

Request for Quotation

**Testing the validity of using eDNA for carbon origin analysis from sediment cores.**

31/07/2023

**Request for Quotation**

**Testing the validity of using eDNA for carbon origin analysis from sediment cores.**

You are invited to submit a quotation for the requirement described in the specification, Section 2.

Please confirm by email, receipt of these documents and whether you intend to submit a quote or not.

Your response should be returned to the following email address by:

Email:Joshua.Parker@naturalengland.org.uk

Date:**01/09/2023**

Time: **12pm**

Ensure you include the name of the quotation and ‘Final Submission’ in the subject field to make it clear that it is your response.

**Contact Details and Timetable**

Josh Parker will be your contact for any questions linked to the content of the quote or the process. Please submit any clarification questions via email and note that, unless commercially sensitive, both the question and the response will be circulated to all tenderers.

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| **Action** | **Date** |
| **Date of issue of RFQ** | **31/07/2023** |
| **Deadline for clarifications questions** | **18/08/2023** at **12:00 BST**  |
| **Deadline for receipt of Quotation** | **01/09/2023** at **12:00 BST**  |
| **Intended date of Contract Award** | **11/09/2023** |
| **Intended Contract Start Date** | **18/09/2023** |
| **Intended Delivery Date / Contract Duration**  | **29/02/2024**  |

**Section 1: General Information**

**Glossary**

Unless the context otherwise requires, the following words and expressions used within this Request for Quotation shall have the following meanings (to be interpreted in the singular or plural as the context requires):

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|  |  |
| **“Authority”** | means Natural England who is the Contracting Authority.  |
| **“Contract”** | means the contract to be entered into by the Authority and the successful supplier. |
| **“Response”** | means the information submitted by a supplier in response to the RFQ. |
| **“RFQ”** | means this Request for Quotation and all related documents published by the Authority and made available to suppliers. |

**Conditions applying to the RFQ**

You should examine your Response and related documents ensuring it is complete and in accordance with the stated instructions prior to submission.

Your Response must contain sufficient information to enable the Authority to evaluate it fairly and effectively. You should ensure that you have prepared your Response fully and accurately and that prices quoted are arithmetically correct for the units stated.

By submitting a Response, you, the supplier, are deemed to accept the terms and conditions provided in the RFQ. Confirmation of this is required in Annex 2.

Failure to comply with the instructions set out in the RFQ may result in the supplier’s exclusion from this quotation process.

**Acceptance of Quotations**

By issuing this RFQ the Authority does not bind itself to accept any quotation and reserves the right not to award a contract to any supplier who submits a quotation.

**Costs**

The Authority will not reimburse you for any costs and expenses which you incur preparing and submitting your quotation, even if the Authority amends or terminates the procurement process.

**Self-Declaration and Mandatory Requirements**

The RFQ includes a self-declaration response (Annex 1) which covers basic information about the supplier, as well as any grounds for exclusion. If you do not comply with them, your quotation will not be evaluated.

Any mandatory requirements will be set out in Section 2, Specification of Requirements and, if you do not comply with them, your quotation will not be evaluated.

**Clarifications**

Any request for clarification regarding the RFQ and supporting documentation must be submitted via email no later than the deadline for clarifications set out in the Timetable. The Authority shall be under no obligation to respond to queries raised after the clarification deadline.

The Authority will respond to all reasonable clarifications as soon as possible but cannot guarantee a minimum response time. The Authority will publish all clarifications and its responses to all suppliers via email unless deemed commercially sensitive.

If a supplier believes that a request for clarification is commercially sensitive, it should clearly state this when submitting the clarification request. However, if the Authority considers either that:

* the clarification and response are not commercially sensitive; and
* all suppliers may benefit from its disclosure,

then the Authority will notify the supplier (via email), and the supplier will have an opportunity to withdraw the request for clarification by sending a further message requesting the withdrawal of the clarification request. If not withdrawn by the supplier within 2 working days of the Authority’s notification, the Authority may publish the clarification request and its response to all suppliers and the Authority shall not be liable to the supplier for any consequences of such publication.

The Authority reserves the right to seek clarification of any aspect of a quotation and/or provide additional information during the evaluation phase to carry out a fair evaluation. Where the Authority seeks clarification on any aspect of the quotation, the supplier must respond within the timeframe requested by the Authority.

**Amendments**

The Authority may amend the RFQ at any time prior to the deadline for receipt. If it amends the RFQ the Authority will notify you via email.

Suppliers may modify their quotation prior to the deadline for Responses. No Responses may be modified after the deadline for Responses.

 Suppliers may withdraw their quotations at any time by submitting a notice via the email to the named contact.

**Conditions of Contract**

The Authority’s standard Condensed Terms and Conditions provided as part of the RFQ will be included in any contract awarded as a result of this quotation process. The Authority will not accept any changes to these terms and conditions proposed by a supplier.

Suppliers should note that the quotation provided by the successful bidder will form part of the Contract.

**Prices**

Prices must be submitted in £ sterling, inclusiveof VAT.

