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Beatrice Offshore Wind Farm
Pre-construction Benthic Sampling and DDV Survey Scope of Works

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1 Scope of Works

1.1 Introduction

Beatrice Offshore Windfarm Ltd (BOWL) requires to undertake a Pre-construction Benthic Survey of the Offshore Wind Farm (OWF) site and an Annex I Habitat Survey of the Offshore Transmission Works (OfTW) cable corridor. The survey will also include underwater camera surveys of targets of high archaeological potential.

The survey results will provide the pre-construction baseline for comparison with outputs from post construction monitoring. This scope of work relates to the pre-construction surveys only. It is desired to undertake this work during Q2 2015.

1.2 Name of Contract

The contract title is 'BOWL Benthic Pre-Construction and DDV Survey'.

1.3 Background

The Beatrice Offshore Wind Farm received consent under Section 36 of the Electricity Act 1989 from the Scottish Ministers on 19th March 2014 ("the S.36 Consent") and was granted two Marine Licences from the Scottish Ministers, for the OWF and for the OfTW respectively, on 15th August 2012 ("the Marine Licences").

This Scope of Works (SoW) provides the specification for pre-construction benthic surveys for the Beatrice OWF and OfTW. A benthic survey programme has been agreed with Marine Scotland in accordance with the Conditions of the Beatrice OWF Section 36 consent (Condition 27) and the Marine Licence for the OfTW (Condition 3.2.2.10). Undertaking these surveys and reporting of the results will be used to discharge these Conditions.

The benthic survey design and the overall benthic monitoring strategy for the Beatrice OWF and the OfTW has been informed by a comprehensive review of monitoring requirements which was undertaken by RPS Energy, on behalf of Beatrice Offshore Windfarm Ltd (BOWL). The review was undertaken to evaluate and provide justification for the need for benthic surveys at the Beatrice site, including along the OfTW corridor, prior to the production of this SoW. This considered the predictions made within the Beatrice Environmental Statement (ES) and Supplementary Environmental Information Statement (SEIS) and the associated degree of certainty in these predictions.

Additionally this SoW also includes a requirement for underwater camera surveys at particular locations where a high archaeological potential was identified from a review of the OWF and OfTW geophysical survey data. This information will be used to confirm the presence of any targets of archaeological interest at these locations to inform OWF and OfTW construction planning decisions around Archaeological Exclusion Zones.

2 Rationale for Sampling Programme

Condition 27 of the Beatrice OWF Section 36 consent states that the Project Environmental Monitoring Programme (PEMP) must cover, but not be limited to:

> *Pre-construction, construction (if considered appropriate by the Scottish Ministers) and post-construction monitoring surveys as relevant in terms of the ES and any subsequent surveys for….[6] benthic communities; and [7] (Seabed scour and) local*

sediment deposition.

Part 3, Condition 3.2.2.10 (b) of the Marine Licence for the OfTW requires that BOWL submit a Cable Plan (CaP) which must include the following:

b) The results of survey work (including geophysical, geotechnical and benthic surveys) which will inform cable routing.

3 Survey deliverables

The Survey deliverables are as stated below. A detailed scope of work is provided in Section 6.

- Deliverable 1 – Pre-construction baseline benthic survey of OWF site, sample locations provided by BOWL;
- Deliverable 2 – Analysis of existing OfTW cable corridor baseline data (geophysical and benthic survey data) and recommendation of Annex I habitat survey sample locations;
- Deliverable 3 – Annex I Habitat Survey of OfTW cable corridor at confirmed sample locations;
- Deliverable 4 - Underwater camera survey of targets of high and medium archaeological potential, location provided by BOWL;
- Deliverable 5 – Data analysis and provision of a Technical Report describing all aspects of the survey and results; and
- Deliverable 6 – Provision of all data, still pictures and video footage in electronic format.

4 Safety, Health and Environment

4.1 General

The contractor shall comply with relevant SHE requirements as detailed in Appendix A SP-SHE-009-001 SHE Spec. BOWL requires that only Contractors who have had their health, safety, environment and quality systems assessed can undertake work on site. This is to promote safety standards and fulfill our statutory obligations, whilst at the same time eliminating duplication at the tender evaluation stage. This invitation is issued subject to your health, safety, environment and quality systems being satisfactorily assessed. If you have not already been assessed, you are required to register on the:

- Achilles Utilities Vendor Database (“UVDB”); and
- Achilles Verify Scheme.
- The Achilles status should be B2 verified status

The UVDB provides BOWL with general information on your company and the Verify Scheme is used to assess your Safety, Health, Environment and Quality competencies.

To register you should contact the UVDB team at Achilles Information Limited as soon as possible (telephone 01235 861118 or email: uvdb@achilles.com). Additional information can

be found at www.achilles.com. Once your participation in the scheme has been confirmed you will need to forward a copy of your registration certificate to BOWL.

Tenderers shall bear all costs and expenses incurred by them in respect of fulfilling the requirements above.

BOWL's Marine Advisor will undertake a visit of any proposed vessel(s) required to undertake the surveys and will inform internal Company SHE procedures during mobilisation which shall be programmed so as not to hinder the execution of the works.

The contractor shall take full responsibility for ensuring that all the works are conducted safely with full regard to environmental considerations. The contractor's personnel are to wear appropriate Personal Protective Equipment (PPE) at all times when undertaking monitoring work and will be in accordance with the Contractor's Project Health and Safety Plan.

Should marine licences be required the contractor will obtain all relevant marine licences and consents to undertake the proposed works.

4.2 SHE Documentation

The contractor shall provide information relating to SHE management and procedures required for the efficient, safe and environmentally considerate completion of the works according to the requirements stated in Appendix A, including but not limited to;

- SHE Organogram;
- Draft SHE Plan;
- Emergency Response Plan
- SHE Policy and Manual;
- Environmental Policy;
- Drugs and Alcohol Policy;
- SHE Performance over the last 5 years;
- Environmental Certification;
- Health and Safety Certification; e.g OHSAS 18001 and
- Vessel Security Plan.

The contractor shall produce method statements and risk assessments in accordance with the requirements of the Safety, Health & Environment Plan, for all activities within this scope. Where vessels are to be used for surveys the SHE Plan and supporting emergency response plans shall be submitted to BOWL at least fourteen (14) days prior to the works commencing. The works shall be undertaken in accordance with the contractor's work specific Health and Safety Plan.

All operatives involved in the subject activities are to be inducted and then fully briefed, via daily Tool Box Talks, on the requirement of the Method Statement and the associated Risk Assessment prepared to support the arrangements in the SHE Plan. The contractor shall submit daily progress reports which include details of inductions, man hours worked, incidents, accidents, safety meetings and hazard/safety observations and submit promptly to BOWL.

4.3 Pollution

The contractor shall comply will all applicable laws and governmental orders, rules and regulations relating to pollution as well as SSE Renewables requirements for Marine Vessel Unit Selection.

The contractor shall fully comply with the requirements of the International Maritime Organisation (IMO) Marine Pollution Regulations (MARPOL).

