

QUESTIONNAIRE FOR COMPACT AUTONOMOUS SURFACE CRAFT ALL DOMAIN
EFFECTS- ANTI SUBMARINE WARFARE (CASCADE-ASW)

1. Introduction. IN is examining the feasibility of inducting Compact Autonomous Surface Craft All Domain Effects - Anti Submarine Warfare (CASCADE-ASW) in MAKE-II category of DAP-2020. Quantity required for prototype is one (01) CASCADE ASW and 01 Control station.

2. Questionnaire. The questionnaire is divided into following parts:-
 - (a) Part A - Description of ASV-ASW
 - (b) Part B - Instructions for filling up questionnaire.
 - (c) Appendix A - Technical Questionnaire.
 - (d) Appendix B - General Questionnaire
 - (e) Appendix C - Vendor Information.
 - (f) Appendix D - Statement of Costs.

3. This questionnaire is open to Indian Vendors only. The definition of Indian Vendors as provided by Para 20 Chap I of DAP20 is applicable.

4. The above information is being sought with no financial commitment and the Ministry of Defence reserves the right to change or vary any part thereof at any stage.

PART A- ENVISAGED DESCRIPTION OF CASCADE-ASW

1. Versions of CASCADE -ASW. Following versions are envisaged for CASCADE-ASW
 - (a) Version 1. CASCADE-ASW
 - (b) Version 2. CASCADE - (Without Payloads enumerated at Para 8)

2. Components. Components of the CASCADE-ASW should include the following: -
 - (a) Autonomous Surface Vessel.
 - (b) Mission Payload to undertake ASW Mission (Neutralisation and/or Surveillance) along with associated accessories.
 - (c) Containerized Control Station, capable of shore based and/or ship-based Command, Control and Communication (C³) operations.
 - (d) Launch and Recovery mechanism for shore as well as ship borne use.
 - (e) Equipment required to support deployment.

3. Role. CASCADE-ASW is to be capable of sub-surface Surveillance, Interdiction and destruction of sub-surface targets in Littoral waters as well as high seas.

4. Area of Operation. The CASCADE-ASW is to be capable of operations in Littoral waters as well as High Seas by both day and night.

5. Launch and Recovery. The CASCADE-ASW is to be able to be launched and recovered from jetty with suitable crane capacity and should be provided with as fitted arrangements for launch and recovery from a ship at sea.

System Description

6. Vessel Specifications. The CASCADE-ASW should possess the following general specifications: -
 - (a) Dimensions.

(i) Length	-	Not more than 20 m
(ii) Breadth	-	Not more than 3.5 m

- (iii) Draught - less than 1 m
- (iv) Height - less than 5 m

(b) Speed.

- (i) Max Speed - More than 20 kn.

(ii) The vessel should be capable of undertaking sustained operations at reduced speeds between 8 to 12 kn to enable effective ASW Operations.

- (c) Endurance. The vehicle should have an endurance of 90 - 120 h at Economical Speed 12 Kn or more.

7. Equipment Fit. Each CASCADE-ASW is to be fitted with following equipment fit:-

- (a) IRPCS compliant Navigation Aids.
- (b) IRPCS complaint lighting system.
- (c) Sound Signalling System.
- (d) Anchoring System.
- (e) Electro - Optical Sensor.
- (f) Fire Fighting system.
- (g) SATCOM Communication system.
- (h) Line of Sight Communication system.
- (j) Secure Data Recorder.
- (k) Remote Camera Monitoring system.
- (l) Combat management system for Command and Control of mission payload.

8. Mission Payload. The CASCADE-ASW is envisaged to be fitted with following payloads:-

- (a) Launch and Recovery System for Active Towed Array Sonar.
- (b) Thin line Active Towed Array Sonar or miniaturised Active Towed array Sonar.

- (c) Twin Tube Torpedo Tube Launcher for Light Weight Torpedo.
- (d) Fire Control System.

