

TENDER ENCLOSURE I– TECHNICAL SPECIFICATIONS

ATTACHED TO THE INVITATION TO TENDER

Invitation to tender no. EMSA/OP/06/2016

Contracts for Remotely Piloted Aircraft System (RPAS) services in the maritime environment

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1 Introduction and background

- 1.1.1.1 The European Maritime Safety Agency (hereafter EMSA or the Agency) was established under Regulation 1406/2002/EC, as amended by Regulation 100/2013/EC of 15 January 2013, for the purpose of ensuring a high, uniform and effective level of maritime safety and prevention of pollution by ships.
- 1.1.1.2 The Agency's main objective is to provide technical, operational and scientific assistance to the European Commission and Member States in the proper development and implementation of EU legislation on maritime safety, pollution by ships and security on board ships. To accomplish this, one of EMSA's most important supporting tasks is to improve cooperation with, and between, Member States in all key areas.
- 1.1.1.3 The European Parliament and Council Directive 2005/35/EC of 7 September 2005, as amended by Directive 2009/123/EC of 21 October 2009 "on ship-source pollution and on the introduction of penalties, including criminal penalties, for pollution offences", elaborated the Agency's task with respect to supporting Member States activities in the field of monitoring marine oil spills. Specifically the Directive requires the Agency to "work with the Member States in developing technical solutions and providing technical assistance in relation to the implementation of this Directive, in actions such as tracing discharges by satellite monitoring and surveillance".
- 1.1.1.4 To improve environmental surveillance capabilities, data from new sensors, in particular from Remotely Piloted Aircraft Systems (RPAS) could be incorporated in information provided to Member States.
- 1.1.1.5 The Agency will organise and provide, as an institutional service provider, pilot RPAS service operations in support of Member States focusing on marine pollution detection & monitoring and emissions monitoring. However this technology has a multipurpose character and could on an emergency basis be used for other purposes, if necessary or requested by, Member States, the European Commission and other Agencies.

2 Type of Procedure

- 2.1.1.1 Economic operators are invited to submit an offer in this open procedure in accordance with the rules set out in the Invitation to Tender and its associated enclosures.
- 2.1.1.2 Within this open procedure, any interested service provider may submit a bid in response to the contract notice and procurement documents and is evaluated based on exclusion, selection and award criteria.

3 Objective of pilot service

- 3.1.1.1 This call for tender is to contract European pilot RPAS services in the civil maritime domain.
- 3.1.1.2 The objective is to provide surveillance services through Remotely Piloted Aircraft Systems (RPAS) for the maritime environment. They should have a high level of deployability and availability that should permit EMSA to offer operational capability and provide additional data streams to European Union Member States, Iceland, Norway, to the European Commission, to European Union Agencies and to governmental organisations.
- 3.1.1.3 A scalable service in terms of operations is foreseen with a possibility to have a number of simultaneous RPAS operations. The deployment should be based on mobile units (Local Ground Control Station - LGCS), which can be relocated as new requests may come over time. The RPAS services should be more cost effective compared to manned patrol aircraft and should be used as a complementary tool in the overall surveillance chain, including satellite imagery, vessel positioning information and surveillance by maritime patrol aircraft and vessels.
- 3.1.1.4 By establishing multiple framework contracts (FWC) to acquire pilot RPAS services, EMSA seeks cooperation with contractors covering one or both lots of the tender. The provision of cost-efficient RPA services in the maritime environment should include assets and relevant expert staff to pilot the RPAS, capture and disseminate the data. The FWCs will be implemented through specific contracts.

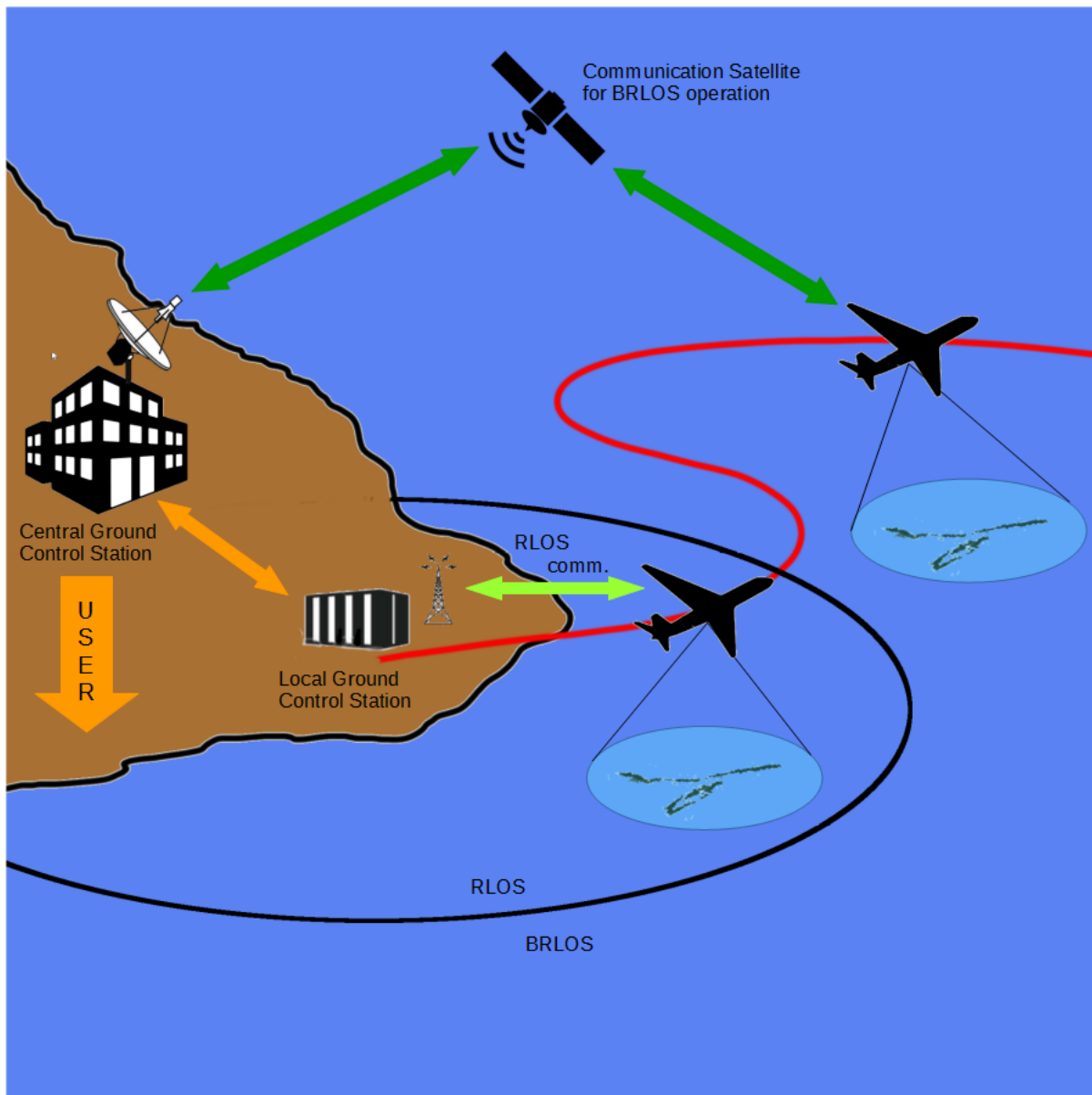


Figure 1: Typical RPAS operation in the maritime environment

- 3.1.1.5 The scenario depicted in Figure 1 illustrates a type of surveillance service which EMSA may request. The figure reflects the foreseen deployment where the RPAS surveys an Area of Interest (AoI). This deployment includes the taxi flight from the base airport to the AoI, the specific activity for the service requested and finally passing all surveillance information and payload data to the users. For this transfer, the RPAS is using a direct link when flying within Radio Line of Sight (RLOS) and changing seamlessly to a satellite link when flying Beyond Radio Line of Sight (BRLOS). The communication link with the Coordination Centre will be part of the contracted operations.
- 3.1.1.6 Two classes of RPAS are foreseen to address the different operational domains in two lots: Medium size RPAS with long endurance and a comprehensive set of sensor capabilities mainly for pollution monitoring and RPAS mainly for emissions monitoring.

- 3.1.1.7 There will therefore be several framework contracts signed for each lot representing the two RPAS classes. The lots and their implementation will be further described in section 5.
- 3.1.1.8 However and if possible, within the RPAS classes, the operations should address multiple purposes according to the capabilities of the RPA and the sensors and according to EMSA's core tasks and Member State needs. The RPA will be used for marine pollution monitoring such as oil spills and emissions monitoring but could also be used for other purposes on an emergency basis.
- 3.1.1.9 The RPAS services will be available free of charge to users from European Union Member States, Iceland, Norway, to the European Commission and to European Union Agencies. Throughout this document the terms "user" and "Member States (MS)" refers to this given list of users.
- 3.1.1.10 The RPAS services will only be initiated following specific requests from these users.
- 3.1.1.11 The RPAS shall be available on a scheduled basis, but shall also allow unscheduled requests on a best effort basis.
- 3.1.1.12 The proposed solutions by the bidder fulfilling the requirements given in this document will be subject to evaluation.
- 3.1.1.13 Throughout this document the term "the bidder" means that the tenderer shall address the requirements in its proposal as requested in the procurement documents. Reference to "the contractor" means that the tenderer shall perform or implement such requirements during the execution of the contract.

4 Requested Services

4.1 General Considerations

- 4.1.1.1 The contract seeks to acquire RPAS based services, including set-up, operations, piloting, maintenance, and data dissemination as defined in the specific contracts and based on user needs.
- 4.1.1.2 Any services requested should be performed by the contractor in line with the operations defined in the specific contracts based on user needs.
- 4.1.1.3 Areas of operation can be all sea areas surrounding the European Union with an EU or EFTA country as a starting point of the service and if requested by governmental users or the European Commission, the service could be extended outside EU adjacent seas upon common agreement.
- 4.1.1.4 The following deliverables are expected:
- RPAS fitted with (ad-hoc) payload, communications and deployment support;
 - Being available on-site for flying;

- Surveillance flight hours following the tasking requested by a user for a specific deployment and flight operations;
- Data sent in real time to the users and EMSA for future integration in EMSA's systems. This should be provided in the agreed format and from the following:
 - Payload data (images, videos, etc.);
 - RPAS housekeeping data (aircraft system information such as heading, position, system status, etc.);
- Keeping the RPAS available for deployment throughout the framework contract (only lot 1).

