RCloud Tasking Form – Part B: Statement of Requirement (SoR)

Title of Requirement	**Tests for blast model validation FY21-25**
Requisition No.	**1000166584**
SoR Version	**0.1**

1.	**Statement of Requirements**
1.1	**Summary and Background Information**
	The objective of this requirement is to undertake a range of high-quality blast experiments to generate data suitable for the validation for analytical models. Across MoD the ability to accurately predict blast loading within a number of critical threat scenarios is essential. Several analytical techniques are used to make these predictions, ranging from high fidelity numerical simulations to lower fidelity Fast Running Engineering Models (FREMs). In each case, comprehensive and reliable experimental data is needed for model validation. In some cases, such data can also be used to provide input data for each modelling approach.
1.2	**Requirement**

	It is required that a contracted agency provide two basic generic forms of experimental evaluation: **A. Free-field blast testing:** This involves measuring the spatial distribution of pressure and temperature time histories at key locations on rigid, immoveable targets resulting from the initiation of explosive charges. Accurate and reliable measurements are required for scaled distances of 0.1 $m/kg^{1/3}$ and above. **B. Confined blast testing** This involves measuring the spatial distribution of pressure and temperature time histories (of appropriate duration) at key locations within a rigid enclosed environment, with control of the atmospheric content, resulting from the internal initiation of explosive charges. Additionally, an enclosed multiple chamber environment (with variable venting options) may be required in which flow velocities at key locations must be measured. Accurate and

reliable measurement are required for loading densities (Charge size/ chamber volume) of up 1.0 kg/m^3.

Additional information:

- Pressure measurements must include contributions from both the initial shock component of the blast loading as well as the subsequent Quasi-static pressure development, where significant
- Temperature measurements are also required where appropriate and possible
- The measurement of blast flow velocities may also be required. Dstl will be able to supply bespoke gauges for this if required

In the case of both (a) and (b), the charges may be specified to be:

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In the case of both (a) and (b), intervening materials could be present within the test setup. These are additional, inert materials which are to be located between the charge and locations where blast loads are to be measured. Intervening materials may include:

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In the case of (b) only:

- Multiple, interconnected chambers with different venting options may be needed for custom configurations
- The initiation of multiple charges may be required during a single test
- Where a cased explosive is used, it may be necessary to measure the resulting particle/fragment distributions using suitable diagnostics
- Tests may have to be conducted in the following non-standard environments ○ Partially evacuated
    - ○ Inert atmosphere (e.g. Nitrogen or Argon) ○
      Involving the presence of concrete dust

The requirements are summarised in Table 1 below, each test or test series having a particular combination of attributes.

WP2021.1 will be initially let with the contract, this is the only guaranteed WP within this contract, with further options being optionally implemented as the project progresses (however, there is no requirement for the additional options to be taken up and any additional options which are activated may not be activated in the order listed, unless dependent on the completion of others).

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This should include the cost of the setup, detonators, site fees, high speed video (where appropriate) etc. Prices should be included as fixed prices if possible or ROM (Rough Order of Magnitude) if necessary, stating which is used, (e.g. for intervening materials as the exact material is not specified).

The approximate date upon which each option will be instigated (if activated) is as follows:

FY2021-2022 – Seven options expected

WP2021.1 – Sept 2021 (Or contact start date)

WP2021.2 – Oct 2021

WP2021.3 – Dec 2022

WP2021.4 – Jan 2022

WP2021.5 – Jan 2022

WP2021.6 – Jan 2022

WP2021.7 – Feb 2022

WP2021.8 – Feb 2022

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UNDER FOIA EXEMPTION

2022-2023

REDACTED UNDER FOIA EXEMPTION

2023-2024

REDACTED UNDER FOIA EXEMPTION

2024-2025

REDACTED UNDER FOIA EXEMPTION

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Each option will follow the steps below:

1. Development of an appropriate test plan in line with requirements in Table 1
2. Generation of a test setup including associated diagnostics and requisite ancillary materials
3. Conduct tests to generate requisite data (including requisite conditioning and processing)
4. Supply generated test data (in both raw and conditioned form) and technical report (as well as associated additional images and video) to Dstl