9. Technical Systems. Each CASCADE-ASW should have following technical systems:-

- (a) Power generation, distribution and management system.
- (b) Propulsion system powered by diesel engines.

10. Auxiliary Systems. Each CASCADE-ASW is to be fitted with following Auxiliary systems :-

- (a) Air conditioning system,
- (b) Fuel system.
- (c) Fresh water or sea water systems.
- (d) Hydraulic systems for smooth functioning of mission systems and equipment.

Command and Control

11. Modes of Operation. The CASCADE-ASW should be capable of offering varied levels of autonomy as follows:-

- (a) Autonomous. The vessel should enable complete autonomous operation including mission autonomy.
- (b) Remote. The vessel should enable remote controlled operation from the Command and Control Station.
- (c) Minimally Manned Mode. The CASCADE-ASW should also be capable of being operated in minimally manned mode with fitment of enclosed bridge for operation by a crew of maximum two personnel.

12. Control Station. Each CASCADE-ASW is to be controlled through a Control Station for Command Control and Communications (C³) functions to provide the following functionality:-

- (a) Operation and monitoring of all systems of ASV.
- (b) Operation and monitoring of all payloads of ASV.
- (c) Mission planning and monitoring.

- (d) Combat Management system for Command and Control.
- (e) Fire Control System.

13. Compatibility with Combat Management Systems. A software application for Combat Management systems of *IN* would be developed which would enable a ship's Combat Management System to undertake following:-

- (a) Monitoring of Mission Execution by CASCADE-ASW
- (b) Mission Planning for CASCADE-ASW

PART B- INSTRUCTIONS FOR FILLING UP QUESTIONNAIRE

1. Following documents are required to be submitted by respondents:-
 - (a) Response to Technical questionnaire as per Appendix A.
 - (b) Response to General questionnaire as per Appendix B.
 - (c) Response to Vendor information as per Appendix C.
 - (d) Filled up costing for prototype and Procurement as per Appendix D
2. In case a proposed solution does not confirm to the limits as per questionnaire respondents may respond with recommended limit or proposed specifications. Further respondents are to justify the recommended limit.
3. The respondents shall submit one (01) copy of response, clearly marking one copy as 'Original Copy' in hard copy. In the event of any discrepancy between the content in soft copies of documents submitted, the contents in the 'original copy' shall govern/ prevail.
4. The responses should be submitted strictly as per the formats given in respective appendices. Should a Vendor need to mention any other information, a separate column may be added as the last column only or as a separate attachment.
5. The respondents are also required to submit a soft copy of the response in a CD/ DVD in PDF format and word format. All response appendices (A,B,C,D) should be submitted as separate file in soft copy. Supporting documents or additional reference should be submitted in a separate folder in soft copy with proper reference mentioned against each parameter or sub parameter in respective appendices.
6. Responses (CD containing soft copy and hard copy) are to be addressed to following address:-

Project CASCADE-ASW
Directorate of Staff Requirements
IHQ MoD (Navy)
D Block
Defence Officers Complex
Africa Avenue
New Delhi - 110 023
7. Responses are to be provided within 03 Weeks. Extension of date for provision of responses will be maximum 02 weeks. Extension if required is to be sought through official request on email id dsr@navy.gov.in or request forwarded on Fax number 011-26771320. Any responses received post due date are liable not to be examined.

