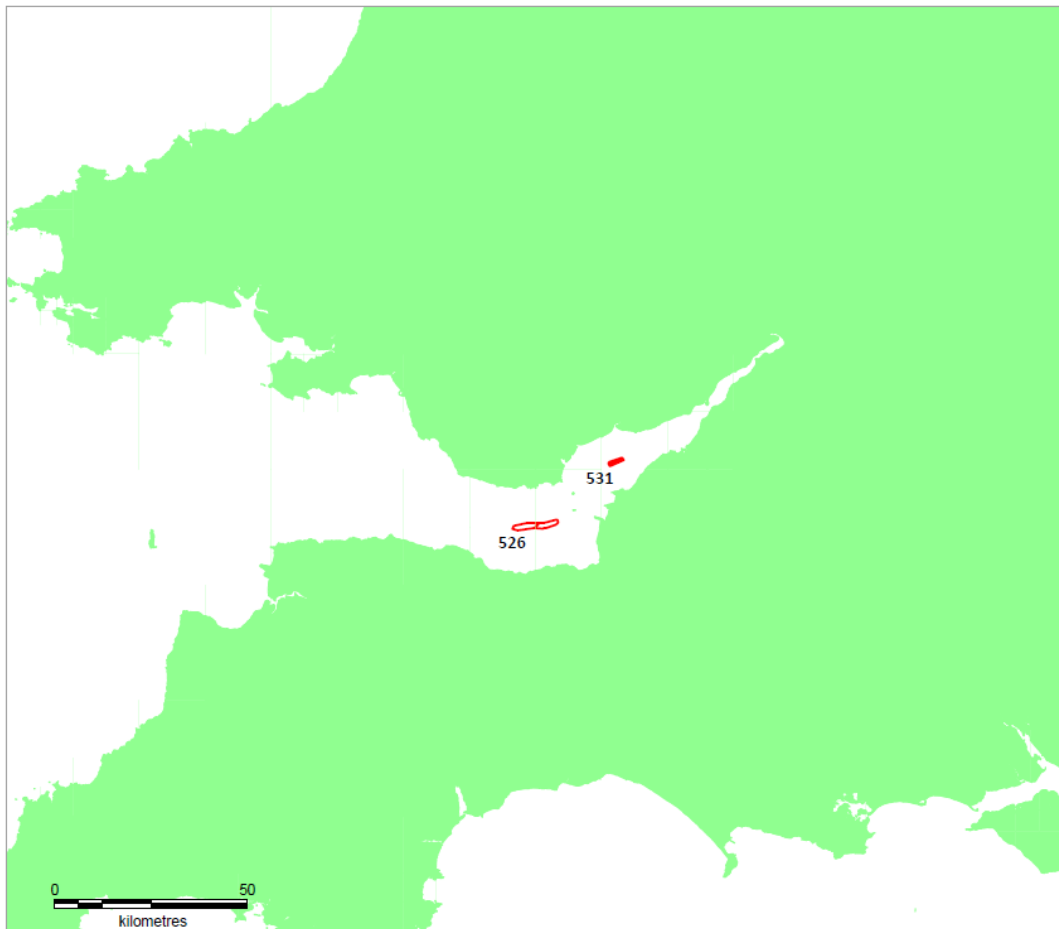


Regional Geophysical Monitoring Programme Survey Specification

Bristol Channel 2026

Licence Areas 526 & 531



August 2025

1. Introduction

CEMEX UK Marine Ltd, Hanson Aggregates Marine Limited (trading as Heidelberg Materials UK Aggregates Marine) and Tarmac Marine Ltd collectively known as the RMA (Resource Management Association), are required to undertake a Full Regional Geophysical Monitoring Programme (RGMP) in 2026. The works required are defined as the *Full Regional Monitoring Survey* in the method statement provided in Appendix A.

Ahead of the surveys taking place the RMA members are required to obtain approval of the survey specifications from the MMO. Therefore, this document presents the specifications for the 2026 surveys, which are based on the MMO approved methodology for regional geophysical surveys.

The scope of the RGMP includes surveying, reporting and comparisons to previous datasets. The works are spread across two Licence Areas: Area 526 which is equally shared between Cemex, Heidelberg & Tarmac, and Licence Area 531 which is equally split between Tarmac & Heidelberg. This specification provides details of the location of the works required, the operations and specifications for the survey works and the requirements for sample processing and data analysis and reporting. The reporting specifics are given in section 6.

The data to be collected in 2026 are:

- Multi-beam bathymetry
- Side scan sonar

The RMA will appoint an independent survey contractor to undertake the monitoring surveys. Survey operations will be carried out in accordance with the BMAPA Fisheries Code of Practice (Appendix D). The survey vessel(s) will be required to position themselves with differential GPS to allow positioning within a few metres of their intended location. The survey team and equipment will also comply with all relevant merchant shipping and health and safety legislation. The fieldwork is planned to take place between March and the end of 2026.

2. Overview of Proposed Works, General Requirements & Quality Control (QC)

All works will be completed to the requirements of the method statement in Appendix A and those detailed in this document.

Collected data will be fit for purpose – suitably high resolution & of a high enough definition for identification and assessment of features of potential conservation interest (e.g potential geogenic and biogenic reefs), features of potential archaeological interest and other seabed features and sediment for regulatory analysis & archaeological inspection. Any substandard data will be re-collected at the contractor's expense.

All survey equipment, set up and configuration will be suitably checked and calibrated during mobilisation and as required throughout the survey. It will be confirmed that

relevant instruments are logging correctly. During survey, online systems will be monitored, and adjustments made to instrument settings, as required, to optimize data quality. Prior to demobilisation, it will be confirmed that all survey and data requirements have been met and data backed up successfully. Suitable QC procedures will also be adhered to during data processing and reporting.

3. Planned survey array

A full coverage bathymetric and sidescan sonar survey will be carried out over the licence areas shown in Figure 1. As specified in the Method Statement (Appendix 1), the surveys will cover the area dredged since the beginning of the current marine licences plus a buffer of 500 metres with the tide and 250 metres across the tide.

The survey area co-ordinates are provided in Appendix C and are based on the EMS dredging footprint data from the start of the current marine licences up to and including July 2025. Nearer to the time of the operations, and as required by the Method Statement, the survey areas will be updated with more recent EMS data to capture any dredging activity that may have taken place beyond the survey extents defined in Figure 1.