Delivery Timescales

- A meeting within one month of implementation is required to monitor progress and confirm that the proposed outputs will fall in line with expectation. A brief presentation is to be given to provide an overview of the planned work. This meeting will be held at the contractor's premises (if possible). COVID restrictions will however be observed
- Monthly progress updates are required via an e-mail, after the initial meeting.
- Updates by email/telecom at completion of each of the tasks above to discuss choices/decisions made as a result of that particular task
- Experimental Tests completed within 12 weeks of contract placement (unless otherwise agreed)
- Deliver technical report within 16 weeks of contract placement, unless otherwise agreed, along with any associated raw/processed data
- An "end of project" wash-up meeting is required to present and discuss the findings of the technical report

Mandatory requirements

For each work package the following are mandatory requirements:

- All characterisation and validation tests are to be carried out at the supplier's premises, unless otherwise agreed
- The contractor will provide all explosives and inert materials required (unless only available to MoD)
- Costing must be provided per option and broken down into a general cost and cost per test

	• Calibration certificates, for all physical lab test equipment, shall be provided to ensure data collected is accurate and suitable for model validation (unless Dstl supplies the gauges) • It is required that the supplier provide details of their expertise in blast testing; the physics of blast loading and related mitigation • It is required that the contractor demonstrate their understanding in using experimental data to validate numerical simulations • It is required that the following be supplied to Dstl: ○ Test data (raw and/or processed) ○ Photographs of and drawings of test set-ups and diagnostic equipment ○ Material properties associated with any intervening (or other) materials ○ Associated video imagery **Desirable requirements** It is desirable that Dstl persons associated with the project are able to be in attendance during some of the validation tests. This will be with agreement between the contractor's representative/project officer and the Dstl demander and/or project manager. COVID restrictions will however be observed,
1.3	**Options or follow on work**

WP2021.1

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Following steps 1 to 4 as described in section 1.4 above, the requirement to investigate the explosive output of charges initiated within a “random luggage” environment. Analysis of the data is required to determine the mitigating (or enhancing) effects of the intervening material on the potential loading of a structure in the proximity to the explosive detonation.

Specific requirements include:

- Confined blast test (see Table 1)
- Spherical and flat disk charges (of mass to be advised by Dstl) at stand-offs of 125mm, 250mm and 400mm
- Representative Intervening materials – “randomised luggage” (of varying thicknesses) to be suggested by the supplier
- Instrumentation – to be suggested by the supplier
- Specific data to be captured – spatial and temporal pressure and specific impulse measurements are required over a 200mm diameter region from the axis of the charge centre at each thickness of material

WP2021.2:

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WP2021.3:

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WP 2021.4

Following steps 1 to 4 as described in section 1.4 above, the requirement to characterise PBXN109, providing data for the indirect validation of numerical EOS models in the near-field, far-field and confined regimes.

Specific requirements include:

- Free-field and Confined blast tests (see Table 1)
- Spherical charges (of mass to be advised by Dstl) at a range of stand-offs (in the near-field to far-field regimes) and within confined environment
- Representative PBXN-109 charges (to be supplied by Dstl)
- Intervening materials – Air and Nitrogen (for confined tests) atmosphere
- Instrumentation – to be suggested by the supplier

Specific data to be captured – spatial and temporal pressure and specific impulse measurements (at locations to be suggested by the suppler) and thermal and QSP measurements (confined tests).

WP 2021.5

Produce a series of liners for the confined blast chamber, able to significantly reduce the thermal losses from the interior to the chamber. The liner should be expected (although not guaranteed) to survive, without significant damage, the initial shock, temperature and long-term loading. Cost per unit should be supplied (or cost for first unit and then for additional units if appropriate).

All liners should allow the current confined test instrumentation to be fielded.