The contractor shall have emergency contingency plans for spillage incidents.

The contractor shall identify and liaise with the local Harbour Master, Coast Guard, Port Authorities and any local Navigational body to fully acquaint itself with prevailing maritime conditions and emergency bodies.

The contractor shall be fully responsible for pollution emanating from all vessels used by the contractor or its Sub-contractors in the performance of the contract, all of whom shall comply with the following:

- Solid waste such as tins, bottles or any form of trash must be placed in approved containers ready for transportation to shore; and
- Solid combustible waste and garbage shall not be disposed of overboard except as specified under MARPOL or under a specific governmental discharge permit.

The contractor shall inform itself of the aforesaid laws, orders and regulations and ensure that the master, officers and crew of the vessels used by contractor in the performance of the contract are fully cognisant of their responsibilities thereunder.

The contractor agrees to the following:

- To clean up and remove any pollution resulting from any non-compliance with the provisions of this Clause at its sole cost and expense;
- That if the contractor does not clean up and remove the pollution after a formal request from BOWL to do so, BOWL may, may after giving the contractor reasonable notice clean up and remove the pollution materials referred to in this Clause to the extent required to comply with all applicable laws and governmental orders, rules and regulations relating to pollution or the requirements of the IMO MARPOL and:

In the event of any such clean up by BOWL, the contractor shall reimburse BOWL upon receipt of invoices therefore from BOWL for any direct and unavoidable cost of such clean up and removal to the extent necessary to comply with all applicable laws and governmental orders, rules and regulations relating to pollution or the requirements of the IMO MARPOL provided that the BOWL shall have a duty to mitigate any such costs.

5 Quality of Work

5.1 Quality Management

The contractor shall operate a Quality Management System that meets the requirements of BS EN ISO9001:2008. The contractor will follow relevant best practice and industry guidance as identified in Section 6 Proposed Sampling Methodology. The methodologies (data collection, analysis and interpretation) will be agreed prior to commencing the survey work and report writing.

5.2 Deliverables

The deliverables identified in this Scope of Works, within Section 6 Proposed Sampling Methodology and Section 7 Reporting, shall be submitted within the stated timeframe and will be compliant with the quality requirements contained within LF000005-WI-022 Supplier Quality Requirements provided as Appendix B to this Scope of Works.

6 Proposed Sampling Methodology

The sampling methodologies presented within this SoW are based on the following reports. These reports will be made available to the benthic survey contractor to allow for adequate comparison between datasets of previous surveys:

- Beatrice Offshore Wind Farm ES and SEIS with particular regard to Section 10: Wind Farm Benthic Ecology, Section 22: OfTW Benthic Ecology, Section 9: Physical Processes and associated Annexes;
- Beatrice Offshore Wind Farm Preliminary Design – Phase 2 Cable Burial Risk Assessment – Transmission Cables (SSE, 2011); and
- The results of geophysical surveys of the OfTW undertaken to inform the Environmental Impact Assessment (EIA).

6.1 OWF Pre-construction Benthic Survey

Deliverable 1 – Pre-construction baseline benthic survey of OWF site, sample locations provided by BOWL

The focus of the OWF monitoring strategy (both pre- and post-construction) is on the SS.SCS.ICS.MoeVen: *Moerella* spp. with venerid bivalves in infralittoral gravelly sand biotope (hereafter referred to as MoeVen), since this habitat was valued as a receptor of high importance in the Beatrice OWF ES and SEIS and as a consequence, moderate (significant) adverse effects were predicted on this habitat in the Beatrice OWF SEIS as a result of seabed disturbance during construction. This is reflected in the locations to be sampled during both the pre- and post- construction surveys described in the following sections.

To provide an adequate pre-construction baseline against which the results of the post-construction sampling outlined in Section 6.5 can be compared, a single pre-construction benthic survey of the MoeVen biotope in the OWF site is to be undertaken. Any post-construction survey requirements are not included within this scope.

Benthic infaunal sampling is required to characterise and determine pre-construction baseline conditions with respect to benthic species within the MoeVen biotope potentially affected by the proposed wind farm development. Sediment sampling is also required in order to determine the physical nature of the substrate to aid faunal community characterisation and allow subsequent assessment of associated seabed disturbance.

6.1.1 OWF Survey Design

During the pre-construction survey, triplicate grab samples will be collected from 10 stations located within the MoeVen biotope (within the OWF boundary) and from two reference sites, located to the north east of the Beatrice OWF; see indicative locations within the OWF site in Figure 1. The survey stations have been identified based on the biotope map for the OWF

site produced for the EIA baseline characterisation. All sampling stations to be surveyed correspond with sites sampled during the EIA baseline surveys undertaken in 2010 and which were assigned as the biotope MoeVen (or a variant of this biotope in the case of the reference stations). The exact locations of the grab sample stations will be determined once the turbine plan is finalised by BOWL. This will ensure that sample locations are not lost post-construction (e.g., due to co-location of turbines on sample locations for example). The finalised grab sample stations will be provided by BOWL to the survey contractor.

A total of 12 sample stations equates to 36 individual samples for analysis across the MoeVen biotope (i.e. 36 replicates within this particular biotope across its geographic spread within the Beatrice OWF site). The grab sampling methodology to be employed at each sample station is outlined in Section 6.1.2.

Each of the triplicate samples will be analysed for particle size analysis (PSA) and benthic infauna (i.e., species identification, enumeration and biomass determination). The methodologies for these analyses are described in Section 6.1.3.

