



Government of India  
NATIONAL DISASTER MANAGEMENT AUTHORITY  
A-1, Safdarjung Enclave, NDMA Bhawan,  
New Delhi –110 029  
Phone: 011-26701862



No.44/6/2018-RR

Dated: 25.11.2019

**Invitation for Expression of Interest (EOI)**

Dear Sir/Madam,

**NATIONAL DISASTER MANAGEMENT AUTHORITY** invites sealed Expression of Interest (EOI) from Consulting Firm / Company / Academic Institutions / Autonomous Organization / Centre of Excellence / Research Organization / Scientific Laboratory / Consortium / foreign bidders with joint ventures and foreign bidders having offices in India for undertaking **SCOPING STUDY ON ROLE OF UAVs / DRONES IN DISASTER MANAGEMENT.**

The EOI Document containing the details of qualification criteria, submission requirement, brief objective & scope of work and method of evaluation etc. is enclosed.

The EOI Document is also available on the NDMA website. You may submit your responses in sealed envelopes in prescribed format to Under Secretary (Rehabilitation and Recovery), NDMA Bhawan, NDMA, New Delhi-110029 latest by 24.12.2019 (1700 hrs).

Queries if any may be referred in writing to the Under Secretary (Rehabilitation and Recovery), at the above mentioned address or at E-mail: [usrr@ndma.gov.in](mailto:usrr@ndma.gov.in)

S. No.	Critical Dates	Date	Time (IST)
1.	EOI Publishing Date	25.11.2019	1200 hrs
2.	Document Download Start Date	25.11.2019	1215 hrs
3.	Document Download End Date	24.12.2019	1600 hrs
4.	EOI Submission Start Date	25.11.2019	1230 hrs
5.	EOI Submission End Date	24.12.2019	1700 hrs
6.	EOI Opening Date	26.12.2019	1100 hrs

Yours faithfully,

Sd/-  
Under Secretary (Rehabilitation and Recovery),  
NDMA Bhawan, New Delhi-110029  
For & on behalf of NDMA

Encl.: EOI Document.

**Expression of Interest (EOI)**

**For**

**Engagement of Consulting Firm/ Company/ Academic Institutions/ Autonomous Organization/ Centre of Excellence/ Research Organization/ Scientific Laboratory/ Consortium/ foreign bidders with joint ventures and foreign bidders having offices in India to**

**CARRY OUT SCOPING STUDY ON ROLE OF UAV / DRONES IN DISASTER MANAGEMENT**

**NATIONAL DISASTER MANAGEMENT AUTHORITY**

**NDMA BHAWAN**

**A1, SAFDARJUNG ENCLAVE**

**NEW DELHI – 110029**

**Tel-011 26701862**

**November 25, 2019**

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## 1.1 Background:

Besides the military and commercial applications of UAVs, there is no doubt in their efficiency in case of supporting emergency Disaster management. This study focuses mainly on operational and tactical Drone application in disaster management using a time-scaled separation of the application, like pre-disaster activity, activity immediately after the occurrence of a disaster and the activity after the **primary disaster elimination**. The applications of UAVs can be helpful in disasters like earthquake, flood, landslide, fire, CBRN etc. An earthquake is a rapid escalating disaster, where, many times, there is no other way for a rapid damage assessment than aerial reconnaissance. For special rescue teams, the Drone application can help much in a rapid location selection, where enough place remained to survive for victims. In contrast, managing floods is a very complex and difficult task for a typical slow onset disaster. It requires continuous monitoring of dykes, flooded and threatened areas. UAV can help managers largely keeping an area under observation. Forest fires are disasters, where the tactical application of Drone is already well developed. UAV can be used for fire detection, intervention monitoring and also for post-fire monitoring. In case of nuclear accident or hazardous material leakage Drone is also a very effective or can be the only one tool for supporting disaster management.

In UAV-Assisted Disaster Management, the response time of disaster management personnel during a natural disaster is key in saving the lives of those in the affected areas. The most efficient situational awareness is achieved through aerial assessment—UAV networks. Different regulations apply to the usage of UAVs, depending on the country, but during a disaster, special authorizations are usually granted to flying devices to help first responders to assess the situation as quickly as possible. Using UAVs, first responders can understand which structures were affected by the event, the extent of the damage to these structures, the state of the transportation infrastructure, and the potential number of people affected by the event in a better manner. However, the UAV network can't efficiently cope with issues of power supply limitations, processing power limitations, unreliable communication channels, unexpected node failures, maximal physical load size, and maneuverability in harsh conditions. The need for real-time knowledge in driving SAR missions can't be underestimated, and a recent Red Cross report advocates for UAVs as one of the most promising and powerful new technologies for this purpose. From their high vantage point, teams of UAVs can provide reconnaissance and mapping support; perform structural assessment; identify stranded survivors and direct them to safe locations; and serve as an ad hoc communications infrastructure to connect mobile devices to the nearest radio access network (RAN), relying on different types of UAVs, such as blimps, balloons, and fixed-wing and rotary-wing UAVs.

