

RETURN BIDS TO:
RETOURNER LES SOUMISSIONS À:
**Bid Receiving Public Works and Government
Services Canada/Réception des soumissions
Travaux publics et Services gouvernementaux
Canada**
1713 Bedford Row
Halifax, N.S./Halifax, (N.É.)
B3J 1T3
Bid Fax: (902) 496-5016

**REQUEST FOR PROPOSAL
DEMANDE DE PROPOSITION**

**Proposal To: Public Works and Government
Services Canada**

We hereby offer to sell to Her Majesty the Queen in right of Canada, in accordance with the terms and conditions set out herein, referred to herein or attached hereto, the goods, services, and construction listed herein and on any attached sheets at the price(s) set out therefor.

**Proposition aux: Travaux Publics et Services
Gouvernementaux Canada**

Nous offrons par la présente de vendre à Sa Majesté la Reine du chef du Canada, aux conditions énoncées ou incluses par référence dans la présente et aux annexes ci-jointes, les biens, services et construction énumérés ici sur toute feuille ci-annexée, au(x) prix indiqué(s).

Comments - Commentaires

Title - Sujet 100M Depth rated AUV System	
Solicitation No. - N° de l'invitation W7707-165820/B	Date 2015-08-24
Client Reference No. - N° de référence du client W7707-16-5820	
GETS Reference No. - N° de référence de SEAG PW-\$HAL-305-9583	
File No. - N° de dossier HAL-5-75018 (305)	CCC No./N° CCC - FMS No./N° VME
Solicitation Closes - L'invitation prend fin at - à 02:00 PM on - le 2015-09-10	Time Zone Fuseau horaire Atlantic Daylight Saving Time ADT
F.O.B. - F.A.B. Plant-Usine: <input type="checkbox"/> Destination: <input checked="" type="checkbox"/> Other-Autre: <input type="checkbox"/>	
Address Enquiries to: - Adresser toutes questions à: Collier, Susan	Buyer Id - Id de l'acheteur hal305
Telephone No. - N° de téléphone (902) 496-5350 ()	FAX No. - N° de FAX (902) 496-5016
Destination - of Goods, Services, and Construction: Destination - des biens, services et construction: DEPARTMENT OF NATIONAL DEFENCE DRDC ATLANTIC 9 GROVE STREET DARTMOUTH NOVA SCOTIA B3A3C5 Canada	

Instructions: See Herein

Instructions: Voir aux présentes

Vendor/Firm Name and Address

**Raison sociale et adresse du
fournisseur/de l'entrepreneur**

Issuing Office - Bureau de distribution

Atlantic Region Acquisitions/Région de l'Atlantique
Acquisitions
1713 Bedford Row
Halifax, N.S./Halifax, (N.É.)
B3J 3C9
Nova Scot

Delivery Required - Livraison exigée See Herein	Delivery Offered - Livraison proposée
Vendor/Firm Name and Address Raison sociale et adresse du fournisseur/de l'entrepreneur	
Telephone No. - N° de téléphone Facsimile No. - N° de télécopieur	
Name and title of person authorized to sign on behalf of Vendor/Firm (type or print) Nom et titre de la personne autorisée à signer au nom du fournisseur/ de l'entrepreneur (taper ou écrire en caractères d'imprimerie)	
Signature	Date

Solicitation No. - N° de l'invitation

W7707-165820/B

Amd. No. - N° de la modif.

File No. - N° du dossier

HAL-5-75018

Buyer ID - Id de l'acheteur

hal305

Client Ref. No. - N° de réf. du client

W7707-16-5820

CCC No./N° CCC - FMS No/ N° VME

Request for Proposal (RFP) attached below.

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PART 1 - GENERAL INFORMATION

1.1 Security Requirements

There is no security requirement applicable to this Contract.

1.2 Statement of Requirement

Public Works and Government Services on behalf of DRDC intends to procure one (1) complete 100 meter depth rated Autonomous Underwater Vehicle (AUV) system. This system will be used to augment existing autonomous systems and provide a platform to continue R&D development in underwater research at DRDC Atlantic.

DRDC has a requirement for an AUV with onboard vehicle control system with a mature interface to various adaptive behavior “autonomy software” architectures.

Autonomous vehicle manufacturers typically provide vehicle navigation and control systems on a main vehicle control computer (VCC). The VCC is capable of outputting vehicle position and trajectory information to a separate payload computer. The VCC in return accepts input of autonomy decisions such as heading, speed and depth. For more details see Statement of Work attached in Annex A herein.

