



# 2025 Interim Regional Geophysical Monitoring Survey Report

Licence Area 531

PREPARED FOR

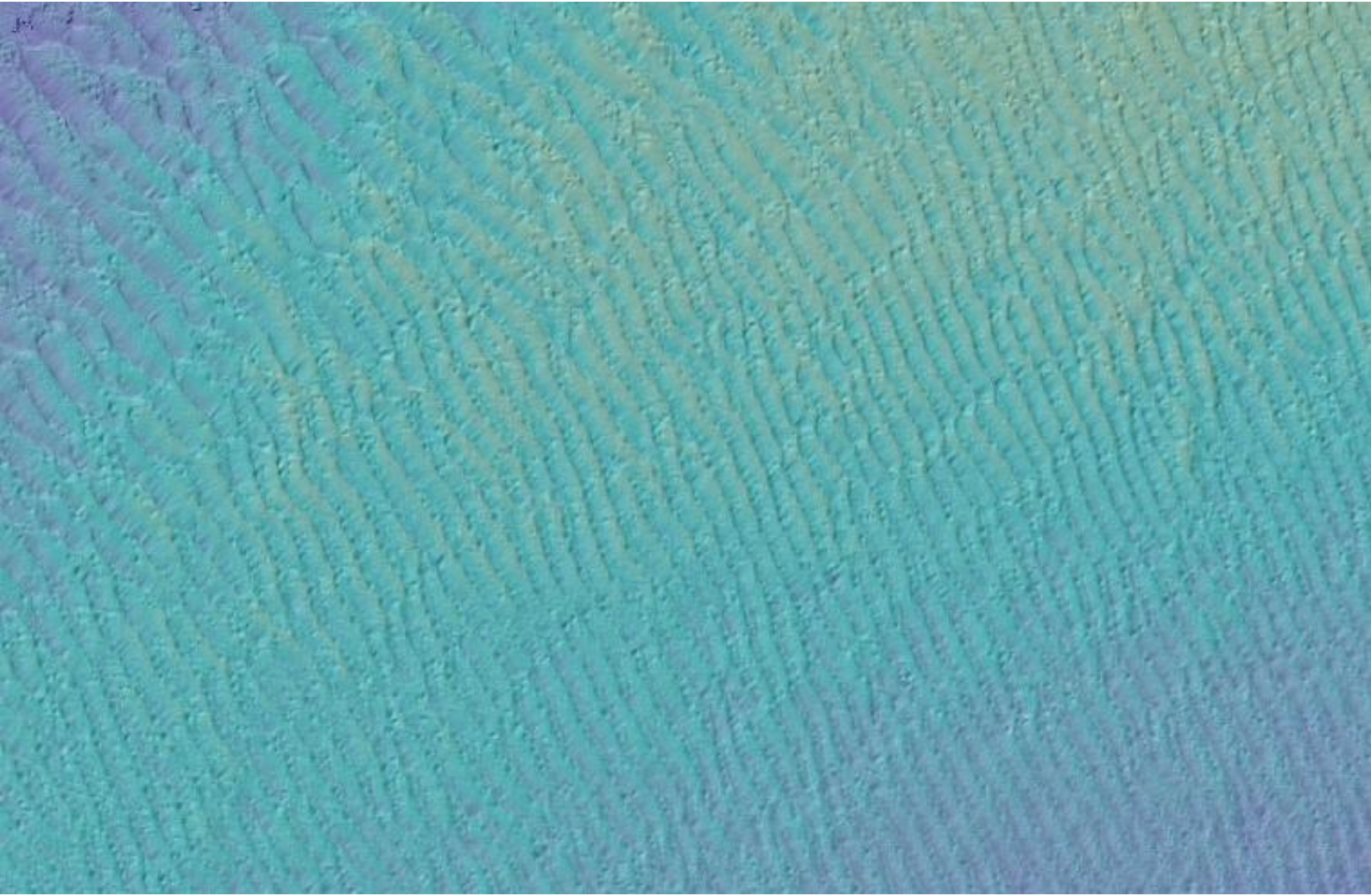


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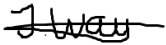
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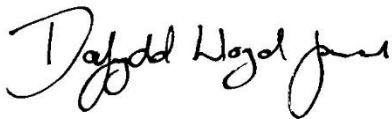
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## ACRONYMS AND ABBREVIATIONS

<b>Acronym/ Abbreviation</b>	<b>Description</b>
CD	Chart Datum
DGM	Digital Ground Model
EMS	Electronic Monitoring System
ERM	Environmental Resource Management
ES	Environmental Statement
EZ	Exclusion Zone
HM	Heidelberg Materials UK Aggregates Marine
km	Kilometre
m	Metre
MMO	Marine Management Organisation
Mt	Million Tonnes
NRW	Natural Resources Wales
iRGMP	interim Regional Geophysical Monitoring Report
RGMP	Regional Geophysical Monitoring Report
t	Tonne
TM	Tarmac Marine Ltd
UKHO	United Kingdom Hydrographic Office
UTM	Universal Transverse Mercator
VORF	Vertical Offshore Reference Frame

## EXECUTIVE SUMMARY

The co-operators of Licence Area 531, Tarmac Marine Ltd and Heidelberg Materials UK Aggregates Marine, have contracted Environmental Resources Management Ltd to undertake an interim regional geophysical monitoring review. The marine aggregate Licence Area 531 is located to the south of the West Middle Ground bank, in the Severn estuary, 13 km east of Cardiff.

This report provides a summary of the results of the interim Regional Geophysical Monitoring Programme survey work, carried out by ABPmer, in 2024. Full coverage multibeam bathymetry data were acquired across the area dredged since 2022, as indicated by The Crown Estate's Electronic Monitoring System, plus a buffer of at least 50 m. This report compares the data with the previous surveys: the previous monitoring survey in 2022 by Shoreline Surveys Ltd, and the 2018 baseline survey undertaken by Titan Environmental Surveys Ltd.

The water depths recorded in the 2024 data ranged from 1.5 m above Chart Datum (using the Vertical Offshore Reference Frame model shifts) in the central and northeastern area, to 12.2 m below Chart Datum in the northwestern region. The licence area is located over a bank, with small to large subaqueous dunes present across much of the area. The area was seen to be highly dynamic, with subaqueous dunes seen to migrate between survey time periods, even within the same year's campaign.

The average bathymetric changes across the entire survey area, between 2022 and 2024, were within 1.0-3.0 m, and within 0.5-7.7 m between 2018 and 2024. The majority of bathymetric changes were mainly related to the accretion of sediment within the centre and west of the licence area. Although dredged between 2022 and 2024, as well as between 2018 and 2024, no clear lowering of the seabed was visible within the licence area; however, the area with the greatest accumulation of sediment was less intensely dredged. The region is highly dynamic and heavily influenced by tides and currents, and the accumulation appears linked to the migration of the banks, with a natural replenishment of material in the central region of the area.

Between 2022 and 2024, a small region of shallowing was noted in the far eastern part of the area, up to 2.6 m, or less than 0.5 m on average. Between 2018 and 2024, the shallowing in this area was up to 4.5 m, or 1.70 m on average. For both bathymetric comparisons, the majority of the shallowing was outside of the licence area. Profiles of the changes indicate that the changes appear to be linked to natural migration and variability within the dynamic system.

The resources remaining in Licence Area 531 were updated for the bathymetric change occurring between 2022 and 2024. The results show that the resource, averaged over a 250 m grid, centred on 125 m nodes, has at least 6.4-8.0 m remaining, with more than 12 m in the majority of the licence area, and up to 28.3 m in the northern part of the licence area. There are no areas of less than 0.5 m of resource remaining.

As a result, there were no areas requiring exclusion zones to manage areas of thin resource.

It is recommended that the monitoring programme continues to be undertaken, as set out in the licence conditions and monitoring plan, to include:

- A full geophysical survey including the collection of multibeam bathymetry and sidescan sonar over the area dredged since the beginning of the licence will be completed in 2026. The line spacing of the survey will ensure full coverage of data across the survey area. A conservation and archaeological review will be undertaken alongside resource updates;
- A regional seabed monitoring survey will be conducted in 2026, over a confirmed array comparable to the pre-dredge survey;
- Reporting of the monitoring will be completed within the calendar year following the calendar year of the monitoring survey, therefore the 2026 Regional Geophysical Monitoring Program and Regional Seabed Monitoring Program will be reported in 2027;
- A substantive review will be submitted by 2028, with the current monitoring plan reviewed and confirmed.

To date, the bathymetric monitoring programme has shown that the effects from aggregate extraction are, in general, within the envelope of those predicted by the Environmental Statement and Licence Conditions. Considering the evidence presented within this report, it is concluded that dredging activity in Area 531 has not resulted in any unpredicted or unacceptable impacts to the marine environment.

# 1. INTRODUCTION

## 1.1 PROJECT BACKGROUND

Tarmac Marine Ltd (TM) and Hanson Aggregate Marine Ltd, now trading as Heidelberg Materials UK Aggregates Marine (HM) are both licence holders for Area 531 and have contracted Environmental Resources Management Ltd (ERM) to undertake an interim Regional Geophysical Monitoring Programme (iRGMP) review. The marine aggregate Area 531 is located to the south of West Middle Ground, in the Severn estuary, 13 km east of Cardiff (see Figure 1-1). The English/Welsh median line runs through Area 531; therefore, it is split into 2 sub-areas. According to the Marine Licence (MMML1948v1TC; updated 2021), Area 531 covers 3.47 km<sup>2</sup> in total, with 1.98 km<sup>2</sup> in English waters and 1.49 km<sup>2</sup> in Welsh waters.

TM and HM operate under separate licences, issued by Marine Management Organisation (MMO) and Natural Resources Wales (NRW), and summarised in Table 1-1.

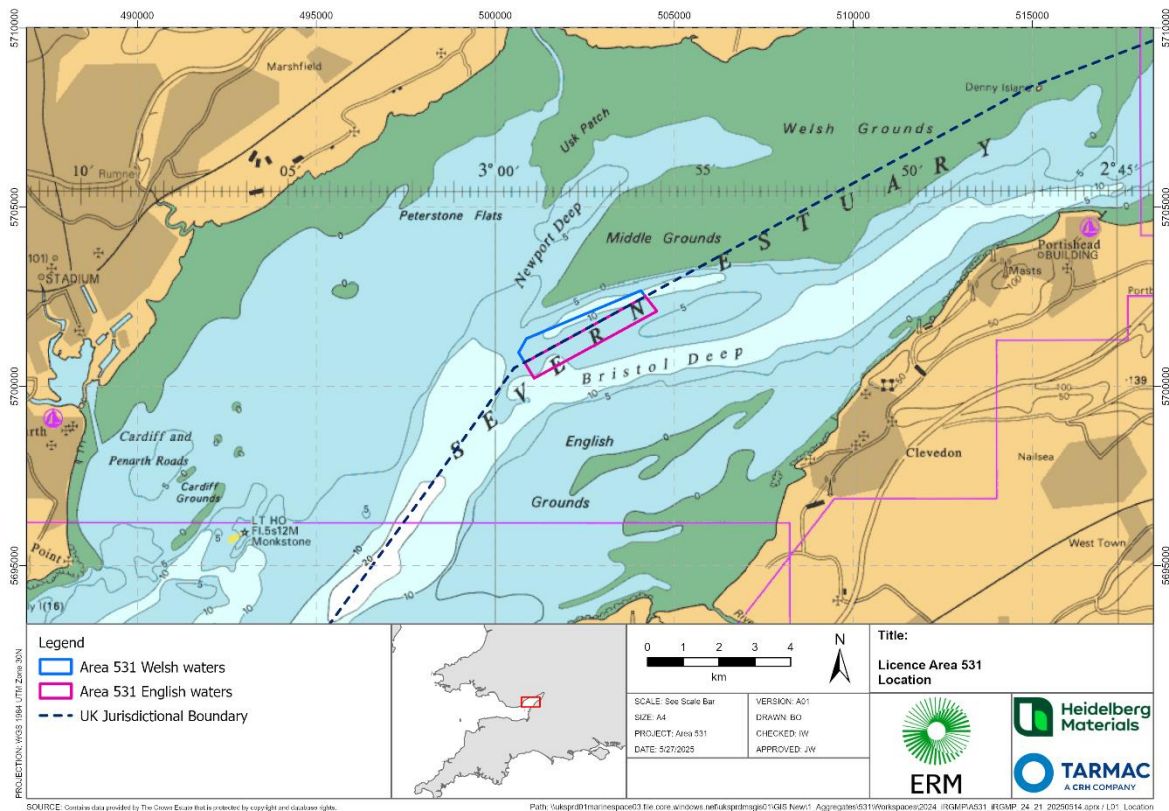
**TABLE 1-1: LICENCE DETAILS FOR AREA 531**

<b>Operator</b>	<b>Marine Management Organisation</b>	<b>Natural Resources Wales</b>
Tarmac Marine Ltd	L/2021/00111/1 (13 May 2021)	MMML1948v2TC (22 April 2025)
Heidelberg Materials UK Aggregates Marine	L/2021/00119/2 (01 April 2021)	MMML1948v3HN (22 April 2025)

The licences permit a combined maximum extraction of 4.5 million tonnes (Mt) of aggregate over a 15 year period (TM: 13 May 2021 to 12 May 2036; HM: 01 April 2021 to 01 April 2036). This is a combined maximum limit across the 2 sub-areas. Within a 12 month period, a maximum permitted extraction of 300,000 tonnes will be divided between the 2 companies (150,000 tonnes per licence holder, over combined sub-areas). Extraction of aggregate from within the area takes place using trailer suction hopper dredgers and anchor dredgers.

