# 1. Outer Wash Aggregates Site 481

## 1.1. Overview

**Area of sea in relation to coastline, 12nm and continental shelf, estuaries etc**

Area 481 lies across the 12nm limit, situated north-east of the mouth of the Wash in the North Sea.

**Industry this case study focuses on**

Area 481 is licensed for marine aggregates extraction, it is part of a wider region used extensively by the aggregates industry and referred to as the Humber Region (Russell, 2011). The Humber Region supports an additional nine aggregate production licences, the majority of which lie to the north and east of Licence Area 481.

### 1.1.1. Generic Current Status of Industry Sector

**Overview of sector development and status**

The marine aggregates sector plays a significant role in supplying sand and gravel to the construction industry and for beach replenishment, both to domestic and foreign markets. Although marine aggregate production has decreased in recent years as a result of decreased demand arising from the UK recession, it is expected to recover to pre-recession levels in the coming years. In 2010, a total of just under 16m tonnes of sand and gravel were dredged from 66 Licence Areas which together cover a total of 1,291km$^2$ (The Crown Estate, 2011).

To obtain an aggregate extraction licence an applicant must provide a successful tender for a given area to The Crown Estate. The applicant must then apply for a Marine Licence from the MMO. The Marine Licence Application must be supported by a robust Environmental Impact Assessment. Following the granting of a Marine Licence by the MMO, The Crown Estate may then issue the applicant with a licence to dredge (MMO, 2011). Marine surveys are usually undertaken as part of the EIA process.

**History and forecast (where known) of requirements to conform to legislation in environmental monitoring**

Each individual extraction area is licensed for extraction by the Crown Estate for a limited period; usually 10-15 years. Licence Area 481 is licenced for an extraction for a period of 15 years. The Licence was granted in 2008 to Tarmac United Marine Dredging Limited and Van Oord. In order to maintain their right to extract aggregates from a Licence Area, marine aggregates extraction companies are usually required to undertaken monitoring of the impacts of their activities at intervals throughout the life of the licence.

Through the Marine Aggregate Levy Sustainability Fund (MALSF), significant advances have been made in relation to the understanding of the impacts of aggregates extraction on the biological and physical environment. As part of the research funded by the MALSF, large regional environmental characterisation (REC) projects were conducted in four significant aggregates areas; the South Coast, the

Humber, the Outer Thames and the East Coast. The REC projects were undertaken with the objective of gaining an understanding of the character of the principle regions from which marine aggregates are extracted.

In addition to the MALSF funded regional studies, the marine aggregates operators have funded Regional Environmental Assessment (REA) studies. A total of four REA projects were commissioned by industry across areas which overlap with each of the REC study areas. The purpose of the REA projects was/is to conduct cumulative and in combination assessments of the impacts of aggregates extraction across each of the principle aggregates extraction regions.

**Development of monitoring requirements through different stages of sector development, e.g. licensing rounds**

As a result of the potential impacts that aggregates extraction activities can have upon the marine environment, the marine aggregates industry operates within a strict framework of regulations, which includes requirements for environmental surveying prior to, and throughout, each stage of site use. It is common practice for a marine aggregates operator to commission environmental surveys at the EIA stage of a project, at the pre-dredge stage in order to establish a baseline for monitoring, during operations and following expiry of the licence.

A licence to extract aggregates from the seabed is granted subject to the fulfilment of a Schedule of Condition attached to the licence. The conditions are often specific to a given Licence Area and are typically dependent on the conservation significance and environmental resources of the area in question. Dredging of the site must commence within 12-18 months of the licence being given. Following commencement of dredging, the licence has an operational limit of ten to fifteen years, after this there is a time-limit of up to two years in which the operator must conduct any post-dredging monitoring. However, in many cases marine aggregates operators apply to renew their licences following expiry.

**Emphasis on particular biological (and biophysical) parameters and reason for this**

In terms of biological monitoring, the key priority for aggregate sites are benthic surveys as a result of the potential impact of dredging on benthic organisms through direct removal of organisms from the seafloor during the dredging process and indirect impacts such as changes in habitat which arise as a result of the creation of sediment plumes within the water column and the deposition of mobilised sediments on the seabed. Further surveys, such as resource thickness surveys, geophysical surveys, bathymetric surveys, epibenthic surveys, archaeological surveys, are often executed throughout the duration of the licensing process. The results of such surveys maybe incorporated into standalone reports, whilst the data that such surveys yield may be used to inform further investigations, such as plume modelling and coastal processes studies.