Appendix A
Refers to Para 1 Part B

TECHNICAL QUESTIONNAIRE

<u>Ser</u>	<u>Specification/ Parameters/ Information Required</u>	<u>Information about proposed solution</u>
<u>Dimensions</u>		
1.	What is the length of the proposed CASCADE (Limit - Not more than 20 m)	
2.	What is the breadth of the proposed CASCADE (Limit - Not more than 3.5 m)	
3.	What is the draught of the proposed CASCADE (Limit - Not more than 1 m)	
4.	What is the height of the proposed CASCADE (Limit - Not more than 5 m)	
<u>Speed</u>		
5.	What is the max speed of the proposed CASCADE (limit - more than 20 Knots)	
6.	What is the operational speed of the proposed CASCADE (limit - between 8-12 knots)	
<u>Endurance</u>		
7.	What is the endurance of CASCADE ? (90- 120 h at Economical Speed of more than 12 Kn)	
<u>Equipment fit.</u>		
8.	Which IRPCS compliant Navigation Aids would be fitted on the CASCADE? Please provide brief description and technical details	
9.	Which IRPCS compliant lighting system would be fitted on the CASCADE? What are the likely specifications of the system? Please provide brief description and technical details	
10.	Which sound signaling system would be fitted on the CASCADE? Please provide brief description and technical details	
11.	What are the capabilities of anchoring system envisaged on the CASCADE? (maximum depth to which anchoring would be possible)	
12.	Which Electro optical system would be fitted on the CASCADE? Please provide brief description and technical details	

<u>Ser</u>	<u>Specification/ Parameters/ Information Required</u>	<u>Information about proposed solution</u>
13.	Which Firefighting system would be fitted on the ASV? Please provide brief description and technical details	
14.	Which SATCOM Communication system would be fitted on the CASCADE? Please provide brief description and technical details	
15.	Which Line of Sight Communication system would be fitted on the CASCADE? Please provide brief description and technical details	
16.	Which Secure Data Recorder would be fitted on the ASV? Please provide brief description and technical details	
17.	Which Remote camera monitoring system would be fitted on the CASCADE? Please provide brief description and technical details	
18.	What is the plan for inclusion of AI in autonomous navigation?	
19.	How will the algorithm for collision avoidance be implemented	
20.	What Level of Autonomy as per IMO levels 1-4 are planned to be achieved for the equipment	
<u>Mission Payload</u>		
21.	Which Thin line Active Towed Array Sonar or miniaturised Active Towed array Sonar is planned to be fitted onboard the CASCADE? List out following details :- Manufacturer, Active Frequency, Passive frequency , length of towed array, winch details, other technical and operational details	
22.	Which Torpedo tubes are planned to be fitted onboard the CASCADE? List out following details :- Manufacturer, Type of tubes, dimension of tubes, compatibility of tubes with torpedoes, technical and operational details	
23.	Which FCS is planned to be fitted onboard the CASCADE? List out following details :- Manufacturer, Type of FCS, method of firing technical and operational details	
24.	How is the firing chain planned to be implemented from control station to FCS ?	

<u>Ser</u>	<u>Specification/ Parameters/ Information Required</u>	<u>Information about proposed solution</u>
25.	How will autonomous operation of the entire ASW Chain will from Detection to neutralisation work ?	
<u>Technical Systems</u>		
26.	How is the Power generation, distribution and management system implemented on the CASCADE. Provide operational and technical details	
27.	What is the envisaged Propulsion system i.e water jet or propellers? Provide operational and technical details	
28.	Which diesel engines would be used on the CASCADE? Provide operational and technical details	
29.	How will technical systems work in remote autonomous and minimally manned mode?	
30.	How will the steering system work in remote autonomous and minimally manned mode?	
<u>Auxiliary Systems</u>		
31.	Provide Technical and operational details of Air conditioning system.	
32.	Provide Technical and operational of Fuel system.	
33.	Provide Technical and operational of Fresh water or sea water systems.	
34.	Provide Technical and operational of Hydraulic systems.	
35.	Provide details of any other auxiliary systems envisaged for the CASCADE.	
36.	Provide Technical and operational of firefighting system.	
<u>Command and Control</u>		
37.	Give a brief description of how following modes of operation would be implemented on the CASCADEs (a) Autonomous. (b) Remote. (c) Minimally Manned Mode.	
<u>Control station</u>		
38.	What are the dimensions of control station?	
39.	Can the control station be fitted inside a standard 20ft container?	
40.	What all is envisaged to be fitted on controls station? eg AC, SATCOM antenna etc	

