



**Greenwall Environmental Innovation
(Cornwall) Ltd**

Development & Provision of
AI Software –
“Asbestoprobe”
Invitation to Tender



4 March 2019



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1 **Confidentiality Statement**

All documents issued and information given to and received from the Tenderer shall be treated as confidential. Tendering participants must ensure that any tender information released outside of its organisation is subjected to equivalent provisions for non-disclosure and confidentiality.

All information contained within this document is confidential and is provided only to give bidders and potential suppliers an adequate understanding of Greenwall Environmental Innovation (Cornwall) Limited requirements. Under no circumstances should information be disclosed to any third party.

Should you not wish to participate in/respond to this tender you are requested to destroy/delete this document along with any attachments.

You agree to hereby grant Greenwall Environmental Innovation (Cornwall) Limited (and any of its affiliates) unlimited license to full, free and unrestricted rights to all data, calculations, drawings, specifications, documents, materials, intellectual property, software data rights and other things arising as a consequence of the performance of this process. You also agree to execute and procure that your personnel will execute a written assignment of any or all of such rights in favour of Greenwall Environmental Innovation (Cornwall) Limited if required to do so by Greenwall Environmental Innovation (Cornwall) Limited

2 **Background/Introduction**

Greenwall Environmental Innovation (Cornwall) Limited, herein referred to as “Greenwall”, is a research and development company which is focused on the on-site real time measurement of asbestos content of building materials.

We are leading a project to develop “Asbestoprobe” – the first bespoke portable, truly cost-effective, real-time, asbestos detection device, which uses Near Infra-Red (NIR) spectroscopy and is capable of immediately detecting whether asbestos is present (in situ) in any structure or material.

The project is part-funded by the European Regional Development Fund (ERDF).

Greenwall has always been passionate about the quality of service and equipment we provide to our clients; therefore, we expect the same from our suppliers. It is Greenwall stated objective to purchase goods and services from the supplier, contractor or provider that offers the firm the best value for money whilst minimising commercial risk.



3 **Project Requirements**

Currently an intrusive laboratory based testing process is used to identify asbestos content of materials in buildings. This is time consuming and can be risky to those carrying out the tests if the appropriate measures are not taken. It is also expensive due to the testing environment required, the postage & packing of the samples, the laboratory tests and the elapsed time between a testing visit starting and receiving the results several days later. Greenwall have developed a method of measuring asbestos content on site and in real time.

The objective of the project is to advance Asbestoprobe – from its current TRL3 through to TRL5 through the development of a preproduction prototype of the solution which will be validated in field trials in both the Construction and Aerospace sectors – which represent the initial target markets.

Greenwall require external expertise to produce AI software for the prototypes of Asbestoprobe in order to be able to identify the type of asbestos detected from a predefined data base of asbestos samples and report back to the user of the Asbestoprobe within minutes. (Full process is defined later in this document).

4 **Specification of the service required**

4.1 **Software**

Title: Prototype Software 2. Development of AI & communications software system

Reference: Greenwall Asbestoprobe (G1) Instrument control software on electronic board;

Greenwall will supply a micro NIR spectroscope for the purpose of analysis and access to an extensive data base of asbestos containing materials, both real world samples and man made.

4.1.1 **The Workflow will need to be achieved in 4 phases;**

4.1.1.1 ***Phase 1 – Building the reference database***

The first step of the process will be to analyse a set of representative samples of the variability observed in the materials containing the different asbestos type. This is of crucial importance in order to train the model properly. These samples will be analysed by Greenwall, using Near Infra red techniques; Global Standard Polarised Light Microscopy (PML), Antaris™ II FT-NIR Analyzer, selected competitor equipment and the results of the analysis shall be shared with successful service provider.



The Service provider is required to compare the discriminating power of the Asbestoprobe against the provided analysis data (Mandatory).

The output for Phase 1 is a report showing the comparison of results to determine the ranking of the Asbestoprobe Optic versus the Global Standard (PML), Antaris™ II FT-NIR Analyzer, selected competitor equipment.

4.1.1.2 Phase 2 – Building the model

Once Phase 1 is complete, the development of the model can start. Various combinations of spectral pre-treatment, partial least square discriminant analysis classification and artificial neural networks will be tested in order to enhance the spectral information and optimize the detection results with minimizing false positives and false negatives. (Mandatory)

The output of Phase 2 is to develop a software model that shall enhance the operability of the Asbestoprobe Optic to operate at world standard or better.