**Disclosure**

All Central Government Departments, their Executive Agencies and Non Departmental Public Bodies are subject to control and reporting within Government. In particular, they report to the Cabinet Office and HM Treasury for all expenditure. Further the Cabinet Office has a cross-Government role delivering overall Government policy on public procurement, including ensuring value for money and related aspects of good procurement practice. For these purposes, the Authority may disclose within Government any details contained in your quotation. The information will not be disclosed outside Government during the procurement.

In addition, the Authority is subject to the Freedom of Information Act 2000 and the Environmental Information Regulations 2004, which provide a public right of access to information held by public bodies. In accordance with these two statutes, the Authority may be required to disclose information contained in your quotation to any person who submits a request for information pursuant to those statutes.

Further to the Government’s transparency agenda, all UK Government organisations must advertise on Contract Finder in accordance with the following publication thresholds:

* Central Contracting Authority’s: £12,000
* Sub Central Contracting Authority’s and NHS Trusts: £30,000

For the purpose of this RFQ the Authority is classified as a Central Contracting Authoritywith a publication threshold of £12,000 inclusive of VAT.

If this opportunity is advertised via Contracts Finder, we are obliged to publish details of the awarded contract including who has won the contract, the contract value, and indicate whether the winning supplier is a small and medium-sized enterprise (“SMEs”) or voluntary organisation or charity. A copy of the contract must also be published with confidential information redacted.

By submitting a Response, you consent to these terms as part of the procurement.

**Disclaimers**

Whilst the information in this RFQ and any supporting information referred to herein or provided to you by the Authority have been prepared in good faith the Authority does not warrant that this information is comprehensive or that it has been independently verified.

The Authority does not:

* make any representation or warranty (express or implied) as to the accuracy, reasonableness or completeness of the RFQ;
* accept any liability for the information contained in the RFQ or for the fairness, accuracy or completeness of that information; or
* accept any liability for any loss or damage (other than in respect of fraudulent misrepresentation or any other liability which cannot lawfully be excluded) arising as a result of reliance on such information or any subsequent communication.

Any supplier considering entering into contractual relationships with the Authority following receipt of the RFQ should make its own investigations and independent assessment of the Authority and its requirements for the goods and/or services and should seek its own professional financial and legal advice.

**Protection of Personal Data**

In order to comply with the General Data Protection Regulations 2018 the supplier must agree to the following:

 You must only process any personal data in strict accordance with instructions from the Authority.

* You must ensure that all the personal data that we disclose to you or you collect on our behalf under this agreement are kept confidential.
* You must take reasonable steps to ensure the reliability of employees who have access to personal data.
* Only employees who may be required to assist in meeting the obligations under this agreement may have access to the personal data.
* Any disclosure of personal data must be made in confidence and extend only so far as that which is specifically necessary for the purposes of this agreement.
* You must ensure that there are appropriate security measures in place to safeguard against any unauthorised access or unlawful processing or accidental loss, destruction or damage or disclosure of the personal data.
* On termination of this agreement, for whatever reason, the personal data must be returned to us promptly and safely, together with all copies in your possession or control.

**General Data Protection Regulations 2018**

For the purposes of the Regulations the Authority is the data processor.

The personal information that we have asked you provide on individuals (data subjects) that will be working for you on this contract will be used in compiling the tender list and in assessing your offer. If you are unsuccessful the information will be held and destroyed within two years of the award of contracts. If you are awarded a contract it will be retained for the duration of the contract and destroyed within seven years of the contract’s expiry.

We may monitor the performance of the individuals during the execution of the contract, and the results of our monitoring, together with the information that you have provided, will be used in determining what work is allocated under the contract, and in any renewal of the contract or in the award of future contracts of a similar nature. The information will not be disclosed to anyone outside the Authority without the consent of the data subject, unless the Authority is required by law to make such disclosures.

**Equality, Diversity & Inclusion (EDI)**

The Client is striving to create a diverse and inclusive working environment where every individual has equality of opportunity to progress and to apply their unique insights to making the UK a great place for living. The Service Provider is expected to respect this commitment in all dealings with Natural England staff and service users.

Suppliers are expected to;

* support Defra group to achieve its Public Sector Equality Duty as defined by the Equality Act 2010, and to support delivery of [Defra group’s Equality & Diversity Strategy](https://www.gov.uk/government/publications/defra-group-equality-diversity-and-inclusion-strategy-2020-to-2024/defra-group-equality-diversity-and-inclusion-strategy-2020-to-2024).
* meet the standards set out in the [Government’s Supplier Code of Conduct](https://www.gov.uk/government/publications/supplier-code-of-conduct)
* work with Defra group to ensure equality, diversity and inclusion impacts are addressed (positive and negative) in the goods, services and works we procure, barriers are removed and opportunities realised.

**Sustainable Procurement**

Addressing global sustainability impacts and realising additional community benefits within commercial activity is core to Defra group’s approach, working with its supply chain is key to achieving sustainable outcomes. In addition to supporting Defra group to meet its outcomes we look to understand and reduce negative sustainability impacts associated with our commercial activity and realise benefits.