Figure 1: *Bristol Channel Regional Geophysical Monitoring Licence Areas in Regional Context*

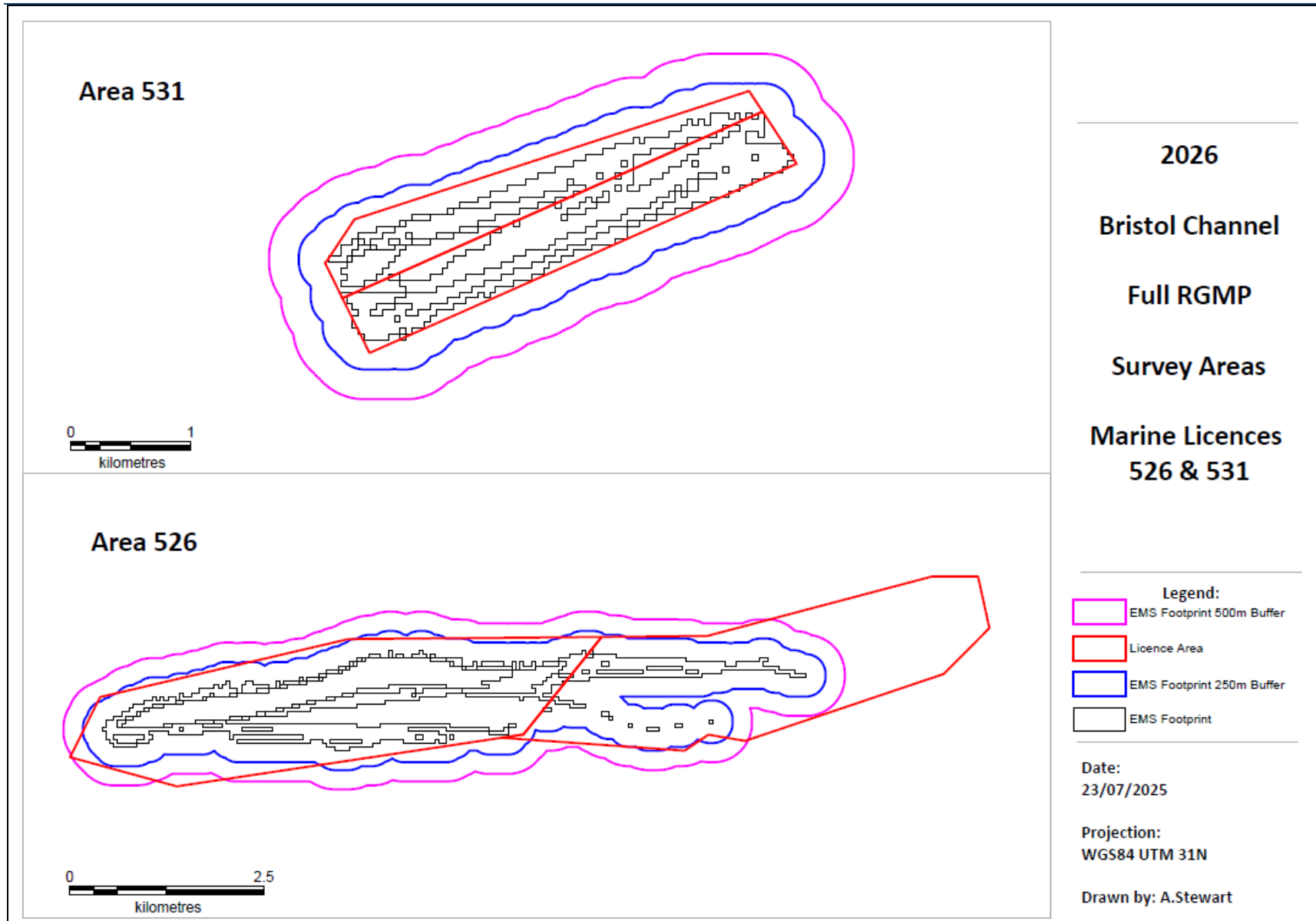


Figure 2: Bristol Channel Regional Geophysical Monitoring Survey Areas 526 & 531 (based on EMS plus buffer – these will be reissued in early 2026)

AREAS TO BE SURVEYED

- 526 – EMS Footprint & buffers shown. 250 across tide and 500m with tide
- 531 – EMS Footprint & buffer shown. 250 across tide and 500m with tide

4. Multi-Beam Bathymetry

Purpose - to determine the level of seabed within and surrounding the areas dredged.

- A complete set of soundings will be collected from the survey areas to the requirements defined in Appendix A, using a multi-beam echosounder (MBES). The line plan will be sufficient to achieve full data coverage of the survey areas.
- MBES data will be collected in horizontal 0.5m bins or better and presented in gridded GeoTIFF or GeoJPEG format.
- A chart displaying the bathymetric soundings overlain with bathymetric contours at 1m intervals and a chart showing the seabed relief will be provided.
- Details of swath calibration will be recorded in the survey report. Checks will be performed in the field to verify the accuracy of the soundings obtained and a TS dip performed prior to commencement of survey and at 12-hour intervals.
- Data will be plotted using the WGS84 spheroid and UTM Zone 30 North projection.
- Soundings will be reduced to Chart Datum (CD), using a suitable method, to the specifications given in Appendix A.
- XYZ ASCII data files for each licence area will be supplied containing the sounding data obtained and reduced to CD. Data files will be provided in the following horizontal bin sizes: 0.5m and 2m.

5. Side Scan Sonar

Purpose - to collect high quality side-scan sonar data for the area for seabed characterisation, including conservation and archaeological review.

- Full coverage side-scan sonar data will be collected over the survey areas, to the requirements defined in Appendix A.
- The side-scan sonar system employed will be of high quality to collect good quality dual frequency data (high and low resolution).
- Minimum of 100% coverage of the seabed within the survey area will be achieved.

- Track plots offset to instrument are to be plotted using the WGS84 spheroid and UTM Zone 30 North projection. Plots are to display both geographical and grid positions. All plots are to be supplied in digital format.
- Raw xtf, Coda-compatible files will be supplied by the contractor as soon as the data is available for Conservation and Archaeological reviews.
- Side-scan mosaics of individual areas (including their buffers) will be presented in GeoTIFF file format and digital chart.

6. Reporting Deliverables

The standard reporting and charting requirements are outlined in Appendix A.

In addition to the standard reports, the RMA will also arrange for the following comparison charts and report:

- Interpretation of the side scan sonar data into a seabed features chart and a comparison between the results of the survey, the baseline survey results and, where appropriate, the last survey results (if different from the baseline).
- Absolute bathymetric comparisons between the 2026 data and the baseline and, where appropriate, the last survey results (if different from the baseline).
- Average bathymetric comparison charts to include average bathymetric comparisons for 2026 data vs baseline and the last survey results if different from the baseline.
- Average remaining resource thickness charts using the bathymetric changes between the 2026 and baseline data to update the baseline resource data.
- The averaging charts will be conducted using the standard methodology as listed in Appendix E.
- Textual analysis will be required in the survey report describing the charts and their results in relation to the marine licence conditions.