WP 2021.6

Produce a series of alternative confined blast chambers, constructed of materials that significantly reduce the thermal losses from the interior. The chambers should be expected (although not guaranteed) to survive, without significant damage, the initial shock, temperature and long-term

	loading. Cost per unit should be supplied (or cost for first unit and then for additional units if appropriate). All chambers should allow the current instrumentation to be fielded. Chambers should be of similar dimensions to the currently used steel chambers if possible. The chambers should be atmospherically controlled if possible (a cost for atmospheric and non-atmospheric chambers is suggested). WP2021.7 Following steps 1 to 4 as detailed in section 1.4 above, the requirement to determine the reduction in thermal loss using methods produced in WP2021.5 or WP2021.6. Tests should be conducted (repeating tests done in a steel chamber) using PE4, PE8 or PE10 Requirements include: • Confined blast tests (see Table 1) • Charge mass and geometries to be suggested by supplier, within confined environment • Intervening materials – Air and Nitrogen (for confined tests) atmosphere • Instrumentation – to be suggested by the supplier Specific data to be captured – spatial and temporal pressure and specific impulse measurements (at locations to be suggested by the suppler) and thermal and QSP measurements (confined tests) WP2021.8 Following steps 1 to 4 as detailed in section 1.4 above, the requirement to understand blast propagation through urban environments using a small-scale facility Requirements include: • Free-field blast tests (see Table 1) • Charge mass and geometries to be suggested by supplier • Instrumentation – to be suggested by the supplier Specific data to be captured – spatial and temporal pressure and specific impulse measurements (at locations to be suggested by the suppler) WP2022.1 – WP2024.6 REDACTED UNDER FOIA EXEMPTION
1.4	**Contract Management Activities**

	• A meeting within one month of implementation is required to monitor progress and confirm that the proposed outputs will fall in line with expectation. A brief presentation is to be given to provide an overview of the planned work. This meeting will be held at the contractor's premises (if possible). COVID restrictions will however be observed. • Monthly progress updates are required via an e-mail, after the initial meeting. • Updates by email/telecom at completion of each of the tasks above to discuss choices/decisions made as a result of that particular task • Experimental Tests completed within 12 weeks of contract placement (unless otherwise agreed) • Deliver technical report within 16 weeks of contract placement, unless otherwise agreed, along with any associated raw/processed data • An "end of project" wash-up meeting is required to present and discuss the findings of the technical report
1.5	**Health & Safety, Environmental, Social, Ethical, Regulatory or Legislative aspects of the requirement**
	Any explosive testing is to be carried out in appropriately licensed premises and be subjected to inspection and authorised for use by the Dstl Trials Safety Technical Authority.

1.6	Deliverables & Intellectual Property Rights (IPR)					
Ref.	**Title**	**Due by**	**Format**	**Expected classification (subject to change)**	**What information is required in the deliverable**	**IPR Condition**
WP2021.1-1	*WP2021.1-1 Work plan summary*	*T0+1 Months*	*Presentation*	*OS*	*Presentation pack to include but not limited to:* *• Overview of planned work* *• Detailed test plan and schedule* *• Proposed outputs.* *• Risks/issues.*	
WP2021.1-2	*WP2021.1-2 Technical Report*	*T0+4 Months*	*Technical Report*	*OS*	*Technical report to include but not limited to:* *• Detailed list of test setup and information* *• Trial log* *• Overview of test success/problems* *• Assessment of results and conclusions, with key results highlighted* *• Summary of results* *• All raw/processed data supplied, as an annexe or spreadsheets as appropriate*	

WP2021.2-1	*WP2021.2-1 Work plan summary*	1 month from activation	*Presentation*	*OS*	*Presentation pack to include but not limited to:* *• Overview of planned work* *• Detailed test plan and schedule*	
					• Proposed outputs. *• Risks/issues.*	
WP2021.2-2	*WP2021.2-2 Technical Report*	4 months from activation	*Technical Report*	*OS*	*Technical report to include but not limited to:* *• Detailed list of test setup and information* *• Trial log* *• Overview of test success/problems* *• Assessment of results and conclusions, with key results highlighted* *• Summary of results* *• All raw/processed data supplied, as an annexe or spreadsheets as appropriate*	
WP2021.3-1	*WP2021.3-1 Work plan summary*	1 month from activation	*Presentation*	*OS*	*Presentation pack to include but not limited to:* *• Overview of planned work • Detailed test plan and schedule* *• Proposed outputs.* *• Risks/issues.*	