4.2 Marine pollution monitoring

4.2.1 General

- 4.2.1.1 Information from the detection, monitoring and tracking of oil spills provides essential input to the decision-making process on response operations. Oil spills appear as dark patterns on Synthetic Aperture Radar (SAR) images. However, other substances, including some natural phenomena, have the same effect. Synergies with the EMSA CleanSeaNet services can be achieved as the RPAS collected data would complement the CleanSeaNet satellite imagery service which mainly uses SAR satellites. Additional sensor technologies, such as infrared (IR), have been developed to further discriminate the type of substance causing the observed pattern and, if the substance is oil, the thickness of the oil. In addition to the detection of oil spills, vessels are to be detected in order to link a spill to a potential polluter; this can also be supported by integrating oil spill modelling in the overall monitoring chain.
- 4.2.1.2 EMSA, under its mandate as defined in Directive 2005/35/EC of 7 September 2005, as amended by Directive 2009/123/EC of 21 October 2009 "on ship-source pollution and on the introduction of penalties, including criminal penalties, for pollution offences", is providing services to all EU Member States and EFTA countries. Therefore the area for oil spill monitoring encompasses all European seas and areas of responsibility of the Member States ranging from the Arctic area to the Mediterranean and Atlantic south of the Canary Islands.
- 4.2.1.3 The source of the oil pollution can be from any vessel or offshore oil platform.

4.2.2 Oil spill detection (wide area monitoring)

- 4.2.2.1 RPAs could be used to monitor wider areas, for example sea basins such as the Baltic Sea, North Sea, Atlantic, Mediterranean and Black Sea, or areas of particular interest such as oil and gas production fields. Currently, wide area monitoring is performed by satellites or also by fixed wing aircraft operated by the MS individually or in collaboration.

- 4.2.2.2 Large swath radar satellites however are polar orbiting and sun synchronous. This leads to the effect that during mid day and during night no satellites images can be taken. In order to fill these gaps other sensor platforms are needed. RPAS can be operated all day and can cover as well large areas.
- 4.2.2.3 Further RPAS allow – in contrast to satellites - to analyse oil spills, which are detected by the RPAS itself or by satellite, more in detail due to its capability to carry additional sensors as explained in section 4.2.1.1.

4.2.3 Oil spill monitoring and support to response operations

- 4.2.3.1 Once an oil spill has been detected, further investigation with regard to its size, location, and possible spread or movement might be relevant for a decision on response activities. This requires sensors with a better resolution and additional sensors as listed above. Such information provides support to spill response operations in order to guide the response assets or dispersant aircrafts to the most relevant locations. For large spills in particular, the capacity of RPAS to stay on site is extremely important to ensure an efficient response operation.
- 4.2.3.2 Support to response activities from above sealevel requires to stay on site which is only possible for aircraft. As manned aircraft are limited in endurance RPAS shall fill the gap to support extended on-site operations.
- 4.2.3.3 Frequently oil and Hazardous and Noxious Substances (HNS) pollutions are associated with dangerous gas emissions or open fires, which prohibit in-situ observation by manned assets such as vessels or aircraft. For incident investigation purposes, physical details (e.g. the temperature of the fire and installations) are requested by different Member States. Steerable RPAS may take measurements even in situations of harmful gas emissions, often not available by other means.

4.3 Emissions monitoring

- 4.3.1.1 Due to the recent entering into force of the new limits for sulphur content of marine fuels since 1 January 2015¹, SOx emissions from ships need to be monitored. The enforcement by Member States under Directive 1999/32/EC (as amended) will require monitoring of the emissions and information exchange between the responsible administrations.

¹ Directive 2012/33/EU of the European Parliament and of the Council of 21 November 2012 amending Council Directive 1999/32/EC as regards the sulphur content of marine fuels.

- 4.3.1.2 An RPAS has the capability to measure ship emissions and thus can complement monitoring needs for Member States. Shipowners would also welcome such a service to ensure fair competition however they would not be the users of the service which would be limited to Member States. EMSA is therefore interested in contracting an RPAS capability for measuring SOx emissions for individual vessels to be provided to Member States upon their request. In particular, lot 2 of this procurement will focus specifically on emissions monitoring.
- 4.3.1.3 This pilot RPAS service would primarily be aimed at measuring the amounts of sulphur dioxide that are emitted by individual vessels travelling into or in the European Emission Control Areas (ECAs) located in the EU however the service could also be offered to any MS who could use them in other areas. Ships sailing in this area, irrespective of their flag (EU and non-EU flagged ships), have to comply with a maximum of 0.1% sulphur content per unit mass of fuel. This objective can be met by either using compliant fuels or any approved emission abatement method, in line with the relevant provisions of the Directive². These areas are termed SECAs (Sulphur Emission Control Area).
- 4.3.1.4 In addition to ECAs, the Directive includes sulphur limitations for other areas, which are also found to be relevant within the context of these Framework contracts which will be concluded meaning that the RPAS services could also be used in other areas where the MS may have an interest. The following limits can also be extracted from the provisions of the Directive:
- Passenger Ships operating on regular service: limitation of 1.5% sulphur content in mass, valid for territorial seas, exclusive economic zones and pollution control zones falling outside SECAs(until 1 January 2020). When they are in port or in SECAs this would be limited to 0.1%.
 - All Ships: 0.5% sulphur content in mass, valid for territorial seas, exclusive economic zones and pollution control zones falling outside SECAs (from 1 January 2020 onwards). Until 2020, the value is 3,5% except for passenger ships (see above).
- 4.3.1.5 Furthermore, EU Member States, as part of the Directive's implementation and enforcement, have their inspection obligations established in the Commission

² Council Directive 1999/32/EC (as amended) includes, in its Article 4c(1), the possibility for ships to use oil fuels that would otherwise be non-compliant, provided that the objective to "continuously achieve reductions of sulphur dioxide emissions that are at least equivalent to the reductions that would be achieved by using marine fuels that meet the requirements of Articles 4a and 4b" is met.

Implementing Decision (EU) 2015/253³. The frequency of fuel sampling and analysis is quantified in Article 3 as a percentage of the individual ships to be inspected, depending on the relative geographical location of EU Member States in relation to SECAs. The same Article states however that this frequency can be adjusted down but not reduced by more than 50 % “... *subtracting the number of individual ships for which possible non-compliance is verified using remote sensing technologies...*” The use of RPAS for SOx monitoring, as is considered for these tender specifications, is in line with this legal provision, in support of EU Member States obligations in the implementation and enforcement of Directive 1999/32/EC (as amended).

4.3.1.6 Briefly, a generic description of the operational concept for RPAS SOx “sniffing”, in support of sulphur inspection programmes by EU Member States, shall encompass:

- Preparing the flight plan, permit to fly, communications, geo-location checks and verification, definition of the operational area and possible contingency plans;
- Measuring air samples in close “fly-by” operations to the individual ships’ exhaust plumes;
- Considering potential integration and data transfer from the RPAS to EMSA’s sulphur inspection data sharing platform (THETIS-S).

4.3.1.7 This would be followed by alerts being generated where there may be possible non-compliance cases, assisting national administrations in their decision-making process and allowing to possibly select ships for future inspection at a next port of call. These alerts, inspections, and follow-ups are not part of this contract.

4.3.1.8 EMSA provides services to all EU Member States and EFTA countries. Although emissions monitoring activities are expected to be in specified SECAs and approaches to the major European ports, the RPAS service for emissions monitoring can be used all over European waters. The main objective of the RPAS service is that it can assist Member States to check EU and non-EU flagged vessels that may be in transit in EU waters and ensure that they comply with the requirements of the Sulphur Directive.

³ Commission Implementing Decision (EU) 2015/253 of 16 February 2015 laying down the rules concerning the sampling and reporting under Council Directive 1999/32/EC as regards the sulphur content of marine fuels.

4.4 Vessel detection and identification

4.4.1 Vessel Detection, Monitoring and Tracking

- 4.4.1.1 Users are already provided by the Agency with a permanent feed of correlated terrestrial and satellite AIS combined with LRIT and VMS data combined with EMSA Central Ship Database information. The service provides integrated vessel track data for individual vessels and the information layers contain the last known vessel positions as well as other ship particulars.
- 4.4.1.2 With the detection of oil spills by RPAS, a link can be made between the spill and a potential polluter.
- 4.4.1.3 For the emissions monitoring to be provided with RPAS, the feed of correlated vessel data can assist to follow the ship to port for future inspection.

4.4.2 Vessel Identification

- 4.4.2.1 In case of particular interest, the RPAS will need to be able to identify ship names if possible (ship name, IMO number, MMSI, Flag, etc.). Two vessel categories are to be focussed on: small objects at sea (typically <15m length) not necessarily having strong radar reflections and larger vessels (typically >15m length).

5 Lot Structure

5.1 Lots

- 5.1.1.1 The framework contracts will be divided over two lots as follows:
 - Lot 1: Medium size, long endurance RPAS services for pollution monitoring; and
 - Lot 2: RPAS services for Emissions Monitoring
- 5.1.1.2 These will be described in more detail below.
- 5.1.1.3 EMSA may call upon more than one service in either lot simultaneously.

5.1.2 Lot 1: Medium size, long endurance RPAS services for pollution monitoring

- 5.1.2.1 This lot will focus on marine pollution monitoring covering the services indicated in Section 4.2 and could also respond in emergency situations. The concept of operations and service requirements are indicated in section 7.2. The RPAS will focus on long endurance operations, equipped with the necessary sensors for marine pollution monitoring but could also be used for general maritime surveillance if needed.

5.1.3 Lot 2: RPAS for emissions monitoring

- 5.1.3.1 This lot will focus on emissions monitoring covering the services indicated in Section 4.3 and the concept of operations and service requirements indicated in section 7.3.

5.2 How the Contract will work

5.2.1 The Framework Contract in Cascade

- 5.2.1.1 The contracts awarded per lot will be framework contracts (FWC) valid for two years with a possible renewal for a further one year period and then a final second renewal period for another year if requested by EMSA.
- 5.2.1.2 Framework contracts will be signed with two companies for each Lot indicated in section 5.1. Should the relevant number of RPAS or sensors or the required capabilities not be reached with the two companies, framework contracts may be signed with other companies.
- 5.2.1.3 The Agency is requesting a certain set of minimum capabilities to be offered by the bidder in order to sign a framework contract.
- 5.2.1.4 Further advanced capabilities are requested which are not mandatory, but will allow a better score during evaluation.
- 5.2.1.5 The framework contracts per lot will be in cascade, which means that EMSA will rank the tenderers in descending order with a view to establishing a list of contractors and the sequence in which they will be offered specific contracts. The companies will be ranked according to their scores in terms of best price-quality ratio as indicated according to the scoring scheme in section 21.