Appendix A. Method statement for geophysical surveys required for Regional Monitoring Surveys

Version 5.0 – 07/02/2017

Purpose of the geophysical surveys: to acquire full coverage multibeam bathymetry and, where required for Full Regional Monitoring Surveys, side scan sonar data in and surrounding defined areas of individual marine aggregate extraction licence areas. This is to take place in specific regions to identify seabed changes, the effectiveness of current mitigation measures and development (dredging) impacts.

The minimum standard individual survey extents and associated buffers are set out below, however where specific requirements are deemed necessary, these will be defined on a licence-specific basis by individual operators.

Minimum standards: The bathymetric survey specification will mirror the minimum requirements defined under International Hydrographic Organisation Order 1a for areas up to 100m water depth (see summary annex). Full 100% data coverage within the survey area will be acquired. Due regard will be shown to the need to resolve heritage, habitat, and dredging-related features such as wrecks, reefs, and dredge marks etc and the data will be capable of resolving these. Consistency of approach to the surveys between survey years is clearly fundamental so that accurate, valid comparison of seabed levels will be possible. Due regard will also be given to this aspect by survey contractors.

Timing: The Full Regional Monitoring Surveys (FRMS), requiring multibeam bathymetry and side scan sonar, will take place in years 4, 9 and 14 of a given regional monitoring plan. The FRMS will be undertaken in the same year as the Regional Seabed Monitoring Programme (RSMP).

Interim Regional Monitoring Surveys (IRMS), requiring multibeam bathymetry alone, will take place in years 2, 7 and 12, or as licence specific timing dictates.

Coverage and survey type: FRMS surveys will cover the cumulative dredge footprint derived from Crown Estate EMS coverages over the current licence term to not more than two months before the regional surveys are due to start with a minimum 250 metre cross tide and 500 metre tide parallel buffer zone, defined in consultation with the MMO and its advisors. These surveys will use a multibeam bathymetry system and side scan sonar. The individual licence area survey extents will be combined to generate the regional survey area.

IRMS surveys will cover the dredge footprint derived from Crown Estate EMS coverages that has occurred since the previous geophysical survey using a multibeam system only with a 50 m buffer on all sides.

The density of line spacing across the regional survey area will be determined by the survey contractor, based on the water depths involved and the specifications of the survey equipment being employed.

Positioning

Horizontal positioning provides the location (latitude and longitude) of the survey vessel on the sea surface. Both a primary and secondary differential GPS (or other appropriate positioning system, providing similar or better accuracy) will be used for this purpose.

Vertical positioning provides the tidal height from observed tides over a given time to allow water depths to be reduced to chart datum (CD). A suitable navigation and heading system will be used to record this data.

Soundings will be reduced to chart datum using observed tides from GNSS (Global Navigation Satellite System) height observations and the UKHO Vertical Offshore Reference Frame (VORF) model, with quality control from comparisons of derived data against predicted tides for coastal localities.

Motion data: comprises heading (the direction or bearing of travel) and attitude (the motion of the survey vessel on the sea surface in terms of heave, pitch, yaw and roll). Motion sensor data will be collected during surveys and provided to the multibeam echo sounder during operations as part of standard hydrographic survey practice.

Navigation software: A combined navigation and data acquisition system will be used to record data from the primary and secondary navigation, echo sounder and motion sensors. Position, heading and fix point data will be output from the navigation software to the echo sounders and side scan sonar. Fix points will be recorded on survey vessel trackplots to enable bathymetry and seabed features to be charted. Sound speed profiles will be undertaken at regular intervals to ensure no artefacts in the data.

Geodetic parameters: geodetic datum will be WGS84, ellipsoid will be WGS84 and projection will be the relevant UTM Zone as appropriate to the region in question (i.e. Zone 31N east of Greenwich meridian and Zone 30N to the west).

Multibeam bathymetry system

The multibeam will operate to a specific frequency, typically 200-400kHz, a defined number of beams, pulse type and gain. Sound velocity sensors will be mounted on the transducer head to record real time sound velocity.

Resolution will be as specified but typically 1-2 m, with full coverage.

Data should be supplied in two formats – RAW unprocessed data and binned “xyz” data at 1-2m horizontal resolution.

Side scan sonar

A minimum requirement of a dual frequency tow fish will be used operating at high (400 kHz or greater) and low (100 kHz) frequencies. The maximum data range per channel will be 500 m at low frequency and 150 m at high frequency.

A suitable range overlap will be maintained to ensure full data coverage across both multibeam and side scan sonar.

Data will be collected digitally. RSMP samples will be used to ground truth the side scan sonar data.

Reporting & Charts

A single survey report should be produced for the regional survey, which sets out the general methodology of the works undertaken.

The regional survey data should be interpreted and presented on an individual licence area basis, via a series of annexes within the regional report. This data and the associated charts and interpretations, including comparisons with previous licence area surveys as required, should be able to be used in their own right.

All charts will include the survey and licence area boundaries.

- Track chart – showing the coverage of the survey lines in relation to the survey area limits and the fix marks along these lines.
- Bathymetric soundings – showing soundings in metres and decimetres, reduced to chart datum (CD). Isobaths will be plotted on this chart at 1 m intervals.
- Seabed relief – water depths will be displayed as a gradational colour scale in metres below chart datum.
- Seabed features - the side scan sonar data will be interpreted to show the seabed sediment types, sonar contacts (objects) with dimensions, bedforms, wrecks and other marks such as dredge scars. This will be assisted using regional sampling data.
- Seabed level changes – showing differences in water depth between specific surveys, reported to a common datum and tidal reduction.
- Seabed feature comparisons – showing differences in seabed features detected between specific survey.

IHO STANDARDS FOR HYDROGRAPHIC SURVEYS (S-44)
5th Edition February 2008

TABLE 1
Minimum Standards for Hydrographic Surveys
(To be read in conjunction with the full text set out in this document.)