WP2021.3-2	*WP2021.3-2 Technical Report*	4 months from activation	*Technical Report*	*OS*	*Technical report to include but not limited to:* *• Detailed list of test setup and information* *• Trial log* *• Overview of test success/problems* *• Assessment of results and conclusions, with*	
					key results highlighted • *Summary of results* • *All raw/processed data supplied, as an annexe or spreadsheets as appropriate*	
WP2021.4-1	*WP2021.4-1 Work plan summary*	1 month from activation	*Presentation*	*OS*	*Presentation pack to include but not limited to:* • *Overview of planned work • Detailed test plan and schedule* • *Proposed outputs.* • *Risks/issues.*	

WP2021.4-2	*WP2021.4-2 Technical Report*	March 2022	*Technical Report*	*OS*	*Technical report to include but not limited to:* • *Detailed list of test setup and information* • *Trial log* • *Overview of test success/problems* • *Assessment of results and conclusions, with key results highlighted* • *Summary of results* • *All raw/processed data supplied, as an annexe or spreadsheets as appropriate*	
WP2021.5-1	*WP2021.5-1 Work plan summary*	1 month from activation	*Presentation*	*O*	*Presentation pack to include but not limited to:* • *Overview of planned work* • *Detailed plan and schedule*	
					• *Proposed outputs.* • *Risks/issues.*	
WP2021.5-2	*WP2021.5-2 Technical Report*	March 2022	*Technical Report*	*O*	*Technical report to include but not limited to:* • *Detailed list of information* • *Specifications of structure* • *Overview of test success/problems* • *Summary of output*	

WP2021.6-1	*WP2021.6-1 Work plan summary*	1 month from activation	*Presentation*	*O*	*Presentation pack to include but not limited to:* • *Overview of planned work • Detailed plan and schedule* • *Proposed outputs.* • *Risks/issues.*	
WP2021.6-2	*WP2021.6-2 Technical Report*	March 2022	*Technical Report*	*O*	*Technical report to include but not limited to:* • *Detailed list of information* • *Specifications of structure* • *Overview of test success/problems* • *Summary of ouput*	
WP2021.7-1	*WP2021.7-1 Work plan summary*	1 month from activation	*Presentation*	*OS*	*Presentation pack to include but not limited to:* • *Overview of planned work* • *Detailed test plan and schedule*	

					• *Proposed outputs.* • *Risks/issues.*	

WP2021.7-2	*WP2021.7-2 Technical Report*	March 2022	*Technical Report*	*OS*	*Technical report to include but not limited to:* • *Detailed list of test setup and information* • *Trial log* • *Overview of test success/problems* • *Assessment of results and conclusions, with key results highlighted* • *Summary of results* • *All raw/processed data supplied, as an annexe or spreadsheets as appropriate*	
WP2021.8-1	*WP2021.8-1 Work plan summary*	1 month from activation	*Presentation*	*OS*	*Presentation pack to include but not limited to:* • *Overview of planned work* • *Detailed test plan and schedule* • *Proposed outputs.* • *Risks/issues.*	
WP2021.8-2	*WP2021.8-2 Technical Report*	March 2022	*Technical Report*	*OS*	*Technical report to include but not limited to:* • *Detailed list of test setup and information* • *Trial log* • *Overview of test success/problems* • *Assessment of results and conclusions, with*	

					key results highlighted • *Summary of results* • *All raw/processed data supplied, as an annexe or spreadsheets as appropriate*	

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1.7	Deliverable Acceptance Criteria