This requirement is subject to Agreement on Internal Trade (AIT).

1.3 Debriefings

Bidders may request a debriefing on the results of the bid solicitation process. Bidders should make the request to the Contracting Authority within 15 working days from receipt of the results of the bid solicitation process. The debriefing may be in writing, by telephone or in person.

1.4 Trade Agreements

This requirement is subject to Agreement on Internal Trade (AIT).

PART 2 - BIDDER INSTRUCTIONS

2.1 Standard Instructions, Clauses and Conditions

All instructions, clauses and conditions identified in the bid solicitation by number, date and title are set out in the *Standard Acquisition Clauses and Conditions Manual* (<https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual>) issued by Public Works and Government Services Canada.

Bidders who submit a bid agree to be bound by the instructions, clauses and conditions of the bid solicitation and accept the clauses and conditions of the resulting contract.

The 2003 (2015-07-03) Standard Instructions - Goods or Services - Competitive Requirements, are incorporated by reference into and form part of the bid solicitation.

Subsection 5.4 of 2003, Standard Instructions - Goods or Services - Competitive Requirements, is amended as follows:

Delete: 60 days

Insert: 120 days

2.2 Submission of Bids

Bids must be submitted only to Public Works and Government Services Canada (PWGSC) Bid Receiving Unit by the date, time and place indicated on page 1 of the bid solicitation.

2.3 Enquiries - Bid Solicitation

All enquiries must be submitted in writing to the Contracting Authority no later than five (5) days before the bid closing date. Enquiries received after that time may not be answered.

Bidders should reference as accurately as possible the numbered item of the bid solicitation to which the enquiry relates. Care should be taken by bidders to explain each question in sufficient detail in order to enable Canada to provide an accurate answer. Technical enquiries that are of a proprietary nature must be clearly marked "proprietary" at each relevant item. Items identified as "proprietary" will be treated as such except where Canada determines that the enquiry is not of a proprietary nature. Canada may edit the question(s) or may request that the Bidder do so, so that the proprietary nature of the question(s) is eliminated, and the enquiry can be answered to all bidders. Enquiries not submitted in a form that can be distributed to all bidders may not be answered by Canada.

2.4 Applicable Laws

Any resulting contract must be interpreted and governed, and the relations between the parties determined, by the laws in force in Nova Scotia.

Bidders may, at their discretion, substitute the applicable laws of a Canadian province or territory of their choice without affecting the validity of their bid, by deleting the name of the Canadian province or territory specified and inserting the name of the Canadian province or territory of their choice. If no change is made, it acknowledges that the applicable laws specified are acceptable to the bidders.

PART 3 - BID PREPARATION INSTRUCTIONS

3.1 Bid Preparation Instructions

Canada requests that bidders provide their bid in separately bound sections as follows:

Section I: Technical Bid (two (2) hard copies)

Section II: Financial Bid (one (1) hard copy)

Section III: Certifications (one (1) hard copy)

Prices must appear in the financial bid only. No prices must be indicated in any other section of the bid.

Canada requests that bidders follow the format instructions described below in the preparation of their bid:

- (a) use 8.5 x 11 inch (216 mm x 279 mm) paper;
- (b) use a numbering system that corresponds to the bid solicitation.

In April 2006, Canada issued a policy directing federal departments and agencies to take the necessary steps to incorporate environmental considerations into the procurement process [Policy on Green Procurement](http://www.tpsgc-pwgsc.gc.ca/ecologisation-greening/achats-procurement/politique-policy-eng.html) (<http://www.tpsgc-pwgsc.gc.ca/ecologisation-greening/achats-procurement/politique-policy-eng.html>). To assist Canada in reaching its objectives, bidders should:

- 1) use 8.5 x 11 inch (216 mm x 279 mm) paper containing fibre certified as originating from a sustainably-managed forest and containing minimum 30% recycled content; and
- 2) use an environmentally-preferable format including black and white printing instead of colour printing, printing double sided/duplex, using staples or clips instead of cerlox, duotangs or binders.

Section I: Technical Bid

In their technical bid, bidders should explain and demonstrate how they propose to meet the requirements and how they will carry out the Work.

Section II: Financial Bid

Bidders must submit their financial bid in accordance with the Basis of Payment. The total amount of Applicable Taxes must be shown separately.

Section III: Certifications

Bidders must submit the certifications required under Part 5.