5.2.2 The Specific Contracts (SC)

- 5.2.2.1 The framework contract in cascade will be implemented by signing specific contracts for the modules as described in section 6.
- 5.2.2.2 Based on a request by a user for a specific RPAS operation, a specific contract will be drawn up for each deployment encompassing several modules.
- 5.2.2.3 The contractor which is ranked first after the evaluation will be the first to be requested by EMSA to sign a specific contract for the deployment.
- 5.2.2.4 However, if the contractor at the top of the list does not meet the capabilities required for that specific deployment because:
- they are still in the development process to reach the mandatory and any proposed additional capabilities
 - the advanced capability needs are not available (i.e. a specific sensor is not available for a particular deployment)
 - of technical problems
 - of any other unavailability to offer the requested service
-

the Agency will then consult the contractor(s) in order of their ranking and sign the specific contract for the deployment with the next contractor in the list who first meets the requested capabilities.

- 5.2.2.5 Should more and different RPAS vehicles be needed than what can be provided by the first contractor, then the following ranked contractor(s) in order of their ranking may be requested to provide the outstanding number of RPAS vehicles and a specific contract may also be drawn up for this purpose. Therefore several specific contracts could be signed with several companies for one user request.

6 Contract modules, timings and associated cost elements

6.1 General Considerations

- 6.1.1.1 Please note that the term deployment, will be used in this document and means a specific "service" which is requested by a user (from either European Member States, Norway and Iceland, European Commission, European Union Agencies, or governmental organisations) for a specific area for a determined period of time.
- 6.1.1.2 The following modules and associated cost elements over time will apply to the two lots. Please be aware that multiple operations could be run in parallel:

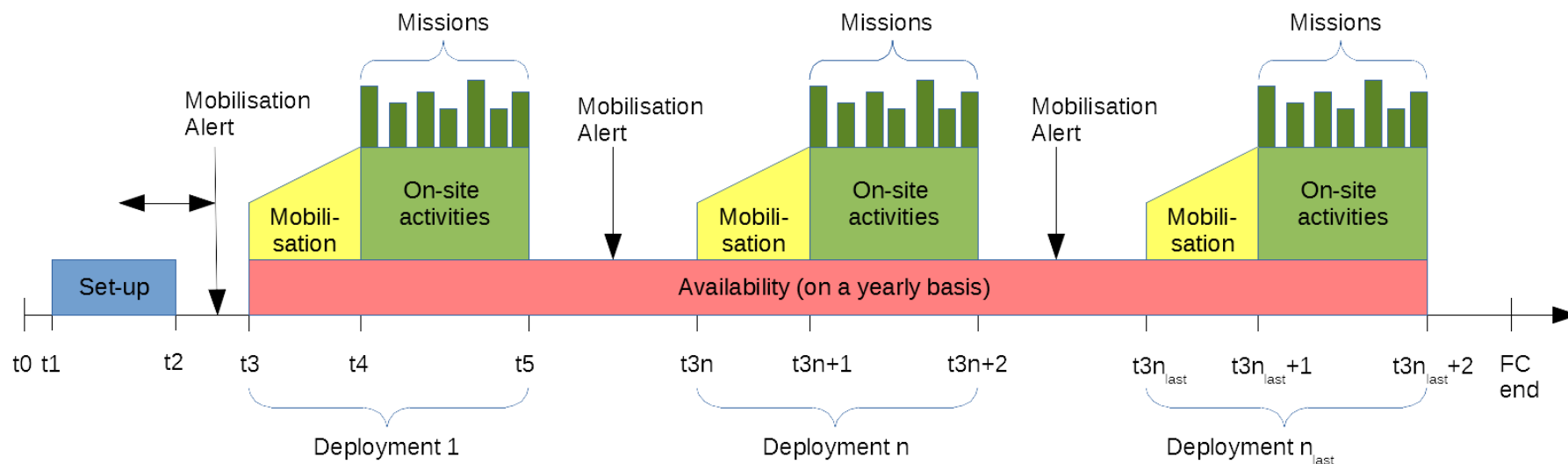


Figure 2 - Framework Contract timeline for various modules

Legend (details see text below):

- Set-Up: means all costs associated to the adaptations for the data handling and interfacing with EMSA and the users, and with the refitting of the aircraft, local ground control segment (LGCS) and any preparations and adjustments needed to be ready for a future EMSA contracted deployments
- Mobilisation Alert: information to the contractor, that a deployment is planned
- Mobilisation: means all costs associated with moving the RPAS vehicle, the local ground control segment (LGCS), the staff, etc. to be on-site where the deployment base will be.
- On-site activities: means all costs associated to working staff, etc. associated with the deployment.
- Missions: includes all costs for the flight hours.
- Availability: covers costs to keep the RPAS available for EMSA operations (applicable only for lot 1).

With:

- t_0 : signature of the framework contract
- t_1 : signature of the specific contract for the initial set-up. It is the intention to sign the specific contract immediately after t_0
- t_2 : end of set-up phase

- t3: signature of the specific contract for the deployment including mobilisation costs, onsite-costs, and costs of the missions (per flight hour).
The permit to fly must be available before the specific contract is signed.
- t4: end of mobilisation and start of on-site activities and missions
- T5: end of deployment
- n: the number of the deployment
- nlast: the last deployment within the framework contract

Note: the mobilisation of the first deployment might be requested during the set-up phase, so that the first on-site activities may immediately follow the set-up phase.

6.2 Module 1: Initial set-up phase

- 6.2.1.1 The first phase from when the FWC will be signed until the first user requests a specific operation, will be the set-up phase. This should be the time when the companies adapt the RPAS to meet EMSA requirements for a potential deployment.
- 6.2.1.2 The set-up costs cover at the beginning of the contract the
- set up of the data provision and visualisation enabling the users and EMSA to have access to the real time data/video streams;
 - assembling a stand-alone mobile unit for flight monitoring and data visualisation which could be transferred to the requesting user, if necessary according to section 7.1.6.7.
- 6.2.1.3 EMSA assumes that the RPAs are already available for flight operations and do not require dedicated development to be fit for purpose. However, if necessary, this module will cover any
- refitting of the aircraft and any preparations and adjustments needed to be ready for a future EMSA deployment.
- 6.2.1.4 The setup-phase will be with the successful acceptance of the “minimum capabilities” as requested within the tender specifications in section 7.
- 6.2.1.5 A final report should be produced to indicate that all tests performed show that the contractor is ready for a potential deployment according to EMSA requirements.
- 6.2.1.6 The set-up phase shall not last more than 3 months after the signature of the specific contract for this module.

6.3 Module 2: Mobilisation

- 6.3.1.1 This phase includes transport of the RPAS, the ground station, and the staff to the relevant location.
- 6.3.1.2 EMSA intends to task the contractor for the mobilisation with at least a 30 day notice (mobilisation alert in Figure 2). During this time, the requesting State will obtain the permit to fly, which then enables EMSA to issue the specific contract for the mobilisation, deployment and missions (flights). However, the specific contract will always remain subject to the approval of the permit to fly.
- 6.3.1.3 The maximum time for mobilisation after the signature of the specific contract for the mobilisation, deployment, and missions shall then not exceed two weeks.
- 6.3.1.4 However in exceptional or emergency situations, the Agency may want to be able to mobilise on short notice. The bidder is requested to provide in its bid

the minimum possible time from the mobilisation alert to be ready for operations. This minimum time will be taken into account during the evaluation of the bids.

- 6.3.1.5 Therefore at the time the contractor receives an alert that the mobilisation will be taking place in the near future, the process to achieve the permit to fly will have already started under the responsibility of the requesting user/State (see 7.1.5.1). The specific contracts will be signed with the contractor only once the permit to fly is obtained.
- 6.3.1.6 The Mobilisation costs should cover:
- preparation of a deployment
 - assisting activities to achieve the permits to fly and providing the necessary documentation to support the approvals and permits to fly
 - the transport of the aircraft, ground station and all other relevant equipment
 - the travel costs of staff
 - the on-site preparation
- 6.3.1.7 The mobilisation costs are applicable from one site to another within and across Europe. They are dependent on a distance, meaning that they are composed of two elements:
- a fixed fee (covering the on-site and deployment preparation)
 - a variable fee for each mobilisation per 500 km of straight distance (great circle) (covering staff travel costs and costs associated with moving the relevant RPA and equipment/base)
- 6.3.1.8 At least one operational briefing on the object(s) of interest will be held per deployment and at the site of the deployment. The service manager from the contractor has to be present at this briefing.
- 6.3.1.9 The mobilisation of the first deployment might be requested during the set-up phase, so that the first on-site activities may immediately follow the set-up phase.
- 6.3.1.10 If the contractor fails to mobilise as requested and according to these tender specifications, EMSA may terminate the contract in line with Article I.11 of the framework contract.

6.4 Module 3: On-site activities

- 6.4.1.1 Each on-site activity will have a minimum duration of 2 months.
- 6.4.1.2 The contractor must be available to provide services day and night for all days. However the flight planning is done based on a weekly schedule. In exceptional cases, an unscheduled mission might be requested, which the contractor has to provide as soon as possible on a best effort basis.

- 6.4.1.3 The bidder has to state its maximum flight capabilities per 24 hours.
- 6.4.1.4 Different operational scenarios in terms of duration of deployments could be foreseen, depending on user requests. Please refer to chapter 21.3 where two scenarios are described, which might represent the lower and upper limit of the on-site activities.
- 6.4.1.5 The on-site costs cover:
- the operation and maintenance of the RPAS on site
 - the staff needed on site (mission/deployment control, pilot(s), payload operators, maintenance, etc.)
 - the third party liability insurance
 - accommodation expenses for the staff needed on site
- 6.4.1.6 The actual on-site operation costs will be calculated based on a calendar day.

6.5 Module 4: Flight operations/missions

- 6.5.1.1 Flight hours are calculated from take-off until landing of the RPA.
- 6.5.1.2 For each month 160 flight hours will be assumed however only the flight hours flown will be paid by EMSA.
- 6.5.1.3 The cost of the flight hours should cover:
- The fuel used in the operation
 - All communication costs regardless if RLOS or BRLOS (i.e. payload transmission and command and control)
 - Any other flight related expense
- 6.5.1.4 Airport fees will be covered by the requesting user, if applicable.
- 6.5.1.5 Different operational scenarios in terms of the number of flight hours could be foreseen, depending on user requests. Please refer to chapter 21.3 where two scenarios are described, which might represent a lower and upper limit of the flight operations.
- 6.5.1.6 A scaling effect with the number of flight hours executed over a period of 12 months of the framework contract (according to date of signature) shall apply:
- as soon as 500 flight hours have been performed/flown, the remaining flight hours to reach the end of the 12 month period will receive a 10% discount.
- 6.5.1.7 Tasking time
- 6.5.1.8 The flights will be tasked based on a weekly schedule. Only in exceptional cases might an unscheduled deployment be requested, which the contractor has to respond to as soon as possible and on a best effort basis.