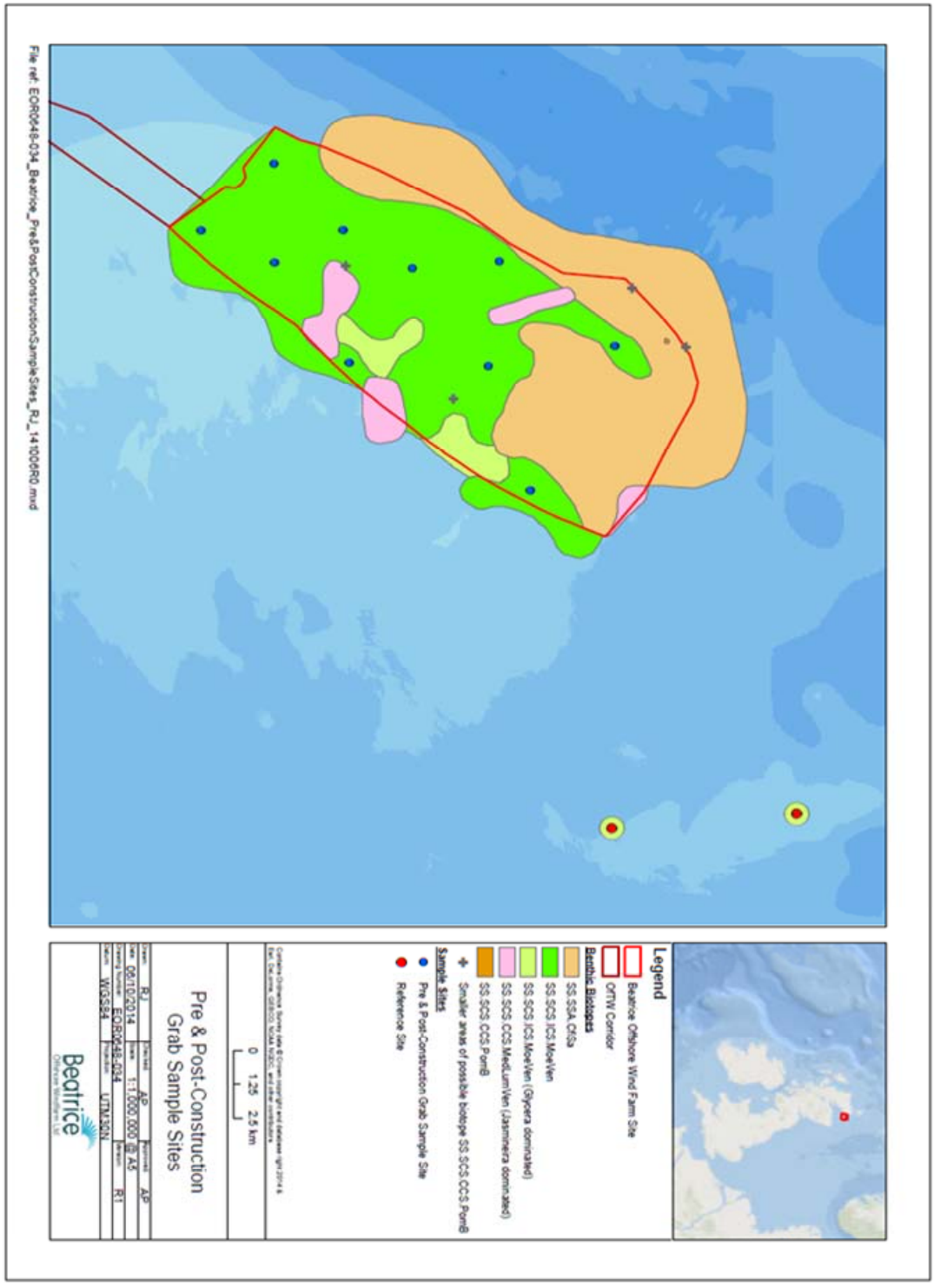

Figure 1. Beatrice OWF indicative pre-construction benthic monitoring sample locations

6.1.2 OWF Survey Methodology

Benthic Grab Sampling

Triplicate benthic samples will be collected at the identified sample locations using a 0.1 m^2 Hamon grab, as this equipment is appropriate to sample the seabed sediments in this area, comprising coarse gravels and sands. The grab methodology has been designed based on guidance provided by '*Procedural Guideline No. 3-9 – Quantitative sampling of sublittoral sediment biotopes and species using remote operated grabs'* included in the JNCC Marine Monitoring Handbook March 2001 (Davies *et al*., 2001). Reference has also been made to "*Guidelines for the conduct of benthic studies at aggregate extraction sites*" (CEFAS, 2002).

The grab will be operated from a suitable vessel licensed for this type of work. A differential GPS (WGS84 datum) is to be used to ensure the sample locations are accurate. Samples must be obtained within 50 m of the specified locations. A photographic record and description of each undisturbed grab must be recorded prior to processing. A field log will be used to record each sample retrieved (date, time, position) with an initial description of sample volume, sediment type, colour, volume and conspicuous fauna.

Each sample is to be checked for adequacy; where practicably possible, samples with unsuitable volume (less than 5 litres) of sediment will be discarded and records of the sample sizes made. Further sampling (up to 5 attempts) is to be made at each site until a sample of sufficient volume is retrieved. Once the sample has been accepted, the material will be transferred from the grab into a large clean plastic fish box (or similar). A sub-sample (of approximately 0.5 litres) will be collected from the well-mixed sediments for PSA. These will be sealed in strong plastic bags with a label both inside and outside of each bag and transferred to a laboratory for analysis.

The remaining sediment will be washed through a 1 mm sieve using a low-pressure deck hose (seawater) and the residue transferred to a pre-labelled bucket with lid and preserved immediately in buffered formalin, to a dilution of approximately 4% w/v. An additional sample label, including date, sample ID and project reference will be placed inside each sample bucket. The sample will subsequently be transferred to a laboratory for faunal analysis following completion of the survey.

6.1.3 Benthic Sample Analysis

Benthic infauna analysis

The preserved sediment material is to be processed in the laboratory by carefully washing the samples with a large volume of tap water through a 1 mm sieve. Samples can be elutriated with water in order to float off the smaller, lighter components of the fauna. These will be retained on a fine mesh sieve (250 µm), transferred to a petri dish and all fauna picked out under a binocular zoom microscope. For samples with large quantities of retained material (where time constraints make examination of the whole fraction under a microscope unrealistic), material can be placed in gridded, white trays and sorted by eye to remove all remaining fauna. The faunal samples should be preserved in 70% IMS for identification, enumeration and specimen coding following Picton and Howson (1999 CD ROM Version). Colonial organisms e.g. bryozoans, are to be recorded as present (P) and for the purposes of abundance counts allocated a numerical value of 1.

All samples are to be subsequently retained in methanol for Quality Assurance (QA) Audit purposes if required. 10% of the benthic samples are to be subject to internal QA. The laboratory undertaking the analysis should be a participant in the National Marine Biological Analytical Quality Control scheme (NMBAQC).

Particle size analysis (PSA)

Each sediment sample is to be processed in the laboratory through sieves over the range 64 mm to 63 µm (0.063 mm) on the Wentworth scale in accordance with CEFAS (2002) to determine the particle size composition of the seabed sediments. The sediment should be washed through a 63 µm (0.063 mm) sieve and the retained material oven dried at 80ºC before being transferred to the coarsest of a series of stacked sieves. These are placed on an automatic shaker for 15 minutes and the contents of each sieve subsequently weighed. Material washing through the 63 µm sieve is to be collected in pre-weighed beakers, oven dried at 30ºC and weighed as a separate fraction. This fraction can be analysed by laser sizing should this be required.

6.2 OfTW Corridor Pre-construction Annex I Habitat Survey of the OfTW

Deliverable 2 – Analysis of existing OfTW cable corridor baseline data (geophysical and benthic survey data) and recommendation of Annex I habitat survey sample locations

Deliverable 3 – Annex I Habitat Survey of OfTW cable corridor at confirmed sample locations

A single pre-construction Annex I habitat survey is to be undertaken to:

- facilitate the identification and delineation of potential Annex I cobble reefs at the landward end of the cable route; and
- to determine whether Annex I submarine structures made by leaking gases are present in association with the pock marks identified in the central section of the OfTW corridor.

The results of this survey will inform and facilitate the routing of the export cable to enable Condition 3.2.2.10 (b) of the Marine Licence to be discharged.

