East Channel
association

regional environmental assessment for aggregate extraction in the eastern English Channel

non-technical summary

January 2003

ROYAL HASKONING
POSFORD HASKONING

contents

Canary Wharf, London

Southampton Football Stadium

Beach replenishment

...all using marine aggregates

Background

The marine aggregate industry plays a vital role in satisfying the UK's need for sand and gravel. Having dredged most of its existing licensed areas for nearly 30 years, the industry is now facing a serious shortage of quality reserves. It believes the answer lies in the deeper waters of the eastern English Channel where extensive new resources have been identified.

Ten applications have been made to the Office of the Deputy Prime Minister (ODPM) for permission to extract aggregates in the eastern English Channel. Recognising the need for an environmental assessment covering the whole region rather than just individual licence application areas, the six operators involved have together commissioned a comprehensive Regional Environmental Assessment (REA). The project has involved input from a team of independent specialists covering a full range of marine science disciplines.

This document provides a non-technical summary of the REA together with background information about the industry and its need for new reserves, given in a statement overleaf written by the applicant companies.

For further details see REA pages iii to xiv.

1 Industry statement

1.1 Need

Marine aggregates are essential products for the development and maintenance of our communities and infrastructure. They are widely used in the construction industry to build our homes, hospitals, schools, offices, bridges, drains, roads and railways and are exported to the continent for the same purpose. They are also used in coastal defence as a source of beach replenishment, particularly in southern and eastern England.

Marine aggregates from UK licensed areas contribute about 7% of construction aggregate needs in the UK. This figure is locally higher, for example in south-east England (including London) marine sands and gravels contribute over 30% of aggregate needs.

Since marine sands and gravels are finite resources, the industry regularly prospects the seabed in search of new deposits. The sand and gravels recently located in the eastern English Channel are needed to replace diminishing resources in the southern North Sea off eastern England and in the outer Thames Estuary, which have traditionally supplied markets in south-east England and the continent.

1.2 Consenting procedures

The UK Government (Office of the Deputy Prime Minister, ODPM) regulates marine aggregate dredging in English waters. Permission to dredge will only be given if the ODPM issues a favourable "Government View" following detailed site specific environmental studies and after several rounds of consultation under the current non-statutory interim procedures (New Arrangements for the Licensing of Minerals Dredging, DETR 1998). The Crown Estate, as owner of the mineral rights to the UK continental shelf (except for coal, oil and gas), issues licences to extract marine aggregate but only if a favourable Government View has been given.

1.3 Responsible practice

The companies involved formed the East Channel Association and, in recognition of the issues which arise surrounding dredging in the eastern English Channel, produced a charter identifying and defining operating policies with procedures addressing those issues.

The remainder of this document summarises the findings of a regional study commissioned by the East Channel Association (ECA) into the potential cumulative and in-combination environmental effects of dredging in the eastern English Channel. The industry charter, in conjunction with the mitigation and monitoring proposals set out in the regional assessment, are intended to represent environmental best practice for aggregate extraction across the eastern English Channel, should licences be granted.

For further details see REA pages iii to xiv.

The ECA Charter

The ECA Charter is a commitment by each company to:

- implement the results and recommendations of the REA and ensuing studies as appropriate to individual applications;
- co-operate and fund future regional environmental studies and research;
- recognise the results of further environmental studies and respond to recommendations;
- monitor, mitigate and manage environmental impacts and operational activity on a regional basis;
- careful management of dredged area, with an aim of reducing dredged area to a minimum;
- zoning permission areas to restrict operational dredging areas;
- only dredging resources >2m thick on average;
- minimise screening;
- transparency – make all relevant dredging and environmental data publicly available through regular company reporting;
- audit – all relevant data will be made available for analysis by independent experts.

Beach nourishment, Sussex

For further details see REA pages iii to xiv.

2 Regional environmental assessment

2.1 The proposals

Six marine aggregate dredging companies have applied for ten licences to extract sand and gravel in the eastern English Channel, 30 km south of Beachy Head. The companies are:

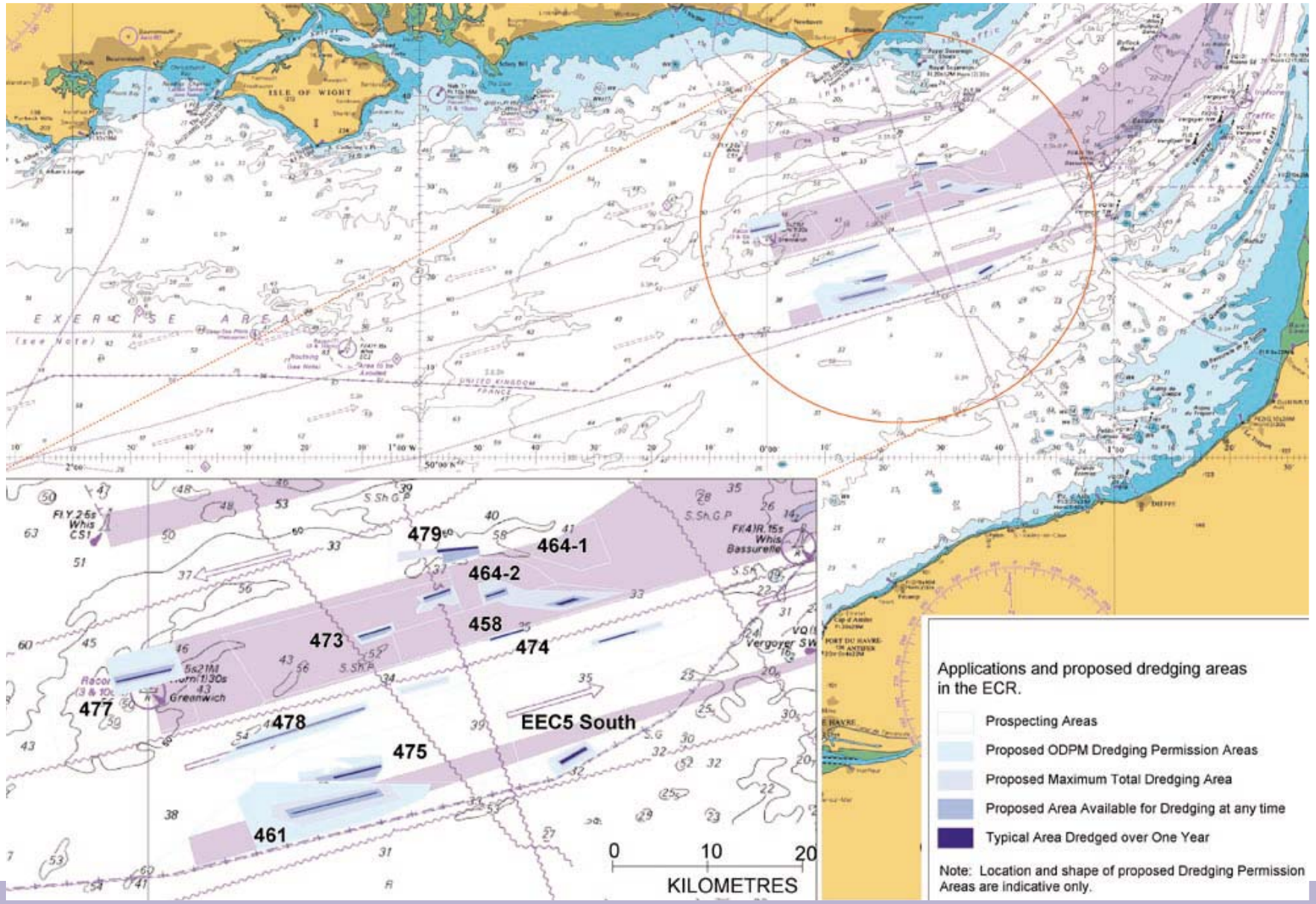
Applicant Company	Area number
Britannia Aggregates Ltd	477
Dredging International (UK) Ltd	478 & 479
Hanson Aggregates Marine Ltd	473, 474, 475, EEC5 South
RMC Marine Ltd	458 & 464, 473
United Marine Dredging Ltd	458 & 464
Volker Dredging Ltd	461

