclusion Zone - page 8

The Crown Estate
16 New Burlington Place
London
W1S 2HX

T 020 7851 5080
E enquiries@thecrownestate.co.uk
W www.thecrownestate.co.uk

British Marine Aggregate Producers Association
Gillingham House
38-44 Gillingham Street
London
SW1V 1HU

T 020 7963 8000
E bmapa@mineralproducts.org
W www.bmapa.org

ISBN: 978-1-906410-13-1

Printed on paper from well-managed forests and other controlled sources