The Client encourages its suppliers to share these values, work to address negative impacts and realise opportunities, measure performance and success.

Suppliers are expected to have an understanding of the Sustainable Development Goals, the interconnections between them and the relevance to the Goods, Services and works procured on the Client’s behalf

**Conflicts of Interest**

The concept of a conflict of interest includes but is not limited to any situation where an Involved Person or Relevant Body has directly or indirectly, a financial, economic or other personal interest which might be perceived to compromise their impartiality and independence in the context of the procurement procedure and/or affect the integrity of the contract award.

We expect suppliers to mitigate appropriately against any real or perceived conflict of interest through their work with government. A supplier with a position of influence gained through a contract should not use that position to unfairly disadvantage any other supplier or reduce the potential for future competition

Where the supplier is aware of any circumstances giving rise to a conflict of interest or has any indication that a conflict of interest exists or may arise you should inform the Authority of this as soon as possible (whether before or after they have submitted a quotation). Tenderers should remain alert to the possibility of conflicts of interest arising at all stages of the procurement and should update the Authority if any new circumstances or information arises, or there are any changes to information already provided to the Authority. Failure to do so, and/or to properly manage any conflicts of interest may result in a quotation being rejected.

Provided that it has been carried out in an open, fair and transparent manner, routine pre-market engagement carried out by the Authority should not represent a conflict of interest for the supplier.

**Section 2: The Invitation**

**Specification of Requirements**

1. **Background to Natural England**

Natural England is the government’s adviser for the natural environment in England. We protect England’s nature and landscapes for people to enjoy and for the services they provide.

Within England, we are responsible for:

* promoting nature conservation and protecting biodiversity;
* conserving and enhancing the landscape;
* securing the provision and improvement of facilities for the study, understanding and enjoyment of the natural environment;
* promoting access to the countryside and open spaces; and
* contributing to social and economic well-being through the sustainable management of the natural environment.
1. **Introduction**

This study aims to test the validity of a novel approach for using eDNA to undertake carbon origin analysis of intertidal sediment cores.

The identification of organic carbon sources associated with carbon stocks is important for understanding blue carbon habitats and how they could contribute towards Net Zero targets in the future (Ortega *et al.* 2020[[1]](#footnote-2)). Despite the growing interest in blue carbon (carbon stored in marine ecosystems), very little is currently known about the origin or source of organic carbon stored within blue carbon habitats (UKBCEP, 2023[[2]](#footnote-3)).

Understanding blue carbon stocks in English waters is one of DEFRAs main policy priorities with the view of including blue carbon into net zero calculations. However, most blue carbon stocks are currently not included within the UK’s national inventory ([Blue carbon (parliament.uk)](https://researchbriefings.files.parliament.uk/documents/POST-PN-0651/POST-PN-0651.pdf); [2019 UK Greenhouse Gas Emissions, Final Figures (publishing.service.gov.uk)](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/957887/2019_Final_greenhouse_gas_emissions_statistical_release.pdf); [United Kingdom. 2021 National Inventory Report (NIR) | UNFCCC](https://unfccc.int/documents/273439); [UK Blue Carbon Evidence Partnership - Evidence Needs Statement (cefas.co.uk)](https://www.cefas.co.uk/media/gdnmduft/ukbcep-evidence-needs-statement_june-23_final.pdf)).

It is important to understand the sources of organic carbon and the transportation pathways in order to ensure that calculations provide an accurate assessment of the UK’s blue carbon stocks and to avoid double counting (UKBCEP, 2023). Understanding the sources and sinks of organic carbon could also be used to inform the conservation and management of marine and intertidal habitats (Ortega *et al.* 2020).

Conventional carbon analysis uses stable isotope analysis (e.g. δ13C and δ15N), which can be used to differentiate between terrestrial and marine organic matter in sediment carbon pools (Ortega *et al.* 2020). However, stable isotope analysis is expensive and has poor taxonomic resolution which cannot provide data at genus or species level. The use of stable isotope analysis may also underestimate the contribution of marine organisms to sediment organic matter (Reef *et al.* 2017[[3]](#footnote-4)).

Environmental DNA (eDNA) metabarcoding is an emerging method which can be used to investigate the organisms which have DNA present within each sample. This can be used to investigate the origins of organic carbon stocks, as well as providing insight as to the relative contribution of marine, coastal and terrestrial species. Whilst it is an emerging method, the use of eDNA is cheaper and provides higher taxonomic resolution than stable isotope analysis.

Multiple studies have demonstrated the use of eDNA methods to analyse sediment samples in order to determine the origin of carbon stocks (Reef *et al.* 2017; Ortega *et al.* 2020; Anglès d’Auriac *et al.* 2021[[4]](#footnote-5); Miyajima *et al.* 2022[[5]](#footnote-6)). eDNA-based methods have been demonstrated to provide an estimation of contribution of marine organisms to blue carbon stocks (Ortega *et al.* 2019[[6]](#footnote-7); Ortega *et al.* 2020). However, these have primarily been undertaken within tropical or sub-tropical environments or focussed upon specific macrophyte groups (Ortega *et al.* 2020).