In addition to site-specific environmental assessments required for each application under the UK Government licensing procedures, the companies formed the East Channel Association (ECA) in 2001 to jointly and voluntarily commission a Regional Environmental Assessment (REA). The REA was initiated to investigate the potential cumulative and in-combination environmental effects of dredging in all ten proposed areas. Posford Haskoning Ltd undertook the REA. This non-technical summary summarises its findings.

2.2 Key features of the REA

- Data collection and consultation with 80 organisations in England and France
- Description of the environment in the eastern English Channel
- Technical reports concerned with the physical environment and coastal processes, benthic ecology, fisheries and fishing, archaeology and navigation
- Assessment of the regional effects of the proposed dredging, including effects on the interests of other nations bordering the area; and
- Recommendations for mitigation, regional monitoring and dredging management to help minimise disturbance to the environment and other sea users.

For further details see REA sections 1 and 2.



For further details see REA sections 1 and 2.

3 The basis for the assessment

3.1 The extent of dredging application areas

The seabed area prospected for aggregates (1132 km^2) is known throughout the REA as the "East Channel Region" (ECR). The ECR represents the focus of the investigation (see page 5). However, dredging operations for the first 15 years will be undertaken within a much smaller area. A proposed dredging plan has been established where a hierarchy of prospecting to operational areas is presented, each with a different status. This is summarised here:

The target for the proposed maximum dredging area in the ECR over 15 years is 117 km^2 within a total proposed Permission Area of 231 km^2. Based on these resource predictions, the ECA believe that dredging would be limited to an area substantially smaller than the 117 km^2.

Within the 117 km^2, the active dredging areas will be limited to highly localised, delineated zones. These range in size from 2 to 10 km^2 and total 43 km^2. They are the proposed areas available for dredging at any one time (see page 5).

It is therefore important to appreciate that not all of the area prospected will be licensed and only a small area of seabed will be dredged during the 15 years of the proposals studied in the REA. This is in common with current practice on existing licence areas where in 2001 nearly all aggregate dredging in UK licences took place in an area of only 13 km^2. Accordingly, it is expected that only around 10 km^2 will be intensively dredged in the ECR each year with much dredging occurring in the same place for many years, again in common with current practice.

3.2 Defining impacts

The REA has adopted a consistent approach to defining impacts from dredging in the ECR.

Three key elements are considered:

- Tonnage extraction levels (million tonnes per year)
- Dredging vessel loading times (hours on site or occupancy)
- Seabed area dredged (number of square kilometres directly disturbed)

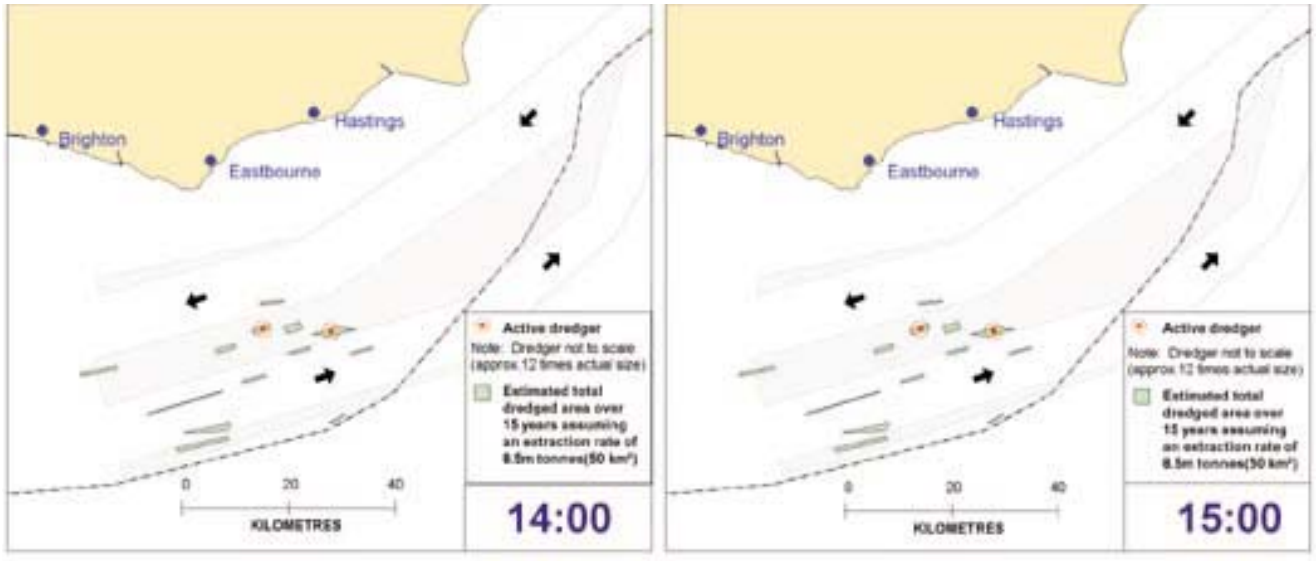
Tonnage

An assessment was undertaken of likely marine aggregate demand from the ECR using current landing statistics for marine aggregates in the market areas to be served. Correspondingly, for the purposes of the REA an annual extraction rate of 8.5 million tonnes per annum (Mtpa) (approximating to current demands) is assumed as a baseline, with a potential increase to 17 Mtpa should demand for marine aggregate significantly increase during the permission periods. This approach ensured that the effects of dredging potentially large volumes from the ECR were thoroughly assessed at the outset. It is envisaged that after 5 years, extraction could increase by up to 50% from 8.5 to 11.5 – 13.5 Mtpa.

Occupancy

At an extraction rate of 8.5 Mtpa, it is envisaged that 4-5 dredged cargoes of 5000 tonnes (average UK cargo size) would be recovered from the ECR each day. For 17 Mtpa, this would be 9 to 10 cargoes each day. Should dredgers be operating simultaneously, they will typically be separated by an average of 10 km given the extent of the ECR. For an extraction rate of 8.5 Mtpa, typically dredgers would be present for 18 hours a day in the ECR. For 17 Mtpa, this figure would rise to 22 hours a day (see page 7).

For further details see REA sections 3.



This plans shows dredger occupancy at 2pm and 3pm on a typical day assuming production of 8.5 million tonnes pa. Typically, an average of five dredgers will operate in the ECR each day and it is likely that there will be a six-hour interval without activity. When dredging concurrently, it is likely that dredgers will be separated by 5 to 10 km.

Example from the REA of analysis of dredger occupancy in the ECR

For further details see REA sections 3.