<u>Ser</u>	<u>Specification/ Parameters/ Information Required</u>	<u>Information about proposed solution</u>
41.	What are the capabilities of the control station	
<u>Quality Assurance</u>		
42.	Which are the recommended Environmental Conditions and standards for testing?	
43.	What standards will be employed for Software quality assurance?	
44.	What standards would be employed for EMI/EMC checks?	
45.	What are the recommended Environmental Stress Screening Tests(ESS).	
46.	How would the Configuration Management(CM) be executed ?	
47.	Which type of components/module its grade of material and specifications will be used for manufacturing of CASCADE-ASW	
48.	What grade of internal wiring would be used	
49.	What specifications and severity would be followed for ingress protection	
50.	What specifications would be followed in case cable glands, shock mounts and associated hardware are used in Cascade -ASW	
51.	<p>What are envisaged specifications of the CASCADE ASW being followed with respect to:-</p> <ul style="list-style-type: none"> (a) Design of equipment. (b) Reliability of equipment. (c) Ergonomics of equipment. (d) Environmental test specifications. (e) Withstanding salt water spray. (f) Shock test specifications. (g) Vibration test. (j) Corrosion resistance. (k) User documentation. (l) Internal Cabling. 	
<u>Product Support and Maintenance</u>		
52.	Can you provide a separate standalone simulator for training? if yes what is the approximate cost of the simulator	
53.	What are the capabilities of the simulator?	
54.	How many trainee and instructor nodes are included in one simulator package?	
55.	What are the envisaged facilities for product support of the CASCADE-ASW?	

<u>Ser</u>	<u>Specification/ Parameters/ Information Required</u>	<u>Information about proposed solution</u>
56.	What are the envisaged infrastructure requirements of the CASCADE-ASW?	
57.	Are you willing to set up repair facilities in India or would the repair facilities be provided through an authorised service representative (if applicable)?	
58.	What is the operational life of the CASCADE-ASW?	
59.	What are the warranty conditions of the CASCADE-ASW? How long would it be valid? (hardware as well as software warranty)	
60.	To ensure Repair and Maintenance support, what is the proposed methodology for 'Operator (O)', Intermediate (I) and 'Depot (D)' Level repairs and maintenance?	
61.	What is the preferred mode of Repair and Maintenance support - Engineering Support Package, Comprehensive Annual Maintenance Contract (including spares) (CAMC), Annual Maintenance Contracts (AMC) or Rate Repair Contracts (RRC)?	
62.	For how many years would support in terms of maintenance/ availability of spares be provided	
63.	What is the Mean Time Between Failure (MTBF) for the system?	
64.	What is the maximum duration the system can be operated continuously?	
65.	What will be the operating and storage temperature/conditions of system	
66.	What is the type and depth of documentation that would be offered for training, operation and maintenance of the CASCADE-ASW?	
<u>General</u>		
67.	What is the recommended platform noise level and equipment SBN and ABN recommended considering that the equipment would be used for ASW operations?	
68.	What is the maximum sea state for operation envisaged?	
69.	What is the type of material envisaged for construction of the hull	
<u>Miscellaneous</u>		

<u>Ser</u>	<u>Specification/ Parameters/ Information Required</u>	<u>Information about proposed solution</u>
70.	Autonomous operations require AI/ DL algorithms with self-learning capability. How is this proposed to be achieved?	
71.	Is Progressive learning growth of the autonomous algorithm with deployment/ exploitation envisaged? If yes how will it be implemented?	
72.	What is the capability of systems to undertake self-diagnoses and system reboot for crash-recovery post deployment while under autonomous operations?	
73.	How will the maintenance envelopes on the CASECASE-ASW cater for all activities essential for ensuring performance parameters of payloads?	
74.	How is the graceful degradation of systems resulting in reduced performance parameter rather complete shutdown going to be ensured?	
75.	What are the redundancies to ensure all availability of critical systems?	
76.	Comment on the built-in tests both onboard the platform and the Control station which will ensure fault detection and localization?	
77.	What would be the keep alive policy while the CASECADE-ASW is stowed ashore for Sonar and other sensors and electronic equipment?	