6.2.1 OfTW Corridor Survey Design

Annex I cobble reef survey

Sampling for the identification and delineation (if necessary) of Annex I cobble reef, using drop down video (DDV) survey techniques, is to be targeted at up to 10 discrete locations falling within an area approximately encompassing the landward 10 km of the OfTW corridor as shown in Figure 2. The 10 sites to be targeted should include those identified during the 2011 benthic baseline characterisation surveys (3 DDV locations) undertaken to inform the Beatrice EIA as well as up to an additional 7 sites distributed across the three main boulder fields previously identified during the geophysical surveys of the OfTW corridor.

The survey contractor will recommend the precise sample locations for ground truthing within the three main boulder fields through analysis and review of the existing benthic and geophysical data (side scan sonar (SSS) and multibeam (swath) bathymetry data) by a suitably qualified marine ecologist.

Annex I habitat submarine structures made by leaking gases survey

With respect to the Annex I habitat submarine structures made by leaking gases, the DDV survey should focus on identifying if this habitat is present at a single pock mark feature in the central section of the OfTW corridor (see Figure 2). The benthic survey contractor should identify the largest pock mark feature from the existing geophysical data and target the DDV sampling at this location.

6.2.2 OfTW Survey Methodology

DDV sampling

A digital video system should be employed to investigate the nature of the seabed for the primary purpose of facilitating the direct observation of potential Annex I habitats and also for describing the pre-construction benthic environment. At each potential Annex I reef/habitat location identified, DDV should be deployed. During deployment, the video signal should be monitored on-board the vessel to ensure good quality images of the seabed are achieved and to make notes on conspicuous species present on the seabed. The system used should be capable of acquiring still images to a resolution of at least 5 megapixels. Seabed images should be acquired using a weighted fresh water camera system, with a scale object visible or other system if/as appropriate and confirmed to be so by the contractor. This system is adapted for low visibility conditions to minimise limitations on returned image quality resulting from high-suspended sediment loadings within the water column.

Prior to deployment, the video equipment should be tested to ensure it is working correctly and a 'clapper-board' used to record survey details including date, time, survey site reference number etc. The video should be started when the camera system is on station and approximately 2 m from the seabed. The video should be stopped when data of sufficient quality has been obtained (nominally a minimum of 5 minutes of footage should be acquired at each site). Optimal conditions for using camera equipment are when current speeds are low (<1 knot) and when sea conditions are calm with low winds. A time related log will be kept with details of the visibility and notes on the image recorded in a field logbook, together with other information including depth, wind speed, wind direction, cloud cover and sea state. As part of the completion of this log, notes should be kept on the exact start/end positions, orientation of vessel/camera, conspicuous species and substratum types, in addition to any other notable features to assist with subsequent analysis of the video data post-surveying. The survey log shall be maintained by a trained and appropriately experienced marine biologist

On board observations of the video footage will be made to assess the potential for Annex I habitats.

At the end of each day, images should be saved from the camera and burnt onto CD, as well as being saved onto hard drives. The logs and all data should also be saved onto the hard drives and additionally onto disks. All video footage will be converted to DVD.

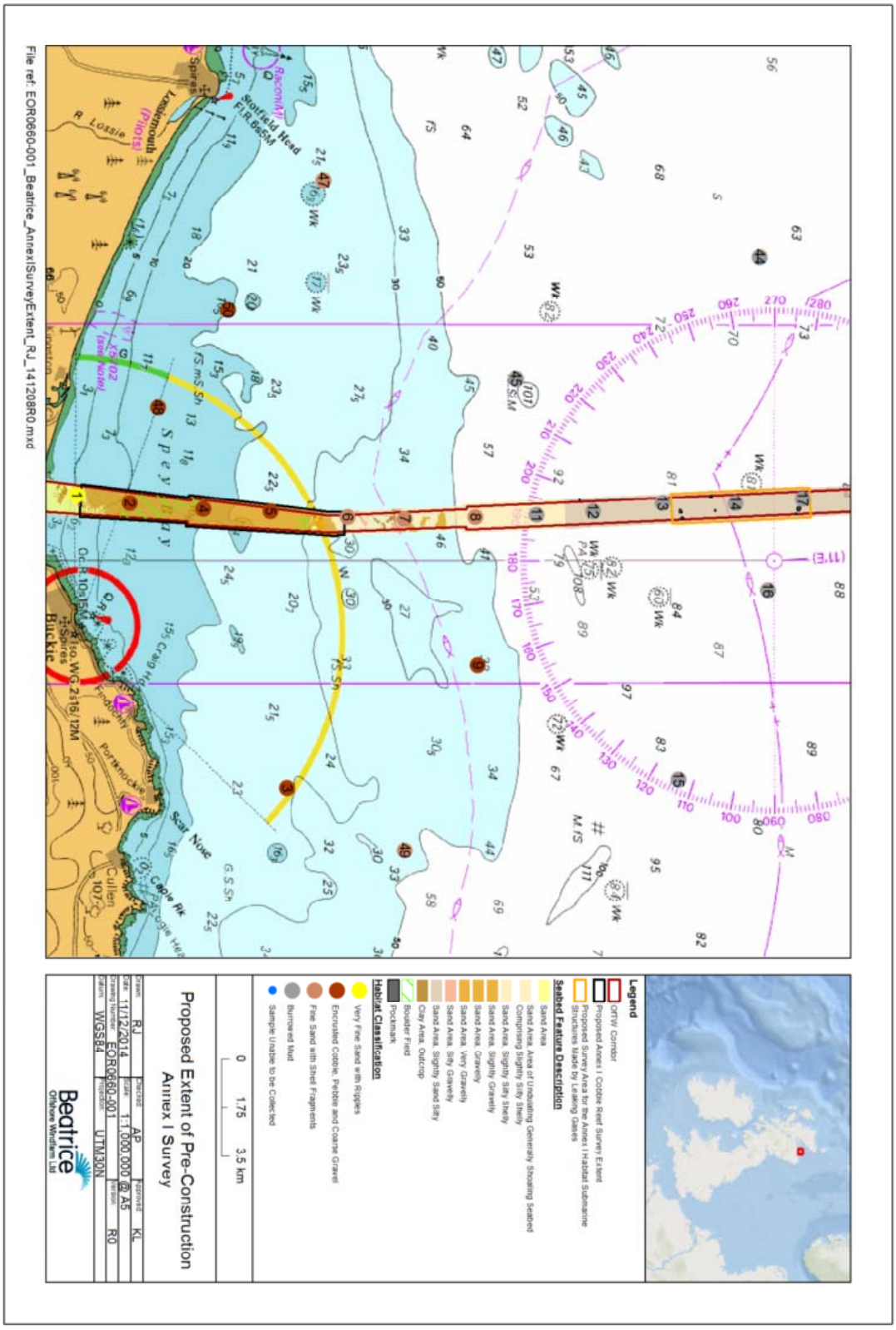

Figure 2 Proposed extent of pre-construction Annex I habitat survey.