- 6.5.1.9 A requesting procedure will be discussed and confirmed during the kick-off meeting. The contractor shall provide a requesting procedure for the actual flights including the foreseen flight path and the maximum duration of the flight (deployment planning). If the bidder already has an automatic procedure, this should be described in the bid.
- 6.5.1.10 However in exceptional or emergency situations, the Agency may want to be able to request flights on short notice. The bidder is requested to provide the minimum time for the aircraft to be ready to fly. The minimum time for tasking a flight will be taken into account during the evaluation of the bids.
- 6.5.1.11 Unavailability of service during deployments
- 6.5.1.12 In case of extreme weather conditions exceeding the declared operational capability of the RPAS or in case of force majeure, (not including unscheduled maintenance), the contractor is entitled to receive the on-site costs, but no compensation will be paid for scheduled, but not performed flight hours. The bidder should provide the weather limitations for the RPA in the proposal.
- 6.5.1.13 In case the contractor is not able to meet the total minimum amount of flight hours specified in the flight plan during the deployment, the on-site costs will be reduced proportionally (i.e. 144 out of 160 flight hours performed, means 10% reduction in on-site costs).

6.6 Module 5: Service availability/reservation fee (only Lot 1)

- 6.6.1.1 With the first mobilisation, the Agency will start to pay a "service availability or reservation fee" in order to ensure that the service is available for deployments within the mobilisation time. This will be applicable to all of the contractors chosen for Lot 1, but not for Lot 2 as the investment in hardware is significantly lower.
- 6.6.1.2 The service availability fee will be paid per quarter calculated based on calendar days.
- 6.6.1.3 The maximum duration for a specific contract to cover the service availability fees will be 12 months. However, EMSA has the intention to conclude specific contracts until the end of the FWC duration. This is detailed further in the draft specific contract annexed to the draft FWC provided with this Invitation to Tender.
- 6.6.1.4 In case the contractor is:
- not able to provide the RPAS due to technical failures within the mobilisation time, the payment of the availability fee will be suspended;
 - not able to provide the services as requested for the next deployment according to these technical specifications, the payment of the availability fee will be suspended.

- 6.6.1.5 Any availability fees already paid to the contractor would then be recovered retroactively to the moment of the end of the last deployment in line with Article II.23 of the FWC.
- 6.6.1.6 After the end of the next successful deployment, the service availability fee(s) will again be paid.

6.7 Module 6: Interfacing

- 6.7.1.1 During the lifetime of the framework contract EMSA may want to integrate the RPAS data streams in its maritime surveillance applications. The data formats and transport mechanisms shall follow certain standards as described below.
- 6.7.1.2 The bidder shall already provide an offer for the implementation of the interfaces on his side in the bid. It is up to EMSA to decide if and when this module will be implemented by issuing a specific contract for this module.
- 6.7.1.3 After module 6 has been completed the contractor is then obliged to provide the data in the given formats and transport mechanisms.
- 6.7.1.4 All service video streams and image data shall be made available as georeferenced data (e.g STANAG 4609, JPEG 2000) to be further processed and visualised by EMSA.
- 6.7.1.5 All service feature data shall be made available as georeferenced data (e.g GML files, GEOJSON, NetCDF) to be fed into geospatial web services (e.g. OGC WFS-T).
- 6.7.1.6 The contractor shall implement a solution for the inventory of the metadata within the context of the services (e.g. via OGC catalogue service (CSW)).
- 6.7.1.7 For communication purposes between EMSA, the requesting national users (or European Agency or the European Commission) and the contractor's operational team, a chat interaction shall be established based on JABBER/XMPP.
- 6.7.1.8 The transfer mechanisms shall be based on HTTP(S), FTP, REST.
- 6.7.1.9 The web services will be based on OGC standards.
- 6.7.1.10 The contractor shall provide the data from its servers in the following formats. Alternative formats require explicit approval of the Agency and shall not be the basis for the bids:

Data type	Data format
Video stream data	STANAG 4609 / MISB 0902 (time coded video data), H.264
Image data	JPEG2000
AIS data	NMEA
Feature data	XML(GML), GEOJSON, NetCDF
Chat communication	JABBER/XMPP
Metadata	ISO 19119/19115

Table 1 *Data exchange formats*

6.8 Other costs

- 6.8.1.1 The RPAS maintenance shall be fully covered by the contractor. This could also include potential modifications' costs related to repetitive issues found during operations that could jeopardise availability.
- 6.8.1.2 No system maintenance or any other additional costs are to be charged to EMSA.

7 Service requirements and Conops

7.1 Requirements for both Lots

7.1.1 General

- 7.1.1.1 EMSA wants to build upon RPAS solutions that are already flying the required sensors. Additional equipment/sensors not indicated as "Mandatory" may be put in place during the lifetime of the contract.
- 7.1.1.2 The Remotely Piloted Aircraft System (RPAS) should include relevant aircraft (RPA), ground control system, launch and recovery equipment (if needed) and communication systems and any other relevant parts required to provide the services.
- 7.1.1.3 The bidder shall provide general performance and operational conditions of the proposed RPAS including but not limited to:
- for general performance conditions: Maximum Take-Off Mass (MTOM), operating empty weight (without payload), recommended payload mass, maximum payload mass, dimensions, and endurance.

- For operational conditions: temperature range, humidity, wind tolerance (including ability for the payload to provide usable data), ceiling altitude, take-off altitude flight radius.

7.1.2 RPAS platform and sensors

- 7.1.2.1 All contracted RPAS vehicles must have the EMSA logo clearly displayed.
- 7.1.2.2 The contractor shall provide EMSA with a model to scale of the RPA that they will be providing, used for information/educational purposes of the Agency.
- 7.1.2.3 The contractor must have appropriate third party liability insurance.
- 7.1.2.4 With regards to the liability for any loss or damage caused by the contractor during or as a consequence of the implementation of the FWC, Article II.6 of the FWC applies.

7.1.3 RPAS communication infrastructure

- 7.1.3.1 The bidder should include a clear description in his proposal on the communication channels capable of transmitting the payload data. This should include communication from the RPA to the ground segment and from there to the users and EMSA (the communication between the aircraft and the ground segment for the different lots is detailed in section 7.2 and 7.3).
- 7.1.3.2 EMSA will request the user / the hosting entity of the operations to provide an internet connection at the Local Ground Control Station (LGCS) as depicted in Figure 1 (i.e. for distributing the payload data). The bidder shall specify the minimum bandwidth needs.
- 7.1.3.3 The communication links shall be contracted for the entire area of operation as specified in the SC and based on the user request and as much as possible the contractor will ensure that they are available.
- 7.1.3.4 In particular the bidder shall describe in detail which communication technology is used to transmit in real time all data to the contractor ground system, including:
 - satellite network,
 - network mode,
 - frequency,
 - guaranteed bandwidth,
 - area of coverage,
 - latency time.

This has to be provided for RLOS and BRLOS communication channels.

- 7.1.3.5 If the frequency bands are not in the aeronautical band and/or the equipment do not have an aviation certification, there is a need to obtain an approval to emit in the frequency band.

- 7.1.3.6 The bidder shall also explain how the access authorisations for the frequency bands will be obtained in the European Member States. The bidder is expected to prepare the associated data package and obtain the related authorisations for the usage of the frequency spectrum.
- 7.1.3.7 Communication ('command and control) between the RPA and the ground segment
- 7.1.3.8 An ATC communication link with the Air Traffic Controller in charge of the sector the RPAS is operated in must be provided. This link must be proven meeting the relevant ATC communications standards.
- 7.1.3.9 The RPA and the ground segment should be both able to transmit and receive command and control data under RLOS and BRLOS conditions. A back up Command and Control Link is mandatory, preferably using another set of frequencies than the primary datalink.
- 7.1.3.10 The BRLOS and the RLOS communications shall provide a bandwidth allowing to transmit all command and control and flight data from the RPA to the ground segment.
- 7.1.3.11 BRLOS communication must use satellite communications. The performance of the satellite link must allow both safe command and control communications.
- 7.1.3.12 Communication (payload link) between the RPA and the ground segment
- 7.1.3.13 The RPA and the ground segment should be both able to transmit and receive payload data under RLOS and BRLOS conditions.
- 7.1.3.14 The BRLOS and the RLOS communications shall provide a bandwidth allowing to transmit all payload and relevant flight data from the RPA to the ground segment.
- 7.1.3.15 BRLOS communication must use satellite communications. The performance of the satellite link must allow the transmission of payload data according to the operational needs.
- 7.1.3.16 At minimum the communication bandwidth for the payload data shall be capable to transmit in parallel:
- one compressed video stream with either a frame rate of at least 10fps and a minimum resolution of 1024 x 768 pixel or a frame rate of at least 25fps and a minimum resolution of 720x576 pixel; as requested for the deployment;
 - one high resolution image of at least 2 megapixel every second;
 - all flight, housekeeping and metadata needed to fully characterise the data received (e.g. georeferencation).
- 7.1.3.17 This however should not be achieved by degrading the command and Control data stream.

- 7.1.3.18 The bidder shall describe which communication contracts are already in place and/or foreseen.
- 7.1.3.19 Communication between Central Ground Control Station and users/EMSA
- 7.1.3.20 The contractor should provide the payload and relevant flight data from the Central Ground Control Station (CGCS) (as depicted in Figure 1) via internet communication to the users in the host country and in parallel to EMSA. The connection to the internet should have a bandwidth suitable to transfer all data without any latency delay due to bandwidth limitations due to the contractor internet connection.
- 7.1.3.21 The contractor should provide a secondary (back-up) communication link to the internet, in case of technical failure in the primary communication link.
- 7.1.3.22 Whether the internet communication is managed by the contractor or sub-contracted to a telecommunications service provider, it should be a fully managed service including all necessary circuit, hardware and software rental and maintenance for the duration of the contract.
- 7.1.3.23 The contractor shall bear all costs (set-up, maintenance, operation and the fee's to the communication service providers) for data transfer to the end point.
- 7.1.3.24 The contractor shall perform standard virus checking, anti-hacking and network security procedures on all messages to prevent malicious attacks.
- 7.1.3.25 The data security concept shall be described in the bid. As a minimum the contractor shall use firewalls in conjunction with the encryption of data for data security.
- 7.1.3.26 EMSA reserves the right to reject network solutions if they are not compatible with the EMSA facilities or the EMSA IT landscape (available from EMSA on request).
- 7.1.3.27 Use of GEANT
- 7.1.3.28 EMSA has a connection to the European R&E⁴ network GEANT (<http://www.geant.net/>) via the "National Research and Education Networks" (NREN) which provides a shared bandwidth transfer of up to 1 GBit/s and a guaranteed bandwidth of 250 Mbit/s.