A number of conditions are attached to the licences, to monitor the effects of dredging on the marine environment, and to ensure compliance with relevant legislation. This report provides a summary of the results of the bathymetric survey work, carried out by ABPmer in 2024, and compares the results with both the defined baseline survey results (Titan, 2018) and the most recent previous survey (Shoreline, 2022). The requirements of this monitoring report, as set out in the licence conditions, are detailed in Section 1.3, below.

**FIGURE 1-1 LOCATION OF AREA 531 (ADMIRALTY CHARTS REPRODUCED UNDER LICENCE. NOT TO BE USED FOR NAVIGATION)**



The Severn estuary, where Area 531 is located (Figure 1-1), is known for strong, semi-diurnal, tides, with large tidal ranges, between approximately 10-12 m (ABPmer, 2019). According to the hydrodynamic review in the Environmental Statement (ES) (ABPmer, 2019), the mean spring tidal range can reach to 12.2 m at Avonmouth, with a maximum of 12.3 m recorded at Chepstow.

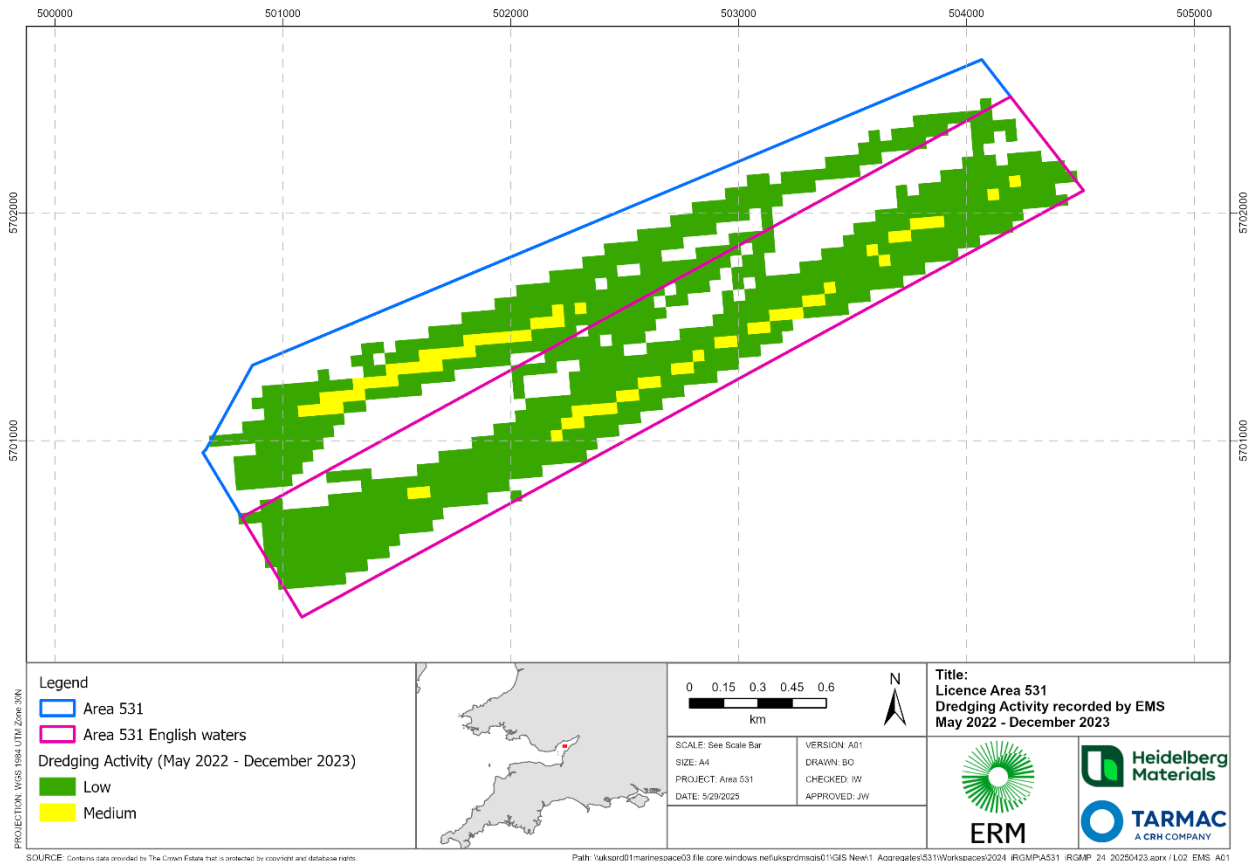
In general, tidal data recorded near to Area 531 show a tidal range of 12.2 m on spring tides and 6.0 m on neap tides, with maximum tidal flow speeds of around 2 m/s and 1.1 m/s, respectively.

### 1.2 DREDGING ACTIVITY WITHIN AREA 531

Between May 2022 and December 2023, the Electronic Monitoring System (EMS) data show that dredging activity occurred throughout Area 531, in an approximately west-southwest/east-northeast direction, over an approximate area of 2.0 km<sup>2</sup> (Figure 1-2). Dredging occurred within both sub-areas, with linear areas of medium intensity within the central part of each sub-area; covering an area of 0.08 km<sup>2</sup> in the Welsh sub-area and 0.09 km<sup>2</sup> in the English sub-area.

The EMS data defined the footprint of dredging activity in the licence area since 2022, and were used, with a buffer zone of at least 50 m, to define the extent of the 2024 bathymetric survey undertaken by ABPmer (Section 1.5).

**FIGURE 1-2 DREDGING ACTIVITY IN LICENCE AREA 531, RECORDED BY ELECTRONIC MONITORING SYSTEM BETWEEN MAY 2022 TO DECEMBER 2023 (SOURCE: THE CROWN ESTATE, PERS. COMM.)**



### 1.3 LICENCE CONDITIONS

As mentioned in Section 1.1, TM and HM operate under separate licences, issued by MMO and NRW, and summarised in Table 1-1.

The current Welsh Marine Licence (TM: MMML1948v2TC; HM: MMML1948v3HN) and English Marine Licence (TM: L/2021/00111/1; HM: L/2021/00119/2), each allows extraction of a maximum of 2.25 Mt per licence holder over the 15-year term of the licence, at annual extraction rates of no greater than 150,000 t per licence holder *per annum*. A number of conditions are attached to these licences in order to monitor the effects of dredging on the marine environment, and to ensure compliance with relevant legislation.

The specific conditions that relate to this monitoring report are presented in full in Table 1-2, with the specification of which licence they relate to stated.

**TABLE 1-2 MMO AND NRW LICENCE CONDITIONS FOR LICENCE AREA 531**

Licence	Condition	Referenced
<b>MMO:</b> <b>5.2.32</b> <b>NRW:</b> <b>3.4.10</b>	<i>The Licence Holder must ensure that no dredging occur in areas of resource 0.5 m or less measured over a 250 m by 250 m grid centred on 125m nodes.</i>	Section 1.2 and Section 2.2

Licence	Condition	Referenced
	Reason: To ensure that dredging operations are within the limits assessed in the ES and to ensure the habitat remains suitable for sandeel.	
<b>MMO:</b> <b>5.2.28</b>  <b>NRW:</b> <b>3.4.19</b>	<p><i>The licence holder must ensure that any additional areas of veneer thickness, as defined in condition 5.2.5 (MMO)/3.3.5 (NRW) [0.5 m or less], within the marine licence area identified during either dredging operations or monitoring are excluded from future extraction upon identification.</i></p> <p><i>The co-ordinates and the date of implementation of the EZ must be provided in writing to the MMO (or NRW) and The Crown Estate within 5 working days of the EZ being implemented. Unless informed in writing by the MMO, the licence holder must not dredge within these zones for the remainder of the licence period.</i></p> <p>Reason: To ensure that sufficient habitat is left so that benthic re-colonisation of the licence area upon cessation of dredging activity and to ensure that the licence holder is operating within the limits tested in the ES.</p>	Section 3.2
<b>MMO:</b> <b>5.2.30</b>  <b>NRW:</b> <b>3.4.13</b>	<p><i>Should any previously unreported wrecks (vessel or aircraft) or other sites of archaeological interest become apparent within the marine licence area, during either dredging operations or monitoring, EZs must be instituted around them as soon as they are discovered in accordance with the procedures set out in the 'Protocol for Reporting Finds of Archaeological Interest' (BMAPA and English Heritage 2005). Unless informed in writing by the MMO, the licence holder must not dredge within these zones for the remainder of the licence period. The co-ordinates and date of implementation of EZs must be provided in writing to the MMO/NRW and The Crown Estate within 5 working days of EZ being implemented. All EZs defined or removed must be agreed with the MMO or NRW.</i></p> <p>Reason: To protect wrecks, war graves and archaeology.</p>	No sites identified during current term, review planned for the next full monitoring reporting – see monitoring plan (Section 4.2)
<b>MMO:</b> <b>5.2.35</b>	<p><i>The licence holder must ensure that:</i></p> <p><i>(i) Specification for an operational stage monitoring programme is drawn up in consultation with the bodies referred to in condition 5.2.47. The specification must include a timetable for the individual monitoring surveys, which are to be undertaken during the first 5 years from the commencement of dredging within the marine licence area. This specification must be sent to the MMO within 9 months of the commencement of dredging;</i></p> <p><i>(ii) Subsequent specifications must be drawn up after the completion of the substantive reviews as required by condition 5.2.39;</i></p> <p><i>(iii) The operational stage monitoring programme is implemented in accordance with the approved specification. The programme must be maintained throughout the period in which dredging is carried out.</i></p> <p>Reason: To secure effective environmental monitoring of the dredging in the interests of protecting the marine</p>	Report recommendations – see Section 4.1

Licence	Condition	Referenced
	environment and assess whether dredging operations are consistent with the predictions made in the ES.	
<b>MMO: 5.2.36</b>	<p><i>All operational monitoring reports must be prepared and submitted to the MMO and the bodies referred to in condition 5.2.47 for review. The reports must be prepared in line with the agreed plans and specifications, and submitted to the MMO for approval within 9 months of the completion of the operational monitoring surveys. Unless otherwise agreed with the MMO, all reports from the operational stage monitoring programme must provide comparison with the baseline monitoring data and other relevant monitoring reports.</i></p> <p><i>Reason: To secure the effective environmental monitoring of the dredging in the interests of protecting the marine environment and assess whether dredging operations are consistent with the predictions made in the ES.</i></p>	General Report submitted within 9 months (June 2025)
<b>MMO: 5.2.43</b>	<p><i>The licence holder must ensure that an average depth of 0.5 m of aggregate resource remains as substrate in those parts of the licence area from which material has been dredged. This will be measured over 250 m by 250 m grid centred on 125 m nodes.</i></p> <p><i>Reason: To ensure that sufficient habitat is left to allow re-colonisation of the seabed upon the cessation of dredging activity.</i></p>	Section 3.2
<b>NRW: 3.4.22</b>	<p><i>All modifications to established EZs, whether temporary or permanent, must be approved in writing by NRW acting on behalf of the licensing authority before being implemented.</i></p>	General report and final recommendations – see Section 4.1
<b>NRW: 3.5.7</b>	<p><i>The Licence Holder must ensure that all survey reports shall provide a comparison with the final report of the pre-dredge survey results (described in condition 3.3.4).</i></p>	Section 2.3

## 1.4 PREVIOUS SURVEYS

Baseline and monitoring surveys, and reporting completed prior and during the dredging operations at Area 531 under the current Marine Licences, are used for comparison with the 2024 data set.

The most recent previous monitoring survey, completed in 2022, is also utilised as a direct comparison of 2024 data. All relevant surveys and pre-dredge baseline reports utilised in this report are listed in Table 1-3.

It should be noted that under the previous Marine Licence, Area 531 was known as Area 470, therefore references to reports from Area 470 are included within this report (e.g. Titan, 2018).

TABLE 1-3 SUMMARY OF KEY DOCUMENTS USED IN THIS REPORT

Stage	Report	Report reference	Author (Year)
Baseline Survey	Area 470 Annual Monitoring Survey 2018; February to March 2018	J1500	Titan Environmental Surveys Limited (2018)
Environmental Statement	Area 531 Environmental Statement (Marine Aggregate Extraction) October 2019	R.3078	ABPmer (2019)
Monitoring Survey	Area 470 and 531; Hydrographic Survey Data Collection Parameters	CS0595 Area 470 and Area531 V1	Shoreline Surveys Limited (2022)
Monitoring Report	Marine Aggregate Dredging Area 531 Operational Monitoring Report 2022	-	Hanson Aggregates Marine Ltd and Tarmac Marine Ltd (2023)
Monitoring Survey	Aggregate Area 531 Geophysical Survey Report: January 2025	R.4673	ABPmer (2025)

## 1.5 2024 BATHYMETRIC SURVEY

In 2024, ABPmer acquired full coverage multibeam bathymetry data on behalf of the licence holders (TM and HM), across the footprint of the dredging activity, defined by the EMS since the last monitoring survey in 2022, with a minimum 50 m buffer (ABPmer, 2025).

The surveys were undertaken aboard the *UKD Resolution*, working on a 12-hour basis, between 13-23 September 2024. The collected multibeam bathymetry data were processed and reduced to Chart Datum (CD) using the Vertical Offshore Reference Frame (VORF) model shifts provided by the United Kingdom Hydrographic Office (UKHO).

Data processing was carried out using BeamworX NavAQ AutoClean software. To achieve good data coverage, quality and data density, survey lines were run with approximately 50% overlap. Gridded datasets and sun-illuminated imagery were exported at resolutions of 0.5 m, 1.0 m and 2.0 m (ABPmer, 2025).

Full details of the survey specification, equipment and results are available in the ABPmer survey report (Appendix A) and Sections 2.1 and 3.1. The equipment is summarised in Table 1-4. Both Licence Area 526 and Area 531 were surveyed within the same operation, under the same contract.