**1.2** UAVs have been used in many different disaster management applications, but mostly for the following:

- Monitoring, forecasting, and early warnings—using structural and environmental monitoring and analyzing information for forecasts, UAVs can act as early warning systems (EWSs).
- Disaster information fusion and sharing—by combining different sources of available information or providing a bridge between different information technologies, UAVs can support other applications during disaster management.
- Situational awareness and logistics and evacuation support—UAVs can help gather information during the disaster phase, especially regarding the movement of affected people and deployed rescue teams.
- Standalone communication system— UAVs can re-establish the damaged or destroyed communication infrastructure during the disaster.
- SAR missions—UAVs can search for and rescue people lost, injured, or trapped by debris.
- Damage assessment—UAVs can help assess the damage through different methods, such as structural health monitoring and UAV video inspection.

- Hazard risk vulnerability Assessment—UAV can be used to assess hazard risk vulnerability assessment in the affected area at the time of disasters.
- Crowd Monitoring and Control—UAV can be used in monitoring and controlling the crowd after getting the real time ground situation.

In addition, the following set of disaster management applications could be managed more efficiently with the use of UAVs:

- Media coverage—UAVs could help deliver timely information to viewers for informational purposes (in contrast to providing situational awareness for rescue teams).
- Medical applications—although restrained in the means of payload weight, specialized Drones could automatically deliver supplies essential to keeping people alive, even in the case of a destroyed transport infrastructure with cut-off roads.
- Infrastructure reconstruction— using a network of UAVs could speed up the process of inspections and improve the efficiency and precision of infrastructure reconstruction.

### **1.3 Deliverables envisaged**

The following deliverables are envisaged out of the study:-

- a) Inception report on commencement.
- b) Interim report-1
- c) Interim report -2
- d) Draft Final report.
- e) Final report.

### **2.0 Aims & Objectives:**

The objective is to carry out scoping study on the role of UAVs in Disaster Management.

### **3.0 Venue & Deadline for submission of proposal**

Proposal, in its complete form in all respects as specified in the EOI, must be submitted to NDMA at the address specified herein earlier. In exceptional circumstances and at its discretion NDMA may extend the deadline for submission of proposals by issuing an amendment to be made available on its website, in which case all rights and obligations of NDMA and the bidders previously subject to the original deadline will thereafter be subject to the deadline as extended.

#### 4.0 TERMS OF REFERENCE

The detailed terms of reference are enclosed at **Annexure-I**.

#### 5.0 INSTRUCTIONS

5.1 The Expression of Interest is to be submitted in the manner prescribed below:-

All information as detailed below is to be submitted in one hard copy in separately sealed envelope and one soft copy in CD:-

- a) Applicant's Expression of Interest as per Format-1.
- b) Organizational Contact Details as per Format-2.
- c) Experience of the organization as per Format-3.
- d) List of three (03) experts/ consultants on payroll as per Format-4.
- e) Financial strength of the company/firm as per Format-5.
- f) Additional information as per Format-6.
- g) Declaration as per Format-7.
- h) Power of Attorney in favor of Authorized Signatory with long and short signatures of Authorized person.

5.2 EOI Documents have been hosted on the website [www.ndma.gov.in](http://www.ndma.gov.in) and [www.eprocure.gov.in](http://www.eprocure.gov.in) may be downloaded from the website.

The bidders are expected to examine all instructions, forms, terms and other details in the EOI document carefully. Failure to furnish complete information as mentioned in the EOI document or submission of a proposal not substantially responsive to the EOI documents in every respect will be at the Bidder's risk and may result in rejection of the proposal.

#### 6.0 Qualification Criteria:

Following will be the minimum pre-qualification criteria. Each eligible firm / Agency should possess all the following pre-qualification criteria. Responses not meeting the minimum pre-qualification criteria will be rejected and will not be evaluated.