⁴ Research and Education

- 7.1.3.29 With the availability of the guaranteed, high bandwidth and cost effective GEANT solution, the data transmission time contributes only marginally to the overall delivery time.
- 7.1.3.30 The contractor may, through the local NREN, connect to the R&E network.
- 7.1.3.31 The cost of the data transmission over the GEANT network and the transmission from the Portuguese NREN to EMSA will be covered by the Agency.
- 7.1.3.32 If the contractor decides to use the R&E network, the contractor has to bear only the costs to the next NREN node (set-up, maintenance, operation and communication cost to the next NREN) and potential fees of the local NREN.

7.1.4 RPA approval

- 7.1.4.1 The RPAS must as much as possible use systems/sensors and/or communication devices that have been approved as part of an RPA which was granted a previous permit to fly. Alternatively, compliance to recognised industry standards shall be demonstrated. The level of compliance to environmental standards should be compatible with the envisaged maritime operations (e.g. salt, humidity, temperature range, high intensity radiated fields, etc.). For example, Eurocae ED14/RTCA DO160 defines environmental qualification tests for equipment used in manned aviation. Equivalent military standards such as for example STANAG 4370 (AECTP 230) or MIL-STD-810-G could also be used. The bidder shall identify the previous approval status and approval types for the RPAS, its components, and sensors and relevant certified management systems should be used according to aviation standards.
- 7.1.4.2 Safe operations should be ensured by having qualified personnel and risk mitigation measures. The bidder shall provide in the proposal the experience of his staff in previous approval processes. The bidder shall summarise his proposed approach to manage the operational risks and demonstrate to the approval authorities that risks are appropriately mitigated. This shall encompass all the elements of the operations from the deployment preparation, the design safety features to the qualification of the RPA pilots and the efficiency of the emergency procedures. Some references are provided in section 7.1.4.3 in order to clarify the expectations.
- 7.1.4.3 Contractors shall support the activities to draw European standards on RPAS authorisation and operation. To this extent the contractor is requested to provide data related to the successful deployments and to voluntarily report incidents. These voluntary reports shall be submitted to the European Aviation

Safety Agency⁵. These events will be recorded in the European Central Repository and analysed as part of the Annual Safety Review⁶. The contractor is asked to make these data available also for the development of a standardised operational environment and risk assessment of RPAS for the "Specific operation" category⁷ for maritime surveillance. The extraction and analysis of the data will be performed by the European Aviation Safety Agency.

References:

Reference	Link
Eurocontrol RPAS documents	http://www.eurocontrol.int/articles/rpas-documents
Safety Assessment & Certification for UAS, Andrew R Evans & Dr Mark Nicholson, JRA Aerospace Ltd / The University of York	http://www-users.cs.york.ac.uk/~mark/papers/BristolUAV07.pdf
Multiple-Scenario Unmanned Aerial System Control: A Systems Engineering Approach and Review of Existing Control Methods, Aerospace 2013, 3, 1; doi:10.3390/aerospace3010001	http://www.mdpi.com/2226-4310/3/1/1/html

7.1.5 Air traffic management

7.1.5.1 EMSA is aware of the difficulties to operate RPAS in the (non-)segregated air space and getting the permits to fly. The users request the services and as such provide an official need for a permit to fly. As the requesting users will in general have institutional contacts to the civil aviation agency responsible for the national Air Traffic Management (ATM), it will also be the responsibility of

⁵ <http://www.easa.europa.eu/>

⁶ See for example, http://easa.europa.eu/system/files/dfu/203807_EASA_SAFETY_REVIEW_2014.pdf

⁷ See EASA: <https://easa.europa.eu/document-library/notices-of-proposed-amendment/npa-2015-10>

the users in cooperation with EMSA to facilitate the process and to provide the permits to fly.

- 7.1.5.2 Cross border operations shall be possible. Therefore paragraph 7.1.5.1 will be applicable for all the concerned Member States.
- 7.1.5.3 However the contractor is obliged to provide all documentation necessary in a timely manner and to support the process of receiving flight approval.
- 7.1.5.4 It will be the decision of the national ATM authority to approve or suggest acceptable solutions related to the flight modalities, e.g. flying within the non-segregated or segregated airspace, the flight levels, the restrictions and/or if the segregated airspace is dynamically allocated for the aircraft operations.
- 7.1.5.5 In order to achieve flight approval, it is an advantage, if the contractor/bidder can:
 - a) provide previous authorisations for the aircraft and sensors operated
 - b) have "detect and avoid"⁸ technologies, even if international standards are not yet available. This will also enable to gather in-service experience to mature the technologies.
 - c) document the flight hours carried out so far with this RPA. Since the flight operations will be approved by different Member States, evidence of similar operations with incident rates and consequences is expected to simplify the approval process.
- 7.1.5.6 The bidder shall provide in its proposal the experience of his staff with ATM procedures for integration of its RPAS into the airspace and previous flight approvals already received for the proposed RPAS.
- 7.1.5.7 The bidder is requested to describe already available:
 - a) operational procedures for the proposed RPAS including interaction with ATC and hand-over procedure between RPA pilots;
 - b) flight check lists;
 - c) maintenance plans;
 - d) RPA pilots' qualification/training plan including ATM/airspace knowledge;
 - e) Mitigation strategy for the following generic hazardous scenarios: loss of command/control link, loss of ground control station, loss of

⁸ In this document, 'detect and avoid', 'sense and avoid' or 'collision avoidance' system are used loosely; the intent of such a system is to detect aircraft and/or obstacles within the vicinity of the RPA, and support the RPA pilot or automatically execute manoeuvres to restore a safe situation if needed.

communications with ATC, loss of control of RPA, loss of engine and technical failure of the RPA;

- f) any proposed "detect and avoid" technology;
- g) contingency procedures.

7.1.6 Data provision

7.1.6.1 The service provider shall be able in real time to present via a geospatial information system and video viewer (video/GIS) data captured by all the sensors in the aircraft payload. This video/GIS system shall be made available to the users and to the Agency.

7.1.6.2 At least the following data shall be made available to the user for lot 1:

- a) Live Streaming Video (and recorded video access) of the image sensors on the RPA
- b) Compiled Maritime Picture
 - Aircraft position
 - Executed flight path
 - Moving Deployment Map
 - Sensor footprint
 - Radar images
 - Identified objects in the radar signal, electro-optical and IR images
 - AIS information and track (position, MMSI, etc.) of the vessels
 - Georeferenced objects and incidents of interest in any of the sensor data

7.1.6.3 At least the following data shall be made available to the user for lot 2:

- a) Live Streaming Video (and recorded video access) of the image sensors on the RPA
- b) Ship emission related data
 - Aircraft position
 - Executed flight path
 - SOx concentration
 - AIS information and track (position, MMSI, ...) of the observed vessel
- c) Additionally the sulphur measurements and the related aircraft positions shall be submitted to EMSA in an INSPIRE⁹ compatible format in order to

⁹ See: <http://inspire.ec.europa.eu/>

be compliant with the EMSA operated THETIS-S information system¹⁰.
The detailed format specification will be provided at the kick-off meeting.

- 7.1.6.4 The contractor shall analyse the video streams based on user requests which are defined within the flight plan, but can be updated during the flight. This includes the immediate information of the users. The analysis could encompass for example:
- a) vessel identification
 - b) scanning/sweeping of certain areas for specific targets
 - c) tracking of objects in support of search and rescue operations
 - d) oil spill detection and delineation
- 7.1.6.5 Any further data product provided by the bidder shall be listed in the proposal and will be evaluated as an advantage.
- 7.1.6.6 It is an advantage if this video/GIS is a web based video/GIS application and can be visualised with standard web browsers without requiring special plugins. The following web browsers should be supported (for the specific version of the browsers, please consult the EC "Browser support" web page: http://ec.europa.eu/ipg/standards/browsers/index_en.htm):
- Microsoft Internet Explorer
 - Firefox
 - Chrome
 - Safari
- 7.1.6.7 In case the contractor cannot provide a web based video/GIS application as described above and is using proprietary technology for data dissemination he has to provide mobile units (e.g. laptops with the relevant software installed) for stand-alone data monitoring by users.
- 7.1.6.8 These mobile units must allow data export. The data should be made available in agreed formats and exchange protocols to users and to the Agency.
- 7.1.6.9 The bidder is requested to describe in the bid the data visualisation technology he provides in detail and to provide access to a mock-up or test account during the evaluation phase demonstrating the visualisation and data exploitation capabilities of the offered systems.
- 7.1.6.10 All data shall be at least accessible from the contractor from his servers for a period of 3 months after the data have been obtained.

¹⁰ See: <https://portal.emsa.europa.eu/web/thetis>

- 7.1.6.11 With Module 6, EMSA might request automated data dissemination to the Agency in specific formats as described in section 6.7 which will go directly to EMSA's maritime applications to complete the maritime picture available to users.

7.1.7 Experts and operational personnel

- 7.1.7.1 The contractor shall provide:

7.1.7.2 Remote pilot(s):

- a) should be authorised to deliver the surveillance flights during day/night;
- b) should be trained to relevant standards and should be authorised to pilot the RPAS vehicles/platforms;
- c) should at least be previously qualified on another aircraft or should hold a qualification of knowledge of the rules of the air;
- d) all RPA pilots shall demonstrate that they underwent a full RPA training program.

7.1.7.3 Sensor/payload operators:

- a) crew with a proven record on sensor operation and data analysis;
- b) the potential contribution of the payload operator actions to safety issues has to be mitigated.

7.1.7.4 Ground crew:

- a) staff to ensure the availability, operation and reliability of the service (technician(s) - for maintenance, payload management, communications, etc.).

- 7.1.7.5 The bidder shall describe the training facilities and training plans, including regular refreshment training courses, for the pilots and operators.

- 7.1.7.6 The bidder shall list the experts foreseen for the execution of this contract (see point 20.5.2).

- 7.1.7.7 In case an expert is replaced during the lifetime of the contract, a person with at least similar qualifications should take over the duties. EMSA has to approve the changes and a new CV with an update of the table in Annex B has to be provided.