Reference	Order	Special	1a	1b	2
Chapter 1	Description of areas.	Areas where under-keel clearance is critical	Areas shallower than 100 metres where under-keel clearance is less critical but <i>features</i> of concern to surface shipping may exist.	Areas shallower than 100 metres where under-keel clearance is not considered to be an issue for the type of surface shipping expected to transit the area.	Areas generally deeper than 100 metres where a general description of the sea floor is considered adequate.
Chapter 2	Maximum allowable THU 95% <i>Confidence level</i>	2 metres	5 metres + 5% of depth	5 metres + 5% of depth	20 metres + 10% of depth
Para 3.2 and note 1	Maximum allowable TVU 95% <i>Confidence level</i>	a = 0.25 metre b = 0.0075	a = 0.5 metre b = 0.013	a = 0.5 metre b = 0.013	a = 1.0 metre b = 0.023
Glossary and note 2	Full Sea floor Search	Required	Required	Not required	Not required
Para 2.1 Para 3.4 Para 3.5 and note 3	Feature Detection	Cubic <i>features</i> > 1 metre	Cubic <i>features</i> > 2 metres, in depths up to 40 metres; 10% of depth beyond 40 metres	Not Applicable	Not Applicable
Para 3.6 and note 4	Recommended maximum Line Spacing	Not defined as full sea floor search is required	Not defined as full sea floor search is required	3 x average depth or 25 metres, whichever is greater For bathymetric lidar a spot spacing of 5 x 5 metres	4 x average depth
Chapter 2 and note 5	Positioning of fixed aids to navigation and topography significant to navigation. (95% <i>Confidence level</i>)	2 metres	2 metres	2 metres	5 metres
Chapter 2 and note 5	Positioning of the Coastline and topography less significant to navigation (95% <i>Confidence level</i>)	10 metres	20 metres	20 metres	20 metres
Chapter 2 and note 5	Mean position of floating aids to navigation (95% <i>Confidence level</i>)	10 metres	10 metres	10 metres	20 metres

IHO STANDARDS FOR HYDROGRAPHIC SURVEYS (S-44)
5th Edition February 2008

Notes:

- 1: Recognising that there are both constant and depth dependent uncertainties that affect the uncertainty of the depths, the formula below is to be used to compute, at the 95% confidence level, the maximum allowable TVU. The parameters “a” and “b” for each Order, as given in the Table, together with the depth “d” have to be introduced into the formula in order to calculate the maximum allowable TVU for a specific depth:

$$\pm \sqrt{a^2 + (b \times d)^2}$$

Where:

- a represents that portion of the uncertainty that does not vary with depth
 - b is a coefficient which represents that portion of the uncertainty that varies with depth
 - d is the depth
 - b x d represents that portion of the uncertainty that varies with depth
- 2: For safety of navigation purposes, the use of an accurately specified mechanical sweep to guarantee a minimum safe clearance depth throughout an area may be considered sufficient for Special Order and Order 1a surveys.
- 3: A cubic feature means a regular cube each side of which has the same length. It should be noted that the IHO Special Order and Order 1a feature detection requirements of 1 metre and 2 metre cubes respectively, are minimum requirements. In certain circumstances it may be deemed necessary by the hydrographic offices / organizations to detect smaller features to minimise the risk of undetected hazards to surface navigation. For Order 1a the relaxing of feature detection criteria at 40 metres reflects the maximum expected draught of vessels.
- 4: The line spacing can be expanded if procedures for ensuring an adequate sounding density are used.
"Maximum Line Spacing" is to be interpreted as the:
- Spacing of sounding lines for single beam echo sounders, or the
 - Distance between the useable outer limits of swaths for swath systems.
- 5: These only apply where such measurements are required for the survey.

Appendix B. MARINE AGGREGATE REGIONAL MONITORING SURVEYS METHODOLOGY FOR COST ALLOCATION AMONGST MARINE AGGREGATE INDUSTRY OPERATORS

Background

Marine aggregate operators are required to undertake a range of marine surveys (bathymetry, side scan sonar, seabed sediment sampling and benthic sampling) to deliver the compliance conditions attached to site specific marine licences. Traditionally, the scope and frequency of these compliance requirements would vary between licences, and as a consequence the surveys would be designed and commissioned by individual industry operators in consultation with regulators and advisors at a licence specific scale. Given the proximity of many marine licence areas to one another, this approach resulted in considerable duplication of time and effort by all parties involved in the process. This duplication of effort was also reflected in the costs expended by industry to undertake such work, as a consequence of multiple surveys being commissioned to acquire data from adjacent sites at different times.

Introduction of Regional Seabed Monitoring Plans

In 2014, the marine aggregate industry commissioned a series of Regional Seabed Monitoring Plans (RSMP) to determine the baseline environmental conditions across five geographic regions; the Humber, the Anglian, the Outer Thames, the Eastern English Channel, and the South coast.

These works were undertaken to fulfil the seabed sampling conditions attached to marine licences for marine aggregate extraction issued by the Marine Management Organisation (MMO) from 2013 onwards. Additionally, marine aggregate operators chose to apply this new approach to a number of existing marine aggregate licence and application areas that were present in each region. In total the RSMP programme applies to over 60 marine aggregate production licence and application areas operated by 10 operating companies and has required seabed data to be collected from 3,500 sample stations.

For each region, a baseline array of sample stations focussing on primary and secondary impact zones of the licence/application areas being surveyed has been defined, together with a supporting array of regional context sample stations and regional reference areas.

The cost split methodology for the RSMP is defined in a separate document, dated 12th November 2014.

Development of a wider approach to Regional Monitoring Surveys

The practical delivery of the RSMP baseline surveys, simultaneously across five regions during 2014/15, highlighted the significant time, effort and costs that were involved for industry and also for the regulators and advisors that would ultimately receive and review the data for compliance purposes. Given that repeat monitoring surveys would be required to deliver the compliance requirements throughout the term of each marine licence (typically

15 years, but with the potential for licences being renewed for a further 15 years), there was the potential for the workload and cost to be concentrated into particular years with implications for practical resourcing and delivery.

Recognising the practical savings in time, effort and cost that can be realised through a more coordinated approach, it was agreed that the concept of planning, undertaking and reporting wider compliance surveys (multibeam bathymetry and side scan sonar) at a regional scale using a common standard be extended to all licences.

To enable this, the common monitoring requirements that applied to every licence area would need to be standardised, so their scope and frequency was consistent. In turn, has allowed the timings of all standard monitoring survey events to be aligned at a regional scale so that all licences are required to deliver the same surveys at the same time.

The timings of the various regional survey events have then been amended so they are staggered across multiple years so the pressures on workload and cost are spread more evenly.

An agreed monitoring plan will be developed by the industry for each region. This will define the management blueprint that sets out the timings and scope of all the various standard compliance and reporting events that will apply to all existing marine licences for aggregate extraction. This framework is also intended to apply to any new marine licences that may be permspecificationed in the future.

This document defines the agreed methodology adopted for allocating the survey and administration costs associated with delivering the regional monitoring requirements in an equitable, consistent, and repeatable manner.

This document also defines how this agreed methodology is to be adopted for allocating the survey and administrative costs associated with delivering subsequent monitoring requirements, including the inclusion of new licence areas into the process.