This project is a pilot study to test the validity of using eDNA for carbon origin analysis from sediment cores. The project will also produce a suitable reference library for appropriate species for this study. The study will aim to demonstrate the suitability of the method for understanding the sources of organic carbon within UK sediments.

**Sample collection and survey area**

Samples were collected by Natural England staff in February 2023 from intertidal sediments within the Solway Firth Special Area of Conservation (SAC), Cumbria, England. Intertidal cores were taken for the analysis of carbon stocks from intertidal muddy sand using a Russian corer from 6 sampling stations (B1;2;3 and C1;2;3).

At each sampling station, a sample was collected from surface sediments and from 40-50 cm depth (excluding sampling stations C2 where only 20-30 cm depth was possible and C3 where no at-depth sampling was possible). 1.5 ml sub-samples were collected from the surface layer and deepest layer (40-50m) of each core. Five replicates were taken at each sampling station (55 samples in total).

**Table 1: Sample ID and sampling stations and sampling depth**

|  |  |  |
| --- | --- | --- |
| **Sample station** | **Depth 1** | **Depth 2** |
| B1 | Surface | 40-50 cm |
| B2 | Surface | 40-50 cm |
| B3 | Surface | 40-50 cm |
| C1 | Surface | 43+ cm |
| C2 | Surface | 20-30 cm |
| C3 | Surface | N/A |

During collection, samples were kept in separate zip lock bags in a clean bucket at outdoor temperature (<5°C). All sample tubes, and bags were wiped with a 10% bleach solution before storage to minimise the risk of cross contamination. Samples were frozen within 6hrs of collection and have been stored at approximately minus 20°C.

The project will use the collected sub-samples to develop a DNA metabarcoding method to determine the origin of organic carbon contained within each sample. In order to achieve this, a bespoke primer sets will be required.

A bespoke reference library will also need to be created for appropriate UK terrestrial, coastal and marine species. The reference library should be tailored for regional area the samples were collected (Solway Firth). It is important that terrestrial species are included within the reference library in order to determine the extent of terrestrial organic carbon input and storage within intertidal sediments. Submissions should provide detailed proposals for which species to include within the reference library in order to meet the aims and needs of the project.

This project will test the suitability of using eDNA to investigate organic carbon sources and the relative contribution of marine and terrestrial organisms to carbon sinks, as well as providing useful insights into blue carbon sinks within intertidal sediments.

The project will help Defra to effectively assess the origin of organic carbon contained within intertidal sediments and the findings may be used to inform Government’s Net Zero calculations. The approach and methodology could also be used for subsequent carbon origin monitoring of other environments, such as for subtidal sediments or other habitats.

1. **Aims and Objectives**

**2.1 Aims**

**Pilot study to test the validity of using eDNA for carbon origin analysis from sediment cores.**

The study should achieve the following:

* Develop a publicly accessible and open access reference library for DNA metabarcoding of eDNA samples to investigate the origin of organic carbon from intertidal sediment samples (including both marine and terrestrial species from the region). This should be a single reference library for the whole project.
* Test the validity and suitability of using metabarcoding of eDNA samples as a method for carbon origin analysis from sediment cores in order to demonstrate its use for UK carbon calculations.

**Main tasks:**

**Development of a bespoke reference library for eDNA sediment carbon origin analysis, including marine and terrestrial species**

A bespoke reference library will need to be created in order to inform eDNA-based organic carbon origin analysis. Reference libraries contain known barcode sequences which can be used to identify the species’ DNA present within each sample, and therefore to identify the biological origin of carbon.

In order to understand the origin of carbon contained within intertidal sediments, the reference library will need to include a range of marine and terrestrial species. Submissions should set out clear proposals for which species to include within the reference library in order to achieve the stated aims and meaningful results.

The reference library should include regional species and communities found in the northwest of England, and the Solway Firth specifically. The contractor would be expected to develop a bespoke reference library, in collaboration with Natural England, to be used for subsequent analysis. This should be undertaken by extracting relevant taxa from curated reference libraries.

The reference library must be open source and publicly available. Submitted quotations should set out proposals for how the contractor will ensure that the reference library is open source. The proposed methodology should be clearly stated within submitted quotations.

**DNA extraction, amplification and processing**

Natural England will provide the contractor with the samples as described above. The contractor will extract, amplify and process the sediment core subsamples to prepare the samples for DNA metabarcoding. Prospective contractors should clearly outline the methods that would be used for DNA extraction and processing within the submitted quotation. Any equipment or extraction methods used should be open source or made publicly available. Submitted quotations should clearly set out how sample contamination will be avoided by the use of lab-based controls and protocols.

**Production of optimised primer sets**

The pilot study will require primer sets which can accurately detect the DNA of terrestrial, intertidal and marine species. Multiple optimised primer sets may be required for subsequent analysis depending on the selection of target species. Multiple primers may be required to capture the breadth of organisms with DNA within intertidal sediments, including from marine or terrestrial sources. The deployed primer sets must be open source or made publicly available (through a methods paper or similar) at the end of the project in order to ensure the approach is replicable and repeatable.