7.1.8 Logistics

- 7.1.8.1 The users (EU Member States, Norway and Iceland, or governmental institutions, or EU Agencies) request the services and as such provide an official need for operations. It will also be the responsibility of the users in cooperation with EMSA and the contractor to provide the base airport facilities, taking into account the operational suitability, working hours and the existence of adequate logistical services.

7.1.8.2 The contractor shall manage logistical issues including:

- Insurances for people and equipment;
- Ground support for the RPAS including the local ground control segment (LGCS) at the location of operation;
- Deployment support to staff (transport, accommodation, etc.);
- Support to ATC authorisations;
- Set up the local communication links to operate the RPA as needed and described above;
- Diplomatic clearance (when required).

7.1.8.3 The contractor must ensure that restrictions or constraints

- from customs
- due to export licenses
- International Traffic on Arms Regulation – ITAR

do not hinder operations in all European Union Member States and EFTA countries.

7.1.9 Quality control

7.1.9.1 A quality management plan or system for the services provided should be shown or perhaps alternatively an ISO certification or an aviation organisation approval for the services provided.

7.1.9.2 EMSA has the right to inspect the state of the RPAS and the service operations at any time it deems necessary.

7.1.9.3 Upon request, the Agency can request calibration certificates of the sensors and the on-board housekeeping equipment.

7.2 Lot 1: Medium size, long endurance RPAS services for pollution monitoring

7.2.1 Definition of service: what to cover, objectives, indicative requirements

7.2.1.1 This service is needed to improve the identification and monitoring of marine pollution, and the detection, identification and tracking of vessels or other objects of interest, including small and fast boats. In emergency situations, this will further support search and rescue operations. For marine pollution monitoring it is necessary to cover large sea areas.

7.2.1.2 At the beginning, operations at one geographical location should be expected, ramping up to multiple geographical locations to be operated in parallel (by multiple companies) during the lifetime of the contract.

- 7.2.1.3 The service should be based on mobile unit(s) (LGCS) which can be relocated at any time.
- 7.2.1.4 The bidder has to describe in detail the technical capabilities of the RPAS and sensors, and to which degree the requirements below are and will be met.
- 7.2.1.5 A lower mean-take-off-mass (MTOM) is an advantage in receiving the permit-to fly.

7.2.2 Aircraft and operational requirements

7.2.2.1 The principal requirements are listed below:

Area (see also 7.1.5.1 and 7.1.5.2)	Areas of operation can be all sea areas surrounding the European Union with an EU or EFTA country.	Mandatory
	If requested by governmental users, the service could be extended outside EU adjacent seas basins.	Mandatory
	Cross border operations will be included. Starting point can be any EU/EFTA country	Mandatory
Endurance	Goal is an endurance of more than 8 hours. The endurance above 8 hours is a key advantage of the system	Mandatory at least 8 hours with the full set of sensors
Frequency of flights	Capability to operate one flight every day with the maximum endurance.	Mandatory
	Capability to operate total flight operations of longer than 10 hours every day. This might require multiple RPAs. It is with the bidder to define the appropriate fleet.	Advantage
Daytime	Day and night operation capability	Mandatory
Environmental conditions / Flight stability	Operation in strong and turbulent weather conditions incl. crosswind (> Bft. 6 or 22-27 knots)	Mandatory
	Operation in heavy precipitation situations and reduced visibility	Advantageous (please detail the capabilities in the bid)
	Operation in icy conditions	Advantage (please detail the capabilities in

		the bid)
Modes	Monitoring: Flying in order to detect vessels, pollution, humans in distress, and other human activity at sea	Mandatory
	Loitering: Supporting actions (e.g. pollution response, search and rescue, rendez vous at sea) at different flight levels	
	Adaptation of the flight track and sensor operation according to last user request upfront and during the flight operation	
Flight altitude	Up to 3000m (or approx. 10,000 feet)	Mandatory
Range	> 400 km (approx.220 nm) (BRLOS operation)	Mandatory
Communication	RLOS and BRLOS with satellite Data Down Link capabilities for payload data	Mandatory
Take-off and landing	The RPAs shall allow automatic take-off and landing	Advantage
Flight mobilisation time	Scheduled tasking: The missions will be tasked on a weekly basis. However the flight operations can be detailed up to 1 hour before the start.	Mandatory
	Unscheduled tasking: The goal for the flight mobilisation time from the receipt of tasking until the flight operation shall be less than 4 hours.	Optional on best effort basis (please detail the capabilities in the bid)
Safety issues / authorisations/ safeguards-pilot licenses	Operational risk management file and mitigation means for the flight authorisation (see 7.1.4.2); Reporting of incidents (see 7.1.4.3). These elements have to be tailored to the operations intended in lot 1.	Mandatory
Pilots, payload operator issues	See 7.1.7.2 and 7.1.7.3 These elements have to be tailored to the operations intended for lot 1.	Mandatory
Ground station /segment	Operational risk management file and mitigation means for the flight	Mandatory

issues	<p>authorisation (see 7.1.4.2);</p> <p>Hand-over procedure for RPA pilots as applicable (see 7.1.4.2);</p> <p>Reporting of incidents related to ground station (see 7.1.4.3).</p> <p>These elements have to be tailored to the operations intended in lot 1.</p>	
Mission availability	95 % of the tasked flight hours shall be achieved	

Table 2 *Operational requirements Lot 1*

7.2.2.2 In order to extend the range and endurance the bidder may also propose a multi-RPAS/multi-ground station setup. However this system will be evaluated as one Remotely Piloted Aircraft System.

7.2.3 Sensor requirements

7.2.3.1 The requirements to be achieved are listed below:

All sensors	<p>Specification of the sustainable environmental conditions for operations and for storage (e.g. humidity, stable wind and gusts, salt concentrations, etc.).</p>	Mandatory
Gimble, including the following devices:	<p>Forward looking and steerable in all directions (fully stabilised)</p> <p>Including an EO sensor and thermal IR sensor and laser illuminator (if available)</p> <p>All sensors in synchronisation</p>	Mandatory
Electro optical (EO), visible	<p>Field of view > 40 degrees</p> <p>Optical zoom more than 10</p> <p>At least 1000 pixels in one dimension</p>	Mandatory
IR, either SWIR, MWIR or LWIR	<p>Field of view > 30 degrees</p> <p>Optical zoom more than 10</p> <p>Noise equivalent temperature resolution better 0.1K (if no thermal IR nadir scanner is available)</p> <p>Temperatur range 0 to 2000 degree</p>	Mandatory

	celsius At least 600 pixels in one dimension	
Laser illuminator in the IR	forward looking and steerable in synchronisation in an spectral range covered by the EO or IR	Advantage
Thermal IR nadir scanner, LWIR	Field of view > 60 degrees At least 1000 pixels in one dimension Noise equivalent temperature resolution better than 0.1K	Only necessary if the IR sensor on the gimbal is not already in the LWIR range Advantage
Maritime radar	360° coverage with multimode capabilities: Maritime modes: Detection and tracking of vessels (range up to 80 km) Other modes: Detection and localization of aircraft Detection and localization of rainy zones Interrogation/Detection of Search and Rescue beacons With a resolution of up to 50cm depending on the mode	Advantage A range more than 80 km is an advantage
Synthetic aperture radar (SAR)	X or C band Range > 30km preferably 360 degrees or otherwise each side of the aircraft With the detection capability of oil on water and of vessels. With a resolution of up to 50 cm depending on the mode.	Mandatory, if not covered by the maritime radar
AIS	AIS transponder	Mandatory within a half year
Distress sensors	Distress signal transponder (EPIRB)	Mandatory within a half year
Telephone mobile unit detections	Terrestrial mobile frequencies	Advantage
	Satellite mobile frequencies	Advantage

SOx and CO₂ sniffer (see details at chapter 7.3.3, Lot 2 sensor requirements)	Capability to have simultaneous measurements of Sulphur Oxide (SOx), carbon dioxide (CO ₂) and optionally NOx in the exhaust plume of a ship. Calculating of the sulphur content of the fuel burnt by the vessel	Advantage
Aircraft housekeeping data	e.g. position, altitude, aircraft principal axes, viewing geometry of the sensors, health of the system and sensors, communication links	Mandatory
Data quality	The data provided shall be geo-referenced with an accuracy of better 100 m within a range of 20 km. The sensors shall be characterised/calibrated. See section 7.19.	Mandatory
Data delivery and formats for integration into EMSA systems	See section 7.1.6: Data provision	Mandatory
	See section 6.7: Module 6: Interfacing	optional Module 6

Table 3 *Sensor requirements Lot 1*

7.2.3.2 For immediate services after signature of the framework contract, the “Mandatory” configuration shall be already available and provided by the contractor as a minimum. This configuration shall be assumed for the price grids in Section 19.2.

7.2.3.3 The bidder is required to state the flight hours the RPAS has already undertaken in this “Mandatory” configuration. It will be an advantage if the bidder can prove that this configuration was already in operational use.

7.3 Lot 2: RPAS services for emissions monitoring

7.3.1 Definition of service: what to cover, objectives, indicative requirements

7.3.1.1 Ship emissions monitoring is required to cover dedicated shipping lanes and entrances to SECAs, but also also areas where ships transit territorial waters or SECAs. The service will also cover all other areas where a MS may have an interest in monitoring emissions.

- 7.3.1.2 In 2016, operations shall take place at one geographical location in or close to SECAs or in areas of a user request and ramping up in 2017 to additional areas, as requested by national authorities.
- 7.3.1.3 EMSA's aim is to provide multiple RPAS unit(s) to the users which can be relocated at any time to different places.
- 7.3.1.4 The bidder has to describe in detail the technical capabilities of the RPAS and sensors, and to which degree the requirements below are and will be met.