4.1.1.3 Phase 3 – Validating the model

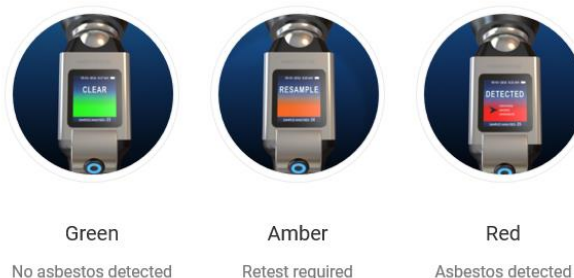
The model will then have to be tested and validated with a new set of samples (provided by Greenwall) that was not used to build the model. (Mandatory)

The output of Phase III is a report that clearly shows Asbestoprobe operating at world standard level or better.

4.1.1.4 Phase 4 – Writing the app and creating the cloud server

When the validation step is successful a dedicated app and a cloud server can then be developed in order to couple the model with the Asbestoprobe. (Mandatory)

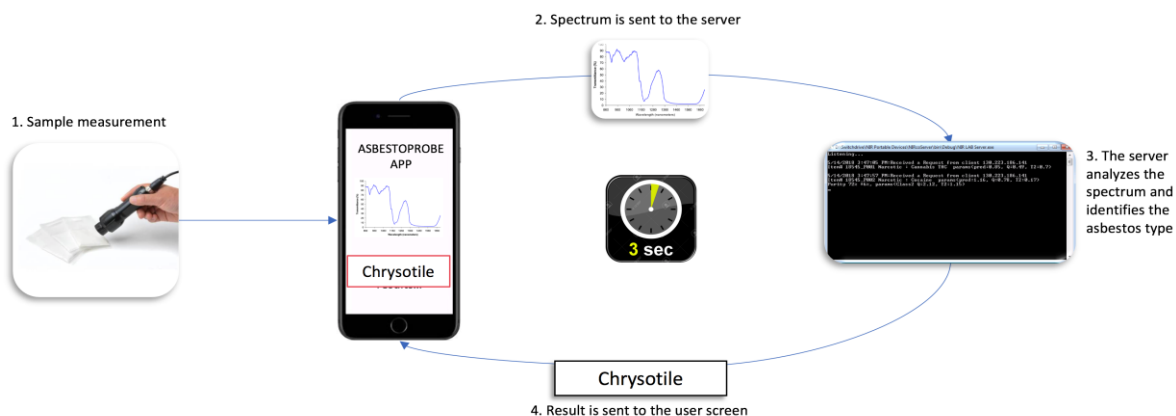
The output for phase 4 is to have the results of any analysis automatically populate a predefined report (provided by others) and to deliver results in a traffic light fashion back to the Asbestoprobe/Mobile phone. (see overleaf).



Green Amber Red
 No asbestos detected Retest required Asbestos detected

Full process is demonstrated in the diagram below.

System Process



Step 1 - Sample measurement	Step 2 - Spectrum is sent to the server
The Asbestoprobe instantly measures the near-infrared spectrum of the sample. The spectrum is stored in the Asbestoprobe app (iOS / Android versions)	The Asbestoprobe app sends the spectrum to the server and it is then saved in the cloud with geolocation and date stamp information in order to maintain traceability of the sample, along with a picture of it
Step 3 - The server analyses the spectrum and identifies the asbestos type	Step 4 - The result is sent to the user screen
The spectrum is processed with various mathematical algorithms and artificial intelligence in order to determine the presence / absence of asbestos and identify the type of mineral. The cloud server saves the prediction result.	End user receives the full information back at the handset. The user receives the result directly on the screen of his smart phone

NB: The analysis process needs to be less than 3 seconds, hence the capability to rapidly take several measurements on the same sample allowing a thorough scan of all sides of the sample in less than a minute. (Mandatory)



Service outputs and performance requirements

- **The development of the algorithms for the detection and identification of asbestos in aerospace / construction materials** – this is likely to centre around the use of PLS-DA (Partial Least Square Discriminant Analysis) and SVM-DA (Support Vector Machines Discriminant Analysis). A key consideration is the selection of the best pre-processing techniques to reduce the scattering effect of the diffuse reflectance signal.
- **Development of evaluation framework** – development of a framework to measure the performance of each algorithm both independently and when integrated together. In subsequent iterations, the framework can be extended with any new use cases.

Greenwall will expect monthly updates on progress.

The AI software needs to interface with the software that is installed in the Prototype handset. The requirements of this software are being developed by other but has the following characteristics:

Instrument control software will have these capabilities:

- manage Near Field Communication;
- manage Global Positioning System;
- manage camera and flash;
- communicate with Asbestoprobe software in the hand held unit.