GENERAL QUESTIONNAIRE

Q1. What are the planned equipment for launch and CASCADE-ASW at Sea or Harbour?

Q2. The Control Station is required to have the capability to transfer raw and processed data to the existing Data Centre of *IN*. Interface details would be shared by *IN* during development phase. The feasibility of the same may be commented upon.

14. A software application for Combat Management systems of *IN* would require to be developed as brought in the specifications of CASCADE-ASW. . Interface details would be shared by *IN* during development phase. Please indicate willingness to undertake the development and capability of the firm to undertake the development.

Q3. Being an Autonomous Vessel, collision avoidance is a critical aspect to be incorporated in the vessel. Description of the collision avoidance system, algorithm used and details of testing undertaken/ planned be elaborated.

Q4. Comment on the possibility of deploying modular systems for minimal computation/ analysis systems

Q5. The version two of the CASCADE is envisaged to undertake surveillance. Comment on the capability of the platform to carry out surveillance in terms of sensors, data processing and transmission to control station.

Q6. Comment on the feasibility of upgradation of the platform to incorporate advance technology tools including AI for maritime surveillance.

Q7. Comment upon the redundancy aspects of mission critical modules/ subsystems to obviate mission failure due to a single point failure.

Q8. What is the manpower required to operate the vessel in various configurations (including remote mode), including launching and recovery at sea/ harbour? What facilities if any are envisaged for manpower on-board?

Q9. How and where are the prototype trials proposed to be undertaken?

Q10. Is there a requirement of major maintenance/ overhaul of the CASCADE-ASW during their service life? What is the likely frequency of such major maintenance/over haul?

Q11. Comment on the maintenance routines required to be carried out during operational cycle of vessel and feasibility of undertaking maintenance at sea/ floating condition?

Q12. What arrangements (lifting appliances, stowage/ launch cradle etc) are envisaged/ required for lifting the CASCADE-ASW on jetty for undertaking repairs? Deliverables that would be provided by the vendor to be highlighted.

Q13. What are the envisaged arrangements/conditions for stowage of the CASCADE-ASW when not in use?

Q14. State the reliability and maintainability model that would be used and indicate envisaged percentage reparability of the envisaged system. Indicate willingness to undergo Maintenance Evaluation Trials at trial stage?

Q15. Comment on the reliability to include capability of AI/ ML based data analysis on envisaged operating hours of individual modules vis-à-vis Mean Time Between Critical Failures (MTBCF), Mean Time Between Failure (MTBF) and Mean Time To Recover (MTTR)?

Q16. The feasibility of undertaking repairs by *IN* for general mechanical, electrical and electronic components be commented upon.

Q17. Are the vessels envisaged to be according to class specifications of a particular class? If yes indicate class, class notations and proposed methodology for class certification?

Q18. Since the equipment would be required to conform to international regulations such as SOLAS, COLREGS etc what is the methodology envisaged to establish conformance and certification of these regulations?

Q19. What would be the likely cost of comprehensive AMC (AMC with spares) in terms of percentage of the cost of procurement?

Q20. What Quality Assurance (QA) methodologies are proposed to be deployed by the vendor during design, development, production and trial phases to ensure delivery of a completely reliable and fail safe operational platform?

Q21. What testing strategy is proposed to be used by the vendor to check the reliable operations of CASCADE-ASW, given the fact that it is an Autonomous vessel?