Extent of area dredged

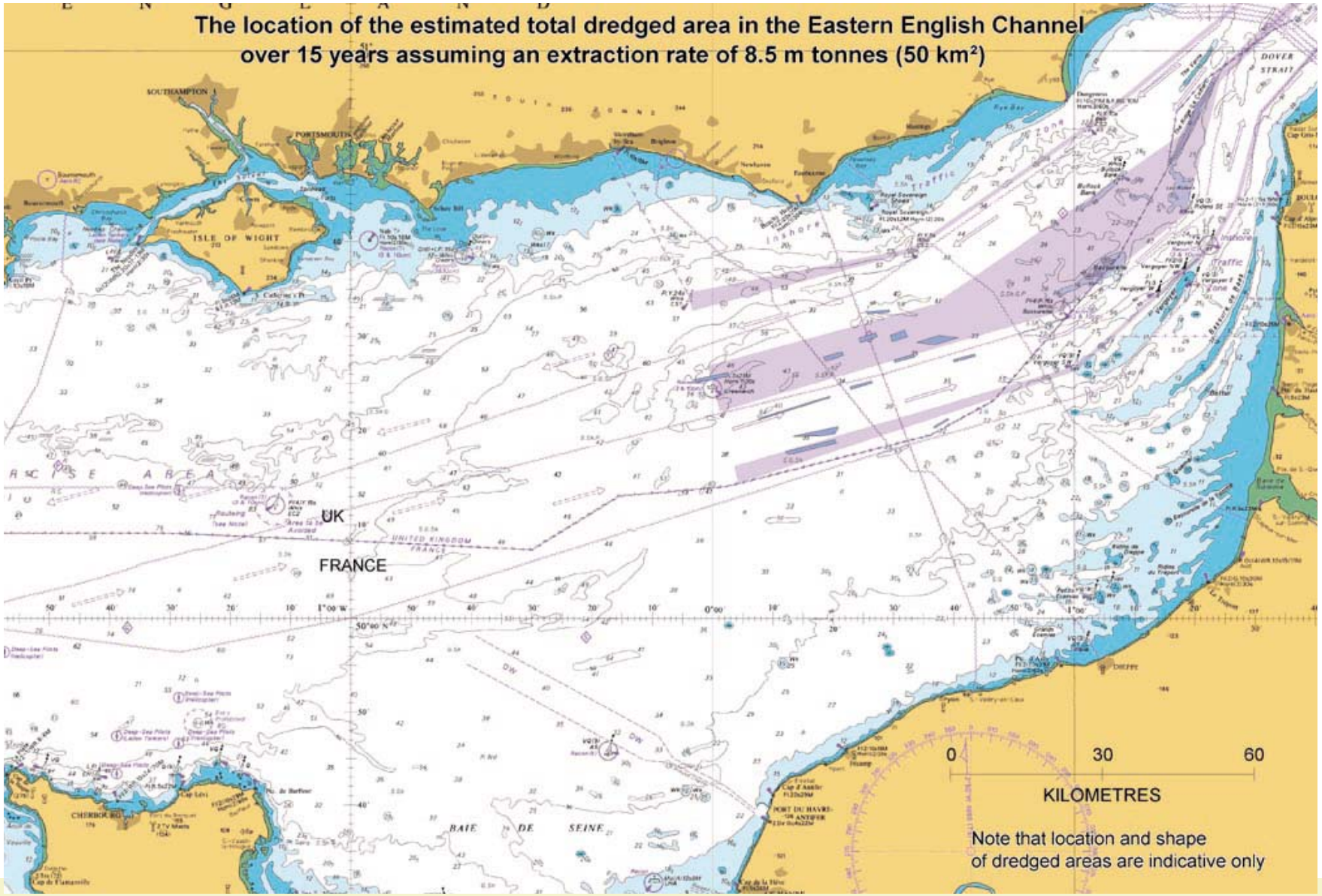
Taking into account the proposed distribution of the dredging activity, a likely minimum dredging depth of 2 m and customer quality requirements, the realistic area of direct dredging impact based on the extraction of 8.5Mtpa is predicted to total 50km^2 over 15 years (see page 9). This figure is used throughout the REA as an impact assumption to assess the potential direct cumulative effects of the dredging activity proposed. The value of 50 km^2 is considered to be a maximum for this tonnage because it is likely that the dredging depth will be greater than 2 m in many places within the dredged area, thereby reducing the need to dredge over a larger area. Should 17 Mtpa be dredged over the 15 years, then the dredged areas could potentially double to 100 km^2, should dredging depths reach 2 m.

3.3

Summary of impact assumptions	
Estimated production level	8.5 Mtpa (to 17 Mtpa)
Dredging depth	2 m (but if practical increasing to over 4m)
Area dredged after 15 years	50 km^2 to 100 km^2
Maximum active area per licence at any one time	2 to 10 km^2
Typical area dredged across the ECR in one year	10 km^2
Example operational dredging zone within the 2-10 km^2	3 km by 0.25 km
Typical duration of activity within 1 dredging zone	1 to 3 years
Amount of sediment rejected by screening	25 to 33% of amount pumped
Dredger occupancy	4 to 5 vessels through a day
Typical number of dredgers working simultaneously	3

Based on the above assumptions, a consistent, methodical approach has been adopted throughout the REA to assessing the cumulative effects of multiple, simultaneous dredging operations in the ECR. Where adverse effects are identified, then mitigation measures and monitoring are proposed. The following sections address in turn the key parameters that could be affected by the activity; that is the physical environment, the biological resource, fishing activity, archaeology and navigation as well as other issues and activities.

For further details see REA sections 3.



For further details see REA section 3.

Note: the 8.5 Mtpa is an assumed annual extraction rate.

4 The physical environment of the ECR and the eastern English Channel

4.1 Existing environment

- The aggregate resources are 'fossil' deposits and are immobile. They are the deposits of rivers now submerged by rising sea level after the Ice Age;
- About 500 million tonnes of such resources have been identified by the ECA;
- The seabed is uniformly gravelly and featureless over most of the ECR;
- Much of the seabed shows signs of fishing activity including trawl and dredge marks;
- Water depths range from 35 – 60 m generally deepening to the south-west.

4.2 Effects of dredging on the physical environment: waves, tides, sediments and the UK and French coastlines

Detailed analysis was undertaken by HR Wallingford of the implications of the proposed dredging activity for both the coasts of southern England and northern France.

In summary, and despite assuming "worst-case" dredged volumes, HR Wallingford concluded that:

- the ECR is too far offshore and in water too deep for waves or tides to be significantly affected by the proposed dredging;
- There is no potential for sediment supply to beaches to be affected;
- There is no potential for beaches to draw down into the dredging areas.

As a result, no mitigation measures are required, although routine monitoring of the seabed sediments and water depths in the dredging areas is recommended.

4.3 Sediment plumes caused by dredging and their effect on the seabed

The process of dredging and screening (the rejection of sand to load a more gravelly cargo) will cause sand and lesser amounts of silt to be released from the cargo back into the sea. This will lead to plumes of suspended sediment dispersing in the water column and settling on the seabed in and around the dredging area. The implications for both English and French waters were investigated by HR and a conceptual model was devised as part of the REA from this analysis along with experience from dredged areas elsewhere around the UK.

For further details see REA sections 4 and 5.