S. No.	Pre-qualification Criteria	Supporting Compliance Document
1.	The applicant shall be a Consulting Firm / Company/ Autonomous Organization/ Centre of Excellence/ Research Organization/ Scientific Laboratory/Consortium/ foreign bidders with joint ventures and foreign bidders having offices in India registered under the Indian Companies Act, 1956 / the Partnership Act, 1932 / Societies Registration Act, 1860, (as amended from time to time)/ Academic Institution or Institutes recognized by the Govt. Authority.	Copy of Certificate of incorporation and Partnership Deed, if any / recognized by Govt. Authority.
2.	(i) The call for proposal is limited for companies registered in India. The bidding company should be registered in the field of	Certificate signed by the Authorized signatory.

	<p>disaster management or related area of expertise.</p> <p>(ii) In case of a consortium, the lead partner should be clearly be identified in the proposal and should conform to the clause (i).</p>	
3.	<p>(i) The Consulting Firm should be in the business of providing similar consultancy services for at least 5 years as on 31.03.2019.</p> <p>(ii) The Consulting Agency shall have experience of providing similar completed consultancy services.</p> <p>(iii) The company / consortium should demonstrate prior working experience of working in India and outside in policy planning in relation to disaster management and Drone based technology.</p>	Certificate by Company Secretary of the organization.
4.	<p>The Consulting Firm should have an annual turnover of Rupees 50 Lakh in each of the last five consecutive Financial Years (FY 2014-15, 2015-16, 2016-17, 2017-18, 2018-19) from only consultancy services rendered in India. (For Academic institutions the same is exempted.)</p>	CA certified document with name of CA registration number, signature and stamp
5.	<p>Details of the Team leader and Key Person Experts with the Consulting Firm/ Institution/ Orgazination, etc.</p>	
6.	<p>The Consulting firm/ Institutions/ Orgazination, etc. should not be blacklisted by any Central Govt. / State Govt. / PSU / Govt. Bodies.</p>	Certificate signed by the Authorized signatory.
7.	<p>PAN No. / Service Tax Registration Certificate</p>	Copy of Certificate to be enclosed.
8.	<p>Startups in the field of disaster management and environment with DIPP registration and empanelled with government of India or State government will be considered as per Ministry of Finance Dept. of Expenditure O.M. No.F.1/15/2018-PPD dated 24.04.2018 and Ministry of Commerce and Industry Order NO. P-45021/2/2017-B.E.-II dt. 15.06.2017.</p>	Certificate for registration signed by the Authorized signatory.

## 7.0 Evaluation Criteria and Method of Evaluation:

- a. Screening of EOIs shall be carried out as per eligibility conditions mentioned in this document and based on verification of testimonials submitted.
- b. EOI will be evaluated for short listing inter alia based on their past experience of handling similar type of project, strength of their man power, financial strength of firm and proposal to the selection committee whose decision will be final.
- c. Agencies who qualify as per the eligibility conditions will be provided a brief about the requirement of the study.
- d. NDMA will take up references and reserves the right to pay due heed to the Applicant's performance elsewhere and any past experience from across the globe.

- e. Short listed agencies will be issued Request for Proposal (RFP) Documents and asked to submit their Technical and Commercial bid in a sealed envelope.

**8.0 Response:**

**8.1** Consulting Agency must ensure that their response is submitted as per the formats attached with this document. Special comments on the objectives and scope of the service projected in the enquiry may also be submitted along with the offer.

**8.2** Application in sealed cover super scribed, as “EOI for Engagement of Consultant for carrying out Scoping study on role of UAVs / Drones in Disaster Management”.

**9.0 Conflict of Interest:**

**9.1** Where there is any indication that a conflict of interest exists or may arise, it shall be the responsibility of the Bidder to inform NDMA, detailing the conflict in writing as an attachment to this Bid.

**9.2** NDMA will be the final arbitrator in cases of potential conflicts of interest. Failure to notify NDMA of any potential conflict of interest will invalidate any verbal or written agreement.

**9.3** A Conflict of Interest is where a person who is involved in the procurement has or may be perceived to have a personal interest in ensuring that a particular applicant is successful. Actual and potential conflicts of interest must be declared by a person involved in a Bid process.

**10.0 Condition under which EOI is issued:**

The EOI is not an offer and is issued with no commitment. NDMA reserves the right to withdraw EOI and or vary any part thereof at any stage. NDMA further reserves the right to disqualify any applicant, should it be so necessary at any stage without assigning any reason whatsoever.