Q22. A platform/system-centric QA approach is necessary for CASCADE-ASW. In view of the same, vendor may specify which of the global best practices in QA methodology for design and development of Autonomous vehicle and Robotic systems are proposed to be incorporated and how would the same be proven by the vendor? QA requirements/ standards envisaged for various tests/ checks in respect of items/ components/ assemblies/ sub-assemblies/systems etc be brought out for the following: -

- (a) Qualification tests - Environmental and EMI/EMC tests.
- (b) Shock Test - when operating below waterline as well as above waterline.
- (c) Environmental Stress Screening (ESS).
- (d) Tests/ checks for the following to be mentioned: -
 - (i) Electrical checks and safety specifications.
 - (ii) Ship motion test.
 - (iii) Switches and cables.
 - (iv) Connectors and LED/LCD.
 - (v) Soldered Electronic and Electrical assemblies.
 - (vi) Burn-in/ Endurance tests.

Q23. Vendor to bring out what special training/ courses and skills will be required by *IN* personnel to undertake repairs (both hardware and software based).

Q24. Please list out what equipment fit on the ASV would be military grade and what would be commercial grade?

Q25. Please provide any other recommended quality standards for equipment fitted on the ASV (only if equipment is not military grade).

Q26. How will the vendor carry out certification /demonstration of the various standards proposed by the vendor? Will the vendor require assistance of *IN/DRDO/Govt* testing facilities?

Q27. What are the likely timeline for undertaking Design and Development of the CASCADE-ASW ? Please indicate major milestones of the timeline in following format.

<u>Ser</u>	<u>Timeline (T_0 = Placement of PSO)</u>	<u>Milestone</u>
(a)	$T_0 + ___ \text{ weeks}$	

Q28. What is the likely timeline for providing deliveries of the system? Please indicate proposed delivery timeline in following format.

<u>Ser</u>	<u>Timeline (T_0 = Placement of Contract)</u>	<u>No of CASCADE-ASV</u>
(a)	$T_0 + ___ \text{ weeks}$	

Q29. Are you willing for Single Stage composite Trials of the equipment in India on a No Cost No Commitment basis?

Appendix C
Refers to Para 1 Part B

VENDOR INFORMATION

Q1. Indicate Name, Address and Unique ID (if any) of the Vendor/Company/Firm.

Q2. Furnish complete postal address, details of local office/ liaison office in Delhi area(if any)/ in vicinity. Details of single Point of Contact (PoC) for clarification of queries, if any.

Q3. The following details to be provided (relevant documents to be forwarded):-

- (a) Category of Industry (Large/ Medium/ Small Scale).
- (b) Annual Turnover in INR for last 03 financial years.
- (c) DPIIT certificate if startup.
- (d) Profit/ Loss Statement of the last 03 financial years.
- (e) Number of employees in firm.
- (f) Details of manufacturing infrastructure that would be useful for manufacturing the CASCADE-ASW and its subsystems.
- (g) Production capacity per annum.
- (h) Details of earlier contracts with Indian Ministry of Defence/ Government agencies:-

Contract Number	Equipment	Quantity	Cost

Q4. Does the firm hold any certification by Quality Assurance Organisation? If yes, the following details to be furnished: -

Name of Agency	Certification	Applicable from (Date & Year)	Valid till (Date & Year)