4.4
Water quality effects from plumes

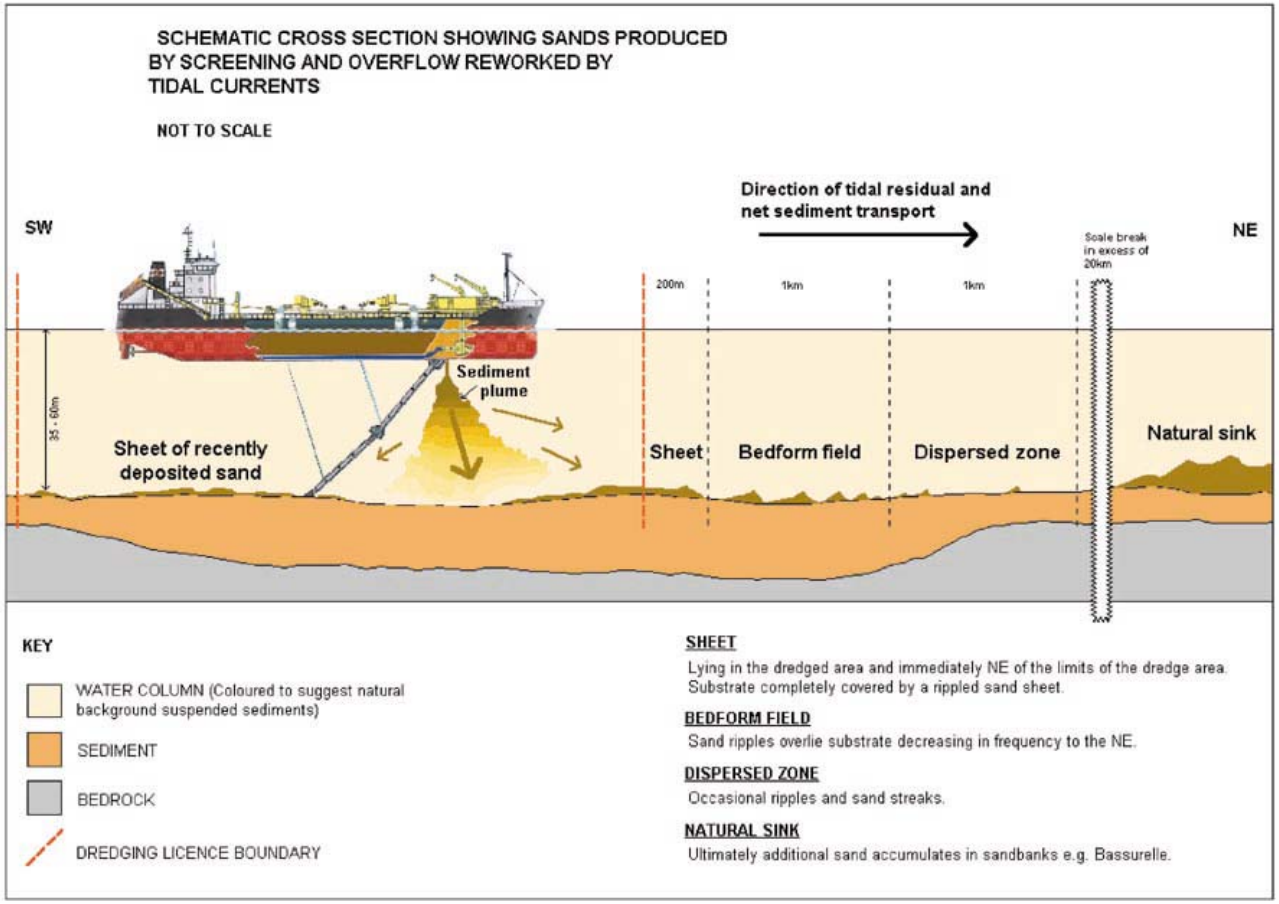
Sediment plumes have the potential to increase water turbidity. The study found the following in this regard:

- Significant concentrations of suspended sediment (>50 mg/l) are typically expected to be confined to the vicinity of the dredging areas themselves (up to 400 m across tide and 1 km along the tide) and are short-lived, quickly falling back to natural background levels (within 6 hours);
- The likelihood of plume coalescence from adjacent simultaneous dredging operations is low due to the separation of concurrent dredging areas (by 5 to 10 km) over a wide area (1132 km^2).

4.5
Seabed effects from plumes

- Screening and overflow from dredging will result in sand and (temporarily) some silt settling on the seabed inside and within a few hundred metres of the dredging area;
- This sediment will be subjected to tidal currents, which will move a proportion of the sediment. Whilst silt will disperse, the majority of rejected sand (being coarser-grained) will not be readily moved and will instead accrete;
- The diagram overleaf illustrates the predicted changes to the seabed that are proposed to arise during dredging operations in one locality.

For further details see REA sections 4 and 5.



Conceptual model (cross-section) predicting sand deposition, transport and bedforms associated with dredging in the ECR

- Once settled, fine to medium-grained sand is predicted to be visible on the seabed, driven by the tide to the north-east (the direction of natural sand movements in the region) for approximately 2 km before diffusing into the naturally occurring seabed sediments;
- Coarser sands are expected to travel much shorter distances and to accrete as a sheet of sediment inside and within 200 m of the dredging area;
- The sediments on the seabed are predicted to form localised sheets dispersing away from the dredging area, with intervening areas of unaffected seabed;
- This conceptual 'model' is based on experience in other existing dredging areas and knowledge of the sediment types and tidal currents in the ECR.

In the course of dredging an area, the seabed sediments will gradually become sandier than before dredging began. However, at the same time, continued action by the tidal currents will winnow the deposits of finer sand and the seabed will naturally coarsen once dredging ceases. It is thus predicted that, over time (probably several years), the seabed in previously dredged areas will mainly consist of fine gravels and medium to coarse-grained sands, similar to the sediments present before dredging.

These changes in the physical environment will have an effect on the biological resource of the seabed, examined in section 6.

5 Impact assessment and benthic recovery models

Impact assumptions for deposition and transport of sand around an example of an operational dredge zone in the East Channel Region

Assumption 1: Operational dredging zone

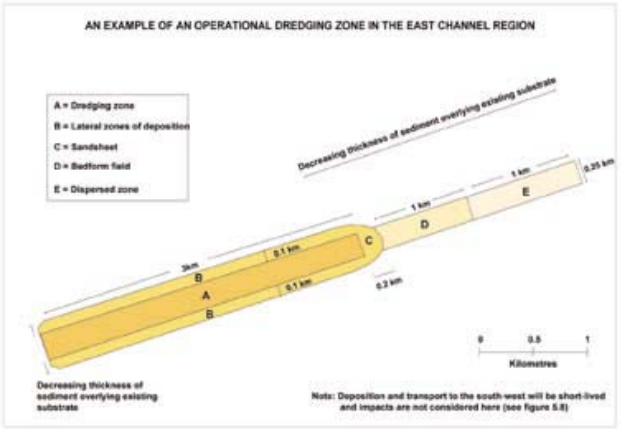
An operational dredging zone will be 3km long by 250m wide in the East Channel Region – **Zone A**

(Note: the sizes of operational dredging zones may differ; some may be longer or narrower)

Assumption 2: Sand Deposition and Transport

The model indicates two zones of deposition:

1. **Lateral** zone of deposition 100m either side along margins of the dredged zone – **Zone B** in diagram
2. Deposition **along the tidal axis** to the Northeast of the dredging zone
   - i) Sheet deposition for the first 200m – complete coverage – **Zone C**
   - ii) Bedform field – 1km of sand ripples with decreasing frequency to the NE – **Zone D**
   - iii) Dispersed zone – 1km of sand streaks – diffuse coverage of sand - **Zone E**



- A typical operational dredging zone in the ECR and the potential coverage of the seabed by sand is shown in the above figure. This is a dynamic system, where sand will be input from the screening process and simultaneously winnowed by tidal currents. Coverage of the substrate and thickness of the sediment decreases laterally from the dredging zone and in the direction of the tidal flow.