**11.0 Last date of submission of EOI:**

The last date of submission of EOI is

24.12.2019 1700 hrs

EOI Opening Date & Time is

26.12.2019 11.00 hrs



## **12.0 FORMATS FOR SUBMISSION:**

### **FORMAT – 1**

#### **APPLICANT’S EXPRESSION OF INTEREST**

To,

Under Secretary (Rehabilitation and Recovery),  
Bhawan, NDMA, New Delhi-110029

#### **Sub: Submission of Expression of Interest to undertake scoping study on role of UAV on Disaster Management**

Dear

In response to the Invitation for Expressions of Interest (EOI) published on 25.11.2019 for the above purpose, we would like to express interest to carry out the above proposed task. As instructed, we attach one set of the following documents in separately sealed envelopes and one soft copy:

1. Organizational Details (Format-2)
2. Experience in related fields (Format-3)
3. List of experts / consultants at least 3 (Format-4)
4. Financial strength of the organization (Format-5)
5. Additional information (Format-6)
6. Declaration (Format-7)

Sincerely Yours,

Signature of the applicant

[Full name of applicant]

Stamp.....

Date:

Encl.: As above.

Note 1: This is to be furnished on the letter head of the organization.

Note 2: Startups in the field of disaster management will be considered as per Ministry of Finance Dept. of Expenditure O.M. No. F.1/15/2018-PPD dated 24.04.2018 and Ministry of Commerce and Industry Order NO. P-45021/2/2017-B.E.-II dt. 15.06.2017.

## FORMAT – 2

S. No	Organizational Contact Details	
1.	Name of Organization	
2.	Main areas of business	
3.	Type of Organization Firm/ Company/ partnership firm registered under the Indian Companies Act, 1956/ the partnership Act, 1932/ Societies Registration Act, 1860.	
4.	Whether the firm has been blacklisted by any Central Govt. / State Govt./PSU/ Govt. Bodies / Autonomous? If yes, details thereof.	
5.	Address of registered office with telephone no. & fax	
6.	Address of offices In India i) National Capital Region of Delhi ii) All other State/UT's	
7.	Contact Person with telephone no. & e-mail ID	

Enclose:-

1. Copy of Certificate of Incorporation.
2. Copy of Article of Association in respect of 3 above.
3. Undertaking in respect of 4 above.

Signature of the applicant

Full name of the applicant

Stamp & Date

Note: Startups in the field of disaster management will be considered as per Ministry of Finance Dept. of Expenditure O.M. No. F.1/15/2018-PPD dated 24.04.2018 and Ministry of Commerce and Industry Order NO. P-45021/2/2017-B.E.-II dt. 15.06.2017.

### FORMAT – 3

<b>Experience in Related Fields</b>					
Overview of the past experience of the Organization in all aspects related to concerned field					
S. No	Items	Number of Assignments  during last 5 years	Order Value of each  assignment in Lakhs of Rs. (Enclose copy of each order)	Mention the name  of Client/ Organization (Enclose completion certificates	Any other
1	Experience of assignments of similar nature				
<p>Decision of Evaluating Committee in ascertaining “similar nature” and “similar assignment” will be final.</p> <p style="text-align: right;">Signature of the applicant Full name of applicant Stamp &amp; Date</p>					

Note: Startups in the field of disaster management will be considered as per Ministry of Finance Dept. of Expenditure O.M. No. F.1/15/2018-PPD dated 24.04.2018 and Ministry of Commerce and Industry Order NO. P-45021/2/2017-B.E.-II dt. 15.06.2017.

**FORMAT – 4**

<b>List of key person expert</b>				
<b>S. No</b>	<b>Name</b>	<b>Designation</b>	<b>Qualification</b>	<b>Relevant Experience</b>
1.				
2.				
3.				
4.				
5.				
6.				

Signature of the applicant

Full name of applicant

Stamp & Date

Note1: Startups in the field of disaster management will be considered as per Ministry of Finance Dept. of Expenditure O.M. No.F.1/15/2018-PPD dated 24.04.2018 and Ministry of Commerce and Industry Order No. P-45021/2/2017-B.E.-II dt. 15.06.2017.

Note 2: It is not necessary that the expert should be on payroll of the firm.