Prospective contractors should clearly outline the methods that would be used to design and/or optimise primers within the submitted quotation.

**DNA metabarcoding and bioinformatics**

Once the DNA has been extracted and amplified, and the samples processed, the contractor should undertake DNA metabarcoding following a clearly defined and replicable protocol.

DNA metabarcoding should be used to identify the species with DNA contained within samples using the aforementioned bespoke reference library. A species list will be produced by DNA metabarcoding to help understand which species’ DNA are identified within each sample. The number of sequence reads for each species can then be used to assess the origin of organic carbon and the contribution of marine and terrestrial species to blue carbon sediment stocks (Reef *et al.* 2017; Ortega *et al.* 2020a; 2020b[[7]](#footnote-8)).

Submitted quotations should clearly set out the proposed methodology for undertaking DNA metabarcoding of sediment samples. It is important to use positive and negative controls when undertaking lab-based analysis of sediment samples. Prospective contractors should clearly outline the controls which would be used to ensure the risk of false positive, false negatives and contamination is minimised.

A species list (including number of sequence reads) should be produced. Taxonomic identification should always be undertaken to the lowest taxonomic classification possible (ideally species). If species level is not possible, the sequence should be assigned to the lowest possible rank (e.g. genus or family). Discussion should be provided, including inferences as to the relative contribution of different species or groups to eDNA contained within each sample.

1. **Outputs and deliverables**

The contractor would be expected to produce the following outputs and deliverables:

**Output 1 – a final report**

The contractor would produce a final report which will be published on the Natural England Access to Evidence Catalogue.

The report should follow the publishing style and standards for Natural England’s Commissioned reports: [Natural England publishing standards for commissioned reports - NECR000 (nepubprod.appspot.com)](https://nepubprod.appspot.com/publication/5790636781600768).

The report should describe the objectives of the study and provide a full and detailed methodology, results and discussion section.

The methods section should cover the following:

* **Sampling methodology**: the report should describe the methodology followed to collect samples, including sampling strategy and field methodology – to be written with the assistance of Natural England staff.
* **Methodology for creation of a bespoke reference library**: including rationale for target species or groups, methods for how the reference library was created and any tools used, as well as how the library has been purposefully designed for this. Any rules used to inform the reference library should be outlined in full. The report should also set out how the reference library will be made publicly accessible and open source.
* **DNA extraction methods**: including the names of kits if used. State how the DNA was quantified and discuss the quality of DNA extracted. State how contamination will be controlled for and avoided.
* **PCR amplification**: specify the primers, PCR cycle conditions and reagents used.
* **Sequencing**: detail how the DNA products were prepared for sequencing including reagents, primers and conditions. State how the DNA was quantified, and the model of the sequencing machine used. In addition, the methods should allow the reader to understand the confidence in the sequences obtained.
* **Bio-informatic processing**: state in detail how the bio-informatic processing was completed, by specifying the steps taken. State any programs that were used.
* **Taxonomic assignment:** where sequences are being used for taxonomic assignment, please explain the methods used to assign a species and why any reads may have been discarded.
* **Carbon origin analysis:** state in detail how the origin of carbon will be determined and the proposed methodology for using eDNA to understand organic carbon within samples.
* **Quality assurance**: state the QA checks that have been undertaken on the results, including thresholds which may have been set.

The results and discussion sections should cover the following:

* **Extraction efficiency:** the efficiency of DNA extraction and correct amplification of expected PCR products at each stage.
* **Problems and resolutions:** a discussion of any problems and how they were resolved, such as issues with PCR leading to a change of reagents or amplification conditions.
* **Discussion of results and confidence levels:** a detailed discussion explaining the results and confidence levels of the bioinformatic processing.
* **Sequence read quality:** Quality of the sequencing reads obtained.
* **Discussion of the pros and cons of the primers and barcode(s) used:** Has the expected species diversity been detected? Have non-target taxa been detected? Is species bias expected? Can the assay distinguish between closely related species?
* **Discussion of any unexpected species detections:** If any non-native or unexpected species have been detected, the confidence in this result.
* **Discussion of any issues:** the discussion should include consideration of any reference database or barcode issues which may have led to sequences being wrongly assigned or not assigned to species level.
* **DNA metabarcoding results and species list:** detailed results tables on species’ DNA identified within carbon stocks, including a categorisation of whether the species are terrestrial, coastal or fully marine.
* **Carbon origin analysis results**: detailed results and discussion for the carbon origin analysis of samples using eDNA. This should include a description of species with DNA identified and relative abundance of each species (or taxonomic group if species is not possible) by stating the number of sequence reads. The percentage contribution of marine, coastal and terrestrial species’ DNA to intertidal sediment carbon stocks and organic carbon contribution from each species should also be reported.
* **Discussion of results:** detailed discussion of the species list and composition of species with DNA present within the samples produced by DNA metabarcoding. This should include a detailed description of species with DNA identified and relative abundance of each species (or taxonomic group if species is not possible) by stating the number of sequence reads.
* **Discussion of method suitability:** a discussion of the suitability for and potential opportunities for using eDNA to analyse and understand the UK’s blue carbon stocks. The discussion should include explore the effectiveness of eDNA metabarcoding for determining the organic carbon input and storage within intertidal carbon sediments, including advantages and limitations of using eDNA in place of conventional stable isotope analysis.
* **Applicability to other habitats:** the discussion should explore how the approach followed in this study could be applied to understand the stocks and origin of blue carbon in the UK’s other marine habitats (e.g. subtidal sediments and other habitats).
* **Discussion for implications for UK carbon calculations:** a discussion on how these data can be used to inform the UK’s carbon budget and Net Zero calculations.
* **Recommendations for future work:** recommendations for future work and further studies to further develop this method should also be included.