PART 4 - EVALUATION PROCEDURES AND BASIS OF SELECTION

4.1 Evaluation Procedures

- (a) Bids will be assessed in accordance with the entire requirement of the bid solicitation including the technical and financial evaluation criteria.
- (b) An evaluation team composed of representatives of Canada will evaluate the bids.

4.1.1 Technical Evaluation

4.1.1.1 Mandatory Technical Criteria

Mandatory Evaluation Criteria for the technical bids are included in Annex A1, Technical Statement of Requirements (TSOR).

- (A) The criteria in the TSOR will be used to assess whether a bid meets the Mandatory Technical Requirements.
- (B) The bid will be assessed against the requirements shown in Table 1 "TSOR Mandatory Requirements" and assigned a "PASS" or "FAIL" designation.
- (C) For each and every Mandatory requirement listed in Table 1, the Contractor must provide a reference as to where in their proposal it states they have met the Mandatory Requirement.
- (D) A compliant bid must PASS all "TSOR Mandatory Requirements".

4.1.2 Financial Evaluation

Evaluation of Price - Canadian / Foreign Bidders – A0222T (2014-06-26)

1. The price of the bid will be evaluated as follows:
 - a. Canadian-based bidders must submit firm prices, Canadian customs duties and excise taxes included, and Applicable Taxes excluded.

- b. foreign-based bidders must submit firm prices, Canadian customs duties, excise taxes and Applicable Taxes excluded. Canadian customs duties and excise taxes payable by Canada will be added, for evaluation purposes only, to the prices submitted by foreign-based bidders.
2. Unless the bid solicitation specifically requires bids to be submitted in Canadian currency, bids submitted in foreign currency will be converted to Canadian currency for evaluation purposes. The rate given by the Bank of Canada in effect on the bid solicitation closing date, or on another date specified in the bid solicitation, will be applied as a conversion factor to the bids submitted in foreign currency.
3. Although Canada reserves the right to award the Contract either on an FOB plant or FOB destination, Canada requests that bidders provide prices FOB their plant or shipping point and FOB destination. Bids will be assessed on an FOB destination basis.
4. For the purpose of the bid solicitation, bidders with an address in Canada are considered Canadian-based bidders and bidders with an address outside of Canada are considered foreign-based bidders.

4.2 Basis of Selection

A bid must comply with the requirements of the bid solicitation and meet all mandatory technical evaluation criteria to be declared responsive. The responsive bid with the lowest evaluated price will be recommended for award of a contract.

PART 5 - CERTIFICATIONS

Bidders must provide the required certifications and associated information to be awarded a contract.

The certifications provided by bidders to Canada are subject to verification by Canada at all times. Canada will declare a bid non-responsive, or will declare a contractor in default in carrying out any of its obligations under the Contract, if any certification made by the Bidder is found to be untrue whether made knowingly or unknowingly, during the bid evaluation period or during the contract period.

The Contracting Authority will have the right to ask for additional information to verify the Bidder's certifications. Failure to comply and to cooperate with any request or requirement imposed by the Contracting Authority may render the bid non-responsive or constitute a default under the Contract.

5.1 Certifications Precedent to Contract Award

The certifications listed below should be completed and submitted with the bid, but may be submitted afterwards. If any of these required certifications is not completed and submitted as requested, the Contracting Authority will inform the Bidder of a time frame within which to provide the information. Failure to comply with the request of the Contracting Authority and to provide the certifications within the time frame provided will render the bid non-responsive.

5.1.1 Integrity Provisions - Associated Information

By submitting a bid, the Bidder certifies that the Bidder and its Affiliates are in compliance with the provisions as stated in Section 01 Integrity Provisions - Bid of Standard Instructions [2003](#). The associated information required within the Integrity Provisions will assist Canada in confirming that the certifications are true.

5.1.2 Federal Contractors Program for Employment Equity - Bid Certification

By submitting a bid, the Bidder certifies that the Bidder, and any of the Bidder's members if the Bidder is a Joint Venture, is not named on the Federal Contractors Program (FCP) for employment equity "[FCP Limited Eligibility to Bid](http://www.labour.gc.ca/eng/standards_equity/eq/emp/fcp/list/inelig.shtml)" list (http://www.labour.gc.ca/eng/standards_equity/eq/emp/fcp/list/inelig.shtml) available from [Employment and Social Development Canada \(ESDC\) - Labour's](http://www.labour.gc.ca/eng/standards_equity/eq/emp/fcp/list/inelig.shtml) website.