- For every active dredging zone of this size (area of 3 * 0.25 km), there will be a direct area of impact through dredging of 0.75km^2 and an indirect area of impact through deposition and transport of sand of 1.15km^2. Therefore, should 10km^2 be dredged in any one year, an area of 15km^2 will be subject to sand deposition and transport at varying intensity. The total area of impact would be 25km^2.

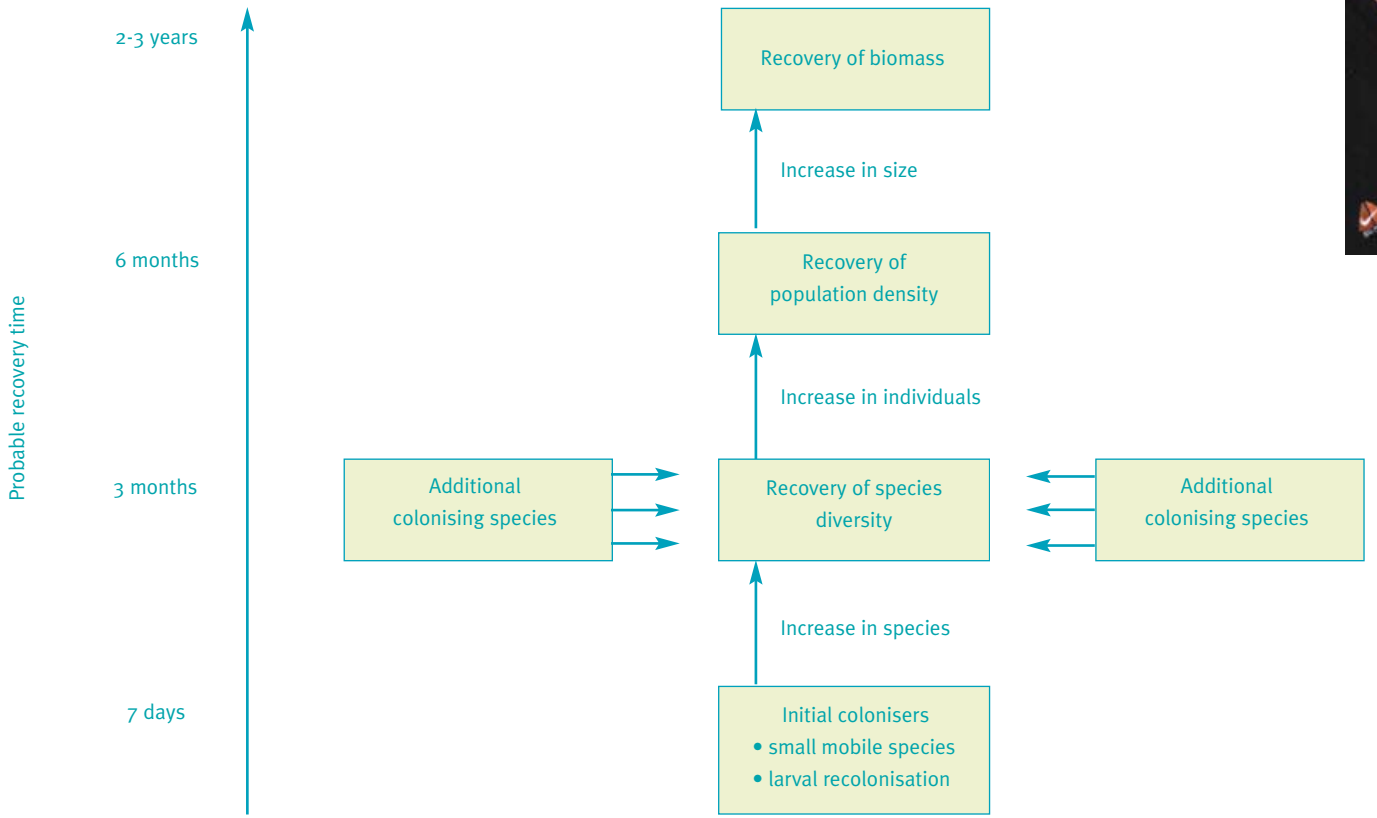
Factor	Zone	Calculation (km)	Area (km^2)
Operational dredging zone	A	0.25 * 3	0.75
Lateral zone of deposition either side of dredging zone	B	(0.1 + 0.1) * 3	0.6
Sand sheet	C	0.25 *0.2	0.05
Bedform field	D	0.25 *1	0.25
Dispersed zone	E	0.25 *1	0.25
Total area of direct impact per operational dredging zone	A		0.75
Total area of indirect impact for an operational dredging zone	B + C + D + E	0.6+0.05+0.25 +0.25	1.15
Total area of impact per operational dredging zone	A+B+C+D+ E	1.15+0.75	1.9

Based on reasoned assumptions presented in section 4 (chapter 5 of the REA), the following model has been developed. The conceptual model has been developed to quantify the potential effects of the impact of dredging due to deposition and mobilisation of screened sediment.

In general terms, based on the model proposed, for each dredging zone (0.75km^2), an additional area of 1.15km^2 will be affected by the deposition of screened sdiment and its transport away from the dredging zone.

For further details see REA section 6.

Generalised recovery sequence showing the nature and rate of recolonisation of benthic macrofauna in coastal deposits following dredging. This diagram is based on current research in shallow water environments. Recovery times in the deeper waters of the ECR will be longer.



For further details see REA section 6.

6 Analysis of cumulative impacts

6.1 Marine biology

Existing environment

- The largely immobile seabed sediments in the ECR are characterised by widespread, stable, long-lived, diverse and rich communities of marine animals. In contrast to inshore areas, little plant life exists because of the lack of light in the deeper waters of the ECR;
- Surveys have shown that there are no rare species or communities of conservation significance in the ECR, which are not widespread across the region;
- No one species dominates the fauna, although scallops, starfish and shore urchins are particularly common on the seabed with polychaete worms most common immediately beneath the seabed surface;
- The gravelly sediment based communities are typical of those present in the wider English Channel;
- Due to the relatively stable seabed environment in the ECR, recovery from disturbance is likely to be slower than for shallower inshore areas where wave action can regularly disturb the seabed;
- The rich communities support larger numbers of mature fish than inshore zones and are an important source of juveniles for some species of fish.

Effects of dredging on marine biology

Dredging operations potentially lead to:

- The removal of organisms from the seabed;
- Temporary reduction in water quality and light penetration
- Sediment deposition and
- Habitat modification.

The direct effect of the proposals over 15 years is predicted to be the disturbance of 50 km^2 of seabed. This represents approximately 0.7% of the offshore resource of sandy gravel and gravelly sand (and hence its associated habitats) across the eastern English Channel, in both English and French waters and 4.4% of the ECR.

The typical area expected to be dredged across the ECR in one year is 10 km^2 based on current practice in existing licences. However, as illustrated on page 14, the sediment 'footprint' (i.e. dredged area and adjoining areas subject to sedimentation from the plumes) is predicted to be 25 km^2, or 2.2% of the total ECR area per annum, based on 8.5 Mtpa of extraction.