The rationale, scope, and methodology for the regional monitoring approach (definition of regions, timings, surveys specification, data processing and analysis) are detailed separately in a document prepared by MMO.

Baseline Regional Monitoring Survey Costs

Baseline Regional Monitoring Surveys (BRMS) are typically required to be undertaken prior to dredging commencing under a new marine licence. Under certain circumstances, MMO may determine that a BRMS be undertaken as part of the next Full Regional Monitoring Survey that has been defined under the regional monitoring plan that has been agreed for the region.

The scope of the licence specific survey will vary on a case-by-case basis, but they will typically involve 100% multibeam bathymetry and side scan sonar data across the area of seabed that has been permspecificationed for dredging (Primary Impact Zone – PIZ) together with a suitable Secondary Impact Zone (SIZ) buffer area to address any potential indirect effects that may arise once dredging commences.

It will be for individual operators to define and agree the extent of the Baseline PIZ and Baseline SIZ for each individual licence with the regulator and their advisors. These coverages will be used to define the regional survey array that is required. The costs involved in such works comprise of three distinct elements:

- i. *Contractor baseline survey costs* – comprising the percentage share of total survey line kilometres required to survey the agreed Baseline PIZ/SIZ for a licence as part of the total regional survey array being undertaken (including tie lines).
- ii. *Contractor fixed survey costs* – comprising the project management, mob/demob, QA/QC and reporting costs associated with a Regional Monitoring Survey.
- iii. *Third party management & administration costs* – comprising those additional costs associated with coordinating and managing the delivery of a Regional Monitoring Survey – including liaison and management of contractors, obtaining the necessary permissions for the regional sample arrays and survey notifications.

The share of each of these three components will be calculated in a different way:

Contractor baseline survey costs

The contractor baseline survey costs will directly reflect the contribution that the array for each individual licence area make to the overall regional survey array, calculated as a percentage share of total line kilometres.

These costs will comprise both the survey works (vessel, personnel time, consumables & weather risk) and the processing/analysis works.

The close proximity of licence areas present in many regions means there are likely to be instances where data requirements may overlap, for example where a SIZ for one licence extends into the SIZ of an adjacent licence. In these cases, the common survey line kilometres should be shared on a pro rata basis.

Contractor fixed survey costs

The contractor fixed costs are shared equally across all operators participating in a Regional Monitoring Survey, to reflect the costs associated with undertaking and delivering the regional sampling requirement.

As the fixed costs would be incurred by any party commissioning a monitoring survey of any scale, the fixed costs are to be shared on an equal basis across all the operators with licence interests in a baseline regional monitoring survey. These will include project management, mob/de-mob, QA/QC and final reporting costs.

Third Party Management & administration costs

Third party management & administration costs are shared equally across all operators with licence area interests.

During the preparation and delivery of a regional monitoring survey, it may be necessary to commission additional support to ensure the successful delivery of the programme. Any third-party management and administrative costs that are incurred will be shared equally across all operators with licence area interests being surveyed. The scope of this split may be applied at either an individual regional scale or across multiple regions, depending on the nature of the function that is being delivered.

Interval Regional Monitoring Survey Costs

Following a Baseline Regional Monitoring Survey (BRMS), Interval Regional Monitoring Surveys (IRMS) are to be undertaken in years 2, 7 and 12 of the regional monitoring plans defined for each geographic region for which this approach applies. The scope of each licence specific survey required under the IRMS will vary on a case-by-case basis. Typically, such surveys will involve 100% multibeam bathymetry across the area of seabed that has been physically dredged since the last regional survey (Interval PIZ as defined by reference to Electronic Monitoring System data) together with a suitable Interval SIZ buffer area to allow any potential secondary effects to be monitored.

It will be for individual operators to define and agree the extent of the Interval PIZ and Interval SIZ for each individual licence with the regulator and their advisors. These coverages will be used to define the regional survey array that is required. To ensure regional monitoring survey costs continue to be allocated in an equitable, consistent, and repeatable manner, the general approach to allocating the costs of interval surveys closely replicates that established for the baseline surveys.

The costs involved in such works comprise of three distinct elements:

- i. *Contractor interval survey costs* – comprising the percentage share of total survey line kilometres required to survey the agreed Interval PIZ/SIZ for a licence as part of the total regional survey array being undertaken (including tie lines).
- ii. *Contractor fixed survey costs* – comprising the project management, mob/demob, QA/QC and reporting costs associated with a Regional Monitoring Survey.
- iii. *Third party management & administration costs* – comprising those additional costs associated with coordinating and managing the delivery of a Regional Monitoring Survey – including liaison and management of contractors, obtaining the necessary permissions for the regional sample arrays and survey notifications.

The share of each of these three components will be calculated in a different way:

Contractor interval survey costs

The contractor baseline survey costs will directly reflect the contribution that the array for each individual licence area make to the overall regional survey array, calculated as a percentage share of total line kilometres.

These costs will comprise both the survey works (vessel, personnel time, consumables & weather risk) and the processing/analysis works.

The close proximity of licence areas present in many regions means there are likely to be instances where data requirements may overlap, for example where a SIZ for one licence extends into the SIZ of an adjacent licence. In these cases, the common survey line kilometres should be shared on a pro rata basis.

Contractor fixed survey costs

The contractor fixed costs are shared equally across all operators participating in a Regional Monitoring Survey, to reflect the costs associated with undertaking and delivering the regional sampling requirement.

As the fixed costs would be incurred by any party commissioning a monitoring survey of any scale, the fixed costs are to be shared on an equal basis across all the operators with licence interests in an interval regional monitoring survey. These will include project management, mob/de-mob, QA/QC and final reporting costs.

Third Party Management & administration costs

Third party management & administration costs are shared equally across all operators with licence area interests.

During the preparation and delivery of a regional monitoring survey, it may be necessary to commission additional support to ensure the successful delivery of the programme. Any third-party management and administrative costs that are incurred will be shared equally across all operators with licence area interests being surveyed. The scope of this split may be applied at either an individual regional scale or across multiple regions, depending on the nature of the function that is being delivered.

Full Regional Monitoring Survey Costs

Following a Baseline Regional Monitoring Survey (BRMS), Full Regional Monitoring Surveys (FRMS) are to be undertaken in years 4, 9 and 14 of the regional monitoring plans defined for each geographic region for which this approach applies. The scope of each licence specific survey required under the FRMS will vary on a case-by-case basis. Typically, such surveys will involve 100% multibeam bathymetry and side scan sonar across the area of seabed that has been physically dredged since production commenced under the current marine licence (Full PIZ as defined by reference to Electronic Monitoring System data) together with a suitable Full SIZ buffer area to allow any potential secondary effects to be monitored.