**TABLE 1-4 GEOPHYSICAL SURVEY EQUIPMENT USED ABOARD THE *UKD RESOLUTION* DURING THE 2024 SURVEY**

<b>Equipment</b>	<b><i>UKD Resolution</i></b>
<b>Positioning system</b>	POS MV Wavemaster II (integrated within the Norbit system)
<b>Motion reference unit</b>	Integrated Applanix POS MV Wavemaster II
<b>Multibeam echosounder</b>	Norbit iWBMSH fully integrated system
<b>Sound velocity probe</b>	Valeport SWIFT SVP
<b>Horizontal Datum</b>	WGS84 UTM 30N
<b>Vertical Datum</b>	VORF CD

The acquisition of the multibeam survey data was carried out over 3 survey periods, due to unworkable weather conditions and the general size of the survey area.

### 1.5.1 DATA QUALITY

The multibeam bathymetry data collected during the 2024 survey were considered to be of good quality, as *per* the data quality definitions summarised in Table 1-5.

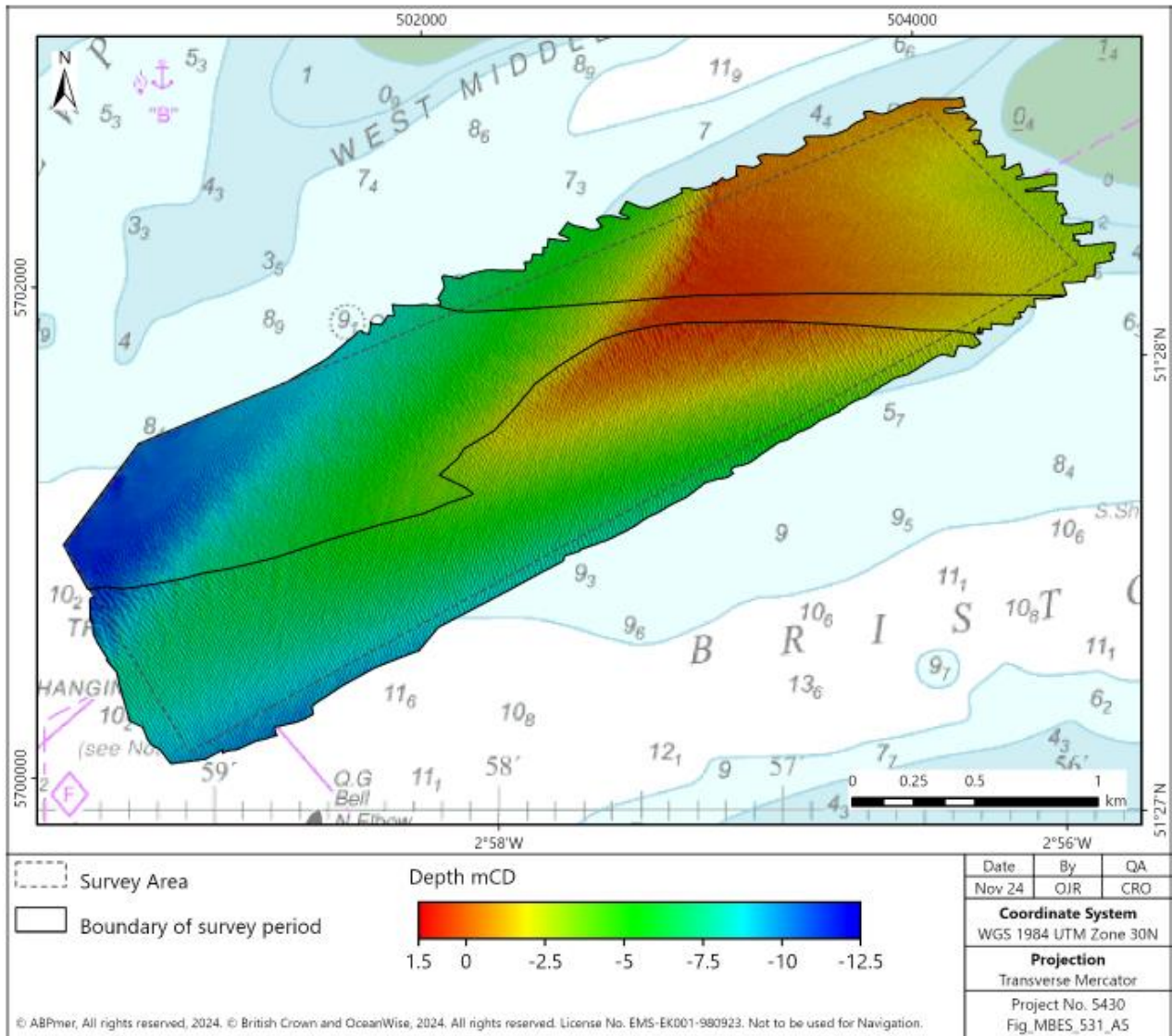
**TABLE 1-5 DATA QUALITY DEFINITIONS**

<b>Quality Level</b>	<b>Definition</b>
<b>Good</b>	Clear and defined data that are largely unaffected by weather, sea state or other hydrodynamic processes (minimal artefacts). The dataset is suitable for interpretation with clear features and textures visible providing high confidence.
<b>Average</b>	Less clear and defined data which may be affected by weather, sea state or other hydrodynamic processes to a moderate degree (artefacts present). The data are still suitable for identification of features and textures, but not to the same degree, therefore interpretation would be of moderate confidence.
<b>Variable</b>	Data are variable across the entire dataset, with some good, average and potentially even sub-average data (artefacts present may obscure the data). The data may still be suitable for interpretation of some features and textures, but confidence in the interpretation may be low.

Due to the survey taking place over 3 survey periods (i.e. 3 separate site visits), the bathymetry data showed "*significant differences*", notably in bedform sizes and frequencies,

between the survey visits (ABPmer, 2025). This resulted in some data artefacts, indicated as visible boundaries between the survey sections, and shown in Figure 1-3.

**FIGURE 1-3: BATHYMETRY OF AREA 531, SHOWING SURVEY REGIONS IDENTIFIED DUE TO 3 SURVEYS PERIODS OCCURING DURING THE DATA ACQUISITION (FROM: ABPmer, 2025)**



## 1.6 2022 GEOPHYSICAL SURVEY

In 2022, Shoreline Surveys Limited acquired full coverage multibeam bathymetry data, covering Licence Area 531 (along with Area 470). The survey was conducted between 12-14 April and 19 April 2022 (Shoreline, 2022). The minimum depth observed from the 2022 survey was 0.3 m above CD (located in the central east of Area 531) and the maximum depth observed was 14.7 m (located in the western section of the survey area) (Shoreline, 2022). A summary of the equipment and datums used is provided in Table 1-6.

**TABLE 1-6 GEOPHYSICAL SURVEY EQUIPMENT USED ABOARD THE *SHORELINE* DURING THE 2022 SURVEY**

<b>Equipment</b>	<b><i>Shoreline</i></b>
<b>Positioning system</b>	Applanix POSMV Wavemaster (PPP Corrections)
<b>Motion reference unit</b>	Integrated Applanix POS MV Wavemaster 2
<b>Multibeam echosounder</b>	Norbit iWBMS
<b>Sound velocity probe</b>	Valeport Mini SVsS
<b>Horizontal Datum</b>	WGS84 UTM 30N
<b>Vertical Datum</b>	CD (-5.81 m Ordnance Datum, Newlyn)

### 1.6.1 DATA QUALITY

The survey data collected during the 2022 survey were considered to be of good to average quality, as *per* data quality definitions summarised in Table 1-5. Discontinuous sandwaves were observed in the form of tearing (lines visible within survey data where bedforms did not align properly) due to survey operations occurring at different times (Shoreline, 2022).

## 1.7 2018 BATHYMETRIC SURVEY

In 2018, Titan Environmental Surveys Ltd (Titan) acquired a full coverage multibeam bathymetry dataset over Licence Area 531 (Titan, 2018). The survey was conducted between 6 February to 6 March 2018. The baseline survey showed that the bathymetric depths across the survey area ranged from 1.38 m above CD to 16.10 m below CD. A summary of the equipment and datums used is provided in Table 1-7.

**TABLE 1-7 BATHYMETRIC SURVEY EQUIPMENT USED ABOARD THE MV *TITAN EXPLORER* DURING THE 2018 SURVEY**

<b>Equipment</b>	<b><i>MV TITAN EXPLORER</i></b>
<b>Positioning system</b>	Trimble SPS 852
<b>Motion reference unit</b>	TSS DMS-05
<b>Singlebeam echosounder</b>	GeoAcoustics Geoswath 4 (250 kHz)

<b>Equipment</b>	<b>MV TITAN EXPLORER</b>
<b>Sound velocity probe</b>	Valeport Miniature Sound Velocity Profiler
<b>Horizontal Datum</b>	WGS84 UTM 30 N
<b>Vertical Datum</b>	VORF CD

### 1.7.1 DATA QUALITY

The survey data collected during the 2018 survey were considered to be of good quality, as *per* the data quality definitions summarised in Table 1-5.

## 2. BATHYMETRIC SURVEY

Survey methods and equipment are provided in Section 1.5. Where mobile sediment features are observed, they are described in line with the methodologies published by Ashley (1990), using the thresholds shown in Table 2-1.

TABLE 2-1 BEDFORM DESCRIPTIONS BASED ON ASHLEY (1990)

Bedform Description	Bedform Wavelength	Bedform Height
Ripple	Less than 0.6 m	Less than 0.075 m
Small subaqueous dune	0.6-5 m	0.075-0.4 m
Medium subaqueous dune	5-10 m	0.4-0.75 m
Large subaqueous dune	10-100 m	0.75-5 m
Very large subaqueous dune	Over 100 m	Over 5 m

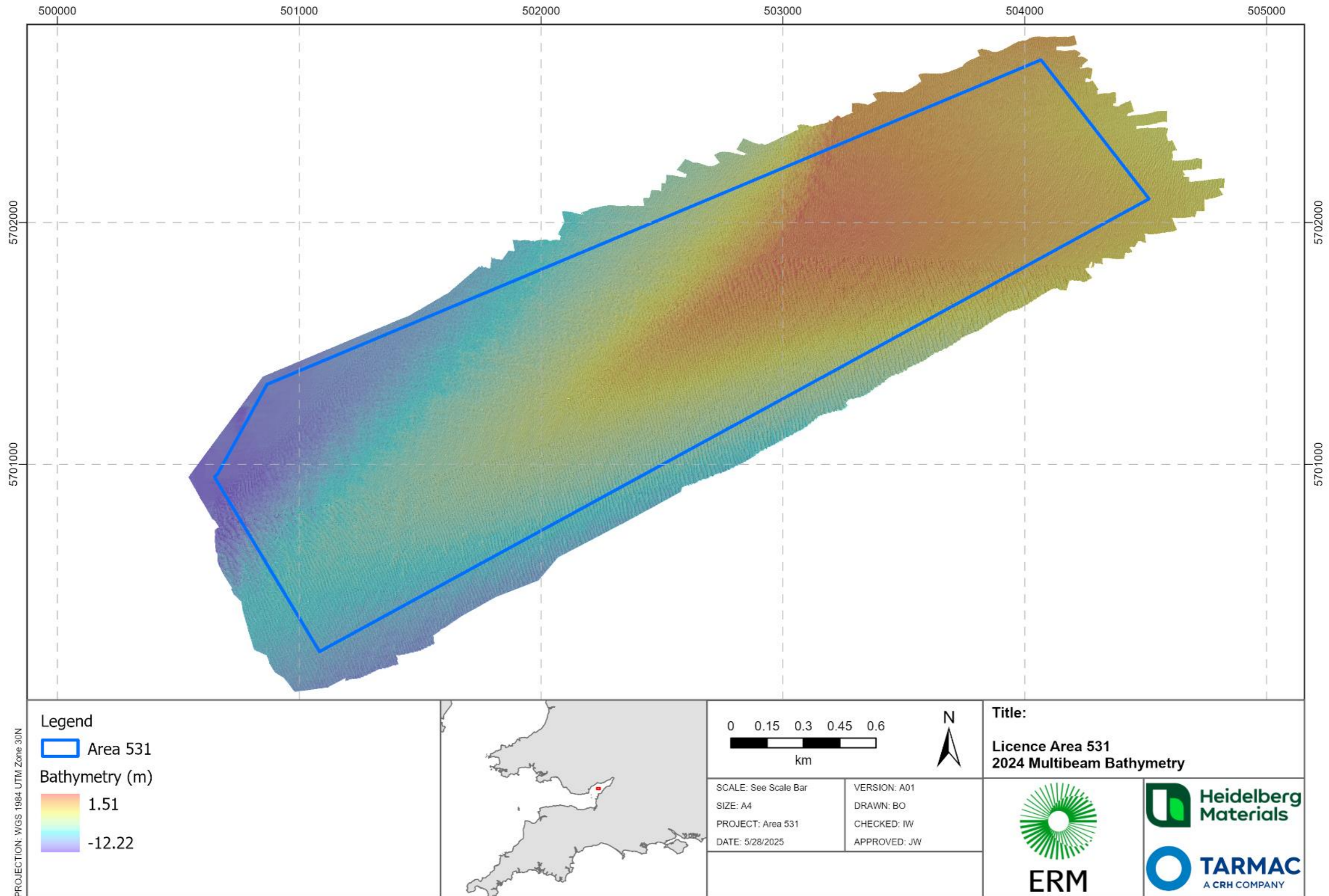
### 2.1 2024 SURVEY RESULTS

In general, the Severn estuary is typically described to have a dynamic nature with an extremely mobile seabed surface.

The water depths recorded in the 2024 data ranged from 1.5 m above CD in the central and northeastern area to 12.2 m below CD in the northwestern region. The shallowest depths were associated with the Middle Ground Bank (ABPmer, 2025). No trawl or dredge trails were noted.