	The standard Acceptance Criteria clause used in most EMR contracts where a report is the main deliverable is as follows: *o All Reports included as Deliverables under the Contract e.g. Progress and/or Final Reports etc. must comply with the Defence Research Reports Specification (DRRS) which defines the requirements for the presentation, format and production of scientific and technical reports prepared for MoD.* *o Interim or Progress Reports: The report should detail, document, and summarise the results of work done during the period covered and shall be in sufficient detail to comprehensively explain the results achieved; substantive performance; a description of current substantive performance and any problems encountered and/or which may exist along with proposed corrective action. An explanation of any difference between planned progress and actual progress, why the differences have occurred, and if behind planned progress what corrective steps are planned.* *o Final Reports: shall describe the entire work performed under the Contract in sufficient detail to explain comprehensively the work undertaken and results achieved including all relevant technical details of any hardware, software, process or system developed there under. The technical detail shall be sufficient to permit independent reproduction of any such process or system.* *o All Reports shall be free from spelling and grammatical errors and shall be set out in accordance with the Statement of Requirement (1) above.* • *Failure to comply with the above may result in the Authority rejecting the deliverables and requesting re-work before final acceptance.* The final technical report shall include, but not be limited to details of all testing undertaken; including documentation of setup and any standards followed; the generated data shall be presented in a clear and concise manner so that it can be used to populate model templates; information surrounding the build, verification and validation computational models. The report is required to be in the form of a written document and be sent to the Technical POCs of the contract REDACTED UNDER FOIA EXEMPTION A data pack of all generated test data (raw and/or processed) and all developed Finite Element models generated as part of the validation exercises must also be supplied along with the written report. The Authority will be responsible for acceptance of the deliverable/s. The outputs will be checked by the Authority for consistency and quality before acceptance.

	Acceptance will take place at Dstl Porton Down. Acceptance will be determined by a formal review of the delivered document/reports by the Authority. Acceptance will take place within 30 days of receipt of the deliverable by the Authority/upon completion of the Contract by the Contractor. The Contractor will be advised if and when the deliverable is acceptable. If any deliverables are not accepted, the Contractor shall be required to take remedial action to the satisfaction of the Authority, at no additional cost to the Authority.

2	**Evaluation Criteria**
2.1	Method Explanation
	Full compliance with MOD terms and conditions is required. *The response from the Contractor will be evaluated by the Senior Technical Lead to ensure the Statement of Requirements have been fully considered and met.* *The evaluation approach utilises the highest scoring technically compliant affordable bid.* *The Authority will use an evaluation model consisting of two Gate criteria, weighted as follows;* *Gate 1: Commercial: Pass/Fail* *Gate 2: Technical: 100%* *A total technical score will be calculated using a weighted sum of marks awarded for each of the questions. The highest scoring technically compliant solution will be allocated the full 100% in the technical assessment.*
2.2	Technical Evaluation Criteria

ID	Criteria	Score	Weighting (%)
1	The bidder has provided clear and well-defined evidence of how their proposed solution will meet the Dstl requirement and provide the required information (deliverable).	0-10	25
2	The proposal provides strong evidence that the bidder has the expertise and deep technical knowledge of the physics of blast loading and mitigation as well as the use of experiments and analytical tools.	0-10	15
3	The bidder has submitted a feasible Project Management Plan, including key factors such as: • detailed work plan of activities, • risks and mitigations clearly identified. • a project plan in the form of a Gantt chart or similar resource plan etc.	0-10	15
4	The bidder provides clear evidence & assessment of the suitability of their resources (equipment) to measure the phenomena and parameters of interest.	0-10	20
5	The bidder has provided a detailed plan of how they intend to produce the requisite pressure and thermal loading data. This must detail the manner in which this data will be generated such that its suitability for validating numerical simulations can be established	0-10	25

The following scoring guide will be used to evaluate against each criteria:

Score	Definition
10	Excellent response
7	Good response
3	Adequate response
0	Non-compliant or Question no answered

2.3 Commercial Evaluation Criteria

ID	Criteria	Score	Weighting
1	Compliance with the required quotation validity period of 30 days from tender due date.	Pass/fail	n/a
2	Provision of completed forms, e.g. Research Worker forms and the Statement Relating to Good Standing.	Pass/fail	n/a
3	Please provide full details of the points of contacts for commercial, project management & technical, for the proposed contract duration.	Pass/fail	n/a
4	A Firm price shall be provided for the work to be completed. Inclusive of priced options per year.	Pass/fail	n/a
5	Written confirmation that the Contractor shall comply with all the applicable UK and EU and US legislation	Pass/Fail	n/a
6	The percentage of work which will be sub-contracted has been specified as this must not exceed 25% of the overall value	Pass/Fail	n/a
7	The Tenderer must confirm their unequivocal acceptance of the RCloud framework V4.0 terms and conditions.	Pass/Fail	n/a
8	The Tenderer must confirm that they have Cyber Essentials	Pass/Fail	n/a