Hand held Software will have these capabilities:

- control all components;
- calibration of the micro Near Infra Red sensor;
- take a Near Infra Red spectrum of the sample;
- calculation of the absorbance values for the sample;
- re-calibrate the sensor when high temperature change is happened;
- take a picture;
- recognise Global Positioning System coordinates;



- be able to use chemometric algorithms;
- display the user information screens;
- display the result on the screen;
- save data and prepare sampling report;
- prepare data to transfer to any other platform using Near Field Communication technology.

4.2 Bid requirements

Timeframe - These works will need to be undertaken in April May and June of 2019.

We request that the company bidding confirms how they will deliver the requirements, complete with the individuals allocated defined skill set, qualifications and experience on other similar projects.

Also please demonstrate how many man days would be allocated to the project to enable meeting the 3 month time table.

Please supply 2 case studies / references from your customer base of similar projects that you have carried out.

Please provide evidence of any industry standards that you comply with and any trade organisations you are a member of.

5 Contract Award

The purchase of this service is part of a grant funded application process and therefore contract award will be subject to grant approval of the project as a whole. Greenwall will compare tenders received on a compliance with the specification and in line with the scoring criteria.

This is an open and competitive process.

Greenwall reserves the right to reject any or all proposals at any time prior to the signing of a Contract, without incurring any liability whatsoever to any proposer and without being required to give reason.

Greenwall does not bind itself to accept the lowest proposal price, or any proposal. In addition, unless the proposer stipulates to the contrary in their proposal, the firm reserves the right to accept such part of the proposal as the firm may decide.



Bidders must confirm they are able to work to the following timescales:

The contract must commence in April 2019 and complete by September 2019

6 **ITT Timetable**

The anticipated timetable for submission of the tender and commission milestones are set out below:

Activity	Date
Date ITT available on Contracts Finder	14 th March 2019
Last date for raising queries	22 nd March 2019
Last date for clarifications to queries	27 th March 2019
Deadline to return ITT	1 st April 2019
Evaluation of ITT	W/C 1 st April 2019
Award of Contract	This is subject to the results of the evaluation process and any clarifications

7 **Conflict of Interest**

Please select either (a) or (b) below with regards to a conflict of interest for this ITT
(Bidders are required to include the appropriate statement in the response sheet:

- a) A Declaration that to your knowledge there is no conflict of interest between your company and Greenwall Environmental Innovation (Cornwall) Limited that is likely to influence the outcome of this procurement either directly or indirectly through financial, economic or other personal interest which might be perceived to compromise their impartiality and independence in the contexts of this procurement procedure.

Or

- b) A Declaration that there is a likely conflict of interest between your company and Greenwall Environmental Innovation (Cornwall) Limited that is likely to influence the outcome of this procurement either directly or indirectly through financial, economic or other personal interest which might be perceived to compromise their impartiality and independence in the contexts of this procurement procedure, please provide details of this connection.



NB: In the event of a conflict of interest Greenwall Environmental Innovation (Cornwall) Limited shall take appropriate steps to ensure that the evaluation of any submission will be undertaken by an independent and impartial party.

8 Exclusions

Greenwall Environmental Innovation (Cornwall) Limited shall exclude applicants from participation in this procurement procedure where they have established or are otherwise aware that the applicant, to include administrative, management or supervisory staff that have powers of representation, decision or control of the applicants company, has been the subject of a conviction by final judgment of one of the following reasons:-

- Participation in a criminal organisation
- Corruption
- Fraud
- Terrorist offences or offences linked to terrorist activities
- Money laundering or terrorist financing
- Child labour and other forms of trafficking in human beings

9 Consortium

Where a consortium or sub-contracting approach is proposed, all information requested should be given in respect of the proposed prime contractor or consortium leader. Relevant information should also be provided in respect of consortium members or sub-contractors who will play a significant (greater than 25%) role in the delivery of the services under any ensuing Contract.

10 Tender Application requirements

Please provide electronic copies of your application using the Response Sheet provided and any supporting documentation which should include:

- Signed non collusion statement (pdf)
- Completed Response Sheet which confirms:
 - You are able to meet the requirements outlined in the brief above.
 - Date of your response,



- That you used our company’s full postal address (albeit your submission might be by email)
- Details of who to contact in your company in relation to this tender
- Company registration Number and VAT number (if appropriate)
- Total cost of providing the goods/services requested in the format required

11 Selection & Award Criteria

11.1 General

Proposals will be evaluated against a weighted scoring criteria set prior to the proposals being opened.

Bidders are advised that incomplete responses to questions such as “noted” and “understood” will be viewed as non-compliant answers and scored accordingly.

Answering specific questions by way of cross reference to answers already supplied in another part of the document will also be viewed as non-compliant.