**FORMAT – 5**

<b>Financial Strength of the Organization.</b>			
S. No.	Financial Year	Overall annual turnover (in Crores of Rs.)	Annual turnover from only Consultancy services rendered in india (in Crores of Rs.)
1.	2014-15		
2.	2015-16		
3.	2016-17		
4.	2017-18		
5.	2018-19		

Note 1: Please enclose auditor's certificate in support of your claim. \_\_\_\_\_

Signature of the applicant  
Full name of applicant

Stamp & Date

Note 2: It is not necessary that the expert should be on payroll of the firm.

Startups in the field of disaster management will be considered as per Ministry of Finance Dept. of Expenditure-O.M. No.F.1/15/2018-PPD dated 24.04.2018 and Ministry of Commerce and Industry Order No. P-45021/2/2017-B.E.-II dt. 15.06.2017.

## FORMAT – 6

### Additional Information

1. List all enclosures related to the previous sections.

S.NO	Description	No. of pages

2. Additional information to support the eligibility as per Section 7 (Not more than 2 pages).

Signature of the applicant

Full name of applicant

Stamp & Date

Note: It is not necessary that the expert should be on payroll of the firm.

Startups in the field of disaster management will be considered as per Ministry of Finance Dept. of Expenditure- O.M. No.F.1/15/2018-PPD dated 24.04.2018 and Ministry of Commerce and Industry Order No. P-45021/2/2017-B.E.-II dt. 15.06.2017.

## FORMAT -7

### Declaration

We hereby confirm that we are interested in competing for the Consultancy Services to undertake the Scoping study on role of UAVs on Disaster Management.

All the information provided herewith is genuine and accurate.

Authorized Person's Signature.

Name and Designation:

Date of Signature:

Note: The declaration is to be furnished on the letter head of the organization.

Note 2: It is not necessary that the expert should be on payroll of the firm.  
Startups in the field of disaster management will be considered as per Ministry of Finance  
Dept. of Expenditure- O.M. No.F.1/15/2018-PPD dated 24.04.2018 and Ministry of  
Commerce and Industry Order No. P-45021/2/2017-B.E.-II dt. 15.06.2017.

**Term of Reference (TOR) for Study on uses of Drone/UAV for Disaster Management**

**1. Introduction**

Escalating the Role of Science and Technology (S&T) into disaster management has been stressed in the Sendai Framework of Action for Disaster Risk Reduction (SFDRR). The Usage of Drone for disaster management is a step in this direction. The role of drone is increasingly being recognized by government agencies for humanitarian response all around the world. A significant increase in the use of drones was observed in Japan after the East Japan Earthquake and Tsunami, especially after the Fukushima nuclear meltdown, Drones have been used extensively for the radiation measurement. An unprecedented number of lightweight drones were launched in the Philippines after Typhoon Haiyan in 2013. They were used in Haiti Following Hurricane Sandy in 2012. More recently, in Nepal, it was used after the 2015 earthquakes by media agencies and responders to capture bird-eye view images and videos of ground damage. In addition, various academic institutions used drones for serial photography to map extent of damages to the informal settlements.

**2. Background**

On 23<sup>rd</sup> December, 2005, the Government of India (GOI) took a defining step by enacting the Disaster Management Act, 2005 which envisaged the creation of the National Disaster Management Authority (NDMA), headed by the Prime Minister, State Disaster Management Authorities (SDMAs) headed by the Chief Ministers, and District Disaster Management Authorities (DDMAs) headed by the District Collector or District Magistrate or Deputy Commissioner as the case may be, to spearhead and adopt a holistic and integrated approach to DM. Since then, there has been a paradigm Shift, from the erstwhile relief-centric response to a proactive prevention, mitigation and preparedness – driven approach for conserving development gains and to minimize loss of life, livelihood and property.

**3. NDMA's Mandate**

NDMA as the apex body is mandated to lay down the policies, plans and guidelines for Disaster Management to ensure timely and effective response to disasters. Towards this, it has the following responsibilities:

- a) Lay down policies on disaster management;
- b) Approve the National Plan;
- c) Approve plans prepared by the Ministries or Departments of the Government of India in accordance with the National Plan.
- d) Lay down guidelines to be followed by the State Authorities in drawing the State Plan;
- e) Lay down guidelines to be followed by the different Ministries or Departments of the Government of India for the purpose of integrating the measures for prevention of disaster or the mitigation of its effects in their development plans and projects;
- f) Coordinate the enforcement and implementation of the policy and plan for disaster management;
- g) Recommend provision of funds for the purpose of mitigation;
- h) Provide such support to other countries affected by major disasters as may be determined by the Central Government;



- i) Take such other measures for the prevention of disaster, or the mitigation or preparedness and capacity building for dealing with the threatening disaster situation or disaster as it may consider necessary;
- j) Lay down broad policies and guidelines for the functioning of the National Institute of Disaster Management.