Canada will have the right to declare a bid non-responsive if the Bidder, or any member of the Bidder if the Bidder is a Joint Venture, appears on the "[FCP Limited Eligibility to Bid](http://www.labour.gc.ca/eng/standards_equity/eq/emp/fcp/list/inelig.shtml)" list at the time of contract award.

PART 6 - RESULTING CONTRACT CLAUSES

The following clauses and conditions apply to and form part of any contract resulting from the bid solicitation.

6.1 Security Requirements

6.1.1 There is no security requirement applicable to this Contract.

6.2 Statement of Requirement

Public Works and Government Services on behalf of DRDC intends to procure one (1) complete 100 meter depth rated Autonomous Underwater Vehicle (AUV) system. This system will be used to augment existing autonomous systems and provide a platform to continue R&D development in underwater research at DRDC Atlantic.

DRDC has a requirement for an AUV with onboard vehicle control system with a mature interface to various adaptive behavior "autonomy software" architectures.

Autonomous vehicle manufacturers typically provide vehicle navigation and control systems on a main vehicle control computer (VCC). The VCC is capable of outputting vehicle position and trajectory information to a separate payload computer. The VCC in return accepts input of autonomy decisions such as heading, speed and depth. For more details see Statement of Work attached in Annex A herein.

This requirement is subject to Agreement on Internal Trade (AIT).

6.3 Standard Clauses and Conditions

All clauses and conditions identified in the Contract by number, date and title are set out in the [Standard Acquisition Clauses and Conditions Manual](https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual) (<https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual>) issued by Public Works and Government Services Canada.

6.3.1 General Conditions

Insert one of the following general conditions for the resulting contract.

2010A (2014-11-27), General Conditions - Goods (Medium Complexity), apply to and form part of the Contract.

6.4 Term of Contract

6.4.1 Delivery Date

All deliverables must be received 8 weeks after contract award.

6.4.2 Option to Extend the Contract

The Contractor grants to Canada the irrevocable option to extend the term of the Contract by up to one (1) additional one year period under the same conditions. The Contractor agrees that, during the extended period of the Contract, it will be paid in accordance with the applicable provisions as set out in the Basis of Payment.

Canada may exercise this option at any time by sending a written notice to the Contractor before the expiry date of the Contract. The option may only be exercised by the Contracting Authority, and will be evidenced for administrative purposes only, through a contract amendment.

6.4.3 Optional Goods and/or Services

The Contractor grants to Canada the irrevocable option to acquire the goods, services or both described at Basis of Payment of the Contract under the same conditions and at the prices and/or rates stated in the Contract. The option may only be exercised by the Contracting Authority and will be evidenced, for administrative purposes only, through a contract amendment.

The Contracting Authority may exercise the option at any time before the expiry of the Contract by sending a written notice to the Contractor.

6.5 Authorities

6.5.1 Contracting Authority

The Contracting Authority for the Contract is:

Name: Susan Collier
Title: Supply Specialist
Public Works and Government Services Canada
Acquisitions Branch
Directorate: Atlantic Region
Address: 1713 Bedford Row
Halifax, Nova Scotia B3J 3C9

Telephone: 902-496-5350
Facsimile: 902-496-5016
E-mail address: susan.collier@pwgsc-tpsgc.gc.ca

The Contracting Authority is responsible for the management of the Contract and any changes to the Contract must be authorized in writing by the Contracting Authority. The Contractor must not perform work in excess of or outside the scope of the Contract based on verbal or written requests or instructions from anybody other than the Contracting Authority.

6.5.2 Project Authority

The Project Authority for the Contract is (To be given upon contract award):

Name: _____
Title: _____

Organization: _____

Address: _____

Telephone : _____

Facsimile: _____

E-mail address: _____

The Project Authority is the representative of the department or agency for whom the Work is being carried out under the Contract and is responsible for all matters concerning the technical content of the Work under the Contract. Technical matters may be discussed with the Project Authority, however the Project Authority has no authority to authorize changes to the scope of the Work. Changes to the scope of the Work can only be made through a contract amendment issued by the Contracting Authority.

6.5.3 Contractor's Representative

Name: _____

Title: _____

Company: _____

Address: _____

Telephone : _____

Facsimile: _____

E-mail address: _____

6.6 Payment

6.6.1 Basis of Payment

In consideration of the Contractor satisfactorily completing all of its obligations under the Contract, the Contractor will be paid a firm price as specified in the Statement of Requirement for a cost of \$(TBD). Customs duties are included and Applicable Taxes are extra.