**Approach to data standardisation (especially qualitative assessments) within sector**

The 'Guidelines for the Conduct of Benthic Studies at Marine Aggregate Extraction Sites' (MALSF, 2011) were produced to provide an outline for survey procedures, data analysis and interpretation. It is best practice for survey companies to follow these guidelines, although the circumstances surrounding a particular licence may result in esoteric deviations from the standard procedures. The survey equipment used to survey an area is prone to variation with as certain equipment may only be suitable for survey specific environments. Moreover, the data transformation, and processing techniques may vary between surveys.

### 1.1.2. Overview of Case Study Industry Activities

**Characteristics of main industry in case study including status of development and development round**

Area 481 was licensed in late 2008, and is now in its operational phase, with permission to dredge over a 15 year period, subject to review every five years during a Substantive Review. The Substantive Review incorporates the results of specific surveys that are conducted at intervals of less than 5 years. An individual report is usually produced for each of the individual surveys, with the Substantive Review providing a comprehensive overview of the results of all of the surveys undertaken up to that point in time. The review must verify the predictions made within the Environmental Impact Assessment for a given project and must demonstrate that "no significant, adverse environmental impacts have resulted from the dredging operations" (Area 481 Schedule of Conditions, 2008) in order for continued permission to dredge to be maintained.

**Characteristics of other industries in area**

Alongside the aggregates industry, this area has a particularly high density of areas leased for offshore wind farms. The offshore wind farm developments that lie within 12nm of Licence Area 481 and their stage of application / development are:

- Triton Knoll
- Race Bank
- Docking Shoal
- Sheringham Shoal
- Lincs
- Inner Dowsing
- Lynn
- Dudgeon
- Humber Gateway.

As noted in Section 1.1, a host of other marine aggregates Licence Areas also lie in the vicinity including Licence Area 480, and Licence Area 107. Further commercial operations of relevance to the area of interest include shipping and fishing.

**Specific local / national drivers for monitoring**

The environmental surveys that are undertaken in association with the areas of industrial activity noted above are driven principally by The Marine Works (Environmental Impact Assessment) (Amendment) Regulations (2011) and the Marine and Coastal Access Act (2009). However, areas of industrial activity which have been in operation for some time may have had their monitoring requirements sculpted by the historical licensing and permitting regulations associated with the Government View procedures that were associated with consenting for aggregates extraction activities, and the Food and Environmental Protection Act and the Coastal Protection Act.

#### 1.1.3. Overview of Case Study MPA Designations

Licence Area 481 falls within the Inner Dowsing, Race Bank and North Ridge Candidate Special Area of Conservation (cSAC), which covers an area of 84,514ha. This cSAC has been put forward as a candidate designation in order to provide protection for biogenic reefs and sandbanks which are slightly covered by seawater all the time, both of which are listed as Annex I habitats under the EU Habitats Directive (1992).

## 1.2. Industry Monitoring Programme

### 1.2.1. Survey Characteristics

**Development of monitoring through different stages of sector development**

As a result of the licences which are granted to control extraction activities aggregate areas are subject to a monitoring programmes of varying frequency, moving from the initial EIA to the pre-dredge phase, to the operational phase and finally, to the post-dredging phase following cessation of extraction activities (see Section 1.1.2).

**Biological (and biophysical) features monitored**

The majority of aggregates industry surveying and monitoring focuses on the physical and ecological characteristics of the seafloor and the potential impacts of dredging on the same. The Licence for Area 481 requires benthic surveys to pay particular attention to *Sabellaria spinulosa* reefs, the razor shell, *Ensis arcuatus*, and sandeel species, within and adjacent to the licensed area. These conditions were inserted into the Schedule of Conditions attached to the 481 Licence at the request of Natural England, who are keen to protect Annex I habitats (*Sabellaria* reefs), monitor the spread of alien invasive species across English waters (*Ensis directus*) and wish to monitor the food resources available to rare birds (sandeels).

**Temporal characteristics, including period of survey (e.g. seasonal control), interannual requirements, also frequency of measurements for data logging (e.g. every minute, hour or day)**

To date, surveys have been carried out in Area 481 during the EIA phase of the project (2005/6), the pre-dredge phase of the project (2008) and during the operational phase (2011). Future operational surveys and a post-dredge survey are planned over the course of the next 13 years of this license cycle, in accordance with the summarised survey schedule presented in Table 1.