It will be for individual operators to define and agree the extent of the Full PIZ and Full SIZ for each individual licence with the regulator and their advisors. These coverages will be used to define the regional survey array that is required.

To ensure regional monitoring survey costs continue to be allocated in an equitable, consistent and repeatable manner, the general approach to allocating the costs of full surveys closely replicates that established for the baseline surveys.

The costs involved in such works comprise of three distinct elements:

- i. *Contractor full survey costs* – comprising the percentage share of total survey line kilometres required to survey the agreed Full PIZ/SIZ for a Licence as part of the total regional survey array being undertaken (including tie lines).

- ii. *Contractor fixed survey costs* – comprising the project management, mob/demob, QA/QC and reporting costs associated with a Regional Monitoring Survey.

- iii. *Third party management & administration costs* – comprising those additional costs associated with coordinating and managing the delivery of a Regional Monitoring Survey – including liaison and management of contractors, obtaining the necessary permissions for the regional sample arrays and survey notifications.

The share of each of these three components will be calculated in a different way:

Contractor full survey costs

The contractor baseline survey costs will directly reflect the contribution that the array for each individual licence area make to the overall regional survey array, calculated as a percentage share of total line kilometres.

These costs will comprise both the survey works (vessel, personnel time, consumables & weather risk) and the processing/analysis works.

The close proximity of licence areas present in many regions means there are likely to be instances where data requirements may overlap, for example where a SIZ for one licence extends into the SIZ of an adjacent licence. In these cases, the common survey line kilometres should be shared on a pro rata basis.

Contractor fixed survey costs

The contractor fixed costs are shared equally across all operators participating in a Regional Monitoring Survey, to reflect the costs associated with undertaking and delivering the regional sampling requirement.

As the fixed costs would be incurred by any party commissioning a monitoring survey of any scale, the fixed costs are to be shared on an equal basis across all the operators with licence interests in a full regional monitoring survey. These will include project management, mob/de-mob, QA/QC and final reporting costs.

Third Party Management & administration costs

Third party management & administration costs are shared equally across all operators with licence area interests.

During the preparation and delivery of a regional monitoring survey, it may be necessary to commission additional support to ensure the successful delivery of the programme. Any third-party management and administrative costs that are incurred will be shared equally across all operators with licence area interests being surveyed. The scope of this split

may be applied at either an individual regional scale or across multiple regions, depending on the nature of the function that is being delivered.

Appendix C. East Bristol Channel Coast Regional Geophysical Monitoring Survey Area Coordinates

(Latitude/Longitude WGS84 - degrees, decimal minutes)

Operators	Area	ID	Latitude			Longitude		
Cemex UK Marine, Heidelberg Materials UK Marine, Tarmac Marine	526	526-1	51	17.8023	N	3	19.5711	W
		526-2	51	17.60532	N	3	19.7244	W
		526-3	51	17.42784	N	3	19.71708	W
		526-4	51	17.27868	N	3	19.58472	W
		526-5	51	17.1321	N	3	19.30668	W
		526-6	51	17.13288	N	3	18.89418	W
		526-7	51	17.1957	N	3	18.43008	W
		526-8	51	17.24514	N	3	18.21336	W
		526-9	51	17.22156	N	3	17.95224	W
		526-10	51	17.23578	N	3	17.18916	W
		526-11	51	17.25096	N	3	16.90758	W
		526-12	51	17.21334	N	3	16.70478	W
		526-13	51	17.23494	N	3	16.30368	W
		526-14	51	17.30772	N	3	15.95262	W
		526-15	51	17.33592	N	3	15.22584	W
		526-16	51	17.41374	N	3	15.08172	W
		526-17	51	17.4537	N	3	14.53698	W
		526-18	51	17.61324	N	3	14.27502	W

Regional Geophysical Monitoring Programme Invitation to Tender – Bristol Channel 2026

		526-19	51	17.6541	N	3	14.01408	W
		526-20	51	17.53104	N	3	13.18926	W
		526-21	51	17.69628	N	3	12.1113	W
		526-22	51	18.02994	N	3	12.01884	W
		526-23	51	17.98656	N	3	11.6691	W
		526-24	51	18.07614	N	3	11.19966	W
		526-25	51	18.29082	N	3	11.01372	W
		526-26	51	18.5592	N	3	11.13588	W
		526-27	51	18.66138	N	3	11.64846	W
		526-28	51	18.72762	N	3	11.92404	W
		526-29	51	18.67098	N	3	12.38076	W
		526-30	51	18.65064	N	3	12.6618	W
		526-31	51	18.67806	N	3	12.85476	W
		526-32	51	18.63828	N	3	13.39974	W
		526-33	51	18.6669	N	3	14.07444	W
		526-34	51	18.56916	N	3	14.49114	W
		526-35	51	18.5037	N	3	15.10998	W
		526-36	51	18.56874	N	3	15.80682	W
		526-37	51	18.4689	N	3	16.63596	W
		526-38	51	18.27612	N	3	17.26308	W
		526-39	51	18.21384	N	3	18.06714	W
		526-40	51	18.11706	N	3	18.46224	W
		526-41	51	18.06492	N	3	18.90222	W
	531	531-1	51	27.95652	N	2	59.50122	W

Regional Geophysical Monitoring Programme – Bristol Channel 2026

Heidelberg Materials UK Marine, Tarmac Marine		531-2	51	27.8142	N	2	59.7543	W
		531-3	51	27.6789	N	2	59.87022	W
		531-4	51	27.47322	N	2	59.83452	W
		531-5	51	27.1182	N	2	59.55924	W
		531-6	51	26.9895	N	2	59.2836	W
		531-7	51	26.96166	N	2	59.03838	W
		531-8	51	27.00102	N	2	58.63818	W
		531-9	51	27.147	N	2	58.31226	W
		531-10	51	27.9465	N	2	55.84146	W
		531-11	51	28.18002	N	2	55.64748	W
		531-12	51	28.41012	N	2	55.73346	W
		531-13	51	28.50312	N	2	55.9182	W
		531-14	51	28.6485	N	2	56.07954	W
		531-15	51	28.7028	N	2	56.33688	W
		531-16	51	28.67472	N	2	56.8899	W
		531-17	51	28.56006	N	2	57.2892	W
		531-18	51	28.47162	N	2	57.64872	W
		531-19	51	28.12122	N	2	58.81098	W
		531-20	51	28.09956	N	2	59.02386	W

Appendix D. BMAPA Fisheries Code of Practice

MARINE AGGREGATE EXTRACTION AND THE FISHING INDUSTRY

Operational Code of Practice

This code has been developed by the British Marine Aggregate Producers Association (BMAPA), the Marine Management Organisation (MMO) and The Crown Estate for the marine aggregate industry, in order to minimise operational conflicts between aggregate dredging vessels and fishing vessels/activity – particularly the loss or damage of fishing gear. This code defines best practice for communication between marine aggregate operators and fisheries interests both in advance of dredging operations commencing and while dredging operations are taking place.