Canada will not pay the Contractor for any design changes, modifications or interpretations of the Work, unless they have been approved, in writing, by the Contracting Authority before their incorporation into the Work.

6.6.2 Limitation of Price

SACC Manual clause [C6000C](#) (2011-05-16) Limitation of Price

6.6.3 Single Payment H1000C (2008-05-12)

Canada will pay the Contractor upon completion and delivery of the Work in accordance with the payment provisions of the Contract if:

- a. an accurate and complete invoice and any other documents required by the Contract have been submitted in accordance with the invoicing instructions provided in the Contract;
- b. all such documents have been verified by Canada;
- c. the Work delivered has been accepted by Canada.

6.7 Invoicing Instructions

1. The Contractor must submit invoices in accordance with the section entitled "Invoice Submission" of the general conditions. Invoices cannot be submitted until all work identified in the invoice is

completed.

Each invoice must be supported by:

a copy of the release document and any other documents as specified in the Contract;

2. Invoices must be distributed as follows:

- a. The original and one (1) copy must be forwarded to the address shown on page 1 of the Contract for certification and payment.

6.8 Certifications

6.8.1 Compliance

The continuous compliance with the certifications provided by the Contractor in its bid and the ongoing cooperation in providing associated information are conditions of the Contract. Certifications are subject to verification by Canada during the entire period of the Contract. If the Contractor does not comply with any certification, fails to provide the associated information, or if it is determined that any certification made by the Contractor in its bid is untrue, whether made knowingly or unknowingly, Canada has the right, pursuant to the default provision of the Contract, to terminate the Contract for default.

6.9 Applicable Laws

The Contract must be interpreted and governed, and the relations between the parties determined, by the laws in force in Nova Scotia.

6.10 Priority of Documents

If there is a discrepancy between the wording of any documents that appear on the list, the wording of the document that first appears on the list has priority over the wording of any document that subsequently appears on the list.

- (a) the Articles of Agreement;
- (b) the general conditions Goods (Medium Complexity) 2010A (2015-07-03);
- (c) Annex A, Statement of Work;
- (d) Annex B, Basis of Payment;
- (e) the Contractor's bid dated _____ (*insert date of bid*)

6.11 Defence Contract

SACC Manual clause A9006C (2012-07-16) Defence Contract

6.12 SACC Manual Clauses

Canadian Forces Site Regulations A9062C (2011-05-16)

Excess Goods B7500C (2006-06-16)

Travel and Living Expense – No allowance for profit and overhead C4001C (2014-06-26)

ANNEX "A"

ADAPTIVE BEHAVIOUR RESEARCH AUV STATEMENT OF REQUIREMENTS

DRDC intends to procure one (1) complete 100 meter depth rated Autonomous Underwater Vehicle (AUV) system. This system will be used to augment existing autonomous systems and provide a platform to continue R&D development in underwater research at DRDC Atlantic.

DRDC has a requirement for an AUV with an onboard vehicle control system with a mature interface to various adaptive behavior "autonomy software" architectures.

Autonomous vehicle manufacturers typically provide vehicle navigation and control systems on a main vehicle control computer (VCC). The VCC is capable of outputting vehicle position and trajectory information to a separate payload computer. The VCC in return accepts input of autonomy decisions such as heading, speed and depth.

The two autonomy software systems used by DRDC are SeeTrack Neptune and MOOS-IvP.

SeeTrack Neptune

SeeTrack Neptune adaptive planning software running on a separate dedicated computer (not the AUV control computer) for autonomy and sensing in the vehicle "pay-load" section. Commonly referred to as a back-seat computer. Ongoing DRDC autonomous system behavior research utilizes SeeTrack Neptune adaptive planning software. Neptune capability provides our researchers with a modifiable platform on which to develop and test autonomous vehicle software routines to support collaborative multi-vehicle operations with our own systems and other Allied nations systems. SeeTrack Neptune is an adaptive planning tool for optimizing the execution of AUV operations. It supports high-level goal-based mission descriptions and allows the matching of mission requirements against vehicle(s) capabilities. SeeTrack Neptune also includes behaviours capable of adapting the mission based on changes in the environment, assets and mission objectives.

MOOS-IvP

MOOS-IvP "Mission Oriented Operating Suite" and IvP "Interval Programming". MOOS-IvP is a set of open source C++ software modules for providing autonomy on robotic platforms. DRDC research into vehicle autonomy utilizes this software to develop and further knowledge in autonomous systems operations, to input defined mission plans, enable the vehicle to adapt to its sensed environment, respond to field-control communications, and collaborate with other autonomous systems.