As mentioned in Section 1.5.1, there were notable differences in bedform heights and wavelengths between the 3 survey periods. The bedforms identified ranged from small to large subaqueous dunes. Large subaqueous dunes (~heights up to 1.3 m) were observed within the southern region of Area 531, whereas within the northwestern and northeastern region, small subaqueous dunes (~heights of 0.25 m) were identified. The variation in these bedforms likely corresponds to changes in local tidal currents, indicating a very dynamic area.

FIGURE 2-1 AREA 531 BATHYMETRY SURVEY RESULTS (SOURCE: ABPmer, 2025)



SOURCE: Contains data provided by The Crown Estate that is protected by copyright and database rights.

Path: \\uksprd01marinespace03.file.core.windows.net\uksprdmgsi01\GIS New\1\_Aggregates\531\Workspaces\2024\_IRGMP\A531\_IRGMP\_24\_20250423.aprx / L03\_MBES\_A01

## 2.2 BATHYMETRIC COMPARISON BETWEEN 2022 AND 2024 SURVEY

The comparison of bathymetric data between the previous survey, in 2022, and the most recent survey in 2024 is shown in Figure 2-2. Figure 2-3 shows the seabed lowering across the area dredged since the 2022 survey, averaged over a 250 m grid, centred on 125 m nodes.

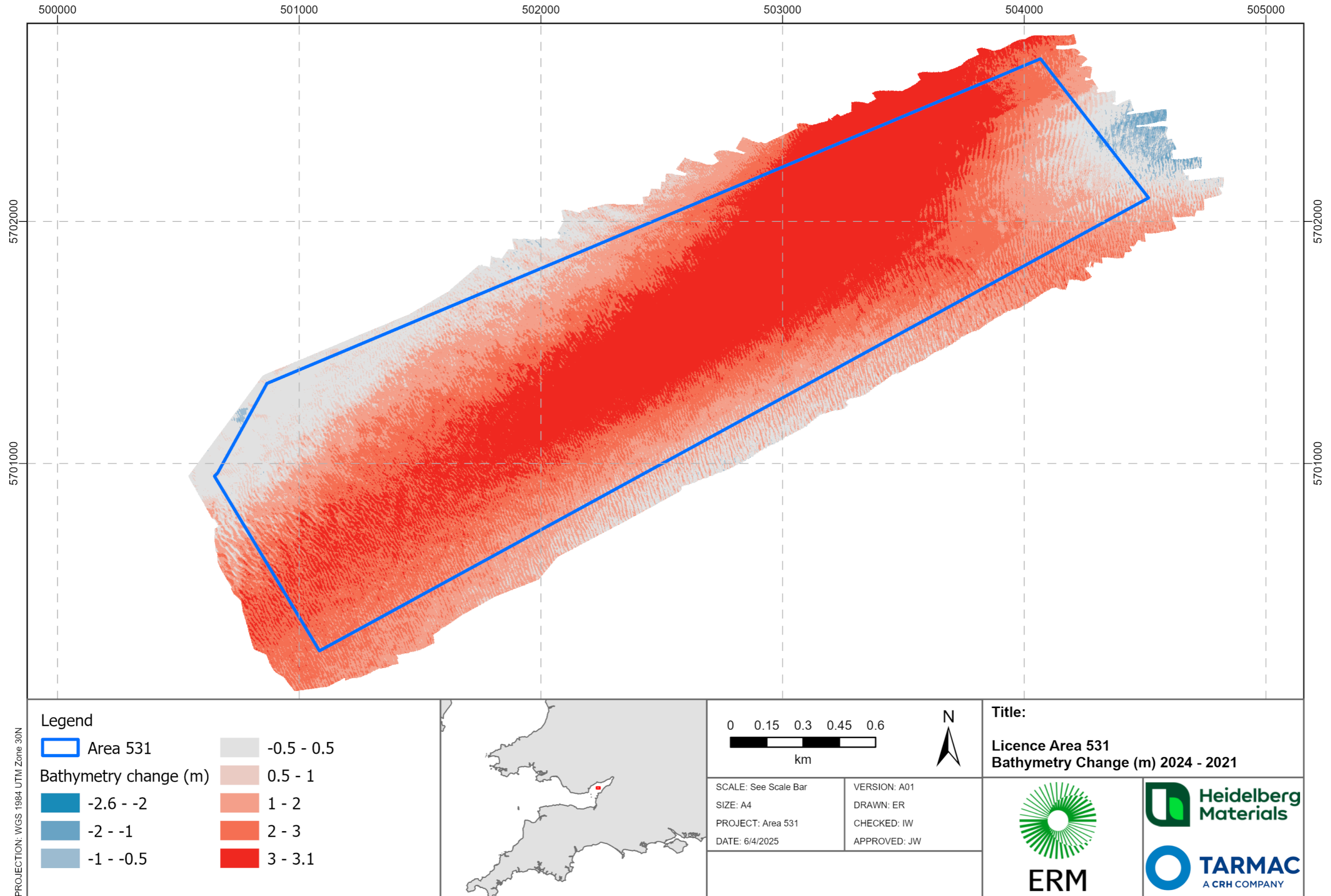
Within Area 531 (Figure 2-2 and Figure 2-3) the comparison shows that the majority of bathymetric changes were related to the accretion of material through the centre and west of the licence area. This is shown in Figure 2-2 by a positive bathymetric change of approximately 0.5-3.1 m.

The bathymetric change between 2022 and 2024, averaged over a 250 m grid, centred on 125 m nodes, was within 0.5-3.0 m across the majority of the survey area (Figure 2-3).

As mentioned previously, the region is highly dynamic and heavily influenced by tides and currents. Although dredged between 2022 and 2024, no clear lowering of the seabed was visible within the licence area; although it is noted that the area with the greatest accumulation was less intensely dredged (Section 1.2). Accumulation of sediment appears linked to natural movement of the banks, with a natural replenishment of material in the central region of the area.

A small region of deepening was seen in the far eastern part of the area, up to 2.6 m, or less than 0.5 m on average; however, the majority of this deepening occurred outside of the licence area.

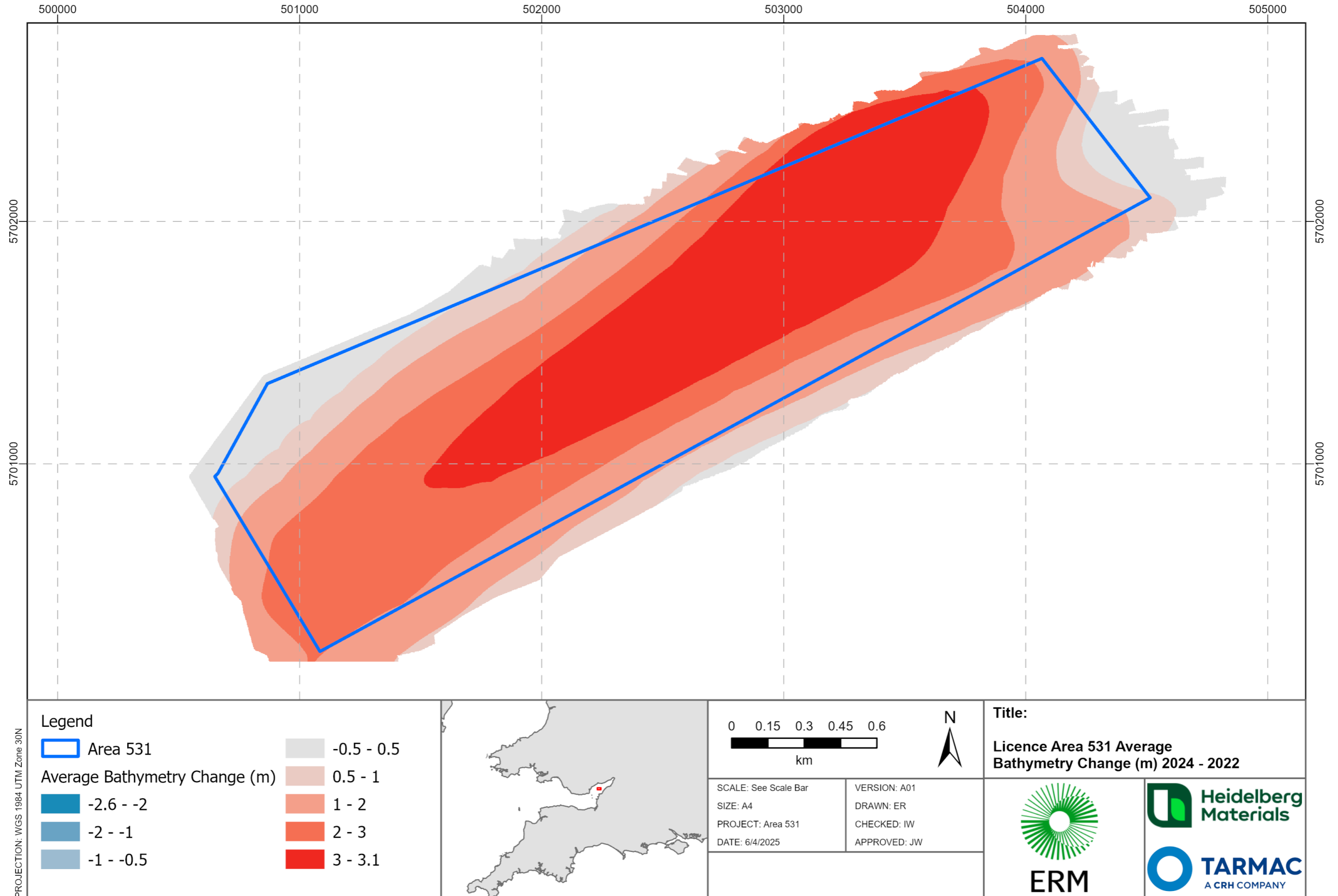
FIGURE 2-2 BATHYMETRIC CHANGE IN LICENCE AREA 531 BETWEEN THE 2022 AND 2024 SURVEYS (SOURCE: SHORELINE, 2022; ABPmer, 2025)



SOURCE: Contains data provided by The Crown Estate that is protected by copyright and database rights.

Path: G:\1\_Aggregates\531\Workspaces\2024\_IRGMP\531\_IRGMP\_24\_20250423.aprx / L04\_Bathy\_Change\_21-24\_A01

FIGURE 2-3 SEABED LOWERING BETWEEN 2022 AND 2024, AVERAGED OVER A 250 M GRID, CENTRED ON 125 M NODES



SOURCE: Contains data provided by The Crown Estate that is protected by copyright and database rights.

Path: G:\1\_Aggregates\531\Workspaces\2024\_IRGMP\A531\_IRGMP\_24\_20250423.aprx / L04\_Bathy\_Change\_21-24\_A01

## 2.3 BATHYMETRIC COMPARISONS BETWEEN 2018 AND 2024 SURVEY

The comparison of bathymetric data between the baseline survey in 2018 and the most recent survey in 2024 is shown in Figure 2-4. Figure 2-5 shows the seabed lowering averaged over a 250 m grid, centred on 125 m nodes across the area dredged since the 2018 survey.

Within Licence Area 531 (Figure 2-4) the comparison shows that the majority of bathymetric changes were related to a general pattern of seabed accretion within the centre and west of mainly the southern half of the licence area. This is shown by a positive bathymetric change in Figure 2-4, of approximately 0.5-8.6 m.

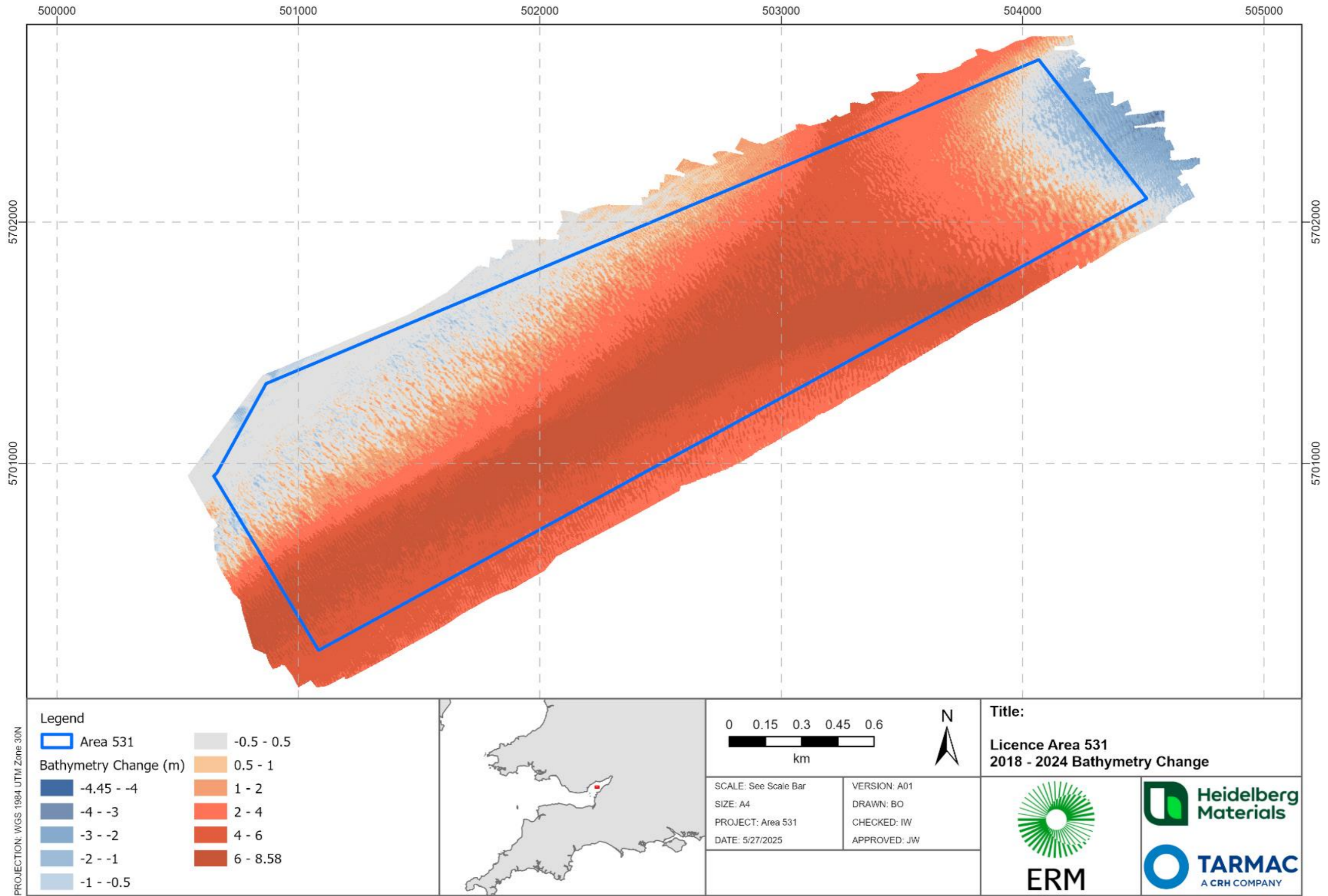
The bathymetric changes between 2018 and 2024, averaged over a 250 m grid, centred on 125 m nodes (Figure 2-5) were within 0.5-6.7 m across the majority of the survey area.