7.3.2 Aircraft and operational requirements

- 7.3.2.1 Emissions monitoring does not require the coverage of large areas but more smaller areas on a more frequent basis.
- 7.3.2.2 The principal requirements are listed below:

Area (see also 7.1.5.1 and 7.1.5.2)	The flights may mainly take place in small areas in the vicinity of ships and their exhaust plume. Flights would take place in SECA areas or near the entrance to a SECA area or in any area of interest requested by a MS. Areas of operation can be all sea areas surrounding the European Union with an EU or EFTA country.	Mandatory
	If requested by governmental users, the service could be extended outside EU adjacent sea basins.	Mandatory
	Cross border operations will be included. Starting point can be any EU/EFTA country.	Mandatory
Endurance	Goal is an endurance of more than 6 hours. The endurance above 6 hours is a key advantage of the system.	Mandatory at least 4 hours with the full set of sensors.
Frequency of flights	Capability to operate one flight every day with the maximum endurance.	Mandatory
	Capability to operate total flight operations of longer than 8 hours every day. This might require multiple RPAs. It is with the bidder to define the appropriate fleet.	Advantage

Daytime	Day and night operation capability	Mandatory
Environmental conditions / Flight stability	Operation in normal weather conditions incl. crosswind(> Bft. 5 or 17-21 knots). Aircraft must be safe to fly in turbulent exhaust plumes in the immediate vicinity of the ships.	Mandatory
	Operation in heavy precipitation situations and reduced visibility	Advantage (please detail the capabilities in the bid)
	Operation in icy conditions	Advantage (please detail the capabilities in the bid)
Modes	Approaching vessels to measure the SOx/CO2 and then relate the sulphur content in the fuel	Mandatory
Flight altitude	The RPAS should be capable to fly at least at flight levels between 50 and 200m (approx. 170-660 feet)	Mandatory
Range	20 - 50 km (RLOS operation) (11-27nm)	Mandatory
	More than 50 km (BRLOS operation) (more than 27nm)	Advantage
Communication	RLOS Data Down Link capabilities for payload data	Mandatory
	BRLOS with satellite Data Down Link capabilities for payload data	Advantage
Flight mobilisation time	Scheduled tasking: The deployment will be tasked on a weekly basis. However the flight operation can be detailed up to 1 hour before the start.	Mandatory
	Unscheduled tasking: The goal for the flight mobilisation time from the receipt of tasking until the flight operation shall be less than 4 hours.	Optional on best effort basis (please detail the capabilities in the bid)
Safety issues / authorisations/ safeguards-pilot licenses	Operational risk management file and mitigation means for the flight authorisation (see 7.1.4.2); Reporting of incidents (see 7.1.4.3).	Mandatory

	These elements have to be tailored to the operations intended in lot 2.	
Pilots, payload operator issues	See 7.1.7.2 and 7.1.7.3 These elements have to be tailored to the operations intended in lot 2.	Mandatory
Ground station /segment issues	Operational risk management file and mitigation means for the flight authorisation (see 7.1.4.2); Hand-over procedure for RPA pilots as applicable (see 7.1.4.2); Reporting of incidents related to ground station (see 7.1.4.3). These elements have to be tailored to the operations intended in lot 2.	Mandatory
Mission availability	95 % of the tasked flight hours shall be achieved	

Table 4 *Operational requirements Lot 2*

7.3.3 Sensor requirements

- 7.3.3.1 The requested information can be retrieved from a set of sensors which include electro optical (EO), SO_x and CO₂ sniffers which shall allow to determine the sulphur content of the fuel used on board, and an AIS transponder. Further these sensors shall allow to steer the RPAS to the plume and to identify the vessel. The sensor technology used should be state-of-the-art.
- 7.3.3.2 The main objective is SO_x measurements however the CO₂ measurements are essential to be able to make the relevant calculations to determine the sulphur content of the fuel used. The SO₂ emitted can be measured but cannot be related to the sulphur content in the fuel unless the ratio of SO₂/CO₂ is known (will assist calculation from ppm to %). The specific algorithms and methodology to calculate the Sulphur content in the fuel of the inspected

vessel should therefore be explained in the proposal. Possible procedures are available in the literature (e.g. Alfody et al., 2011)¹¹.

7.3.3.3 In particular, the bidder shall describe in detail which type of SO_x and CO₂ sniffer will be used.

7.3.3.4 The RPAS should have the capability to take simultaneous measurements of SO_x and carbon dioxide (CO₂) in the exhaust plume of a ship. The RPAS will need to fly inside the ships' exhaust in order to take the measurements which will mean

- a procedure to identify the plumes;
- a need to be able to fly in more turbulent wind conditions as well as being adaptable to differing speeds of ships.

7.3.3.5 The installation of thermal infrared cameras on an RPA would strengthen the capabilities to identify the plumes of the vessels and to visualise the vessel details, in particular at night.

7.3.3.6 Although the initial priority is to measure sulphur oxides which is mandatory for the contract, it would be an advantage if nitrogen oxides (NO_x) could also be measured.

7.3.3.7 The requirements to be achieved are listed below:

All sensors	Specification of the sustainable environmental conditions for operations and for storage (e.g. humidity, stable wind and gusts, salt concentrations, etc.).	Mandatory
Gimble, including the following devices:	Forward looking and steerable in all directions (fully stabilised)	Mandatory
Electro optical (EO), visible	Field of view > 30 degrees Optical zoom more than 3 At least 800 pixels in one dimension	Mandatory

11 Alfody, B., J. Balzani and F. Lagler (European Community, 21.06.2011, <http://ec.europa.eu/environment/air/transport/pdf/ships/Final-report.pdf>)

IR/UV	<p>Infrared and Ultraviolet channels support the detection of the plume (IR also at night).</p> <p>This could be done by additional cameras or with appropriate filters in front of the wide range electro-optical camera.</p> <p>At least 600 pixels in one dimension</p>	Advantage
AIS	AIS transponder	Mandatory within a half year
SO_x and CO₂ sniffer	<p>Capability to have simultaneous measurements of Sulphur Oxide (SO_x), carbon dioxide (CO₂) and optionally NO_x in the exhaust plume of a ship.</p> <p>Calculating the sulphur content of the fuel burnt by the vessel</p>	Mandatory
Aircraft housekeeping data	e.g. position, altitude, aircraft principal axes, viewing geometry of the sensors, health of the system and sensors, communication links	Mandatory
Data quality	Calculating of the sulphur content of the fuel burnt by the vessel with at least 30% accuracy.	Mandatory within a half year
	<p>The data provided shall be geo-referenced with an accuracy of better than 50m within a range of 5 km.</p> <p>The sensors shall be calibrated. See section 7.1.9.</p>	Mandatory
Data delivery and formats for integration into EMSA systems	See section 7.1.6: Data provision	Mandatory
	See section 6.7: Module 6: Interfacing	optional Module 6

Table 5 *Sensor requirements Lot 2*

7.3.3.8 For immediate services after signature of the framework contract, the “Mandatory” configuration shall be already available and provided by the contractor as a minimum. This configuration shall be assumed for the price grids in Section 19.2.

- 7.3.3.9 The bidder is required to state the flight hours the RPAS has already undertaken in this "Mandatory" configuration. It will be an advantage if the bidder can prove that this configuration was already in operational use.

8 Reports and Invoicing

8.1 Mobilisation Reports

- 8.1.1.1 For each mobilisation (module 2), the contractor has to produce a mobilisation report including activities performed according to Section 6.3.

8.2 Service Reports

- 8.2.1.1 For each deployment (module 3 and 4), the contractor has to produce a quarterly service report (accompanying the invoice) indicating what happened during the deployment, and including the following information:

- User who requested the deployment
- Description of the deployment
- Reference made to the Tasking Form
- Flight hours performed
- Flight hours performed outside what was tasked (over or under)
- Flight patterns made
- staff having worked on the deployment
- Main problems or issues to resolve for future deployments
- Main findings and observations during the deployment (the occurrence of events grouped per category)

- 8.2.1.2 In case the contractor was not able to perform the service, a non-flight report has to be issued per deployment, indicating:

- User who requested the deployment
- Reference made to the tasking form
- Description of the planned missions
- Reason for cancelling the flight or for reduced flight hours compared to the agreed flight plan.

8.3 Availability Report

- 8.3.1.1 The contractor must produce, along with the invoice, a report on the state of the RPAS, proving that the RPAS is available for services (module 5).

8.4 Interfacing Report

- 8.4.1.1 A report indicating what has been undertaken during the development of the system interfaces (module 6) including acceptance of the interfacing based on relevant testing must be produced by the contractor.

8.5 Invoicing

- 8.5.1.1 The contractor shall request the payment of the services delivered and agreed by the parties on a periodic basis as defined in the framework contract (tender enclosure II) and/or specific contracts. The above mentioned reports in chapters 8.1 to 8.4 will be used as supporting evidence for the invoices.

9 Contact point

- 9.1.1.1 The contractor shall provide a contact person for EMSA to be able to address any enquiry. Enquiries shall be resolved in a timely manner.
- 9.1.1.2 A contact person for planning of deployment operations shall also be provided by the contractor. This will be the focal point for any planning issue with regards to the deployments.

10 Contract management responsible body

- 10.1.1.1 The European Maritime Safety Agency, - Department C -Operations will be responsible for managing the contract. The address of EMSA is the following: European Maritime Safety Agency, Praça Europa 4, 1249-206 Lisbon, Portugal.

11 Project management, Operation, and Emergency and Quality Plans

11.1 General

- 11.1.1.1 All documentation shall be written in the English language.
- 11.1.1.2 The contractor shall be available for a monthly teleconference.

11.2 Project Management Plan

- 11.2.1.1 The project will require the highest standards of project and operational management.
- 11.2.1.2 The bidder shall provide a Project Management Plan. This plan should contain the following elements as listed in this chapter:

- Proposed team structure and the involvement and interaction of each team member within the different modules of the FWC including operational deployments;
- Detailed curriculum vitae of the key technical and management persons who will be delivering the service under the proposed contract.
- Specific to Module 1 and 2: Several Project Plans detailing the activities and timelines for the set-up period including final acceptance test (Project Plan 1) and also timings and tasks for the mobilisation (Project Plan 2). The outline Plan 1 for the set-up shall include a work breakdown, a Gantt chart showing tasks to be done, schedule and milestones for service set-up including who will work on the tasks for the set-up. The bidder shall describe contingency measures in case of system failures which may impact the service chain.

11.2.1.3 Recognised standards for project management shall be identified in the bid.

11.3 Operational Plan

11.3.1.1 This document is related to Module 3 and 4 and should cover how the RPA system is operated during deployments. This should include command and control procedures and communication with pilots, ATM authorities, etc.

11.4 Emergency /Contingency Plan

11.4.1.1 A plan should be provided which includes any emergency and contingency plans should an operation not go according to planned. This should be provided to EMSA during the set-up phase.

11.5 Quality Plan

11.5.1.1 A plan should be provided which shows the quality management for the contract which may include the quality management system that the company follows as well as specific quality related measures to be followed during the lifetime of the contract (i.e. ISO certification, etc.).

12 Timetable

12.1.1.1 The estimated date of signature of the framework contract is expected to be the third quarter 2016.

12.1.1.2 Module 1 services will be procured through the signature of a specific contract.

12.1.1.3 The service set-up of module 1 shall not last longer than 3 months after the signature of the specific contract.

12.1.1.4 The bidder shall comply with the due date for all milestones, deliverables and meetings identified in the Table below.