**Table 1, summary of the monitoring schedule for Licence Area 481**

| Survey Type | 2013 | 2015 | 2017 | 2019 | 2021 | 2024 |
|---|---|---|---|---|---|---|
| Bathymetric | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Side Scan Sonar | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Benthic | ✓ | | ✓ | | | ✓ |
| Resource | ✓ | | ✓ | | ✓ | ✓ |
| Sediment Grab | | | | | | ✓ |
| Archaeological Investigation | | | | | | ✓ |

Following the completion of the post dredge monitoring surveys to be undertaken in 2024 monitoring of the area will cease, unless the licence is renewed.

**Table 2, monitoring data acquired by Tarmac Marine Dredging Ltd and Van Oord from across the area of interest since 2005**

| Data Type | Source | Stage | Date | Comments |
|---|---|---|---|---|
| Benthic stations | Tarmac Marine Dredging Limited | E.g. EIA baseline, pre-operational, monitoring year 1 | 2005, 2008, 2011 | |
| SSS data | Tarmac Marine Dredging Limited | EIA baseline, pre-operational, monitoring year 1 | 2005, 2008, 2011 | |
| Bathymetric data | Tarmac Marine Dredging Limited | EIA baseline, pre-operational, monitoring year 1 | 2005, 2008, 2011 | |
| Resource Survey | Tarmac Marine Dredging Limited | EIA baseline, pre-operational, monitoring year 1 | 2005, 2008, 2011 | |

### 1.2.2. Monitoring Methods

**Monitoring protocols and survey methods**

It is a condition of the licence that the ongoing monitoring surveys shall be comparable with the methodologies used during the pre-dredge baseline surveys carried out in 2008, unless permission to vary the methodologies (including the timing of the surveys and numbers and position/extent of sampling locations) is requested and granted by the regulators.
The pre-dredge survey involved;

- benthic sampling with a 0.1m$^2$ mini-Hamon grab and seabed imagery acquisition
- epibenthic sampling with a 2m scientific beam trawl
- a strong focus on sandeels and *Ensis arcuatus.*
- the mapping of the seabed in Area 481 using high-resolution side scan sonar and swathe bathymetry.

Thirty benthic stations were sampled at the pre-dredge stage. Epibenthic trawl samples were acquired at eight pre-selected stations, sandeel trawls were conducted at ten stations and the anchor dredge was deployed at eleven stations to sample *Ensis*.

As part of protocol, all positions during sampling were checked with the ship navigational officer and carefully noted with the details: station number, date, time of sample collection, position of sample, type of deposit, sample volume and weight, and details of any sub-samples taken. Quantitative analysis of the benthic infaunal samples was then conducted within an NMBAQC compliant laboratory.

The operational dredging survey was conducted in a similar manner to the pre-dredge survey. However, some aspects were conducted differently. Preferred sandeels and *Ensis* habitats were assessed by proxy as a result of poor sampling success and the semi-quantitative nature of the pre-dredge data. and the requirement for anchor dredging and the requirements for all trawling was dropped. Hence, attempts were made to acquire grab samples from 50 stations, with the additional stations used to assess the presence of Annex 1 habitats, and the encroachment of *Crepidula fornicata*. The area subject to side-scan sonar and multi beam surveying techniques in 2011 represented a reduction in area compared to the area surveyed during 2008.

### 1.2.3. Post Survey Data Processing

**Type of processing and data products derived, including level of detail provided. Provide detail for different parameters as relevant.**

Upon arrival at the laboratory, the survey samples were checked against the field notes in accordance with the internal MES Standard Operating Procedure.

All taxonomic analysis was quality assured internally by senior taxonomists and checked against a reference collection. The laboratory is a member of the National Marine Biological Analytical Quality Control scheme (NMBAQC).

**Pre-dredge survey 2008**

- Benthic infauna were identified to species level, the blotted wet weight of each major phylum recorded, and the particle size of grab samples analysed.
- Contents of the epibenthic samples were identified and counted, and the blotted wet weight of each taxon was recorded.
- The sandeels were counted, measured and weighed whilst on the survey vessel and the benthic sediments in the vicinity of the trawls categorised by particle size.
- Habitat mapping was completed by analysing a number of quantitative and qualitative data.