#### **4. Drones in Indian Context**

In India till recently, drones were used by the armed forces and the State police force for tactical warfare, surveillance and crowd management, Occasionally, National Disaster Response Force (NDRF) has employed drone for search and rescue purpose. One such instance is that of 2013 Uttarakhand floods where two drone (NETRA) were procured by NDRF to assist search rescue in difficult terrain. But till recently drones were banned from the public domain citing security risk.

The directorate General of Civil Aviation (DGCA) in August 2018 announced draft regulations on the civil use of “Drones/UAVs”. This new drone policy allows personal, recreational and commercial use of drones to be effective from December 2018. Despite this promising amend, currently there is no framework that explicitly supports the deployment of drone-enabled solutions especially for disaster management. Realizing this, National Disaster Management Authority (NDMA) calls for a study on the usage of Drones/UAV for managing disasters and develop a framework for its implementation.

#### **5. Scope of the Study**

The study’s overall aim is to increase the role of Science and Technology into various phases of disaster management by using drone as an innovation. In order to achieve this, the objectives of the proposed study are as follows:-

- a) Study & Analyse the present aviation law and Policy on drones to identify policy measures for using UAVs/Drones in Disaster Management.
- b) Identify different types of UAV/Drones and their application in different types of hazards.
- c) Facilitate consultation with related stakeholders to be identified by NDMA
- d) Identify and suggest possible training programs on using drones in India, for disaster management.
- e) Draw lessons from good practices from the use of drones in other countries.
- f) Develop a framework for drones in disaster management incorporating the above three items.
- g) Prepare a detailed document identifying types of UAVs which can be used in Hazard mapping as well as Disaster Management.

#### **6. Deliverables envisaged**

The following deliverables are envisaged out of the study:-

- a) Inception report on commencement
- b) Interim report-1
- c) Interim report-2
- d) Draft Final report
- e) Final report

## **7. Time period of the study**

The total time period for study is 8 months. It is expected that the Inception report of the scoping study will be submitted within three weeks from the day of commissioning of the study, dealing out the methodology, list of stakeholders to be consulted and necessary support to be provided by NDMA among others.

The draft of the final report is expected to be submitted for review by the end of the seven month from the day of the commission of the project. Based on the review, the final report is expected at the end of 8<sup>th</sup> months from the day of commissioning of the project.

## **8. Expected qualification of the consultant**

The study can be taken up by a Consulting Firm/ Company/ Academic Institutions/ Autonomous Organization/ Centre of Excellence/ Research Organization/ Scientific Laboratory/ Consortium/ foreign bidders with joint ventures and foreign bidders having offices in India, etc.. The Agencies/ Firms, etc. should have proven experience in the field of disaster management. The Agencies/ Firms should have in-depth knowledge of Usage of RPAS in Disaster Management, Payload capabilities, Technical and Hardware Knowledge. The Agencies/ Firms will also take regular presentation of the progress of the study.

The firm/ Institution should conduct the scoping study keeping in mind the latest Policy on Requirements for Operation of Civil Remotely Piloted Aircraft System (RPAS) issued by Office of the Director General of Civil Aviation, Technical centre, opp. Safdarjung Airport, New Delhi effective from 1 December 2018.

The Consulting Agency/ Firm should have experts possessing education qualification and experience as follows:

**i) Team Leader :** Expertise on disaster risk reduction, especially focusing on science and technology and its application in policy perspectives. Should have deep knowledge in the policy making and science and technology in DRR in India with at least 15 years of experiences and proper knowledge on international formworks and global expertise.

**ii) Key Person Expert 1 :** Expertise on application of drones in disaster risk reduction, as well as disaster situation, with specific experiences on aviation related governance, system development, and global experiences and expertise.

**iii) Key Person Expert 2 :** A PhD in computer science or related field. Proven technical expertise on navigation techniques of Drones for damage and need assessments with experience on multi-criteria decision making of Internet of Things (IOT).

**iv) Key Person Expert 3 :** A PhD degree in disaster management or related fields, and at least 5 year or more experiences in government related policy making at the national, State and City levels in India. Prior working experience with the aviation industry is an advantage. Working experience with the aviation industry is an advantage. Working knowledge of GIS mapping.

9) An expert core group will be formed under whose guidance and monitoring, the firm will carry out the study.