Annex I cobble reef survey

As a minimum, 5 minutes of video footage and 5 stills images are to be collected from each DDV site. If potential Annex I cobble reef habitat is identified then further DDV sampling is to be undertaken at appropriate intervals around the sample site in order to determine the extent of the potential reef. These additional DDV survey locations should be sampled at 100 m to the north, south, east and west of the original survey location (i.e., cruciform). If the reef is also recorded at these additional points, further drop down video samples at 100 m intervals along that line should be taken until the extent of the relevant reef is determined, i.e. the reef is no longer observed in the video footage. This should give an indication of the extent of the reef and therefore provide additional information on the conservation importance of the feature. In the case of well developed cobble reef, additional resources/sample locations may be required for full delineation, but this would need to be confirmed and agreed by the BOWL client representative or survey manager.

Annex I habitat submarine structures made by leaking gases survey

During the DDV survey of the pockmark, an assessment of activity (e.g., gas seepage) will be required, including the identification of potential methane-derived authigenic carbonate structures within the pockmark which may be indicative of Annex I habitat. Images are to be acquired via DDV in the form of cruciform transects across the pock mark feature. At least two photographic transects should be undertaken through this feature and each transect should have multiple sites separated by only a few seconds or metres, with at least one good photograph obtained for each position. The density of photographs should be increased within the centre of the feature where possible.

6.2.3 OfTW DDV Survey Data Analysis

Video Analysis

Office based review and analysis of the DDV records are to be undertaken by experienced marine ecologists. Species are to be identified and their abundance or percentage cover quantified estimated using the Superabundant, Abundant, Common, Frequent, Occasional or Rare (SACFOR) scale. This scale is based on that devised by the JNCC (Connor and Hiscock, 1996) and uses the average species size to classify the population. Where possible, efforts should also be made to assign relevant biotope codes to DDV locations according to Connor *et al*. (2004).

Data should be collated using Excel spreadsheets in a way which conforms to the relevant Marine Environmental Data and Information Network (MEDIN) Data Guideline and with all site locations recorded. Relevant data can then be transferred to GIS format so that spatial plotting of information can be achieved.

Annex I reef assessment and mapping of the OfTW corridor

Annex I cobble reef assessments should be undertaken using appropriate guidance notes, including Irving (2009) for potential cobble reefs as summarised in Table 6.1. This should be undertaken by a suitably trained marine ecologist familiar with the relevant Annex I guidance documents. Information gathered from the DDV surveys is to be interpreted, together with the existing geophysical data, to produce a habitat map of the area showing detailed information of the locations and extents of potential Annex I habitats within the OfTW corridor and potential ecological constraints for cable route selection.

The scoring system proposed by Irving (2009), indicates that cobble reefs should be elevated by at least 0.064 m, be composed of at least 10% cobbles, cover an area of at least

25 m^2 and have an associated community of largely epifaunal species. These parameters are summarised in Table 6.1 and should be used to assess the likelihood of cobble reefs being present. Further information on these parameters and how they should be used in Annex I reef assessments are outlined in the relevant guidance notes.

Table 6.1 Range of figures which could be used as a measure of "reefiness" for cobble reefs (Irving, 2009).

Measure of 'reefiness'	Not a cobble reef	Low	Medium	High
Composition	<10%	10-40% Matrix supported	40-95%	>95% Clast supported
Elevation	Flat Seabed	<0.064 m	0.064 m – 5 m	>5 m
Extent	<25 m^2		>25 m^2	
Biota	Dominated by infaunal species			>80% of species present composed of epifaunal species

6.3 DDV surveys at targets of high or medium archaeological potential

Deliverable 4 - Underwater camera survey of targets of high or medium archaeological potential, locations to be provided by BOWL

Targets of high and medium archaeological potential were identified from an expert review of the OWF and OfTW geophysical survey data during the EIA process. These are shown in Figures 3 to 6. An Archaeological Exclusion Zone (AEZ) has been defined around each target to provide protection from potential damage to any feature during construction. There are up to 13 AEZs around targets within or adjacent to the OWF site and up to 26 AEZs within or adjacent to the OfTW cable corridor. DDV documentation of targets that are potentially in the vicinity of OWF or OfTW infrastructure would enable confirmation of their archaeological potential and provide the basis for confirming, or removing the AEZ at that location.

Following confirmation of the final wind turbine array layout and further export cable design works, BOWL will confirm which locations should be subject to further DDV survey. For the

purposes of this scope of works it is assumed that DDV sampling at up to 20 locations will be required.

Investigation of targets currently protected by AEZs will involve a minimum of 3 DDV drops collecting video over a 360^{o} rotation. Video footage will be reviewed on board to assess the archaeological potential of the target. Still images should be obtained of any identified targets. Further DDV video and still images should be obtained, if necessary, to quantify the extent of any target of archaeological potential. On board supervision of this work should be undertaken by a suitably qualified and experienced marine archaeologist.

As per the OfTW Annex I habitat DDV survey, a time related log will be kept with details of the visibility and notes on the image recorded in a field logbook, together with other information including depth, wind speed, wind direction, cloud cover and sea state. As part of the completion of this log, notes should be kept on the exact start/end positions, orientation of vessel/camera, conspicuous species and substratum types, in addition to any other notable features to assist with subsequent analysis of the video data post-surveying. The survey log shall be maintained by a trained and appropriately experienced marine archaeologist.

A similar DDV drop at a disused (suspended) well head may also be required by BOWL to confirm the nature of any visible infrastructure at this location to support cable routing decisions.

At the end of each day, images, video, logs and other data should be burnt onto CD and saved onto hard drives. All video footage will be converted to a DVD format.

6.4 Survey timing

It is currently planned that construction at the Beatrice site will begin in 2017. The pre-construction benthic survey is to be undertaken in Q2 2015.

6.5 Post-construction survey requirement

The benthic monitoring strategy agreed with Marine Scotland includes post-construction surveys to be undertaken within the OWF. However these do not form part of this scope of works. The output from the survey described in this scope of works will be expected to be of such a quality that it will form the baseline for comparison of any subsequent survey results.

No post-construction survey of the OfTW corridor is planned.