**Output 2 – Species list and dataset**

A Microsoft Excel spreadsheet listing the species identified (scientific and common names), the fragment of DNA extracted as part of the study identified as that species, and the reference library and sequence ID used to identify the species.

This should include the percentage match of a sequence to its identification and the number of reads of each sequence. If a species was not assigned, the sequence should be identified to the lowest possible level (e.g. genus or family). The spreadsheet should also provide the percentage match and number of reads for each species.

**Output 3 – Bespoke reference library (open access)**

A bespoke reference library should be developed for the study. The reference library should be open access and publicly accessible. Submissions should provide detailed proposals for the format of the reference liberty and for how the reference library will be made publicly available / open access.

**Output 4 – All raw sequence data generated in the FASTQ format.**

Natural England will own all data generated in the project. Please refer to the terms and conditions.

1. **Timeline for project delivery**

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| --- | --- |
| **Event** | **Date** |
| Successful contract awarded | **11/09/2023**  |
| Finalise sampling design in conjunction with NE project officer | **06/10/2023** |
| Draft final report and associated products to be delivered | **22/12/2023** |
| Draft report with NE comments to be returned to contractor | **31/01/2024** |
| Final report to be delivered  | **29/02/2024** |

Any delays to this timetable should be discussed with the Natural England Project Officer and delays not outside the control of the contractor will be penalised.

1. **Other**

In support of this contract NE will provide the winning supplier with:

* Collected samples for analysis
* Project support from dedicated Project Officer
* Opportunity to feedback and discuss progress and the project monthly by email / MS Teams, or as required.

Please see the following site for information on how to obtain access to the GI datasets listed above: <https://www.gov.uk/how-to-access-natural-englands-maps-and-data>

The intellectual property rights and copyright for all products (including photographs) will lie with Natural England. All data will be made available by Natural England under the [Open Government Licence](http://www.nationalarchives.gov.uk/doc/open-government-licence/) at the end of the project via [www.data.gov.uk](http://www.data.gov.uk)

**Payment**

The Authority will raise purchase orders to cover the cost of the services and will issue to the awarded supplier following contract award.

The Authority’s preference is for all invoices to be sent electronically, quoting a valid Purchase Order number. Invoiced as agreed with the Authority after certain project milestones**.**

It is anticipated that this contract will be awarded for a period of 8 months to end no later than31st March 2024. Prices will remain fixed for the duration of the contract award period. We may at our sole discretion extend this contract to include related or further work. Any extension shall be agreed in writing in advance of any work commencing and may be subject to further competition.

**Evaluation Methodology**

We will award this contract in line with the most economically advantageous tender (MEAT) as set out in the following award criteria:

Technical – 60%

Commercial – 40%

Evaluation criteria

Evaluation weightings are 60% technical and 40% commercial, the winning tenderer will be the highest scoring combined score.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Award Criteria** | **Weighting (%)** | **Evaluation Topic & Weighting** | **Sub-Criteria** | **Weighted Question** |
| **Technical** | **60%** | **Service / Product Proposal** | **Methodology- Quality of Proposal**  | **3 Questions****Q1.1 (30% of technical score available)****Q1.2 (30% of technical score available)****Q1.3 (10% of technical score available)** |
| **Key personnel**  | **1 Question****Q2.1 (20% of technical score available)** |
| **Quality Assurance measures**  | **1 Questions****Q3.1 (10% of technical score available)** |
| **Availability/ capacity** | **1 Question (Pass/ Fail)**Q4.1 |
| **Commercial** | **40%** | **Whole life cost of the proposed Contract** | **Commercial Model** | **1 Question** **(100% of commercial score available)** |

**Technical (**60**%)**

Technical evaluations will be based on responses to specific questions covering key criteria which are outlined below. Scores for questions will be based on the following:

|  |  |  |
| --- | --- | --- |
| **Description** | **Score**  | **Definition** |
| **Very good**  | 100 | Addresses all the Authority’s requirements with all the relevant supporting information set out in the RFQ. There are no weaknesses and therefore the tender response gives the Authority complete confidence that all the requirements will be met to a high standard.  |
| **Good** | 70 | Addresses all the Authority’s requirements with all the relevant supporting information set out in the RFQ. The response contains minor weaknesses and therefore the tender response gives the Authority confidence that all the requirements will be met to a good standard.  |
| **Moderate** | 50 | Addresses most of the requirements with most of the relevant supporting information set out in the RFQ. The response contains moderate weaknesses and therefore the tender response gives the Authority confidence that most of the requirements will be met to a suitable standard.  |
| **Weak**  | 20 | Substantially addresses the requirements but not all and provides supporting information that is of limited or no relevance or a methodology containing significant weaknesses and therefore raises concerns for the Authority that the requirements may not all be met. |
| **Unacceptable** | 0 | No response or provides a response that gives the Authority no confidence that the requirement will be met.  |

Technical evaluation is assessed using the evaluation topics and sub-criteria stated in the Evaluation Criteria section above.