MOOS is publish-and-subscribe middleware, and the IvP Helm is a behavior based architecture. The MOOS and IvP Helm architectures both allow a system to be readily extended without any modification to the core, publicly available free software. A benefit is that it is possible to develop unique payload autonomy systems to a specific need.

BACKGROUND

The Mine Defence project, part of the DRDC's Maritime Science and Technology Programme, is focused on the use of unmanned systems for naval mine countermeasures activities. A key research area has been the development of autonomous vehicle behaviours and autonomous cooperation between different MCM autonomous systems. This AUV will play a key role in DRDC research.

To facilitate other DRDC work the AUV will support DRDC mine countermeasures (MCM) sonar and automatic target recognition research and will be supplied with a high frequency interferometric side-scan sonar. The AUV will operate as a contributing member of a fleet of autonomous systems and must communicate using underwater acoustic modems with other AUVs and autonomous surface vehicles. The AUV will deploy from a variety of locations, including large and small boats, from a jetty, a beach or rocky shore line.

The AUV system must be easily transportable to remote field locations by road, rail, sea and air transport. The AUV must be of a size and weight allowing for manual deployment of the vehicle by a two-person crew in a small boat.

The AUV will be usable in all regions of the country and overseas. Operations include Northern latitudes where traditional navigation systems using magnetic compasses are typically unreliable; therefore an integrated and operational inertial navigation system (INS) is necessary. The INS is required to provide for accurate AUV heading control to carry out mission tasks.

DRDC SUPPORT

- (a) No DRDC Atlantic support is required during this requirement.
- (b) The DRDC Atlantic technical authority or representative reserves the right to inspect the build stage of the AUV and sea acceptance trials, with prior notice and arrangements being made with the contractor.

DELIVERABLES

The contractor must deliver to the Crown:

- i. One (1) AUV with depth rating of 100m with functionality and support equipment as detailed in the TSOR. The AUV must have successfully completed a contractor sea acceptance trial; and
- ii. A copy of the sea acceptance trial results for the delivered AUV, must at a minimum show the AUV operational parameters, sensor system integration, functionality and navigation accuracy.

DELIVERY DATE

All the deliverables must be received 8 weeks from contract award.

UNFUNDED OPTIONS

In the proposal the contractor shall submit pricing for the following three unfunded options that DRDC may evoke at a later date.

OPTION 1

Conductivity, Temperature, Depth (CTD) probe fit for AUV

From an Environmental Battlespace Characterization perspective, the AUV must have the ability to sense/measure water column properties, specifically conductivity, temperature and depth. Vertical profiles of water column acoustic propagation conditions are required for sonar performance prediction, which feeds into informed AUV mission planning for MCM applications.

Requirements:

The CTD probe must be integrated with onboard vehicle data logging and power supply. The CTD output data must be logged to a file for retrieval by the operator upon completion of the mission. The CTD must be well-integrated with exterior of the vehicle, i.e. must not be a snag point for in-water obstructions,

minimize flow disturbance nor induce a drag component sufficient to deviate vehicle. Calibration certificate and sensor user manual must be provided.

Conductivity range and accuracy: 0 to 9 +/- 0.0005 S/m Temperature range and accuracy: -5 to 35 +/- 0.001 C Pressure range and accuracy: Consistent with pressure rating of the vehicle, +/- 0.2% of full range.

OPTION 2

Complete OEM Spare Parts kit

OPTION 3

An operations and maintenance training course to provide operators and maintainers with the basic knowledge and experience to operate and maintain the AUV.

TECHNICAL STATEMENT OF WORK

Acronyms: The following is a list of acronyms used in this TECHNICAL STATEMENT OF WORK.

ATR	Automated Target Recognition
AUV	Autonomous Underwater Vehicle
ADCP	Acoustic Doppler Current profiling
CEP	Circular Error probable
VCC	Vehicle Control Computer
GPS	Global Positioning System
Wi-Fi	Local area wireless technology
Li-Ion	Lithium Ion
DVL	Doppler velocity Log
MSDS	material safety data sheet
INS	Inertial navigation System (synonymous with Inertial Measurement Unit)
RMS	Root Mean Square
WHOI	Woods Hole Oceanographic Institution
TA	Technical Authority
PWGSC	Public Works and Government Services Canada
DRDC	Defence Research and Development Canada
INS	Initial Navigation System
SDK	Software Development Kit