As mentioned previously, the region is highly dynamic and heavily influenced by tides and currents. Although dredged between 2018 and 2024, no clear lowering of the seabed was visible within the licence area; though, the area showing the greatest accumulation was less intensely dredged (Section 1.2). Accumulation of sediment appears linked to natural movement of the banks, with a natural replenishment of material in the central region of the area.

A small region of deepening was seen in the far eastern region of the area, up to 4.5 m, or 1.70 m on average, however the majority of this deepening occurred outside of the licence area.

Reviewing profiles of the changes indicates that the changes appear to be linked to natural migration and variability within the dynamic system (Figure 2-6).

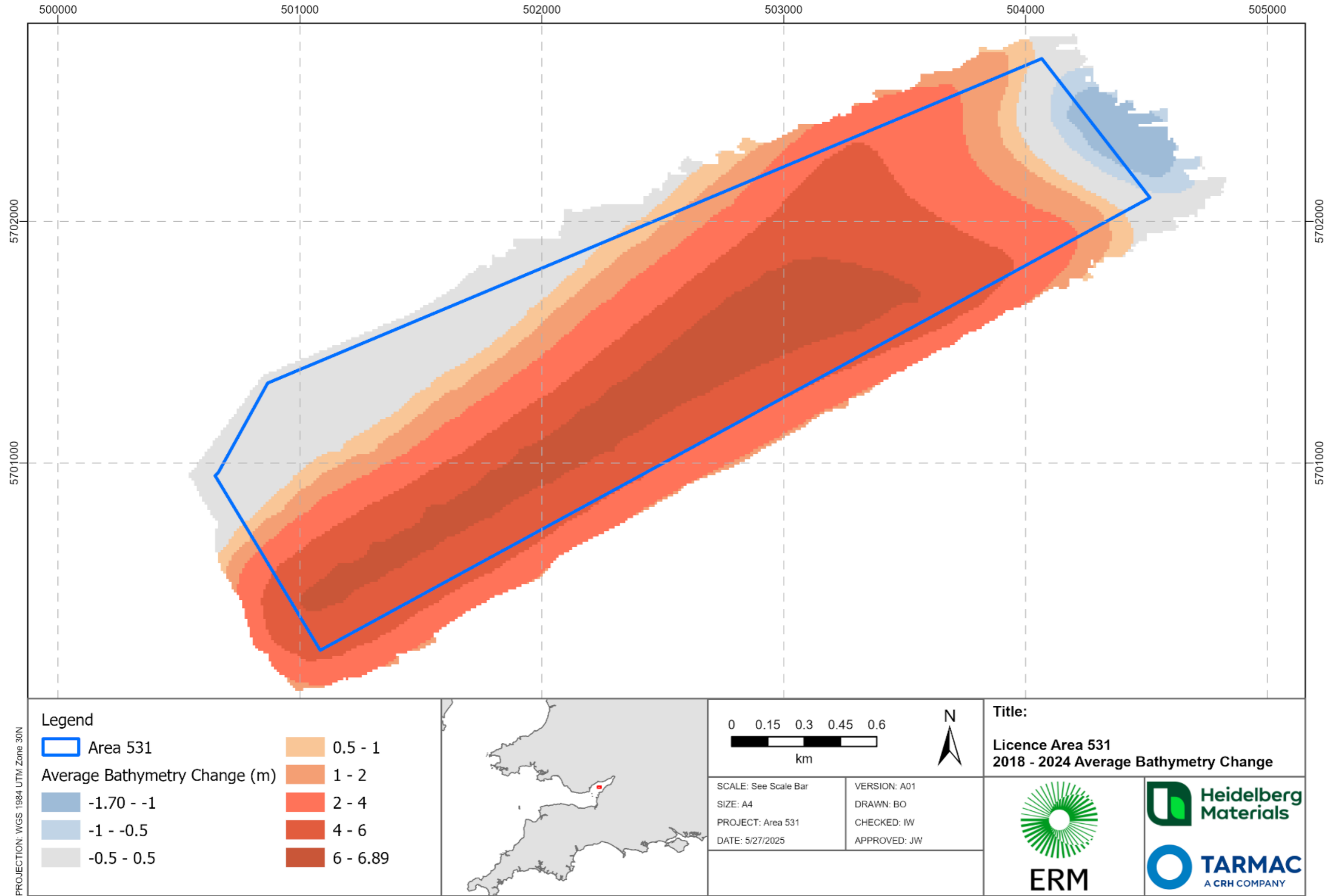
FIGURE 2-4 BATHYMETRIC CHANGE IN LICENCE AREA 531 BETWEEN 2018 AND 2024 SURVEYS (SOURCE: TITAN, 2018; ABPmer, 2025)



SOURCE: Contains data provided by The Crown Estate that is protected by copyright and database rights.

Path: \\uksp01marinespace03.file.core.windows.net\uksp01marinespace\GIS New\1\_Aggregates\531\Workspaces\2024\_IRGMP\531\_IRGMP\_24\_20250423.aprx / L04\_Bathy\_Change\_18-24\_A01

FIGURE 2-5 SEABED LOWERING BETWEEN 2018 AND 2024, AVERAGED OVER A 250 M GRID, CENTRED ON 125 M NODES

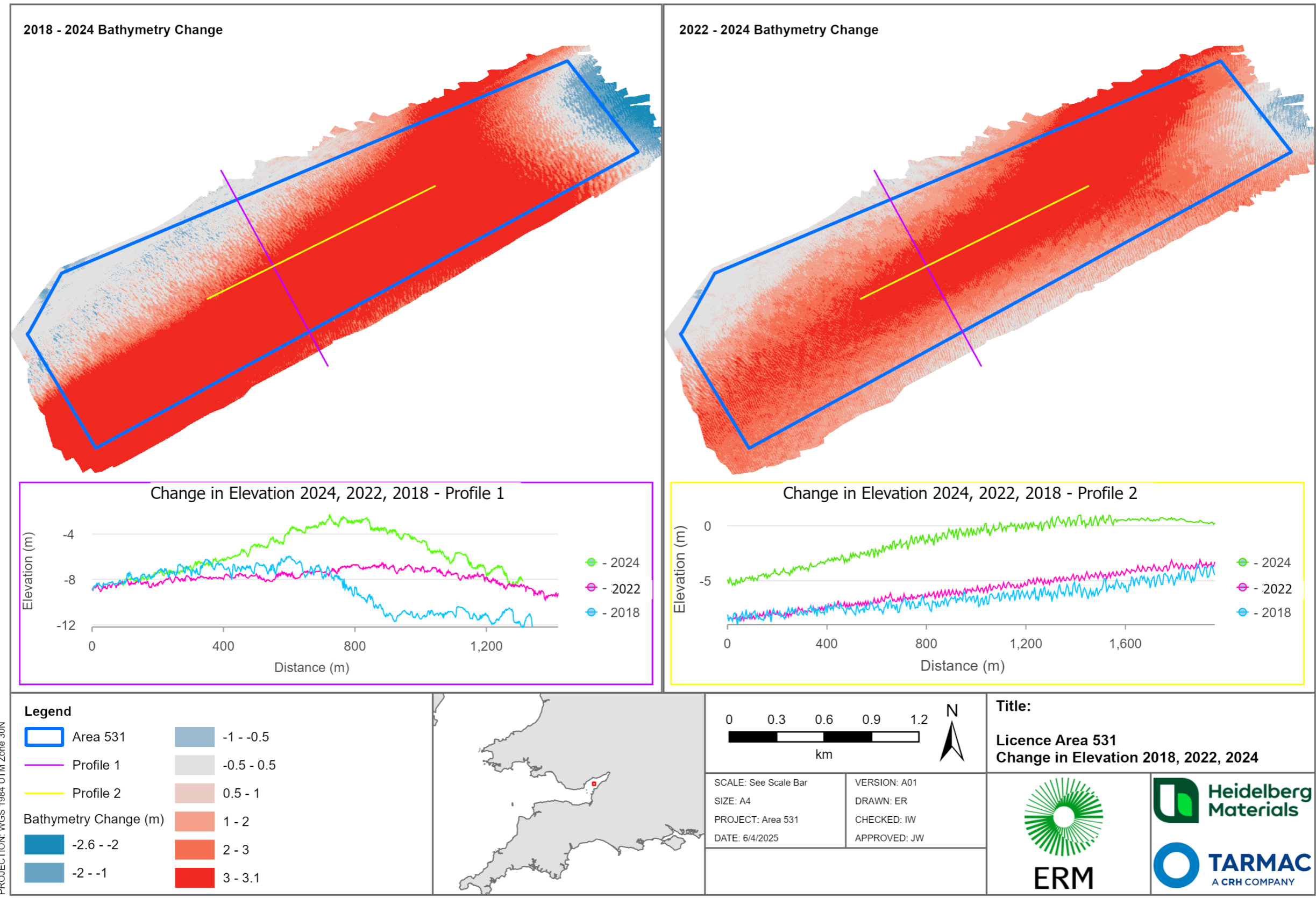


PROJECTION: WGS 1984 UTM Zone 30N

SOURCE: Contains data provided by The Crown Estate that is protected by copyright and database rights.

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FIGURE 2-6 CROSS SECTIONAL DIAGRAM SHOWING THE CHANGE IN ELEVATION THROUGHOUT THE SURVEY YEARS, SHOWING THE ACCRETION OF SEDIMENT IN LICENCE AREA 531 FROM 2018, 2022 TO 2024



SOURCE: Contains data provided by The Crown Estate that is protected by copyright and database rights.

Path: G:\1\_Aggregates\531\Workspaces\2024\_IRGMP\531\_IRGMP\_24\_21\_20250514.aprx / L04\_Bathy\_Comp\_A02

## 3. RESOURCE ASSESSMENT

### 3.1 METHODOLOGY

Resource thicknesses are derived at baseline from the interpretation of high resolution shallow seismic profile data, assisted by vibrocores and grab samples. Seismic data allow the extent, geometry, thickness and composition of a deposit to be interpreted using professional judgement and knowledge of the geological context of the site in question. With accurate navigation and position fixing, the data on the seismic profiles allow features apparent in the data to be plotted and a geological chart can be created.

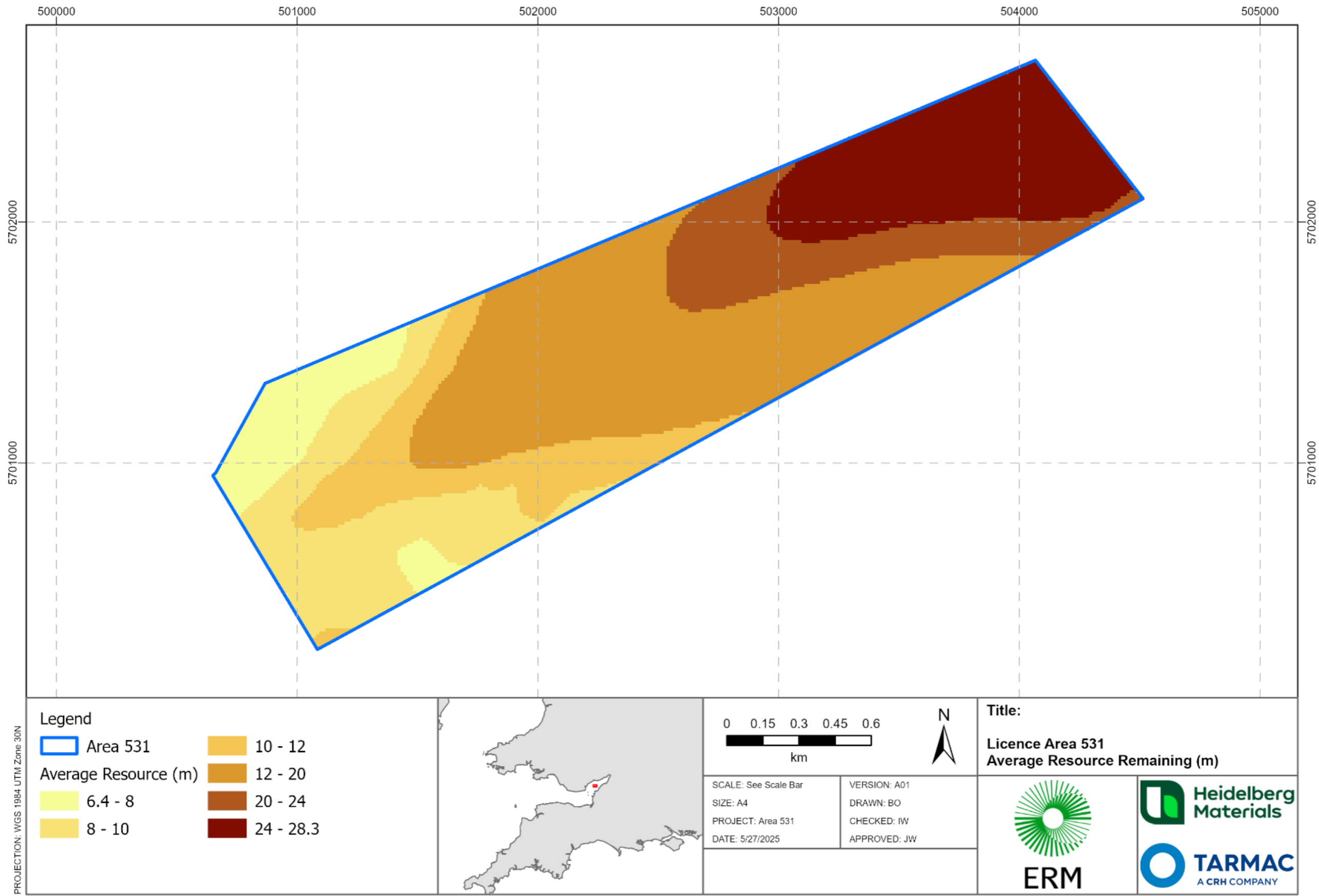
Sediment samples from known locations in the licence area are used to assist the data interpretation, confirming that inferences made from the seismic data about sediment type and thickness are correct. Once maximum confidence is achieved, thickness contours (isopachs) are drawn joining points of equal resource thickness, typically plotted at intervals of 1 m, matching the typical resolution of the seismic data. The finished isopach chart is digitised and inputted into proprietary digital ground modelling (DGM) software.