Separate submissions for each technical question should be provided and will be evaluated in isolation. Tenderers should provide answers that meet the criteria of each technical question.

Responses should not exceed four sides of A4, and use Arial font, size 11.

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| **Methodology** | **Detailed Evaluation Criteria** |
| **Q1.1 Lab-based methodology and analysis.****Detail your proposed methodology, including proposed assay development meeting the requirements of the proposal, bioinformatic pathways and DNA metabarcoding.**  | Quality of proposal based on the proposed lab-based methodology, including proposed assay development and bioinformatic pathways.  The response should:1. Demonstrate a clear understanding of the nature of the requirements.
2. Be a clear, practical, achievable, and cost-effective methodology to deliver these requirements.
3. Have information in sufficient detail to allow a full appraisal of the suitability of the approach to deliver for the project.
 |
| **Q1.2 Reference Library** **Detail the proposed methodology for the development of a bespoke reference library. Responses should clearly define how target species will be selected, how the reference library will be produced and proposals for hosting the reference library to ensure it is publicly available and open access.**  | Quality of proposed methodology to develop a suitable reference library meeting the requirements of the proposal and how the reference library will be made accessible and open source at the conclusion of the project.  |
| **Q1.3 Evidence of repeatability** | The ability of the sampling and analysis (assays and bioinformatics) strategy to be replicated in future years or for other applications.The response should set out how the protocol, equipment and reference library will be made publicly accessible / open source in order to demonstrate repeatability.  |

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| **Key Personal**  | **Detailed Evaluation Criteria** |
| **Q2.1 Please provide evidence of experience of key staff**  | Please provide CV of key staff involved in project as well evidence of relevant projects and experience.  |

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| **Quality Assurance** | **Detailed Evaluation Criteria** |
| **Q3.1 Please provide evidence of the quality assurance methods and metrics.**  | Please provide evidence of quality assurance methods which will be used at each step of the process, including DNA extraction and amplification, DNA metabarcoding, positive and negative controls and level of confidence in species allocation. |

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| **Availability**  | Detailed Evaluation Criteria |
| **Q4.1 Provide a statement on your availability & capacity carry out the work** | Please supply a proposed schedule of work, stating the timescales you will be able to execute and deliver the products specified above. See Section 5 Timeline for project delivery. |

**Commercial (**40**%)**

The Contract is to be awarded as a fixed which will be paid according to the completion of the deliverables stated in the Specification of Requirements.

Suppliers are required to submit a total cost to provide the deliverables stated in the Specification of Requirements. In addition to this the Commercial Response template must be completed to provide a breakdown of the whole life costs against deliverable/objectiveused in the delivery of this requirement.

Calculation Method

The method for calculating the weighted scores is as follows:

Commercial

Score = (Lowest Quotation Price / Supplier’s Quotation Price) x40% (Maximum available marks)

Technical

Score = (Bidder’s Total Technical Score / Highest Technical Score) x 60% (Maximum available marks)

The total score (weighted) (TWS) is then calculated by adding the total weighted commercial score (WC) to the total weighted technical score (WT): WC + WT = TWS.

**Information to be returned**

Please note, the following information requested must be provided. Incomplete tender submissions may be discounted.

Please complete and return the following information:

completed Commercial Response template

separate response submission for each technical question (in accordance with the response instructions)

completed Mandatory Requirements (Annex 1)

completed Acceptance of Terms and Conditions (Annex 2)

**Award**

Once the evaluation of the Response(s) is complete all suppliers will be notified of the outcome via email.

The successful supplier will be issued the contract, incorporating their Response, for signature. The Authority will then counter sign'.

Annex 1 Mandatory Requirements

**Part 1 Potential Supplier Information**

Please answer the following self-declaration questions in full and include this Annex in your quotation response.

**Part 1.1 Potential Supplier Information:**

|  |  |  |
| --- | --- | --- |
| **Question no.** | **Question** | **Response** |
| **1.1(a)** | Full name of the potential supplier submitting the information |  |
| **1.1(b)**  | Registered office address (if applicable) |  |
| **1.1(c)** | Company registration number (if applicable) |  |
| **1.1(d)** | Charity registration number (if applicable) |  |
| **1.1(e)** | Head office DUNS number (if applicable) |  |
| **1.1(f)** | Registered VAT number  |  |
| **1.1(g)** | Are you a Small, Medium or Micro Enterprise (SME)? | (Yes / No) |

Note: See EU definition of SME <https://ec.europa.eu/growth/smes/business-friendly-environment/sme-definition_en>

**Part 1.2 Contact details and declaration**

By submitting a quotation to this RFQ I declare that to the best of my knowledge the answers submitted and information contained in this document are correct and accurate.