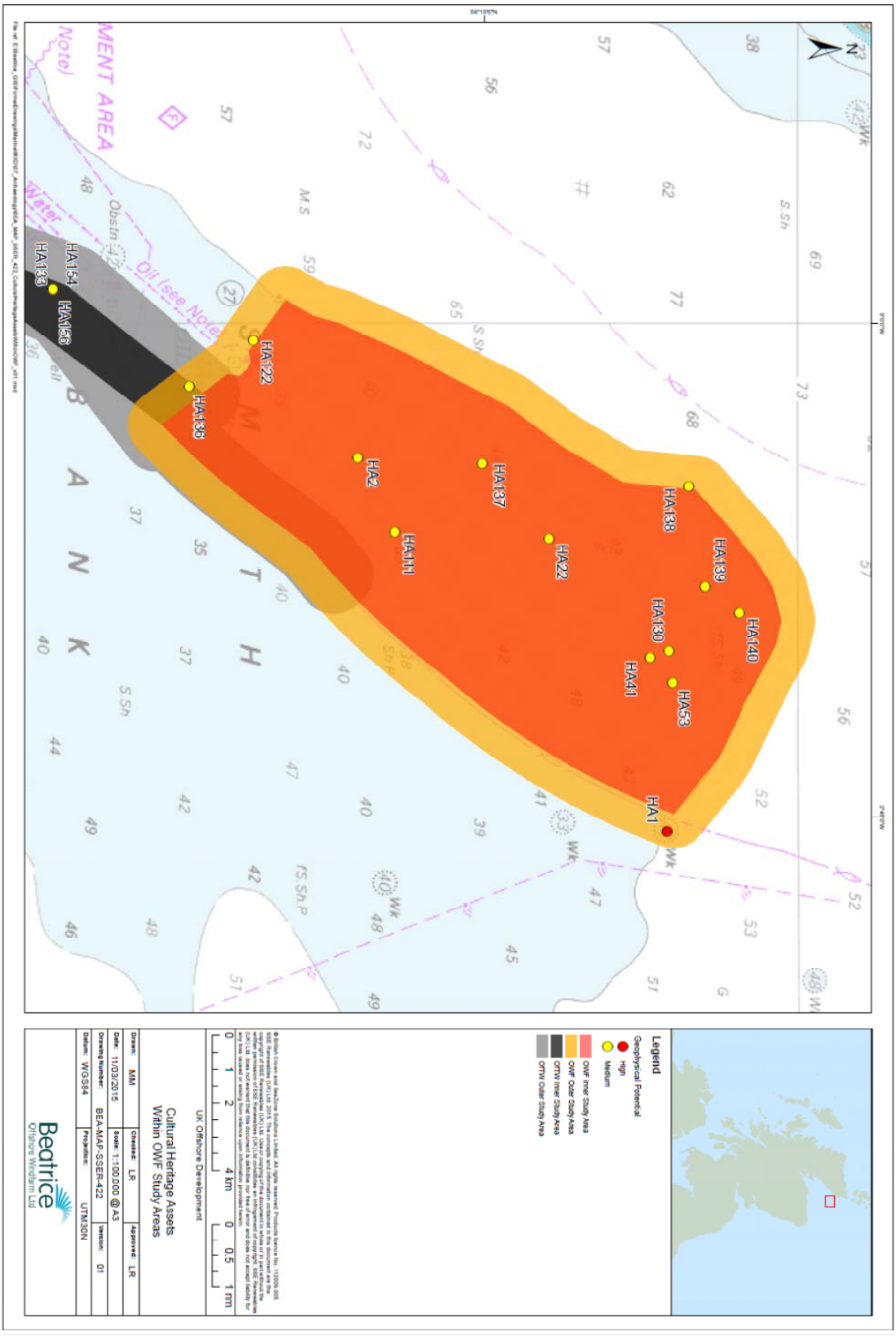

Figure 3 Locations of high archaeological potential within the OWF study areas.

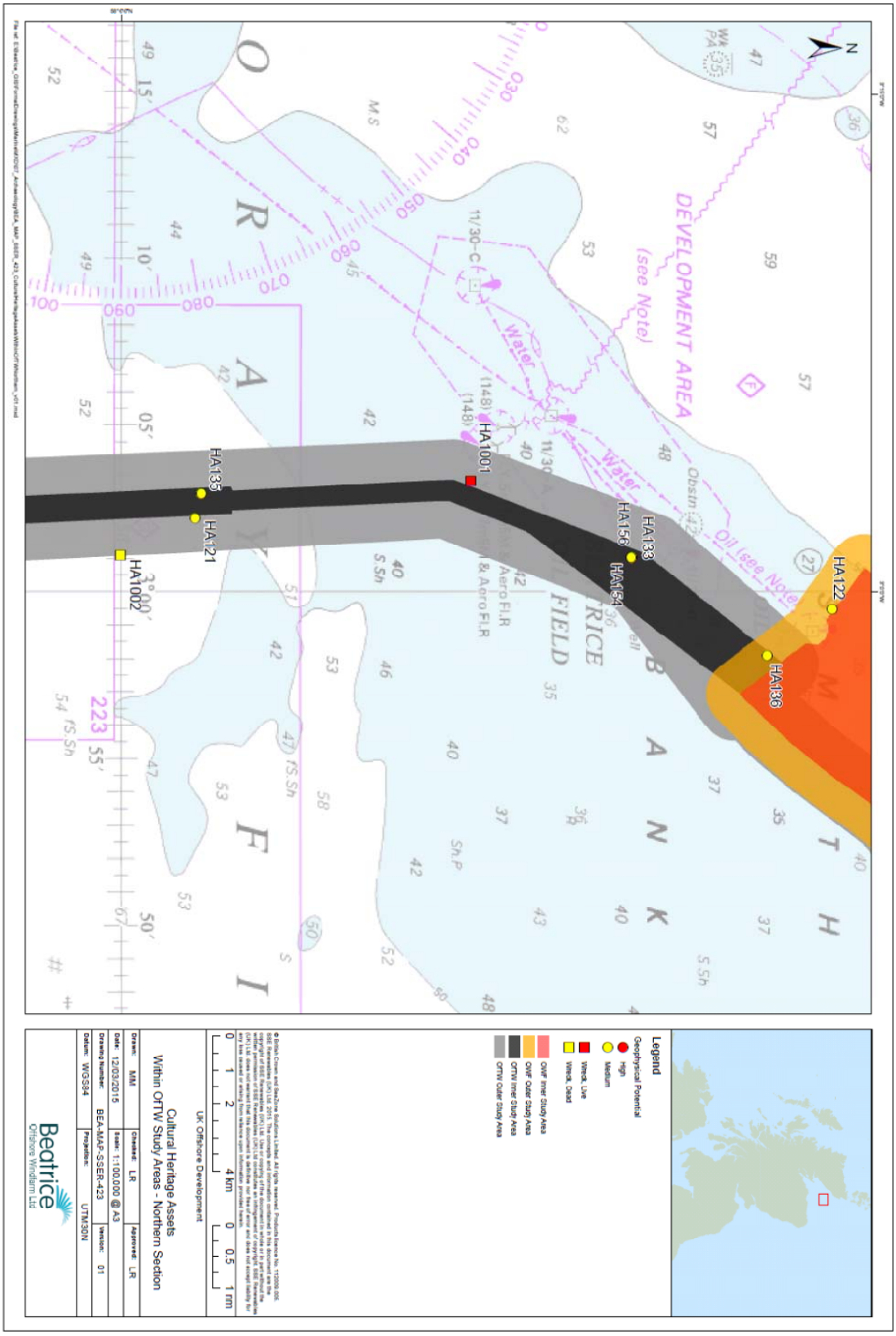

Figure 4 Locations of high archaeological potential within the OfTW, northern section.