The marine life on the seabed in the ECR is expected to be affected by the proposed dredging activity as a result of the direct effects of extraction, the indirect effects of the sediment plume in the water body and the deposition and subsequent transport of sediment. This in turn has implications for the fish resource that it supports.

For further details see REA sections 4 and 6.

6.2
Fish resources

A significant amount of information has been gathered on the fish resources of the eastern English Channel. The study area can be defined by drawing lines from Dungeness to Calais and from the Isle of Wight to Cherbourg. However, there is a lack of detailed information on the distribution of fish resources in the ECR, especially in its central area. From the information available, the most important fish species in the ECR include scallop, bass, sole, cod, plaice and herring. A number of commercially and ecologically important species spawn in parts of the ECR, but the inability to precisely define the location of these areas makes it difficult to assess and accurately quantify the potential effects of aggregate dredging on the spawning patterns of these species.

Effects of dredging on finfish and shellfish

Key impacts on fish stocks are:

- Direct removal;
- Smothering due to sediment settling from the plume;
- Increased water turbidity;
- Dredging noise avoidance;
- Altered seabed topography.

The species most vulnerable to the above are:

- Scallops (with limited mobility to avoid dredging);
- Spawning herring and
- Egg bearing female crabs

The extent of the area to be dredged over a 15 year period is expected to be 50 km^2, which represents 0.2% of the fisheries study area (ICES Area VIId, at around 30,000 km^2) and 4.4% of the ECR.

The area expected to be dredged in one year, 10 km^2, represents 0.04% of the fishing study area and 0.9% of the ECR. Within this area, the direct removal of biomass is unlikely to affect finfish (who are opportunistic feeders), crabs and lobsters, but will have an influence on scallops and other sessile shellfish and could affect over-wintering buried female brown crabs. Scallops and spawning herrings are also likely to be more vulnerable to the settlement of sand in the footprint of dredging activity.

Seabed recovery

The more sandy seabed sediments left after dredging will support a less diverse community until the seabed sediments coarsen. Full recovery of prey communities able to support fish populations is expected to take 4 to 6 years. However, the biomass of the main prey species (polychaete worms) will recover within 2 years and many prey items will partly recover within 6 months.

For further details see REA sections 4 and 7.

6.3
Fishing activity

Information on fishing activity has been obtained from DEFRA, ICES and UK, French, Belgian and Dutch fishing organisations. Additional sources were over-flight and satellite surveillance data and landing statistics by vessel type and nationality for the region (see page 20).

- Vessels from France, Belgium, the Netherlands, Denmark, the UK and Germany fish within the ECR;
- French fishing effort accounts for nearly 70% of catch values in ICES Area VIId and the UK accounts for 18%;
- Species targeted include cod, plaice, sole, herring, scallop, lemon sole and bass.

The REA has addressed the following potential impacts to the fishery:

- Reduction in catches due to the direct influence of extraction;
- The disruption to fishing activities (eg trawling operations and static fishing gear); and
- The indirect influence of sediment plume effects.

The area of the ECR subject to these effects is estimated to be 10 km^2 per year directly and an additional 15 km^2 from the plume sedimentation described above. The total 25 km^2 represents 2.2% of the ECR per year. Over 15 years assuming 50 km^2 are dredged (see above) then 125 km^2 (11% of the ECR) will be affected under the dredging 'footprint' described above. Primarily this has implications for shellfishing rather than finfishing.

The economic return from fishing in the ECR associated with 10 km^2 of annual dredging has been calculated at £65,310 each year. The value associated with the 50 km^2 assumed to be dredged over 15 years is therefore £327,000, which is approximately 0.3% of the average annual value added to the sector.

However, occupancy of the ECR by dredgers will typically consist of 5 dredgers per day for a total of 18 hours and the dredgers will be on average 10 km apart. The 5 dredgers compares to the 200 vessels transiting the region each day in the traffic lanes. Furthermore, fish will be able to move from the dredging zones and would be available to be caught elsewhere. Provided that full mitigation is adopted (see below), the long-term effects on commercial fisheries are not expected to be significant, especially once the marine life on the seabed recovers.

For further details see REA sections 4 and 8.

6.4
Shipping and navigation in the ECR

Existing situation

- The eastern English Channel is a busy area for merchant ships travelling to and from northern Europe via the Dover Straits. Around 100 vessels a day travel in each direction (see page 22).
- The ECR lies partly within the Eastern Channel Traffic Separation Scheme (TSS) which routes north-east bound shipping to the south towards the Dover Straits and south-west bound shipping to the north through the English Channel. Smaller numbers of vessels cross the scheme travelling from England to France and back.
- Some of the dredging application areas lie in the shipping lanes whilst others lie in the separation zone between them.
- The investigation into the effects of the proposed dredging on safe navigation in the REA has been assisted by data from the Maritime and Coastguard Agency, the Channel Navigation Information Service, the Meteorological Office and the site specific navigational studies of the applicant companies.
- All vessels in the area must comply with the International Regulations for Preventing Collisions at Sea (1972) (the ColRegs) and Rule 10 covers activities in the Traffic Separation Scheme.

Effects of dredging in the ECR on shipping and navigation

A collision risk assessment for dredging in the ECR was undertaken for the REA. The average risk of collision for all the dredging application areas was one collision in 164 years based on the dredging of 8.5 Mtpa and one in 82 years for dredging 17 Mtpa. These are worst-case scenarios calculated on theoretical continuous dredging.

The collision risk is higher in the traffic lanes than in the separation zone, although it is still insignificant at 1 in 50 years in the shipping lanes of the TSS.

Nevertheless, the ECA has agreed a set of strict operating procedures with advice from specialist consultants and these are summarised in section 7.