**Operational Survey 2011**

- Benthic infauna were identified to species level, the blotted wet weight of each major phylum recorded, and the particle size of grab samples analysed.
- Habitat mapping was completed by analysing a number of quantitative and qualitative data.

All biological samples were sieved over a 1mm mesh. During both years the sediment samples were sieved across a nest of sieves of the following sizes: 64 mm, 31.5 mm, 16 mm, 8 mm, 4 mm, 2 mm, 1 mm, 0.063mm.

Various methods were used for statistical analyses of data from both surveys including multivariate and univariate analysis.

There was no requirement to produce GIS metadata for the project. Any metadata that may have been produced would have been produced to the survey contractors own in-house specifications.

#### 1.2.4. Dissemination of Data Products

**Ultimate owner of data and any restrictions in place**

The data owners are Tarmac Marine Dredging Ltd (formerly United Marine Dredging Ltd) and Van Oord UK Ltd. The data is made available to the client and was not released into any external database. The final reports were made available to the MMO and to their advisors in line with the Schedule of Conditions attached extraction licence for Area 481.

#### 1.2.5. Internal Survey Management

Survey procurement is administered within Tarmac Marine Dredging Limited in consultation with Van Oord. At present the person responsible for procurement survey services within Tarmac is Dr Andrew Bellamy, Resources Manager. For each of the surveys, during each round of monitoring a number of companies are invited to tender for the specific projects. The successful tender is that which presents the strongest bid, with quality and price being the principle criteria. In addition Tarmac and Van Oord principally select companies to work on their projects who have a reputation for working to high safety standards.

### 1.3. MPA Monitoring Characteristics

#### 1.3.1. Survey Characteristics

**Biological (and biophysical) features monitored**

The features to be monitored within the cSAC are the Habitats Directive Annex 1 habitats: Sandbanks and *S. spinulosa* biogenic reefs.

Prior to designation, Entec (2008) were commissioned by Natural England to compile a summary of the evidence relating to the habitats and species found across the site. This report was largely based on an amalgamation of evidence accumulated by industrial operators who have completed a variety of surveys across the area over the course of a number of decades. These surveys were undertaken by industrial operators in order to support applications for permission to develop areas of the seabed, or to fulfil the obligations associated with their pre-existing permission. Much of the evidence which underpins the designation of the cSAC was acquired by Marine Ecological Surveys Limited (MESL), EMU Ltd, IECS, Thomson Unicomarine, AMEC and the MALSF. That so many surveys have been completed surveys

across the area scheduled for designation within the Inner Dowsing, Race Bank and North Ridge cSAC is reflective of the importance of the area to a variety of industries, including the marine aggregates industry and the offshore wind Industry.

As part of the UK Government's commitments under the EU Habitats Directive (1992), Natural England is required to undertake an assessment of the condition of the features of the Inner Dowsing, Race Bank and North Ridge cSAC once every six years. The baseline survey work was completed on behalf of Natural England by Cefas during 2011. This survey comprised acquiring bathymetric data, grab samples and seabed images. It is likely that future surveys will employ methodologies similar to those employed during the baseline survey. Information relating the areas surveyed in 2011 were not available to the project team at the time of publication.

**Table 3, the data acquired during Inner Drowsing, Race Bank and North Ridge cSAC baseline monitoring programme**

| Data Type | Source | Stage | Date | Comments |
|---|---|---|---|---|
| Benthic stations | Cefas | Reporting | 2011 | Report due in 2012 |
| Bathymetic survey | Cefas | Reporting | 2011 | Report due in 2012 |
| Geophysical survey | Cefas | Reporting | 2011 | Report due in 2012 |
| Seabed imagery survey | Cefas | Reporting | 2011 | Report due in 2012 |

### 1.3.2. Monitoring Methods

The methods used by Cefas to undertake the baseline monitoring project that was completed in 2011 were not available to the project team at the time of writing. However, it is likely that the Cefas will have acquired the data in a manner which will facilitate comparisons between, and integration with, data acquired by the majority of the industries whom operate across the area of interest.

### 1.3.3. Post Survey Data Processing

The manner of post-survey data processing need not be relevant, as long as the raw data are available to Natural England. The only area in which it is foreseen that this may not be the case is if the sieve meshes used for sediment sample processing differ between surveys.