Licence Conditions require that the resource assessment be updated as part of this monitoring review. The bathymetric change occurring since the initiation of dredging (shown in Figure 2-4) will be subtracted from the DGM generated from the 2018 baseline isopachs as each monitoring survey is undertaken. The resource was updated in 2022 as part of the operational monitoring report (Hanson and Tarmac, 2023); therefore, this monitoring report has used the bathymetric change between 2022-2024 to define the updated 2024 resource remaining. As required by the Licence Conditions, the resource remaining was averaged using the standard methodology of analysis across 250 m squares at 125 m centres. The results of this analysis are presented in Figure 3-1.

### 3.2 RESULTS

The average resource remaining is presented in Figure 3-1 and shows that the average resource within Area 531 has, at least 6.4-8.0 m remaining, with more than 12.0 m in the majority of the licence area, and up to 28.3 m in the northern part of the licence area. There are no areas of less than 0.5 m of resource remaining.

FIGURE 3-1 AVERAGED RESOURCE ISOPACHYTES FOR LICENCE AREA 531, AVERAGED OVER A 250 M GRID, CENTRED ON 125 M NODES



SOURCE: Contains data provided by The Crown Estate that is protected by copyright and database rights.

Path: \\uksprd01marinespace03.file.core.windows.net\uksprdmgs01\GIS New\1\_Aggregates\531\Workspaces\2024\_IRGMP\A531\_IRGMP\_24\_20250423.aprx / L06\_Avg\_Resource

### 3.3 RECOMMENDATIONS FOR MITIGATION

No regions were identified within the 2024 survey data as having 0.5 m or less of resource remaining, averaged over a 250 m grid, centred on 125 m nodes and, therefore, no exclusion zones (EZs) have been recommended.

## 4. CONCLUSIONS

Based on the analyses of the 2024 survey data presented in this review, the following conclusions are made for this monitoring report:

- All surveys were considered to be accurate and fit for the purpose of monitoring the effects of marine aggregate extraction on the environmental resources present within Licence Area 531;
- Full coverage multibeam bathymetry data were acquired by ABPmer across the area dredged since 2022, as indicated by The Crown Estate's EMS, and this report compared these results with the previous 2022 survey by Shoreline Surveys Limited and the 2018 baseline survey by Titan Environmental Surveys Ltd;
- The 2024 survey data recorded water depths ranging from 1.5 m above CD in the central and northeastern area to 12.2 m below CD in the northwestern region;
- The bathymetric comparisons between years 2018-2022 and between 2022-2024 show no defined areas of lowering associated with dredging, however there was evidence of accretion within the licence area of up to 8.6 m, or 6.7 m on average, associated with the naturally occurring migration of the bank. The region is known to be highly dynamic and heavily influenced by tides and currents;
- The average resource isopachs, averaged over a 250 m grid, centred on 125 m nodes, show no areas within Area 531 of 0.5 m or less of resource.

### 4.1 RECOMMENDATIONS

Following a review of the 2024 data there are no new recommendations.

### 4.2 FINAL REMARKS

It is recommended that the monitoring programme continues to be undertaken, as set out in the monitoring plan and licence conditions, to include:

- A full geophysical survey including the collection of multibeam bathymetry and sidescan sonar over the area dredged since the beginning of the licence will be completed in 2026. The line spacing of the survey will ensure full coverage of data across the survey area. A conservation and archaeological review will be undertaken alongside resource updates;
- A regional seabed monitoring survey will be conducted in 2026, over a confirmed array comparable to the pre-dredge survey;
- Reporting of the monitoring will be completed within the calendar year following the calendar year of the monitoring survey, therefore the 2026 Regional Geophysical Monitoring Program and Regional Seabed Monitoring Program will be reported in 2027; A substantive review will be submitted by 2028, with the current monitoring plan reviewed and confirmed.

To date, the monitoring programme has shown that the effects from aggregate extraction are, in general, within the envelope of those predicted by the ES and Licence Conditions. Considering the evidence presented within this report, it is concluded that dredging activity in

Area 531 has not resulted in any unpredicted or unacceptable impacts to the marine environment.

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APPENDIX A

2024 ABPmer SURVEY REPORT

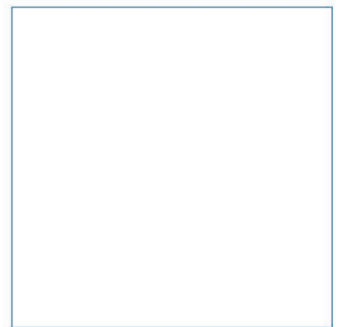
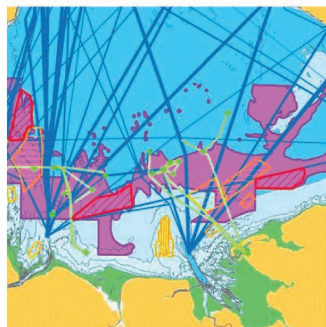
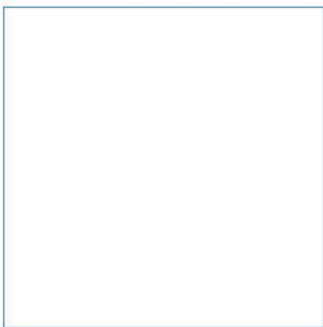
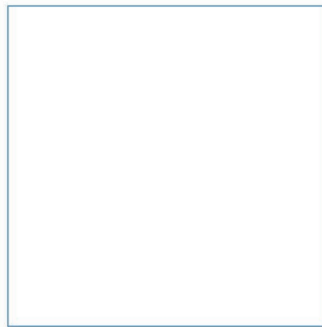
# Tarmac Marine Ltd, Heidelberg Materials UK Ltd



## Aggregate Area 531

### Geophysical Survey Report

January 2025



Innovative Thinking - Sustainable Solutions

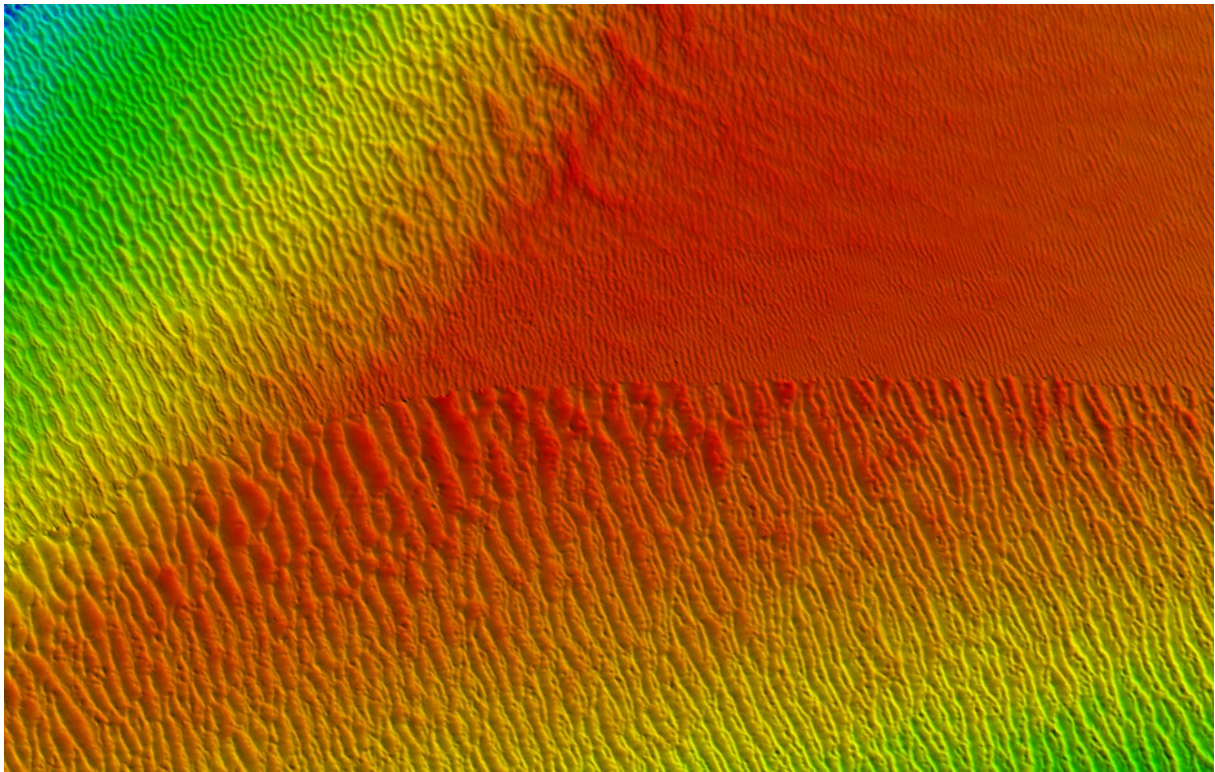


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# Aggregate Area 531




## Geophysical Survey Report

January 2025



# Document Information

Document History and Authorisation		
<b>Title</b>	Aggregate Area 531	
	Geophysical Survey Report	
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Prepared (PM)	Approved (QM)	Authorised (PD)
Tom Wilson	Oliver Ringwood	Paul Clement
		

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# Summary

A full coverage multibeam bathymetric survey was required in aggregate licence Area 531, to determine the level of seabed within and surrounding the areas dredged in the period since the previous monitoring survey. This is to comply with the marine licence conditions for the area.

ABPmer were contracted by Tarmac Marine Ltd (TML) and Heidelberg Materials UK Ltd (HMUK) to undertake a full coverage multibeam survey of aggregate extraction Area 531 which is located to the south of West Middle Ground in the Severn Estuary, directly south of Newport.

The surveys were undertaken from 13 September 2024 to 23 September 2024 working on a 12-hour operational basis onboard the ABP group owned vessel *UKD Resolution* from Penarth Marina, Cardiff, and Newport Dock. The geophysical survey utilised a high-resolution Norbit iWBMSH multibeam bathymetry system with integrated Applanix POS MV inertial positioning system. The multibeam data was processed to provide high-resolution bathymetric imagery.

As part of the same contract, bathymetric acquisition was also required in nearby marine aggregate licence Area 526 located across Culver Sands in the Bristol channel. This survey is reported separately.

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# 1 Introduction

Tarmac Marine Ltd (TML) and Heidelberg Materials UK Ltd (HMUK) contracted ABPmer to undertake geophysical monitoring of aggregate extraction Area 531 using a multibeam echosounder system (MBES) to fulfil the monitoring requirements and aid compliance with the marine licensing conditions of the dredging site.

ABPmer have an in-depth understanding of the licensing requirements of the marine aggregates industry through all stages of the consenting process, which includes all baseline monitoring, impact assessments and post consent studies. This experience includes technical input into Marine Aggregate Regional Environmental Assessments (MAREAs) and Aggregates Levy Sustainability Fund (ALSF) studies. With multiple studies completed for the aggregates industry in recent years, the required deliverables for this project are well understood.

Area 531 is located south of West Middle Ground in the Severn Estuary, 13 km east of Cardiff. The survey area was provided by the clients and was based on the dredging footprint, as defined by the Electronic Monitoring System (EMS) data, since the last monitoring survey. A plot of the EMS footprint is provided in Figure 1. Location coordinates (UTM30N) are detailed in Table 1.

To meet the above licence requirements, ABPmer successfully acquired full coverage multibeam bathymetry within the required area. Bathymetry data was processed and reduced to Chart Datum (CD) before gridded datasets and sun-illuminated imagery were exported at resolutions of 0.5 m, 1.0 m and 2.0 m.

**Table 1. Area 531 - Required survey area coordinates - UTM30N(WGS84)**

Easting	Northing
504672	5702095
501056	5700109
500547	5700945
500852	5701359
504063	5702710
504672	5702095



## 2 Survey Methodology

### 2.1 Survey vessel

The survey vessel, *UKD Resolution*, was utilised for acquisition of bathymetry during this project, vessel selection was based on suitability/availability during the appropriate weather windows for mobilisation. ABPmer and UKD survey teams regularly work collaboratively to conduct bathymetry surveys for dredge monitoring and safety of navigation requirements. For the purposes of this survey, the vessel had two personnel onboard: a UKD coxswain and an ABPmer surveyor. The vessel operated out of Penarth Marina, Cardiff and Newport Dock for the duration of the project.