- Q5. Does the vendor hold membership of FICCI/ ASSOCHAM or other industrial association? If so, name of the organisation, Membership Number and relevant certification to be provided.
- Q6. Elaborate in detail upon the capability to indigenously design and develop the required equipment along with justification and documentary evidence. The following are to be specified: -
- (a) Is the design of the equipment and its software Indigenous?
 - (b) Details of components that are envisaged to be imported and from where?
 - (c) Also indicate willingness to share the Intellectual Property Rights (IPR) of the design.
- Q7. What are the technologies currently available with the vendor that would be harnessed towards manufacturing of the CASCADE-ASW and its associated subsystems and the extent of their availability or accessibility in case they are not available in India?
- Q8. Is collaboration with one or more foreign/Indian firms envisaged to design and develop the system? If so, indicate the scope of collaboration and details of ToT envisaged.
- Q9. Does the vendor have adequate infrastructure to develop, integrate, test and manufacture CASCADE-ASW? If yes, provide details of the same. If no, what would be the timeframe for establishing the same?
- Q10. Indicate willingness to progress the prototype development under Make II and subsequent procurement under Buy (Indian IDDM) Scheme of DAP-2020.
- Q11. What are the areas of uncertainty envisaged by the vendor in the design, development and production of the indigenous development of CASCADE-ASW?
- Q12. Indicate the overall level of indigenisation in the base vehicle and individually for the payloads that is envisaged to be achieved. Approximate breakdown of IC content (in percentage) for each of the sub systems is also to be provided. The procurement would eventually be under Buy (Indian-IDDM), hence, the willingness to meet overall IC content of 50% as per DAP-20, may be confirmed.
- Q13. Will the proposing company/ vendor also be manufacturing the production grade system? If not, what is the plan for production of the system post design and development?

Q14. Does the vendor have the ability to provide product support for complete life cycle of CASCADE-ASW?

Q15. What kind of consort requirements are envisaged for testing the CASCADE-ASW ?

Q16. Any other details which the vendor would like to bring before the Feasibility Study may be provided.

Q17. *Indicate* whether the equipment has been supplied by vendor to any other country and details thereof. (The differences between these versions of equipment and the equipment presently being offered may also be highlighted)

Q18. *Are* you partner with an Indian firm for License production of the equipment in India? If yes, name of firm and exact scope license production? Is the OEM willing to provide IPR (in case ToT with foreign OEM)?

Q19. *Please* provide details of other equipment that is being designed and developed by your company for Navy/Coastguard/Airforce or Army.

Q20. *If* the proposal is being forwarded as a consortium or AoP please provided details of all the participants and who will be the lead agency? In such a case who will be the final production partner? What is the likely work share envisaged between all agencies.

Appendix D
Refers to Para 1 Part B

STATEMENT OF COST OF PROTOTYPE DEVELOPMENT

Ser	Items	Qty	Imported components cost (i)	Indigenous components cost (ii)	Approximate Unit Cost in Rupees (i)+(ii)	Any other details Please mention specific IC content that will be achieved
A.	Cost of fully formed CASCADÉ-ASW	1	(i)	(ii)	(i)+(ii)	
B.	Land based Control Station	1				
C.	Cost of any special maintenance Tools or special test equipment	1				
D.	Project Monitoring and Admin costs	-				
E.	Cost of TOT if any	-				
F.	Any Other Costs (please specify head)					
<i>Mission payloads (Add mission payloads as per proposal of the firm)</i>						
G.						
H.						
	Total					

STATEMENT OF COST FOR PRODUCTION GRADE VERSION (QUANTITY REQUIRED - 18 NOS version 1, 8 NOS version 2*)

Ser	Items	Qty	Imported Components Cost (i)	Indigenous components Cost (ii)	Approximate Unit Cost in Rupees (i)+(ii)	Any Other Details
A.	Cost of CASCADE-ASW		(i)	(ii)	(i)+(ii)	
B.	Cost of CASCADE					
C.	Land Based Control Station					
D.	Mission payloads (please Add mission payloads as per proposal of firm)					
E.	Any other recommended payloads					
F.	Cost of Comprehensive Maintenance Contract (AMC with spares) for 05 years					
G.	Cost of Documentation					
H.	Cost of MRLS and B&D spares					
J.	Cost of training by OEM for operators and maintainer's					
J.	Cost of Special Maintenance tools and special maintenance equipment					
K.	Cost of FATs, installation , Setting to work and acceptance trials					
L.	Cost of integration with CMS					
M.	Any other costs					
	Total					

* Note: The quantity indicated for production is only an indicative requirement and is not a firm commitment. The quantity has been provided so as to enable firms to arrive at economy of scale prior providing statement of cost of production version CASCADE-ASW