**TABLE 1
TSOR Mandatory Requirements**

Item #	Requirement	PASS	FAIL	Proposal Reference Location
1	Sea Acceptance Trial Test Plan In the proposal the contractor must provide a sea acceptance test plan. The test plan must at a minimum test for: AUV operational parameters, sensor system integration, functionality and navigation accuracy.			
2	Depth Rating The AUV and fitted equipment must be capable of diving to and operating at 100 meter depth.			
3	Velocity When submerged the AUV must be capable of a maximum speed of at least four (4) knots.			
	Inertial Navigation System (INS) <i>To facilitate AUV Northern latitude operations a underwater inertial navigation system (INS) is required. The INS must meet at a minimum the following common industry INS specifications when operated in Continental North America waters at Latitudes below 44 degrees North.</i>			
4	The INS must have a positional accuracy of 0.5% or 1.0% of underwater distance travelled Circular Error Probable (CEP) or better.			
5	The INS must connect to and utilize various onboard navigation, heading and velocity adding inputs.			
6	In the proposal the contractor must include logged INS heading output data obtained during in water sea trials and/or operations from an identical or similar INS/AUV combination as proposed.			
7	Magnetic Compass The AUV must be fitted with a digital magnetic compass.			
8	Global Positioning System (GPS) The AUV must be fitted with a GPS and antenna.			
9	The GPS must interface with the onboard navigation system to aid the accuracy of the INS positional solution.			
10	Doppler Velocity Log (DVL) The AUV must be fitted with a bottom tracking Doppler Velocity Log (DVL) which interfaces with the onboard navigation system to aid the accuracy of the INS positional solution.			
11	The DVL must include Acoustic Doppler Current Profiling (ADCP) capability.			

12	<p>Sound Velocity Sensor The AUV must be fitted with a sound velocity sensor.</p>			
13	<p>This speed of sound data must be supplied to the DVL to aid the accuracy of the INS positional solution.</p>			
14	<p>Depth Sensor The AUV must be fitted with a depth sensor that interfaces with the AUV control computer.</p>			
15	<p>AUV RF Control Communications system The AUV Radio frequency (RF) control system must consist of a two way license free Wi-Fi RF control link between the AUV control equipment and the AUV.</p>			
16	<p>Iridium Communications System The AUV must be fitted with an Iridium short burst data modem and antenna. <i>Iridium short burst data provides for long range, remote surface communications and positioning information.</i></p>			
17	<p>Underwater Acoustic Communications system The AUV must be fitted with a WHOI Micro Modem. <i>The WHOI micro modem is necessary for compatibility between other autonomous systems and top side/modem deck boxes in use at DRDC.</i></p>			
18	<p>Battery System The AUV design must incorporate user swappable battery modules to facilitate quick user swap out of a depleted battery module(s) for a charged module(s).</p>			
19	<p>Battery Charging A battery charging system must be supplied with the AUV.</p>			
20	<p>Endurance The AUV must have no less than a six (6) hour operation endurance.</p>			
21	<p>Hi-resolution sonar The AUV must be fitted with integrated dual sided interferometric sonar of 300kHz or greater frequency with a range of 75 meters.</p>			
22	<p>The interferometric sonar must produce single pass high resolution side scan data and co-registered swath bathymetry data.</p>			
23	<p>Sonar Data Analysis Software Software for side scan sonar data analysis and display must be provided. The software functionality is to include tools for normalising the side scan sonar image texture across the swath and to produce geo-referenced data.</p>			

24	<p>Sonar File Format</p> <p>The AUV sonar data format must be one of the following data formats:</p> <ol style="list-style-type: none"> 1. Klein; 2. Marinesonics; 3. Edgetech <p><i>These three data formats are comparable to algorithms and sonar data sets used in Automated Target Recognition (ATR) research. They will also facilitate ongoing sonar research collaboration between DRDC and Allied defense research institutions.</i></p>			
25	<p>The contractor must provide a detailed sonar data file format specification document(s) which identifies and describes the sonar data.</p>			
26	<p>The contractor must provide a sonar data Software Development Kit (SDK).</p>			
27	<p>Weight</p> <p>The AUV fitted with all onboard systems must have a weight in air no greater than 50 kg.</p>			
28	<p>Deployment</p> <p>The AUV fitted with all onboard systems must be hand deployable by a maximum of two personnel.</p>			
29	<p>AUV Design Concept</p> <p>The AUV must utilize a single hull design concept and facilitate removal and exchange of sub-assemblies by the end user (for repair or exchange).</p>			
30	<p>The AUV must utilize a design concept which provides for end user modification, payload integration and upgrades to payload systems, autonomy (back-seat) computers and sub-assemblies.</p>			
31	<p>Onboard vehicle navigation and control system</p> <p>The AUV must be supplied with an onboard vehicle control system with a demonstrated capability to interface with the two following adaptive behavior "autonomy software" architectures:</p> <ol style="list-style-type: none"> a. SeeTrack Neptune; and b. MOOS-IvP 			
32	<p>In the proposal the contractor must include documentation and/or testimonials demonstrating successful work integrating both Neptune and MOOS-IvP on this AUV class.</p>			