The following procedures should be adopted by the marine aggregate industry. In advance of dredging operations:

1. Regional Active Dredge Area (RADA) charts will be produced by BMAPA and The Crown Estate on a bi-annual basis (charts are dated 31 January and 31 July) to show where dredging is currently permisspecified within existing production licences. Areas where dredging is permisspecified is monitored by the MMO through the approved Electronic Monitoring Systems (EMS) located on each vessel. The need for working areas within production licences may be defined through existing licence conditions or through operators' voluntary management arrangements. Any changes to active dredge areas between issues of each RADA chart will be clearly highlighted.

2. Dredging operators will ensure that the limits of their active dredge areas are up to date and coincide with the EMS boundaries so they can be accurately presented through the RADA charts that are routinely issued.

3. The RADA charts will include up to date contact details for all marine aggregate operators with licensed interests in the region.

4. Laminated versions of the RADA charts will be produced by BMAPA on a bi-annual basis and circulated to local fisheries interests (charts may be made available via the relevant MMO coastal office or direct from BMAPA). The latest RADA chart issued will also be flagged via the Marine Aggregate Kingfisher Fortnightly Bulletin service

<http://www.seafish.org/industry-support/kingfisher-information-services/kingfisher-bulletins>

and will be available to be downloaded at

http://www.bmapa.org/issues/other_sea_users.php

5. Where changes to active dredge areas are required (including the commencement of operations on a newly licensed production Licence area), dredging operators will normally be required to provide a minimum of four weeks' notice prior to commencing operations in any new working areas that are defined. Details of the proposed changes will be flagged via the Marine Aggregate Kingfisher Fortnightly Bulletin service, and operators may also be required to directly notify local fishing associations, using where necessary the assistance of the MMO and regional Inshore Fisheries and Conservation Authorities (IFCA) offices.

6. Under exceptional operational circumstances, changes to working areas may be required inside of the standard four week notice period. Should this situation occur, operators are required to liaise directly with the MMO, regional IFCA offices and local fishing associations in order to determine any particular conflicts that could exist and any additional mitigation measures that may be required.

During dredging operations:

7. Dredging and fishing vessels to maintain listening watch on VHF Channel 16.

8. Masters of dredgers to call up on VHF Channel 16 when approaching a dredging area at a range of 10 nautical miles (approximately one hour before operations are to commence). They should provide an estimated time of arrival on the area and position of operation.

9. On hearing a dredging vessel's notification any fishing vessels in the area should respond giving their position and the gear being worked. A VHF working channel should be established between the dredger and the fishing vessel (s).

10. Once communications have been established liaison can take place to allow time for the removal of fishing gear as may be necessary. Dredging should commence clear of fishing gear until it is removed.

11. Masters of fishing vessels approaching an area where an aggregate dredging vessel is operating should call up the dredger on VHF Channel 16 to establish lines of communication.

12. The MMO, regional IFCA offices and local fishing associations can be used to establish communications depending upon the area being worked, such as in cases where direct communication between dredging vessels/operators and fishing vessels/activities is proving difficult.

During survey operations:

13. A range of survey activities may be taken by marine aggregate operators in order to investigate a new area of seabed for potential resources (prospecting) or to obtain environmental data to allow environmental impact assessment to inform a new application. Once an area has been consented, various survey activities will be required during its operation to demonstrate compliance with marine licence conditions and for the operators own resource management purposes. In all cases, it is recognised that such survey works have the potential to interact with other marine users, including fisheries interests.

14. Survey activities comprise of two principal types.

Sampling activities involve a grab or vibrocore being deployed to the seabed from a vessel at a number of sample stations across a given area. Each sample will take between 10 minutes and one hour to obtain, depending on whether the vessel is required to anchor. During the sampling activities, the vessel will display the appropriate lights/shapes for a vessel restricted in its ability to manoeuvre which may create a temporary obstruction for other marine users, including mobile fishing activity. If the vessel is not required to anchor, then the potential for the sampling activities to interfere with static fishing gear is considered to be limited. However, if the vessel is required to anchor before undertaking the sampling works the potential for interaction with static fishing gear will be far greater.

Acoustic and geophysical surveys involve a vessel repeatedly transiting across a defined area in a grid pattern. The equipment for bathymetric surveys will typically be mounted on the hull of the vessel, so the potential for such works to interact with either mobile or static fishing activity is considered to be limited. However, survey works which require equipment to be towed behind the vessel (such as seismic, magnetometer or side scan sonar equipment) – either on the surface or submerged – clearly have far greater potential

to interact with static fishing gear, although the cost of the equipment and importance of obtaining the data will mean that contractors will look to avoid this.

In both cases, the survey works are not expected to have any primacy over other activities that may be taking place.

15. Given the range of survey activity associated with marine aggregate interests that may take place throughout its lifetime, it is essential operators provide sufficient notice to other marine users, including local fisheries interests, to ensure that any potential conflicts can be minimised. Notices should include the type of works being undertaken, the geographical location, the start date and the estimated duration. Contact details for the vessel undertaking the works and the operator (or the operator's agent) should also be provided.

16. Similar to the notice required for the commencement of dredging in a new area (paragraph 5 above), a minimum of four weeks' notice should be provided before any survey works begin outside of the active dredge zone(s) of licence areas. Details of the proposed works should be flagged via the Marine Aggregate Kingfisher Fortnightly Bulletin service, and operators may also choose to directly notify local fishing associations, using where necessary the assistance of the MMO and regional IFCA offices. In some cases, it may be advantageous to appoint a local fisheries liaison officer to assist with the local notifications. Should the commencement date for planned survey works change, on account of inclement weather or because of vessel availability for example, further updates should be provided.

17. The variables associated with suitable weather windows and vessel availability required to undertake offshore survey works mean there may be occasions where it is not possible to provide four weeks' notice. Should this situation occur, operators are required to liaise directly with the MMO, regional IFCA offices and local fishing associations in order to determine any particular conflicts that could exist and any additional mitigation measures that may be required. In all but the most exceptional circumstances, a minimum of two weeks' notice should be provided before any works commence outside active licence areas.

18. Unless there are exceptional circumstances, a minimum of five working days' notice will be provided for surveys undertaken within the active dredge zone(s) of licence areas.