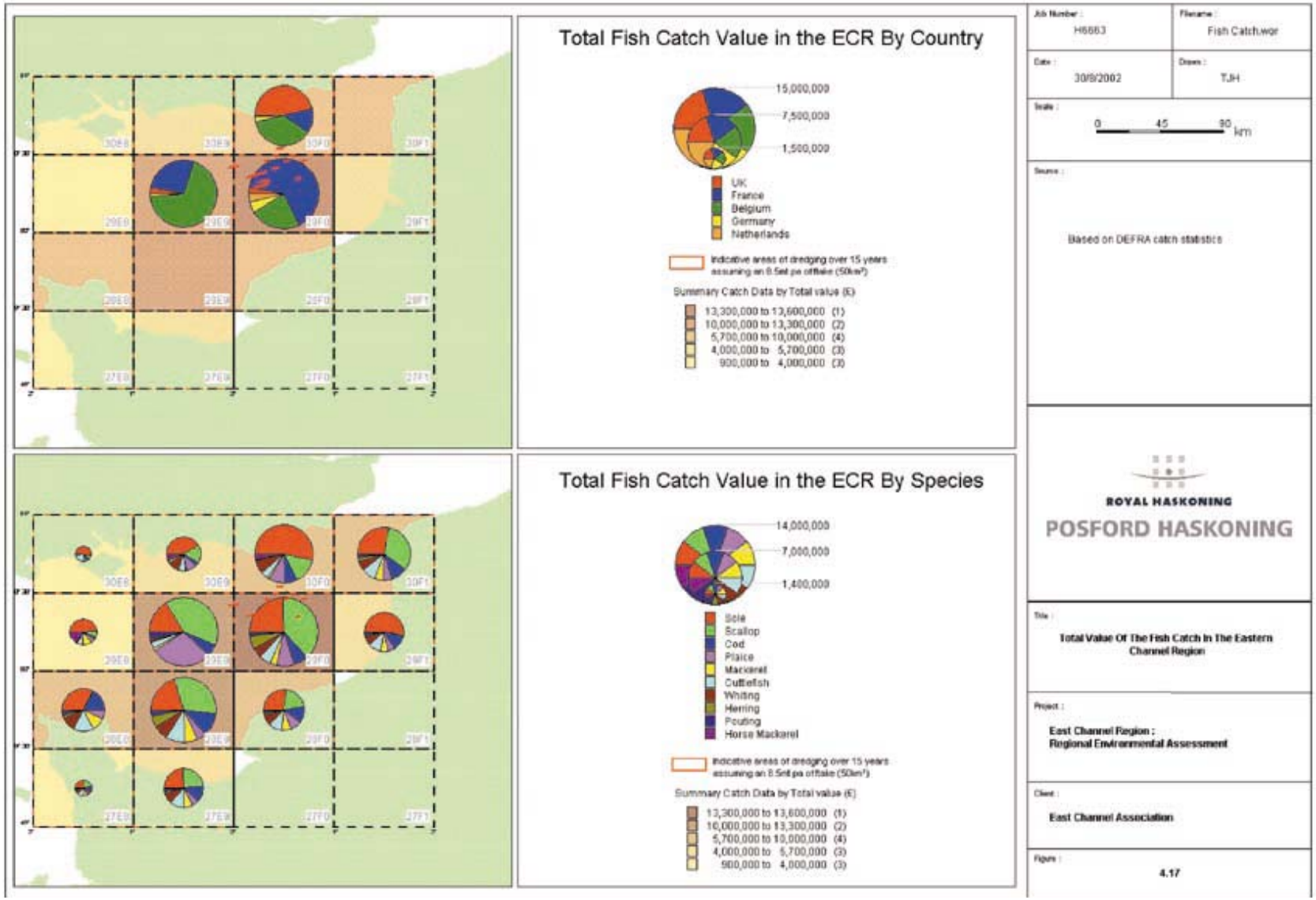
6.5
Archaeology in the ECR

Existing environment

- The potential exists for Prehistoric and Maritime artefacts to be present on and within the aggregate resources in the ECR;
- To date, no finds of Prehistoric age are known in or have been recovered from the ECR;
- There are 31 charted wreck sites, 17 seabed ‘obstructions’ and 7 casualties (wartime wrecks).

A full review of archaeological data sources was undertaken for the ECR and the coasts of southern England and northern France. Data has been acquired from the Maritime section of the UK National Monuments Record, the wreck index of the Hydrographic Office, the database of the Direction Regionale d’Archaeologie de Haute Normandie and the internal database of the Musee Departmental de la Somme.

For further details see REA sections 4 and 9.



Effects of dredging

Whilst there are no known Prehistoric sites or artefacts in the ECR, sites are known in the broader region, for example in the river valleys of northern France and southern England. Given that the eastern English Channel was also dry land during and just after the Ice Age, it is likely that the region was inhabited for at least parts of this period. Dredging therefore has the potential to disturb or remove Prehistoric artefacts from within the aggregate deposits.

Similarly, the potential exists for more recent Maritime artefacts dating from when the sea level rose after the Ice Age, submerging the land that joined England to France. Known wreck sites will be avoided during dredging, but uncharted wreckage could be disturbed and possibly landed at aggregate wharves. Without mitigation, therefore, effects on archaeology are potentially significant and may be transboundary in their nature with Prehistoric and Maritime artefacts relating to European history. Relevant mitigation measures are summarised in Section 7.

6.6 Other issues

The REA also addresses submarine cables, military activity and recreation (sailing, diving and angling) in the ECR.

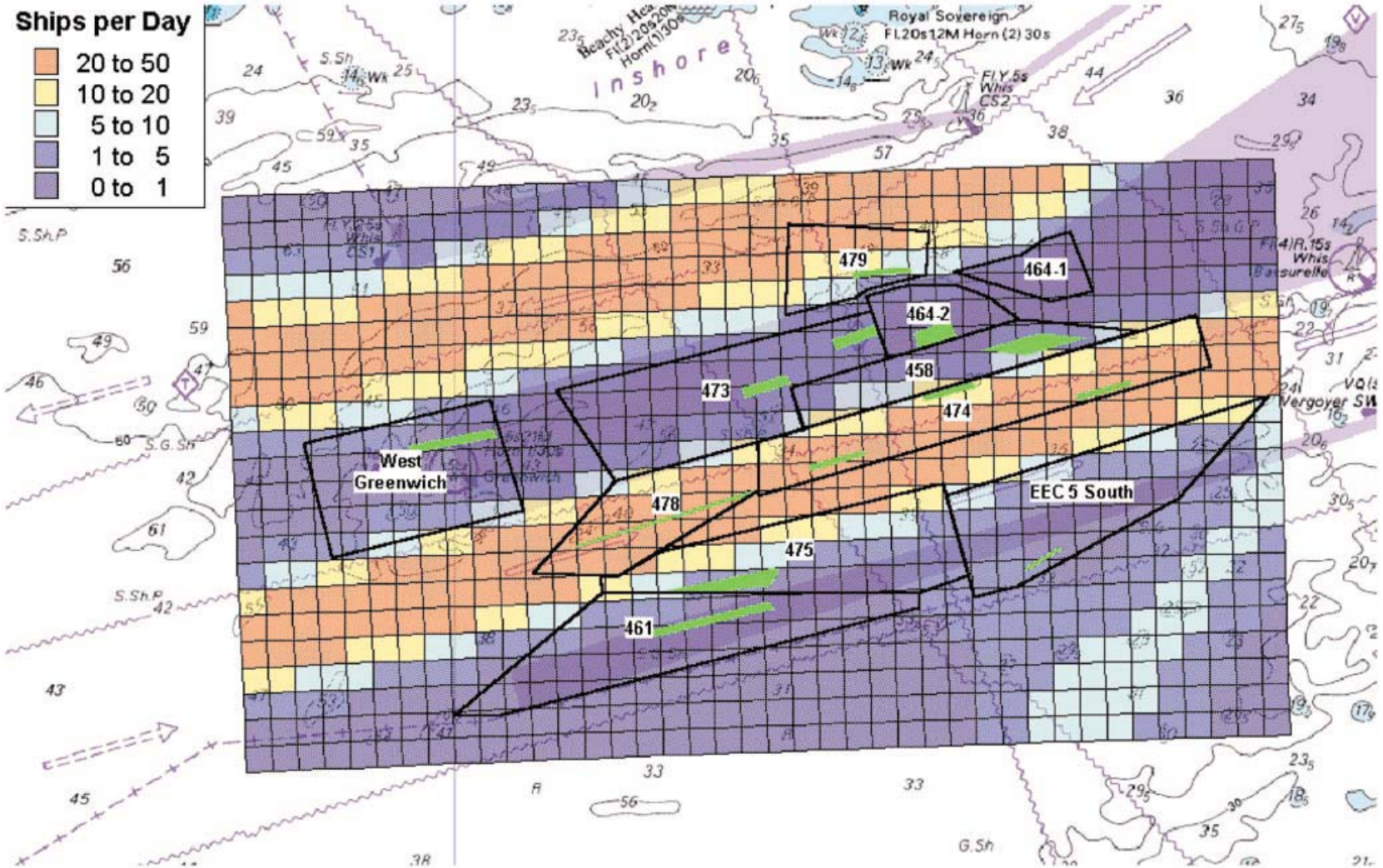
Submarine cables

- There are both disused and live cables running through the ECR on the seabed. Unmitigated dredging has the potential to disturb these;
- However, study of seabed physical processes reveals that dredging will have a negligible effect on the stability of the seabed and on waves and tides. In addition, dredging exclusion zones will be placed around both disused and active cables. No effects on cables are therefore expected.