33	<p>Mission Planning and Vehicle Control Software</p> <p>The AUV must be supplied with AUV mission planning and AUV control software.</p>			
34	<p>The AUV control software must contain functionality to provide the user an ability to track the AUV, obtain basic AUV status data and to abort a mission and to re-mission the AUV.</p>			
35	<p>Vehicle Control Software - Interface Control Document (ICD)</p> <p>The contractor must provide a mission planning and vehicle control software interface control document(s) (ICD) which identifies and describes all inputs and outputs.</p> <p><i>The ICD will provide knowledge to allow DRDC to access the functions and services provided by the software in possible future DRDC developed interfaces</i></p>			
36	<p>Mission Planning and Vehicle Control Computer</p> <p>The mission planning and Vehicle control software must be supplied on a ruggedized laptop(s).</p>			
37	<p>The mission planning and vehicle control laptop display must be daylight readable.</p>			
38	<p>Transport Container</p> <p>The AUV and system must be delivered in fully enclosing water resistant transport container(s).</p>			
39	<p>Technical Data Package</p> <p>The contractor must provide an AUV technical data package. The package must include overall system drawing(s), system mechanical drawings and electrical schematics.</p>			
40	<p>Warranty</p> <p>The contractor must provide a warranty for the AUV system for a period of no less than one year after receipt.</p>			

ANNEX "B"

Basis of Payment

Bidders must submit their financial bid in accordance with the Basis of Payment listed below. The total amount of Applicable Taxes must be shown separately.

The contractor must deliver to the Crown as per Statement of Requirement – Annex A/A1:

Description	QTY	Unit of Measure	Unit Price
<p>1. One AUV with depth rating of 100m with functionality and support equipment as detailed in the TSOR. The AUV must have successfully completed a contractor sea acceptance trial and ;</p> <p>2. Provide a copy of the sea acceptance trial results for the delivered AUV, must at a minimum show the AUV operational parameters, sensor system integration, functionality and navigation accuracy.</p>	1	ea	\$
<p>2. Option 1. Conductivity, Temperature, Depth (CTD) probe fit for AUV</p> <p>From an Environmental Battlespace Characterization perspective, the AUV must have the ability to sense/measure water column properties, specifically conductivity, temperature and depth. Vertical profiles of water column acoustic propagation conditions are required for sonar performance prediction, which feeds into informed AUV mission planning for MCM applications.</p> <p>Requirements: The CTD probe must be integrated with onboard vehicle data logging and power supply. The CTD output data must be logged to a file for retrieval by the operator upon completion of the mission. The CTD must be well-integrated with exterior of the vehicle, i.e. must not be a snag point for in-water obstructions, minimize flow disturbance nor induce a drag component sufficient to deviate vehicle. Calibration certificate and sensor user manual must be provided. Conductivity range and accuracy: 0 to 9 +/- 0.0005 S/m Temperature range and accuracy: -5 to 35 +/- 0.001 C Pressure range and accuracy: Consistent with pressure rating of the vehicle, +/- 0.2% of full range.</p>	1	ea	\$
3. Option 2. Complete OEM Spare Parts kit	1	ea	\$
4. Option 3. An operations and maintenance training course to provide operators and maintainers with the basic knowledge and experience to operate and maintain the AUV. Training will take place in the Halifax and or Dartmouth area. There will be up to a maximum of eight (8) participants. Travel cost allowance in accordance to Treasury board regulations. Training duration: 2 days classroom and 2 days in water. AUV operations manual to be provided.	1	ea	\$
Total:			\$

**ANNEX C
CODE OF CONDUCT**

Code of Conduct and Certification – Related documentation

Offeror’s List of Directors below. Please provide a list of names of all individuals who are currently Directors in accordance with Part 5 – CERTIFICATION.

Directors: Please print clearly

Name	Name	Name	Name

Attach additional names on a separate sheet if required.