The *UKD Resolution* (Figure 2) is a 5.0 m mono-hull vessel, with a draft of 0.3 m. It is permanently mobilised with a Norbit iWBMSH multibeam bathymetry system with integrated Applanix POS MV Wavemaster inertial positioning system, installed on a rotating pole-mount enabling transits at full speed. The vessel is certified to MCA Workboat Category 4 (20 Nm from safe haven in hours of daylight).

The *UKD Resolution* is owned and operated by UKD (UK Dredging Ltd), part of the ABP group.



Figure 2. Survey Vessel UKD Resolution

### 2.2 Survey personnel

A summary of key personnel involved in the project is provided in Table 2.

Table 2. Summary of key personnel

Role	Personnel
Project Manager and Hydrographic surveyor (Lead)	Tom Wilson (ABPmer)
Hydrographic surveyor	Ian Davidson (ABPmer)
Survey Coxswain	Simon Dwight (UKD)
Survey Coxswain	Joe Pearce (UKD)
Hydrographic data processor	Oscar Powell (ABPmer)
Senior GIS Specialist	Oliver Ringwood (ABPmer)

## 2.3 Survey control

Survey operations were acquired relative to the UTM30N projection and WGS84 ellipsoid in the horizontal (Table 3). In the vertical, data was acquired relative to CD by use of the UKHO Vertical Offshore Reference Frame (VORF) geoid separation model.

All georeferenced survey deliverables are provided relative to these coordinates and vertical datum.

**Table 3. Horizontal datum definition**

Horizontal Datum Definition	
<b>Datum Parameters</b>	
Datum	WGS84
Ellipsoid	WGS84
Semi-Major Axis (a)	6,378,137.00000000
Semi-Minor Axis (b)	6,356,752.31424518
Inverse Flattening (1/f)	298.2572235634
<b>Projection Parameters</b>	
Projection Name	UTM30N
Projection Method	Transverse Mercator
Latitude of Origin of Projection	0 °N
Central Meridian of Projection	3 °W
False Easting	500,000 m
False Northing	0 m
Scale factor	0.9996

## 2.4 Survey operations

### 2.4.1 Vessel mobilisation

Geophysical survey operations onboard *UKD Resolution* were conducted on a 12-hour basis operating out of Penarth Marina, Cardiff and Newport Dock from 13 September 2024 to 23 September 2024. There were periods of weather standby in between operational days where the survey team departed site to keep weather delay costs minimal during the period of short weather windows.

A brief summary of daily activities is provided in Table 4. Daily Progress Reports (DPRs) for survey operations of both Area 531 and Area 526 (conducted as part of the same contract) are included as Appendix A, which provide a detailed summary of survey activities.

A multibeam patch test calibration was conducted at the Flatholm (south of Cardiff) calibration site on the first day of operations (13 September 2024).

Multibeam bathymetry data was acquired within the BeamworX NavAQ MBES acquisition software which provided online data quality control displays to ensure data coverage, density and expected data quality was achieved.

Within each of the survey areas, survey lines were run with approximately 50% overlap in order to provide the required bathymetry coverage and data density.

**Table 4. Summary of survey operations**

Date	Vessel Name	Vessel Location	Daily Summary
13/09/2024	UKD Resolution	Penarth Marina	<ul style="list-style-type: none"> <li>▪ Project brief, HSE discussion and vessel inductions held onboard vessel.</li> <li>▪ MBES calibration patch test conducted.</li> <li>▪ Commence survey of Area 531</li> <li>▪ 30% total completion of Area 531 achieved.</li> </ul>
16/09/2024	UKD Resolution	Penarth Marina	<ul style="list-style-type: none"> <li>▪ 60% total completion of Area 531 achieved.</li> </ul>
23/09/2024	UKD Resolution	Newport Dock	<ul style="list-style-type: none"> <li>▪ Survey of Area 531 completed.</li> </ul>

## 2.4.2 Equipment

### Multibeam system

A Norbit iWBMSH fully integrated multibeam system is mobilised to the starboard side of the *UKD Resolution* using a purpose-built over-the-side pole-mount. The transducer can be lifted which enables efficient high-speed transit whilst being deployed in an exact location to prevent the requirement for a recalibration.

Bathymetry data was acquired using the combined data acquisition software BeamworX NavAQ. Data was acquired and processed to meet the requirements defined by the IHO Order 1a specification. During acquisition, Norbit raw .s7k files were logged for bathymetry redundancy.

### Inertial positioning system

An Applanix POS MV Wavemaster II interfaced with Real-Time Kinematic (RTK) corrections, is integrated within the Norbit multibeam system, providing high online accuracy and vessel attitude data to apply to the bathymetry.

The POS MV Wavemaster II is designed to provide accurate attitude, heading, heave, position and velocity data at the location of the multibeam transducer. The system consists of dual GNSS antennas coupled with the integrated Inertial Measurement Unit (IMU). GNSS data is blended with angular rate and acceleration data from the IMU and heading from the Global Positioning System (GPS) Azimuth Measurement System (GAMS) to produce a robust and accurate full six degrees-of-freedom position and orientation solution.

### Sound velocity

Correcting for changes in sound velocity through the water column is essential for accurate position of soundings. Therefore, an AML Sound Velocity Sensor (SVS) is installed within the housing of the Norbit MBES systems, for real-time sound velocity observations to assist in beam forming.

In addition, a Valeport SWiFT Sound Velocity Profiler (SVP) was used to conduct profiles through the water column at regular intervals during survey operations. The system was deployed over the side of the survey vessel and slowly lowered to the seabed before being hauled back to the vessel. During each deployment, the system observed the sound velocity at 0.2 m intervals throughout the full water column providing a sound velocity profile. The profile was then applied within the acquisition software to correct the positioning of the MBES soundings.

## 2.4.3 Data processing

### Positioning

Online, the Applanix POS MV positioning system, interfaced with RTK corrections, achieved an accuracy of <0.1 m. However, to improve this accuracy further, raw Applanix .000 files were logged throughout survey operations. These raw files were imported into the navigation post processing software, Applanix POSPac MMS 9.0. RINEX data from the closest Ordnance Survey GPS Active stations and precise satellite ephemeris data were imported to the project.

The online navigation was then processed producing centimetric accuracy positioning. The resulting 'Smoothed Best Estimate of Trajectory' (SBET) file was exported relative to the WGS84 ellipsoid ready to be applied to the bathymetry.

### Bathymetry

The BeamworX NavAQ raw multibeam files and post-processed navigation SBET files were imported into BeamworX AutoClean processing software. The post-processed SBET was then applied to the bathymetry in conjunction with the UKHO VORF model in order to reduce the data to CD. Any erroneous soundings present on the surface were removed manually using the inspection editor tool. Gridded bathymetry datasets were produced at resolutions of 0.5 m, 1.0 m and 2.0 m.

# 3 Results

## 3.1 Bathymetry

Full coverage multibeam data was acquired within the full required survey area. Preliminary processing and immediate QC took place onboard in order to identify any requirements for re-run whilst the vessel was on location. Due to the size of the survey area and weather conditions surrounding operations multibeam data acquisition of the licence area was undertaken over three survey periods. i.e. the survey team departed site before completion, returning when weather conditions again became suitable for operations. Due to the very dynamic, extremely mobile nature of the Severn Estuary, significant differences in bathymetry (sand ripple size and frequency) were observed between survey periods. This has resulted in a data artefact between the areas surveyed during different periods, as the seabed had changed.

An overview of the bathymetry of Area 531 is provided in Figure 3. The seabed bathymetry ranged from 1.5 m above CD at the central northeast of the area to its 12.2 m below CD at the far northwest of the survey area. Depth was at its shoalest on the Middle Ground bank.

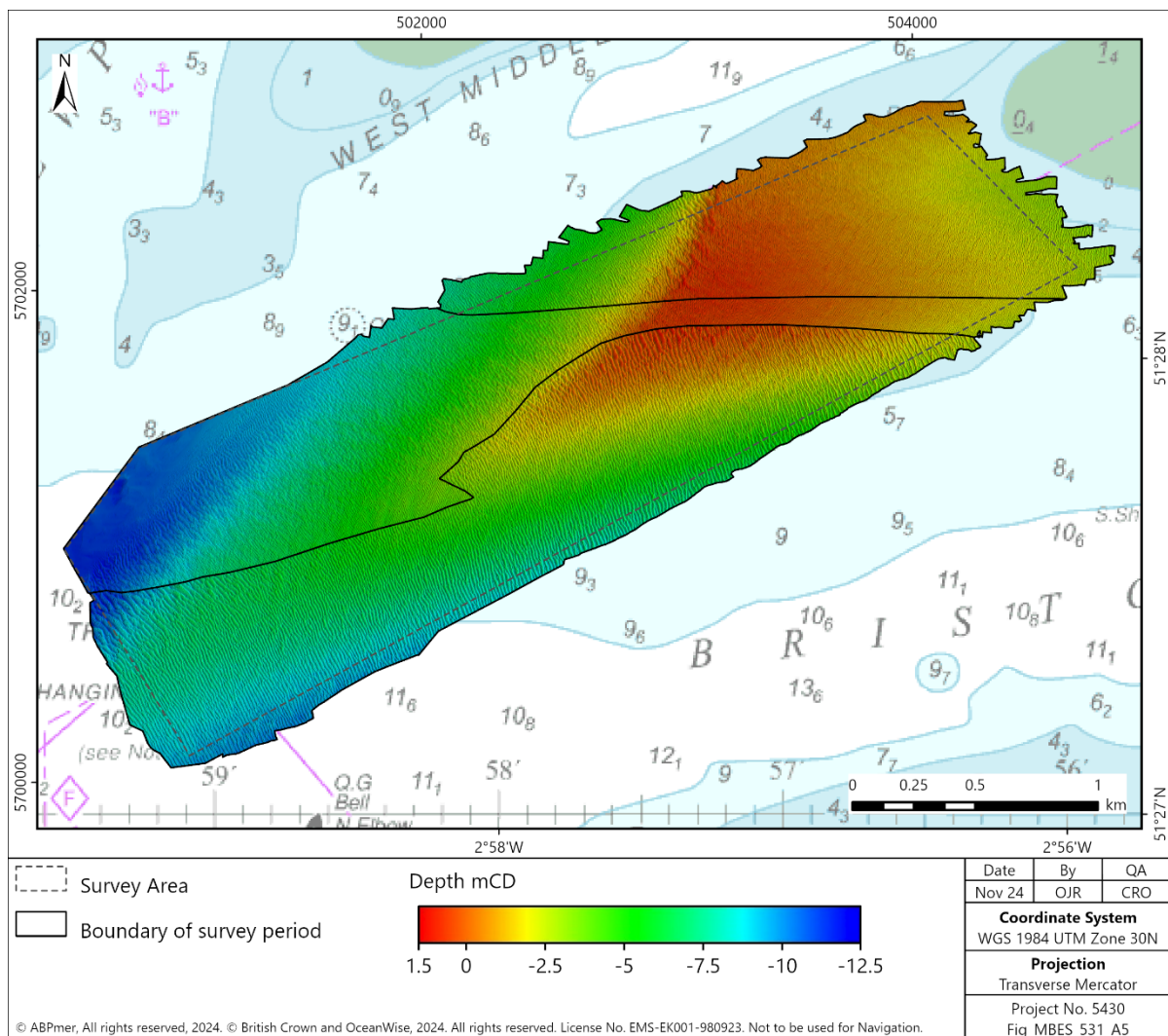


Figure 3. Area 531 bathymetry overview

It was observed that the size of sand ripples altered dramatically between survey periods. Figure 3 includes coverage boundaries of the individual survey periods. The northeast section of the survey area was acquired on 13 September 2024. Data from this period show sand waves of height 0.10-0.55 m with wavelengths of 4.0-10.0 m, The northwest section of the survey area was acquired on 16 September 2024. Sand ripples in this region were observed to be of height 0.1-0.3 m with wavelengths of 3.0-5.5 m. Both sections have a strong visible boundary with the southern section surveyed on 23 September 2024. In this region, larger sand ripples were observed to be of height 0.3-1.2 m with wavelengths of 9.0-17.0 m.

## 3.2 Charts

Multibeam bathymetry data is presented as a series of three north-up charts at scale of 1:5,000 at size A0:

- 5430\_Area\_531\_MBES\_A0
  - Includes sun-illuminated bathymetric imagery
- 5430\_Area\_531\_MBES\_Soundings\_A0
  - Bathymetric soundings and contours
- 5430\_Area\_531\_Trackplot\_A0
  - MBES navigation trackplot

## 3.3 Data deliverables

Table 5 summarises the geophysical data deliverables that are provided with this report.