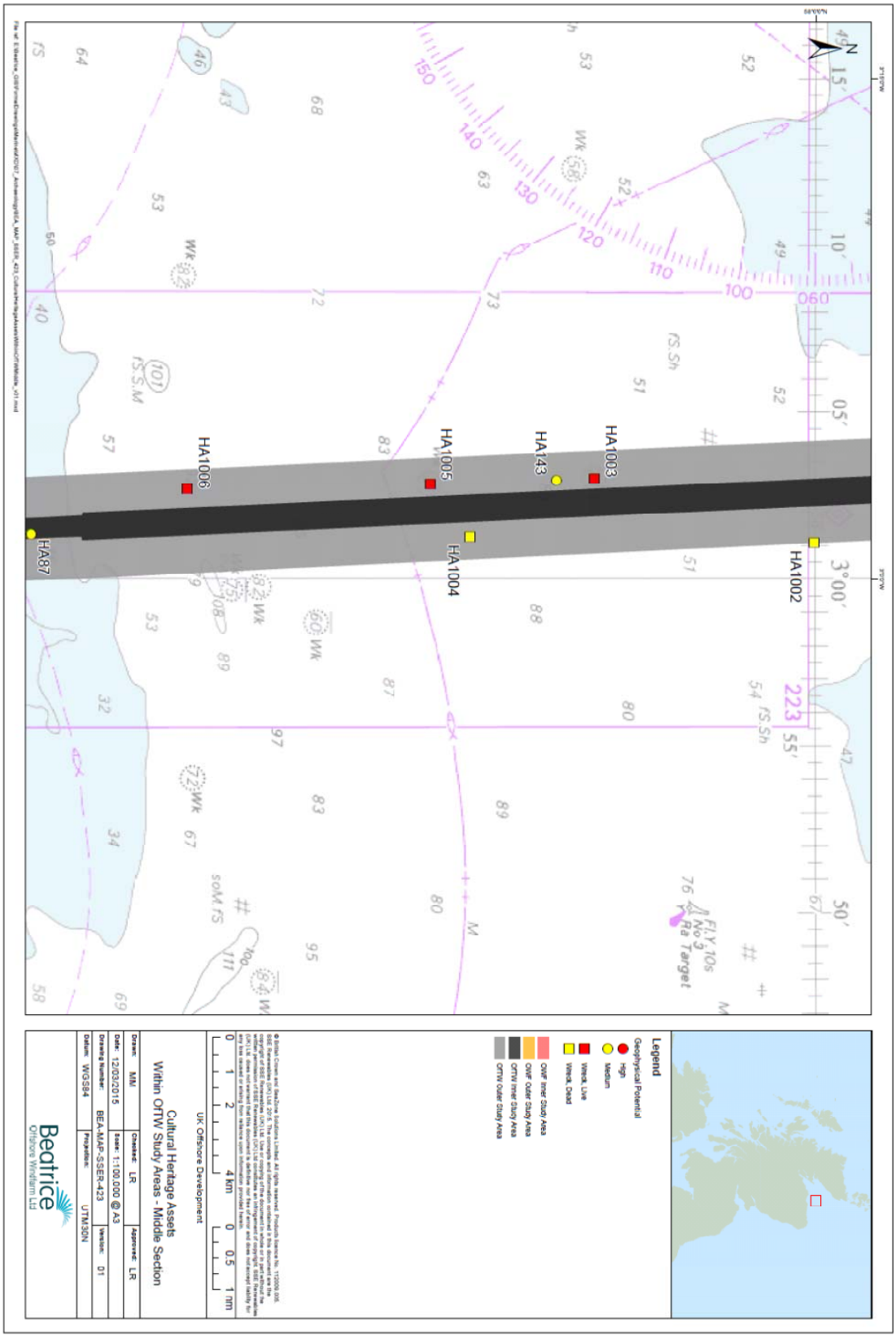

Figure 5 Locations of high archaeological potential within the OfTW, central section.

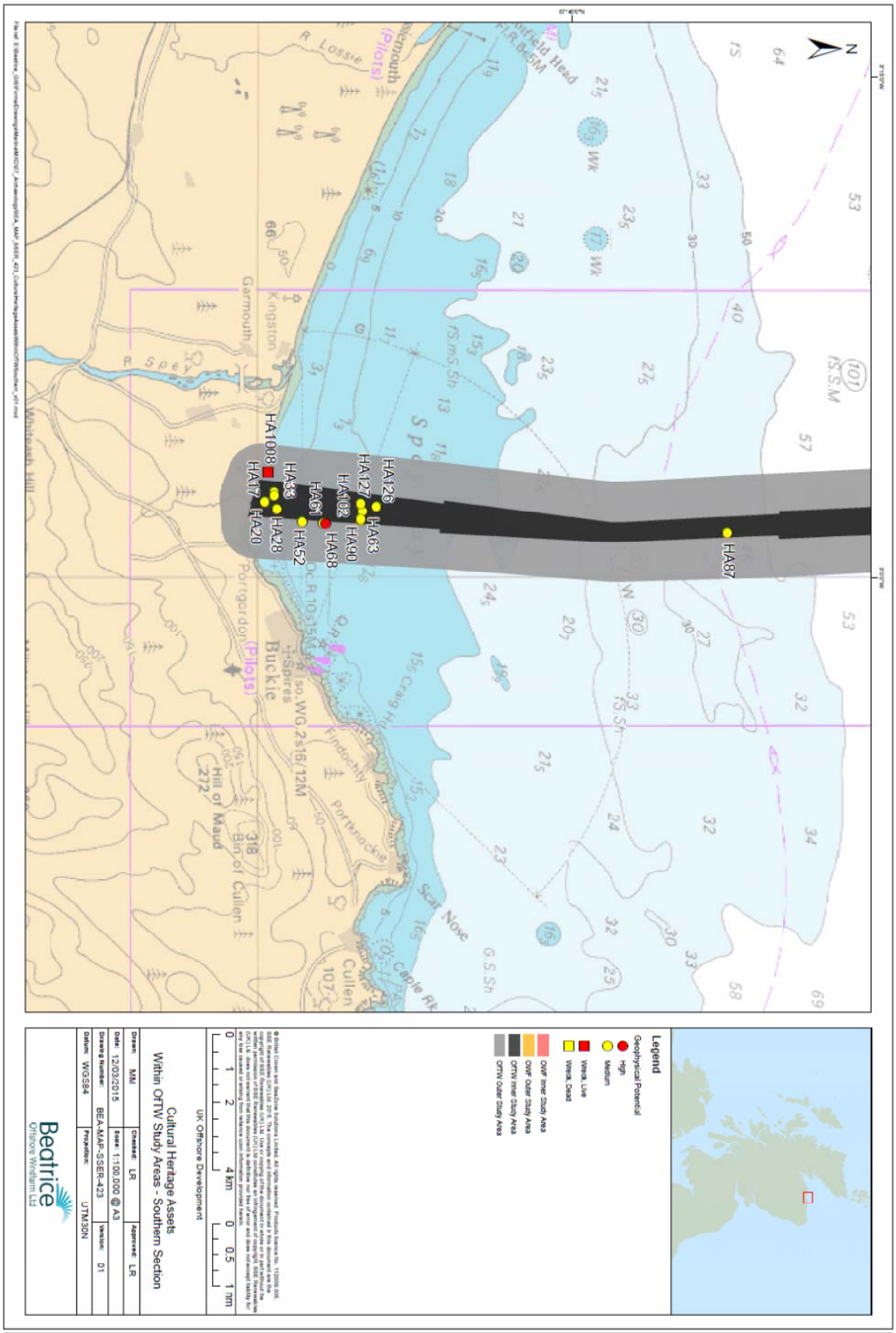

Figure 6 Locations of high archaeological potential within the OfTW, southern section.