Sailing, angling and diving

- Without mitigation and management, dredging vessels have the potential to disrupt existing sailing, angling and diving activities;
- Sailing and some angling is likely to take place in the ECR, although there are no known dive sites in the region given the depths of water and high levels of shipping activity.

For further details see REA sections 4, 10 and 11.



Average daily shipping densities within the ECR.

For further details see REA sections 4 and 9.

6.7
In-combination effects

The potential exists for the predicted impacts associated with the proposed dredging activity to interact with existing activities in the ECR. These are known as "in-combination effects."

Aggregate extraction and fishing activity

Baseline survey data has demonstrated that the seabed of the ECR has been affected by fishing activity eg by trawling and scallop dredging. The removal of biomass and direct effects on habitats are the consequences of fishing that are most likely to have in-combination effects with marine aggregate extraction. However, fishing activity is widespread and of low intensity in the ECR whereas dredging would be a localised and intensive operation. The recovery of habitats in dredged areas may be prolonged due to continual disruption by fishing activity.

The REA recommends that the proposed monitoring programme takes into account the continual fishing activity in the area and attempts to differentiate the effects due to dredging.

Aggregate extraction and installation of services

The combined influence of the removal of habitats from cable-laying and dredging is expected to be localised and limited.

In-combination effects on archaeology

Fishing activity and cable-laying have the potential to influence the archaeological resource of the ECR in combination with the proposed dredging activity. For example, dredging may reduce the thickness of cover over Palaeolithic or Mesolithic sites, exposing them to direct impacts from fishing activity.

Transboundary effects

- ✓ There will be no adverse effects on the French coastline from the proposed dredging;
- ✓ Sediment deposition and transport is not expected to occur outside of English waters;
- ✓ Low concentration plumes are expected to extend up to 5-10 km from the dredging area. This may extend into French waters at times, persisting for up to 12 hours and settling for very short periods at slack water;
- ✓ Water quality implications arising from the plumes (depending on dredging locations in 461 and EEC5 South) have the potential to influence the biological resource of the French part of the eastern English Channel with a minor adverse significance;
- ✓ Potential impacts to EU fishing fleets may occur due to removal of benthic organisms, habitat alteration, displacement of fish stock and reduction in fishing activity in the dredging zone. An impact of minor to moderate significance is expected.

For further details see REA sections 4, 11 and 12.

7 Regional mitigation monitoring and management measures

UK Government policy guidance on the extraction of marine aggregates (Marine Minerals Guidance Note 1 (MMG1) 2002), highlights the need to minimise potential impacts of marine aggregate dredging by identifying appropriate mitigation and monitoring measures where concerns are identified.

The REA has proposed a full suite of management, mitigation and monitoring measures and these are summarised here.

7.1 Dredging management

- Reduce dredged area to a minimum and zone permission areas (see Industry Charter);
- Definition of SMART mitigation (specific, measurable, achieveable, relevant and timebound);
- Implementation of a regional monitoring plan;
- Development of a partnership approach to monitoring, ie the ECA companies sharing responsibility and working with Regulators and stakeholders;
- Obtaining further data on the existing environment where data gaps exist;
- Continuing to research the effects of dredging;
- Implementation of liaison and reporting procedures to cover, amongst others, fishing activity, navigational issues and monitoring results;
- Continuing to develop a Geographical Information System (GIS) for the ECR, begun as part of the REA;
- Setting up a Technical Review Forum with representatives from the dredging industry, UK and overseas regulators and independent specialists to assess and review the dredging, monitoring results, effectiveness of mitigation and ways forward.

7.2 Monitoring and mitigation

The REA predicts that dredging in the ECR will lead to changes in the marine environment with implications for fishing, navigation and marine archaeology. In addition, aggregate dredging has never been undertaken in the ECR or any similar area with the same water depths and hydrodynamic regime. Aspects of the REA have been based on considerable knowledge of the effects of dredging combined with conceptual models which have been developed based on reasoned assumptions. To confirm these predictions and conceptual models, monitoring is necessary. A feedback loop will exist between dredging, mitigation measures and the results of monitoring, whereby dredging activities could be modified in the light of new findings.

For further details see REA section 13.

Nevertheless, with the limits already proposed for the area available for dredging and the management measures set out above, a precautionary approach has been adopted. A summary of the mitigation and monitoring proposals is given below.

Plumes and seabed sediments

- Carry out plume study within one year of dredging commencing;
- Monitor seabed sediment composition in and around the dredging areas;

Marine ecology

- Minimise area dredged – with a target of 10 km^2 per year – and minimise new seabed dredged each year;
- Zoning to target appropriate resources;
- Dredge sites to economic exhaustion, leave similar seabed sediments and then move to new areas, allowing recolonisation of seabed marine life in original dredging areas;
- Minimise screening and dredging to be tide parallel (NE-SW) at minimum distances between dredging zones;
- Develop buffer zones between dredged areas to aid recolonisation;
- Monitoring suspended sediment levels, turbidity and seabed sedimentation caused by plumes. Assess the response of the biological resource;
- Bathymetric surveys and seabed sampling will also be ongoing;
- Regular benthic surveys

Fish resources and fishing activity

- Minimise total area dredged;
- Buffer zones to aid recolonisation and recruitment;
- As appropriate, seasonal and temporal restrictions in sensitive areas;
- Loading times to be minimised;
- Publication of dredge area details, charts and liaison procedures to minimise conflict with the fishing industry;
- Employment of a liaison officer between ECA and UK and overseas fishing interests;
- Partnerships with regulators and fishing interests, eg. log book schemes;
- Appropriate seasonal, temporal and spatial windows to be investigated in relation to herring spawning activity;
- Crab and scallop surveys to be undertaken and records of spawning and feeding patterns to be maintained.

Navigational safety

- The Channel Navigation Information Service oversee traffic through the Dover Strait and TSS. Dredgers would be and are subject to the same regulations as other shipping traffic;
- However a list of operational measures have been drafted by the ECA for dredging within the TSS;
- These include electronic vessel identification systems (transponders), notification of dredger operations to CNIS and cessation of dredging in the traffic lanes when visibility falls below 1 nautical mile, amongst numerous others.

Archaeology

- Sea bed and geological survey data have been and will be examined by archaeologists to identify any sites of interest before dredging begins;
- Dredging exclusion zones will be implemented where needed;
- Any finds on dredgers or at wharves will be reported to archaeological authorities;
- Monitoring and mitigation will be further guided by the forthcoming guidance note "Marine aggregate dredging and the historic environment" (British Marine Aggregate Producers Association and English Heritage).

Further information

If you would like any further information or wish to comment please contact Barrie Hedges on 01491 411798, e-mail him at barrie.hedges@frenchjones.co.uk or write to him at East Channel Association, c/o French Jones Ltd, 31 Market Place, Henley-on-Thames, Oxon RG9 2AA. You may also like to visit the website www.eastchannel.info.