I declare that, upon request and without delay you will provide the certificates or documentary evidence referred to in this document.

I understand that the information will be used in the selection process to assess my organisation’s suitability to be invited to participate further in this procurement.

I understand that the authority may reject this submission in its entirety if there is a failure to answer all the relevant questions fully, or if false/misleading information or content is provided in any section.

I am aware of the consequences of serious misrepresentation.

|  |  |  |
| --- | --- | --- |
| **Question no.**  | **Question** | **Response** |
| **1.2(a)** | Contact name |  |
| **1.2(b)** | Name of organisation |  |
| **1.2(c)** | Role in organisation |  |
| **1.2(d)** | Phone number |  |
| **1.2(e)** | E-mail address  |  |
| **1.2(f)** | Postal address |  |
| **1.2(g)** | Signature (electronic is acceptable) |  |
| **1.2(h)** | Date |  |

**Part 2 Exclusion Grounds**

**Part 2.1 Grounds for mandatory exclusion**

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| --- | --- | --- |
| **Question no.**  | **Question** | **Response** |
| **2.1(a)** | Please indicate if, within the past five years you, your organisation or any other person who has powers of representation, decision or control in the organisation been convicted anywhere in the world of any of the offences within the summary below. |
|  | Participation in a criminal organisation.  | (Yes / No)If yes please provide details at 2.1 (b) |
|  | Corruption.  | ((Yes / No)If yes please provide details at 2.1 (b) |
|  | Fraud.  | (Yes / No)If yes please provide details at 2.1 (b) |
|  | Terrorist offences or offences linked to terrorist activities | (Yes / No)If yes please provide details at 2.1 (b) |
|  | Money laundering or terrorist financing | (Yes / No)If yes please provide details at 2.1 (b) |
|  | Child labour and other forms of trafficking in human beings | (Yes / No)If yes please provide details at 2.1 (b) |
| **2.1(b)** | If you have answered yes to question 2.1(a), please provide further details.Date of conviction, specify which of the grounds listed the conviction was for, and the reasons for conviction.Identity of who has been convictedIf the relevant documentation is available electronically please provide the web address, issuing authority, precise reference of the documents. |  |
| **2.1 (c)** | If you have answered Yes to any of the points above have measures been taken to demonstrate the reliability of the organisation despite the existence of a relevant ground for exclusion? (i.e. Self-Cleaning) | (Yes / No) |
| **2.1(d)** | Has it been established, for your organisation by a judicial or administrative decision having final and binding effect in accordance with the legal provisions of any part of the United Kingdom or the legal provisions of the country in which the organisation is established (if outside the UK), that the organisation is in breach of obligations related to the payment of tax or social security contributions? | (Yes / No) |
| **2.1(e)** | If you have answered yes to question 2.3(a), please provide further details. Please also confirm you have paid or have entered into a binding arrangement with a view to paying, the outstanding sum including where applicable any accrued interest and/or fines. |  |

**Part 2.2 Grounds for discretionary exclusion**

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| --- | --- | --- |
| **Question no.**  | **Question** | **Response** |
| **2.2(a)** | The detailed grounds for discretionary exclusion of an organisation are set out on this [webpage](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/551130/List_of_Mandatory_and_Discretionary_Exclusions.pdf), which should be referred to before completing these questions. Please indicate if, within the past three years, anywhere in the world any of the following situations have applied to you, your organisation or any other person who has powers of representation, decision or control in the organisation |
| **2.2(b)** | Breach of environmental obligations?  | (Yes / No)If yes please provide details at 2.2 (f) |
| **2.2(c)** | Breach of social obligations?  | (Yes / No)If yes please provide details at 2.2 (f) |
| **2.2(d)** | Breach of labour law obligations?  | (Yes / No)If yes please provide details at 2.2 (f) |
| **2.2(e)** | Shown significant or persistent deficiencies in the performance of a substantive requirement under a prior public contract, a prior contract with a contracting entity, or a prior concession contract, which led to early termination of that prior contract, damages or other comparable sanctions? | (Yes / No)If yes please provide details at 2.2 (f) |
| **2.2 (f)** | If you have answered Yes to any of the above, explain what measures been taken to demonstrate the reliability of the organisation despite the existence of a relevant ground for exclusion? (Self Cleaning) |  |

**Annex 2 Acceptance of Terms and Conditions**

I/We accept in full the terms and conditions appended to this Request for Quote document.

Company \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Signature \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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5. Miyajima, T., Hamaguchi, M., Masakazu, H.O.R.I., Munar, J., Abad, J. and Morimoto, N. 2022. Evaluation of carbon export from blue carbon ecosystems and allochthonous sequestration using eDNA techniques. *Authorea Preprints*. [↑](#footnote-ref-6)
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