7 Reporting

7.1 Daily Survey Reporting

Daily progress reports (DPRs) will be issued to BOWL by 1200 hrs the following day, detailing the work completed, the observed weather conditions, any health and safety issues (including accidents/emergencies) and the forecast for the following day. A daily summary of the number of days spent at sea and in port will also be provided.

Within five working days of demobilisation of the survey, a field report will be issued to BOWL providing a summary of the work completed, outlining any health and safety issues and detailing the positions of all sampling undertaken.

7.2 Final Survey Report

Deliverable 5 – Data analysis and provision of a Technical Report describing all aspects of the survey and results

Deliverable 6 – Provision of all data, still pictures and video footage in electronic format.

A single interpretive pre-construction baseline survey report detailing the survey results is required. This will be in three parts, comprising: i) the OWF benthic survey results, ii) the OfTW Annex I habitat survey results, and iii) the archaeological feature DDV survey results.

7.2.1 OWF Benthic Pre-construction Survey Reporting

The OWF benthic survey reporting will detail fieldwork methodologies for the benthic grab sampling undertaken with the Beatrice OWF site and will present site records\survey events and laboratory (taxonomy and biomass) procedures. Within associated appendices, this report will present the field logs, results of the PSA and benthic infauna analysis.

Data should be collated using Excel spreadsheets in a way which conforms to the relevant Marine Environmental Data and Information Network (MEDIN) Data Guideline and with all site locations recorded. All electronic data should be provided in addition to the report

The report will also detail the results of the data analyses, which should broadly follow the analyses undertaken to inform the EIA baseline characterisation as presented in Annex 10A - Wind Farm Benthic Ecology Technical Report, to the ES and will include as a minimum:

- Descriptions of the characterising species, spatial distribution plots of the sediment analyses and summary univariate data (e.g., total number of taxa, abundance, biomass etc.) at each monitoring station;
- Sediment type descriptors including percentage sand, silt and gravel, mean and median grain size, sorting coefficient and skewness etc. from the PSA data;
- Univariate statistical analysis (e.g. Simpson's dominance, Shannon-Weiner diversity, Marglef's diversity, Pielou's evenness) and multivariate statistical analysis of faunal and sediment data using PRIMER to investigate community structure and relationships with abiotic factors with the following analyses being used as a minimum: cluster analysis with multidimensional scaling (MDS); SIMPER; ANOSIM; BIO ENV and/or RELATE; and
- Where relevant, comparisons between the pre-construction data with the data collected during the 2010 baseline characterisation survey.

The Beatrice OWF pre-construction benthic infaunal data will be compared to the previous

dataset available from the EIA characterisation surveys in 2010; however the data acquired in this survey will primarily be used as a baseline for comparison with the future post-construction monitoring surveys.

The report providing the physical and biological analyses is to be produced and issued in draft to BOWL within 30 working days of the receipt of the final laboratory analysis.

7.2.2 OfTW Pre-construction Annex I Habitat Report

The OfTW Annex I habitat survey reporting will detail fieldwork methodologies for the DDV sampling and will present site records\survey events and post-survey data analysis techniques. The report will draw on the results of geophysical and DDV surveys undertaken along the OfTW corridor and should include the results of the Annex I habitat assessments at each DDV location, in line with the guidance presented in Irving (2009), together with plans showing the extents of reef features and/or Annex I submarine structures made by leaking gases, if present, within the OfTW corridor. This report will highlight particular benthic habitat sensitivities within discrete sections of the OfTW corridor and will inform subsequent discussions between BOWL and statutory consultees with regards to export cable routing options and identifying the most appropriate measures to minimise, where possible, direct impacts to Annex I habitats, if present.

Within the associated appendices, this report will present the field logs, the DDV seabed images and seabed image analysis results for the OfTW corridor survey.

Processed DDV data will be provided for each location sampled.

7.2.3 DDV Surveys at targets of high or medium archaeological potential

Reporting will detail fieldwork methodologies for the DDV documentation and will present site records/survey events and post-survey data analysis techniques. The report will provide confirmation of whether or not any targets of archaeological potential were identified and provide recommendations to BOWL on the confirmation or removal of the AEZ concerned.

Within the associated appendices, this report will present the field logs, the DDV seabed images and seabed image analysis results for the DDVsurvey. Processed DDV data will be provided for each target area sampled.

8 Vessel Provision

The survey contractor will source suitable vessels and all necessary survey equipment from which to undertake the monitoring surveys. The vessel shall comply with all the requirements in the Marine Vessel / Unit Selection document PR-OFF-MAR-001 provided with this scope of works. Any vessels used to undertake the survey will require a detailed HSE audit by the BOWL. BOWL reserves the right to instruct the survey contractor to carry out an assessment of the proposed vessel(s) in accordance with the Marine Vessel / Unit Selection Document before any vessel is accepted to be included under the contract.

BOWL reserves the right to carry out HSE audits of the site and technical audits of the contractor's equipment and vessel in accordance with the BOWL's procedures prior to acceptance of monitoring work. BOWL's Marine Advisor shall undertake a site visit to inform internal HSE procedures to the survey vessel(s) during mobilisation that will be programmed such as not to hinder the execution of the works. Previous audit records, where accessible, will be examined by the BOWL prior to the vessel being contracted or hired. BOWL would utilise the IMCA/UKOOA Common Marine Inspection Document and a 3rd party auditor for

the audit(s). Following the audit(s) the contractor will be required to address any serious/major non-compliances raised prior to sailing at their own cost.

Fit for purpose inspections shall include but not be limited to;

- Vessel particulars;
- Previous inspections;
- Certification;
- ISM (if applicable);
- Occupational Health and Safety;
- Welfare conditions;
- Crew Competence and qualification;
- Life saving and Fire Fighting Appliances;
- Navigation and Communications Equipment;
- Pollution Prevention;
- Machinery Space;
- Mooring and lifting equipment; and
- General condition.

The contractor will make available to BOWL's Marine Surveyor/Advisor all information requested and to allow full inspections of equipment and to comply with their recommendations and requirements. Recommendations given by the Marine Surveyor/Advisor shall not relieve the contractor of the ultimate responsibility for proper navigation or its obligations under the Terms and Conditions of the contract.

Where possible the vessel shall have space during the monitoring survey for a minimum of one Company Representative who shall have access to the contractor's facilities at all times to ensure that the works meets the requirements of the contract.

9 References

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