**Table 5. Geophysical data deliverables**

Deliverable	Description	File Type
1_MBES	Gridded bathymetry data (UTM30N and CD). <ul style="list-style-type: none"> <li>▪ 0.5 m resolution</li> <li>▪ 1.0 m resolution</li> <li>▪ 2.0 m resolution</li> </ul>	.xyz / .flt
	Sun-illuminated bathymetric imagery (UTM30N and CD). <ul style="list-style-type: none"> <li>▪ 0.5 m resolution</li> <li>▪ 1.0 m resolution</li> <li>▪ 2.0 m resolution</li> </ul> Including bathymetric image water depth colour bar.	.tif / .tfw
	Bathymetric soundings as displayed on chart (UTM30N and CD).	.xyz
	Bathymetric contours at 1 m intervals (UTM30N and CD).	.shp
	Multibeam navigation trackplot (UTM30N).	.shp
	Multibeam coverage extents (UTM30N)	.shp
	Contours at 1.0 m intervals	.shp

## 4 Abbreviations/Acronyms

A0	Paper Format Dimension
ABP	Associated British Ports
ALSF	Aggregates Levy Sustainability Fund
AML	AML Oceanographic
ASCII	American Standard Code for Information Interchange
AutoClean	Bathymetry Processing Software (BeamworX)
CD	Chart Datum
Demob	Demobilisation
DPRs	Daily Progress Report
EDR	Deployment/Recover
EDT	Equipment Down Time
EMS	Electronic Monitoring System
flt	File type - Float Grid Binary File Format
GAMS	GPS Azimuth Measurement System
GIS	Geographic Information System
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
H&S	Health & Safety
HMUK	Heidelberg Materials UK Ltd
HSE	Health, Safety and Environment
IHO	International Hydrographic Organisation
IMU	Inertial Measurement Unit
iWBMSH	Norbit Multibeam System Model
MAREA	Marine Aggregate Regional Environmental Assessment
MBES	Multibeam Echosounder
MCA	Maritime and Coastguard Agency
MMS	Mobile Mapping Suite
MOB	Mobilisation
mph	Miles Per Hour
NavAQ	Navigation and Data Acquisition Software (BeamworX)
Nm	Nautical Mile
Norbit	Norbit ASA
OPS	Operational
PC	Personal Computer
POS MV	Applanix Positioning System for Marine Vehicles
POSPac	Applanix Post-Processing Software
QC	Quality Control
RINEX	Receiver Independent Exchange Format
RTK	Real Time Kinematic
s7k	File type – Norbit Echosounder
SBET	Smooth Best Estimate of Trajectory
shp	File type - Geospatial Vector Data Format for GIS Software
SVP	Sound Velocity Profile
SVS	Sound Velocity Sensor
SWiFT	Sound Velocity Instrument
tfw	File type - Plain Text Files that Store X and Y Pixel Size (Images)
tif	File type - Tagged Image File Format
TML	Tarmac Marine Ltd

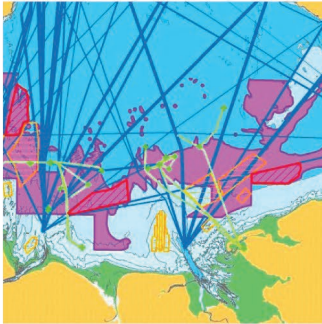
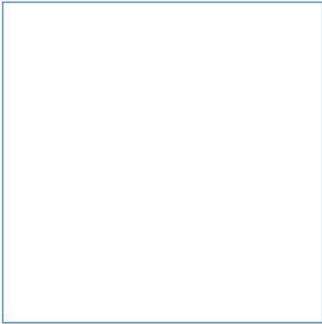
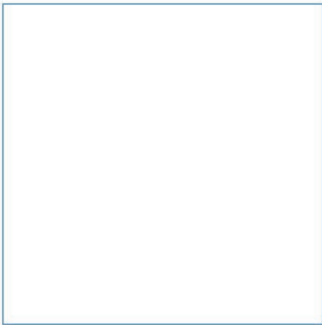
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TRA	Transit
UK	United Kingdom
UKD	UK Dredging Ltd
UKHO	United Kingdom Hydrographic Office
UTC	Coordinated Universal Time
UTM	Universal Transverse Mercator
Valeport	Equipment manufacturer
VDT	Vessel Down Time
VORF	Vertical Offshore Reference Frame
Wavemaster	Applanix Positioning System Model
WDT	Weather Down Time
WGS	World Geodetic System
XCWeather	UK Weather Forecast Information Service
xyz	File format - ASCII

Cardinal points/directions are used unless otherwise stated.

SI units are used unless otherwise stated.

# Appendix



Innovative Thinking - Sustainable Solutions

# A Daily Progress Reports

**Daily Progress Report**

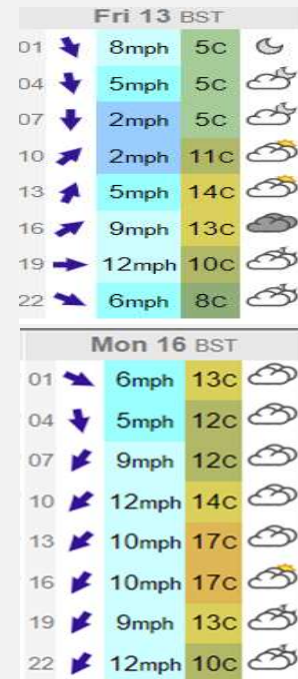
Project: 5430\_Severn\_Estuary\_Areas 526&531  
 Vessel: UKD Resolution  
 Date: 13/09/2024



**PERSONNEL**

Survey Team	Vessel Team
Tom Wilson	Joe Pearce

**WEATHER FORECAST**



Source: XCWeather

**DAILY LOG**

(UTC)	CODE	EVENT
04:30	MOB	ABPmer and UKD survey team arrive at Penarth Marina
04:50	TRA	Slip ropes and pen out of Penarth
05:00	TRA	Pen out of Cardiff Bay
05:40	TRA	Arrive at Flat Holm calibration site
05:45	EDR	MBES calibration patch test
06:55	EDR	Patch test complete
07:00	TRA	Transit to Area 531
07:40	EDR	Commence survey ops of Area 531
13:05	EDR	End of survey ops
13:10	TRA	Transit back to Cardiff Bay
13:40	TRA	Enter lock at Cardiff
13:53	TRA	Exit Lock
13:55	TRA	Enter Penarth Marina
14:00		Refuel
14:08		Alongside
14:20		Depart Vessel

**HSE SUMMARY**

A full vessel induction and H&S brief was performed. No incidents to report.

**CUMULATIVE TIME**      **SURVEY WORK PROGRESS**

ITEM	CODE	TODAY	TOTAL	Area 526	Area 531
Mob/Demob	MOB	00:00	00:00		
Deployment/Recovery	EDR	06:45	06:45		
Transit	TRA	02:25	02:25		
Weather Down Time	WDT	00:00	00:00		
Equipment Down Time	EDT	00:00	00:00		
Vessel Down Time	VDT	00:00	00:00		
<b>TOTALS (Day)</b>		<b>1</b>	<b>1</b>		

**DAILY SUMMARY**

A successful MBES calibration patch test was performed along a rock outcrop in the vicinity of Flat Holm, Bristol Channel, before the vessel transited to Area 531 to begin survey operations. Weather was good and good progress was made in the area.

**UPCOMING PLAN**

Weather will be assessed in the coming days, with a plan to continue survey operations in Area 531 on Monday 16th September 2024, should the current forecast hold.

**Daily Progress Report**

Project: 5430\_Severn\_Estuary\_Areas 526&531  
 Vessel: UKD Resolution  
 Date: 16/09/2024



PERSONNEL	
<b>Survey Team</b>	<b>Vessel Team</b>
Tom Wilson	Simon Dwight

WEATHER FORECAST			
<b>Mon 16 BST</b>			
01	6mph	13C	
04	5mph	12C	
07	9mph	12C	
10	12mph	14C	
13	10mph	17C	
16	10mph	17C	
19	9mph	13C	
22	12mph	10C	
<b>Tue 17 BST</b>			
01	12mph	10C	
04	12mph	8C	
07	13mph	8C	
10	14mph	13C	
13	14mph	16C	
16	14mph	18C	
19	10mph	14C	
22	16mph	12C	

Source: XCWeather

DAILY LOG		
(UTC)	CODE	EVENT
05:30	MOB	ABPmer and UKD survey team arrive at Penarth Marina
05:50	TRA	Slip ropes and pen out of Penarth
06:00	TRA	Pen out of Cardiff Bay
07:30	TRA	Arrive at Area 531
07:35	EDR	Commence survey ops of Area 531
13:50	EDR	End of survey ops
14:00	TRA	Transit back to Cardiff Bay
15:00	TRA	Enter lock at Cardiff
15:10	TRA	Exit Lock
15:15	TRA	Enter Penarth Marina
15:20		Refuel
15:35		Alongside
15:50		Depart Vessel

**HSE SUMMARY**

A full vessel induction and H&S brief was performed. No incidents to report.

CUMULATIVE TIME				SURVEY WORK PROGRESS	
ITEM	CODE	TODAY	TOTAL	Area 526	Area 531
Mob/Demob	MOB	00:00	03:10	0%	60%
Deployment/Recovery	EDR	06:25	13:10		
Transit	TRA	03:05	05:30		
Weather Down Time	WDT	00:00	00:00		
Equipment Down Time	EDT	00:00	00:00		
Vessel Down Time	VDT	00:00	00:00		
<b>TOTALS (Day)</b>		<b>1</b>	<b>3</b>		

**DAILY SUMMARY**

Good progress was made on Area 531, focusing on the deeper areas to the west over the low water period.

**UPCOMING PLAN**

Weather will be assessed tomorrow (Tuesday 17th June) during a routine UKD survey in the Cardiff approach channel, to determine whether survey operations will be possible. If conditions are not suitable, we will look to recommence survey operations w/c 23rd June 2024.

**Daily Progress Report**

Project: 5430\_Severn\_Estuary\_Areas 526&531  
 Vessel: UKD Resolution  
 Date: 23/09/2024



PERSONNEL		WEATHER FORECAST	
<b>Survey Team</b>		<b>Vessel Team</b>	
Tom Wilson		Joe Pearce	
TIME		DAILY LOG	
(UTC)	CODE	EVENT	
05:00	MOB	ABPmer and UKD survey team arrive at Newport Dock	
05:05	TRA	Slip ropes	
05:15	TRA	Enter Newport Lock	
07:00	TRA	Exit Newport Lock	
07:20	TRA	Arrive at Area 531	
07:35	EDR	Commence survey ops of Area 531	
13:45	EDR	End of survey ops	
14:00	TRA	Transit back Cardiff Bay	
15:00	TRA	Enter lock at Cardiff	
15:10	TRA	Exit Lock	
15:15	TRA	Enter Penarth Marina	
15:20	MOB	Alongside	
15:35	MOB	Demobilise survey PC	
16:30		Depart vessel	

Source: XCWeather

**HSE SUMMARY**

A full vessel induction and H&S brief was performed. No incidents to report.

CUMULATIVE TIME				SURVEY WORK PROGRESS	
ITEM	CODE	TODAY	TOTAL	Area 526	Area 531
Mob/Demob	MOB	01:15	04:25	0%	100%
Deployment/Recovery	EDR	06:25	19:35		
Transit	TRA	03:50	09:20		
Weather Down Time	WDT	00:00	00:00		
Equipment Down Time	EDT	00:00	00:00		
Vessel Down Time	VDT	00:00	00:00		
<b>TOTALS (Day)</b>		<b>1</b>	<b>4</b>		

**DAILY SUMMARY**

Survey operations made good use of the high-water period and full coverage of Area 531 was completed successful.

**UPCOMING PLAN**

Weather is unsuitable for survey operations tomorrow (Tuesday 24th September), but current forecast for Wednesday 25th looks promising. The ABPmer and UKD survey team will continue to monitor forecasts, with current plans to utilise the UKD survey vessel 'Christine H' and begin operations on Area 526.

**Daily Progress Report**

Project: 5430\_Severn\_Estuary\_Areas 526&531  
 Vessel: Christine H  
 Date: 25/09/2024



**PERSONNEL**

Survey Team	Vessel Team
Tom Wilson	Joe Pearce

**WEATHER FORECAST**

Wed 25 BST			
01	→	7mph	10C
04	→	7mph	10C
07	→	6mph	9C
10	→	7mph	11C
13	→	8mph	11C
16	→	12mph	11C
19	→	8mph	11C
22	→	7mph	11C
Thu 26 BST			
01	→	2mph	11C
04	→	1mph	11C
07	→	8mph	10C
10	→	3mph	11C
13	→	10mph	13C
16	→	17mph	12C
19	→	18mph	11C
22	→	14mph	10C

Source: XCWeather

**DAILY LOG**

TIME (UTC)	CODE	EVENT
03:00	MOB	ABPmer and UKD survey team arrive at Penarth Marina
03:10	MOB	Mobilise Christine H survey suite
04:00	MOB	Refuel
04:25	TRA	Through Penarth Lock
05:00	TRA	Enter Cardiff Lock
05:15	TRA	Exit Cardiff Lock
05:40	TRA	Arrive at Patch Test site, Flat Holm.
05:50	EDR	Conduct MBES calibration
06:30	TRA	Calibration complete and transit to survey site
07:15	EDR	Begin survey operations on Area 526
12:10	EDR	Survey operations suspended due to weather
12:20	TRA	Transit to Cardiff
13:15	TRA	Enter Cardiff Lock
13:25	TRA	Exit Cardiff Lock
13:30	TRA	Through Penarth Lock
13:35	TRA	Alongside
14:10		Depart Vessel

**HSE SUMMARY**

A full vessel induction and H&S brief was performed. No incidents to report.

**CUMULATIVE TIME**

ITEM	CODE	TODAY	TOTAL
Mob/Demob	MOB	01:25	05:50
Deployment/Recovery	EDR	05:45	25:20
Transit	TRA	04:00	13:20
Weather Down Time	WDT	00:00	00:00
Equipment Down Time	EDT	00:00	00:00
Vessel Down Time	VDT	00:00	00:00
<b>TOTALS (Day)</b>		<b>1</b>	<b>5</b>

**SURVEY WORK PROGRESS**

Area 526	40%
Area 531	100%

**DAILY SUMMARY**

A full MBES calibration patch test was conducted on board UKD survey vessel Christine H at the rocky outcrop surrounding Flat Holm in the Bristol Channel. Survey operations then commenced on Area 526 over Culver Sand. Good progress was made during the calmer winds across the morning, but work was suspended once the waves picked up.

**UPCOMING PLAN**

Weather is unsuitable for survey operations for the coming days and the ABPmer surveyor will travel home tomorrow. Forecasts will continue to be monitored for a suitable weather window to allow for the completion of Area 526.



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