11.2 Selection Criteria

Bidders shall qualify to bid providing they can satisfy the following Selection Criteria:

- Experience of developing AI software
- An understanding and experience of working with Micro Near Infra Red Spectroscopes and chemometrics (mandatory)
- comprehensive knowledge of the applications of portable spectroscopic analysers (desirable);

11.3 Award Criteria

Successful bids shall be assessed against the following Award Criteria

- their compliance to the specification set out in section 4 and the scoring criteria below.

Award Criteria		
Item	Definition	Weight



1.Competency.	Demonstrates that bidders have the correct processes and procedures and the correct calibre of staff Please supply case studies / references from your customer base of similar projects that you have carried out Demonstrate research staff qualified to PhD level with suitable experience in spectroscopy The ability to work at the direction of the project management team and to liaise directly and work closely with manufacturer of the Prototype equipment. The ability to use micro NIR spectrometers to analyse asbestos data (mandatory); knowledge and understanding of the design, engineering and manufacture of the micro NIR spectrometers (mandatory); demonstration of similar collaborations using real-world data (desirable)	30%
2.Capacity.	The bidder needs to demonstrate capacity to handle Greenwall requirements; speed of response to our requirement, and to other market and supply fluctuations? Do bidders have the resources to meet our needs. access to a “clean room” equipped with suitable tools to carry out any changes to the “optics” (mandatory) ownership and ability with “Unscrambler” Camo software (desirable) These resources include staff, equipment, storage, and available materials and its own supply chain partners.	30%
3.Cost.	Competitive and sustainable pricing of all services	15%
4.Consistency.	Bidder needs to provide evidence that it's committed to high quality standards. How will the supplier ensure that it consistently provides high quality goods or services? There are appropriate quality initiatives within the organization, such as ISO 9001 or equivalent. The supplier should evidence the processes or procedures in	25%



	place to ensure consistency.	
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12 Tender Return

Tenders are to be returned by email.

Tenders are to be returned by: 11 am on 1st April 2019

When submitting by **email**, tenders should be sent electronically to:

Mark Wilkes: markw@greenwalluk.co.uk

with the following message **clearly noted in the Subject box;**

Development & Provision of AI Software - Asbestoprobe

Tenderers are advised to request an acknowledgement of receipt when submitting by email.

13 Clarification

There will not be any negotiations of any of the substantive terms of the Tender Documents.

Only clarification queries will be answered. Any clarification queries arising from the Tender Documents which may have a bearing on the offer should be raised as soon as possible in writing.

Responses to any queries will be shared through Contracts Finder website

All e-mailed queries should be dealt with as follows:

Send to:

Name: Mark Wilkes

Copy to:

Name: James Basterfield

E-mail: markw@greenwalluk.co.uk

E-mail: jamesb@greenwalluk.co.uk

NB: No representation by way of explanation or otherwise to persons or corporations tendering or desirous of tendering as to the meaning of the tender, Contract or other Tender Documents or as to any other matter or thing to be done under the proposed contract shall bind us unless such representation is in writing and duly signed by Mark Wilkes of Greenwall Environmental Innovation (Cornwall) Limited.



All such correspondence shall be returned with the Tender Documents and shall form part of any final Contract.

14 **Disclaimer**

The issue of this documentation does not commit Greenwall Environmental Innovation (Cornwall) Limited to award any contract pursuant to the bid process or enter into a contractual relationship with any provider of the service.

Nothing in the documentation or in any other communications made between Greenwall Environmental Innovation (Cornwall) Limited, or its agents and any other party, or any part thereof, shall be taken as constituting a contract, agreement or representation between Greenwall Environmental Innovation (Cornwall) Limited and any other party (save for a formal award of contract made in writing by or on behalf of Greenwall Environmental Innovation (Cornwall) Limited).

Bidders must obtain for themselves, at their own responsibility and expense, all information necessary for the preparation of their tender responses.

Information supplied to bidders by Greenwall Environmental Innovation (Cornwall) Limited or any information contained in Greenwall Environmental Innovation (Cornwall) Limited’s publications are supplied only for general guidance in the preparation of the tender response.

Bidders must satisfy themselves by their own investigations as to the accuracy of any such information and no responsibility is accepted by Greenwall Environmental Innovation (Cornwall) Limited for any loss or damage of whatever kind and howsoever caused arising from the use by bidders of such information.

Bidders shall be responsible for their own costs and expenses in connection with or arising out of their response.

Greenwall Environmental Innovation (Cornwall) Limited reserves the right to vary or change all or any part of the basis of the tender and or the timeline for the procurement process at any time or not to proceed with the proposed procurement process at all.

Cancellation of the procurement process (at any time) under any circumstances will not render Greenwall Environmental Innovation (Cornwall) Limited liable for any costs or expenses incurred by bidders during the procurement process.