19. It is the responsibility of the dredging operator to ensure the risks of any conflicts with fisheries interests are minimised while survey works are being undertaken on their behalf. Operators will require survey contractors to be mindful of fishing interests and to take appropriate action to avoid or minimise interaction with fishing gear whilst surveying. Where appropriate, regular broadcasts by survey vessels, giving updates on the survey programme, will be made.

20. Where the notice of an offshore survey identifies the potential for conflict or interaction with existing fisheries interests, the operator should consider what additional mitigation measures may be possible. These may include excluding survey work in defined areas where high densities of fishing activity have been identified, only working during daylight hours to reduce the risk of interacting with static gear, appointing a fisheries liaison officer on board the survey vessel to liaise directly with fisheries interests, or delaying the commencement of works to allow time for fishing gear to be relocated. With careful advanced planning, it may be possible to arrange for temporary removal of static gear at a time that is mutually acceptable.

21. Where it has been established that specific interaction is likely to occur, throughout the survey, operators should provide regular update notices on progress with the works to local interests. Where the survey area is large, this may include defining the specific areas where works are underway over a given period of time. Any delays to the works, such as through inclement weather, should be clearly signalled along with the potential impact on the end date of the works. Where particular site-specific interactions with local fisheries interests have been identified, confirmation should be provided once the survey works have ended.

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Appendix E. Outline methodology for determining average bathymetric / resource depth change over marine aggregate production Licence areas

In order to demonstrate compliance with several conditions routinely attached to marine licences issued for marine mineral extraction, it is necessary to routinely monitor and assess licence specific bathymetric data during the lifetime of operations.

This data can be used for two principal purposes:

- i. To monitor the changes in bathymetry that result from the extraction activity to ensure they remain within the thresholds (maximum depth change) tested through the Coastal Impact Assessment undertaken for the area; and
- ii. To monitor the changes in resource thickness that result from the extraction activity to ensure that a minimum 0.5m of resource remains, and that underlying sediments are not unacceptably exposed.

In undertaking these analyses, there are a range of variables that have to be considered, including;

- The uneven nature of the seabed (particularly where no pre-dredge data is available)
- The differing penetration of the draghead (due to differing shapes or designs)
- Differing sediments and the degree of compaction of the sediment
- The horizontal extent (lines every 100-250m) and vertical resolution of the 2D seismic data used to define the vertical thickness of the resource
- The irregular relationship between the resource and the underlying sediments
- The fact that the base of the resource may not easily defined but can taper off into different (non-aggregate) substrates.

As a consequence, a standard methodology has been developed which allows the analysis of bathymetric/resource thickness change to be undertaken at a realistic resolution which considers the variables that exist.

The analysis requires a baseline to be defined across the licence area and then monitoring the changes that occur over time using a series of pre-defined nodes arranged on a 125 x 125m grid. To take into account the variables that may exist in the resolution and accuracy of the data being analysed, a value for each grid node is calculated based on the average from the data in a 250m x 250m grid area centred on the node. The overlap in data between nodes increases the resolution of the analysis which in turn reduces the potential for breaches in acceptable limits (whether bathymetric change or remaining resource thickness). When this data is then contoured, it allows changes across the licence area to be resolved at a 125m resolution. This in turn allows effective management measures to be implemented – such as exclusion zones.

Methodology – Changes to bathymetry

Define the bathymetric baseline

1. Undertake a baseline bathymetric survey across the licence area to the specification agreed with the regulator and their advisors
2. Define a series of nodes on a 125m x 125m grid across the licence area (including a surrounding buffer area where required)
3. At each node, generate a bathymetric value from the average of all the values contained within a 250m x 250m square centred on each node from the baseline bathymetric dataset
4. Contour the node values generated under 3. across the licence area to define the baseline conditions.

Define the threshold to be monitored against

5. Determine the maximum depth change limit(s) tested in the coastal impact study that was used to support the site-specific marine licence decision.

Monitor

6. Undertake a monitoring bathymetric survey across the licence area at the timing and to the specification agreed with the regulator and their advisors
7. Using the series of nodes defined under 2., generate a bathymetric value from the average of all the values contained within a 250m x 250m square centred on each node from the monitoring bathymetric dataset
8. Contour the node values generated under 7. across the licence area
9. Compare the monitoring data generated under 8. with the baseline data generated under 4., and generate a contoured plot to show the differences between the baseline and monitoring data
10. Compare the contoured difference plot generated under 9. with the threshold limits defined under 5.
11. From this analysis, determine whether dredging can continue or whether exclusion zones need to be defined to prevent the threshold limits being breached for maximum dredge depth.

Each time a bathymetric monitoring survey is carried out during the lifetime of a Marine Licence the applicant should provide an updated difference plot to the pre-dredge setting to demonstrate that the newly acquired bathymetry is still within the thresholds defined by the worst-case bathymetry modelled through the Coastal Impact Study process. This is to ensure that the physical process impacts are within the limits assessed by CIS.

Methodology – Changes to Resource Thickness

Define the bathymetric baseline

1. Undertake a baseline bathymetric survey across the licence area to the specification agreed with the regulator and their advisors
2. Define a series of nodes on a 125m x 125m grid across the licence area (including a surrounding buffer area where required)
3. At each node, generate a bathymetric value from the average of all the values contained within a 250m x 250m square centred on each node from the baseline bathymetric dataset
4. Contour the node values generated under 3. across the licence area to define the baseline conditions.

Define the thresholds to be monitored against

5. Define a series of isopaches to reflect the pre-dredge resource thicknesses across the licence area. This will be derived from the original resource isopaches, taking account of any subsequent changes resulting from production operations (area dredged/tonnage and volume changes);

Monitor

6. Undertake a monitoring bathymetric survey across the licence area at the timing and to the specification agreed with the regulator and their advisors
7. Using the series of nodes defined under 2., generate a bathymetric value from the average of all the values contained within a 250m x 250m square centred on each node from the monitoring bathymetric dataset
8. Contour the node values generated under 7. across the licence area
9. Compare the monitoring data generated under 8. with the baseline data generated under 4., and generate a contoured plot to show the depth change differences between the baseline and monitoring datasets
10. Compare the contoured difference plot generated under 9. with the threshold limits defined under 5. and generate a contoured plot to show the resource thickness differences between baseline and monitoring datasets.
11. From this analysis, determine whether dredging can continue or whether exclusion zones need to be defined to prevent the threshold limits being breached for minimum remaining resource thickness.

Each time a bathymetric monitoring survey is carried out during the lifetime of a Marine Licence the applicant should provide an updated representation of the remaining isopach thicknesses to demonstrate that a minimum average of 0.5m resource is present across the licence area.