	Event / Delivery	Date, Location From T0	Comment	Event	Delivery	Milestone
T0	Kick-off meeting (KOM) Signature of specific contract for service set-up ¹²	K.O. at EMSA				x
	Update of the project plan and set-up plan	+ 1 week			x	
	Acceptance test of the set-up incl. data handling and dissemination relevant plans described in section 11	+10 weeks		x		x
	Delivery of set-up documentation	To be agreed at kick off	To be approved by EMSA		x	x
	Service in Full Operation	No later than +3 months	Final acceptance of RPAS system with report	x	x	x

Table 6 Set-up time table

12.1.1.5 The table above represents the indicative plan of the implementation of the FWC, which is not binding on the contracting authority and may be adapted during the contractual period.

12.1.1.6 If the contractor has to deviate from the given timeframe justification for the deviation(s) must be given. EMSA reserves the right to disagree with the deviations and the proposed time plan.

12.1.1.7 The kick-off meeting will be held at EMSA at the date of the signature of the specific contract for service set-up and testing, or shortly thereafter. Its purpose shall be to enable the contracting parties to discuss the project to be fulfilled by the contractor, as well as to settle all the details of the work to be undertaken.

12.1.1.8 The contractor's project manager, responsible for the work to be undertaken and the contractor's key technical staff shall be present at the kick-off meeting.

¹² Framework contract(s) shall be already in place prior to kick-off meeting

- 12.1.1.9 For project management the EMSA web based tool TEAMFORGE may be used by both parties for the duration of the contract.

13 Estimated Value of the Contract

13.1 General

- 13.1.1.1 The estimated budget available for the contract is 10 Million Euros excluding VAT. This value does not indicate that this amount will be spent by EMSA under the contract.
- 13.1.1.2 The budget must cover all costs of the contract (e.g. costs for setting up the service, testing, operations, maintenance and upgrades, meetings, and travelling) for the duration of the contract.

14 Terms of payment

- 14.1.1.1 Payments shall be issued in accordance with the provisions of the framework contract and specific contract(s) (Tender Enclosure II).

15 Terms of contract

- 15.1.1.1 When drawing up a bid, the bidder should bear in mind the terms of the draft framework contract contained in Tender Enclosure II.
- 15.1.1.2 EMSA may, before the contract is signed, either abandon the procurement or cancel the award procedure without the bidder being entitled to claim any compensation.
- 15.1.1.3 The implementation of the contracts follows the rules as already described in chapters 5.2 and 6.
- 15.1.1.4 The ownership of the derived data shall be fully and irrevocably acquired by EMSA as stipulated in the draft framework contract (Tender Enclosure II).

16 Subcontracting

- 16.1.1.1 If the tenderer intends to either subcontract part of the work or realise the work in co-operation with other partners, it shall indicate in its offer which part will be subcontracted, as well as the name and qualifications of the subcontractor(s) or partner(s). It should be noted that the overall responsibility for the performance of the contract remains with the tenderer.
- 16.1.1.2 The tenderer must provide required evidence for the exclusion and selection criteria on its own behalf and, when applicable, on behalf of its subcontractors. The evidence for the selection criteria on behalf of subcontractors must be provided where the tenderer relies on the capacities of subcontractors to fulfil

selection criteria¹³. The exclusion criteria will be assessed in relation to each economic operator individually. Concerning the selection criteria, the evidence provided will be checked to ensure that the tenderer and its subcontractors as a whole fulfil the criteria.

17 Joint Offer

- 17.1.1.1 Groups of economic operators, irrespective of their legal form, may submit bids. Tenderers may, after forming a grouping, submit a joint bid on condition that it complies with the rules of competition. Such groupings (or consortia) must specify the company or person heading the project and must also submit a copy of the document authorising this company or person to submit a bid.
- 17.1.1.2 Each member of the consortium must provide the required evidence for the exclusion and selection criteria. The exclusion criteria will be assessed in relation to each economic operator individually. Concerning the selection criteria the evidence provided by each member of the consortium will be checked to ensure that the consortium as a whole fulfils the criteria.
- 17.1.1.3 If awarded, the contract will be signed by the person authorised by all members of the consortium. Tenders from consortia of firms or groups of service providers, contractors or suppliers must specify the role, qualifications and experience of each member or group.

18 Requirements as to the tender

- 18.1.1.1 Bids can be submitted in any of the official languages of the EU. However, since the main working language of the Agency is English, bids should preferably be submitted in English and should, in particular, include an English version of the documents requested under sections 20.5 and 21 of these tender specifications.
- 18.1.1.2 The tenderer must comply with the minimum requirements provided for in these tender specifications. This includes compliance with applicable obligations under environmental, social and labour law established by Union law, national law and collective agreements or by the international

¹³ To rely on the capacities of a subcontractor means that the subcontractor will perform the works or services for which these capacities are required.

environmental, social and labour law provisions listed in Annex X to Directive 2014/24/EU of the European Parliament and of the Council¹⁴.

- 18.1.1.3 The tenderer shall complete the Tenderer's Checklist (Tender Enclosure VI).
- 18.1.1.4 Bids shall be submitted in paper AND electronic versions on CD,DVD, or USB key or similar added to the paper bid.
- 18.1.1.5 If the tenderer intends to either subcontract part of the work or realise the work in co-operation with other partners ("joint offers", see section 17 above) he shall indicate it in his offer by completing the form "Statement of Subcontracting/Joint offers". This document is available on the Procurement Section of EMSA's website (www.emsa.europa.eu).
- 18.1.1.6 The tender must be presented as follows and must include:
- a) **A signed letter** indicating the name and position of the person authorised to sign the contract and the bank account to which payments are to be made.
 - b) **The Financial Form** completed, signed and stamped. This document is available on the Procurement Section (Financial Form) of EMSA's website (www.emsa.europa.eu).
 - c) **The Legal Entity Form** completed, signed and stamped along with the requested accompanying documentation. This document is available on the Procurement Section (Legal Entity Form) of EMSA's website (www.emsa.europa.eu).
- 18.1.1.7 Tenderers are exempt from submitting the Legal Entity Form and Financial Form requested if such a form has already previously been completed and sent either to EMSA or any EU Institution. In this case the tenderer should simply indicate on the cover letter the bank account number to be used for any payment in case of award.

18.2 Part A:

- 18.2.1.1 All the information and documents required by the contracting authority for the appraisal of tenders on the basis of the sections 17, 20.2 and 20.6 of these specifications (part of the exclusion criteria).

¹⁴ Directive 2014/24/EU of the European Parliament and of the Council of 26 February 2014 on public procurement and repealing Directive 2004/18/EC (OJ L 94, 28.3.2014, p. 65).

18.3 Part B:

18.3.1.1 All the information and documents required by EMSA for the appraisal of tenders on the basis of the **Economic and Financial capacity** (part of the Selection Criteria) set out under point 20.4 of these specifications.

18.4 Part C:

18.4.1.1 All the information and documents required by EMSA for the appraisal of tenders on the basis of the **Technical and professional capacity** (part of the Selection Criteria) set out under sections 20.5 of these specifications.

18.5 Part D:

18.5.1.1 All the information and documents required by the contracting authority for the appraisal of tenders on the basis of the **Award Criteria** set out under section 21 (to be read in connection with sections 6, 7 and 11) of these tender specifications. It would be appreciated if the bid could follow a structure which is similar to the tender specifications.

18.6 Part E:

18.6.1.1 Setting out prices in accordance with section 19 of these specifications.

18.6.1.2 The Bidder is requested to fill in all the prices in the Excel template, which is available from the EMSA website (Tender Enclosure III) and to provide the worksheet in digital format and a scanned copy of the price sheet shall be duly signed by the bidder and submitted in digital format to EMSA.

19 Price

19.1 General considerations

19.1.1.1 Prices must be quoted in euro.

19.1.1.2 Prices must be fixed amounts, non-revisable and remain valid for the duration of the contract.

19.1.1.3 Prices must include all costs (including travel expenses and daily subsistence allowance).

19.1.1.4 Under Article 3 and 4 of the Protocol on the privileges and immunities of the European Union, EMSA is exempt from all duties, taxes and other charges, including VAT. This applies to EMSA pursuant to the Regulation (EC) No 1406/2002. These duties, taxes and other charges can therefore not enter into the calculation included in the bid. **The amount of VAT must be shown separately.**

- 19.1.1.5 The bidder is requested to present a price breakdown as specified in this chapter. The bidder is requested to provide the worksheet Tender Enclosure III filled in, in digital format together with the bid. Deviations or modifications to the tables are not allowed.
- 19.1.1.6 All optional "advantages" indicated in these technical specifications will be considered positively during the evaluation however these should be offered as part of the overall bid. In order to be able to compare the bids, should these advantages have an additional price associated then they will not be considered as an advantage for the evaluation.

19.2 Pricing schema

- 19.2.1.1 Service set-up costs (module 1) shall include all costs associated with implementation of the contract, including development and/or adaptation of planning procedures and planning tools, data exchange formats and interfaces and any preparations and adjustments for refitting of the aircraft to be able to be prepared for an EMSA deployment.
- 19.2.1.2 Module 1: Initial set-up phase, Module 2: Mobilisation and Module 3: On-site , shall all include travel costs.
- 19.2.1.3 The prices in the grids below (Tender Enclosure III) refer to the various Modules described in section 6.

19.2.1.4 Lot 1:

19.2.1.5 The cells with the bold frame in the price grid below should be filled in for Lot 1: Medium size, long endurance RPAS services for pollution monitoring:

	Price in Euro	Conditions / further details description
Module 1 –Initial Set-Up Phase		
Fixed set-up fee		Once per framework contract. Limited to 40,000 Euros
Module 2 – Mobilisation		Costs are composed of a fixed fee and a fee per distance
Mobilisation- fixed costs		
Mobilisation costs per 500 km		Distance between company home base and the place of deployment or from one deployment to the next.
Module 3 – On-site activities		
One calendar day of activities on site		
Module 4 – Flight operations/missions		
One flight hour including all fees, fuel, satellite communication (if applicable) and RPAS operation		During: - 30% of the flight time, live video transmission is assumed in BRLOS - 20% of the flight time, live video transmission is assumed in RLOS During the lifetime of the contract correction factors as given in chapter 6.5 might apply. Satellite communication applies.
Module 5 - Aircraft Availability/Reservation Fee		One fee should be stated for the whole system offered /on stand-by which might include several RPAs.
Calculated on a daily basis but SC for one year. Price to be given is annual fee.		Starting with the first request for mobilisation
Module 6 – Interfacing		
Fixed fee		Limit to 75,000 Euros. Once per framework contract

Table 7 Price grid template for Lot 1 (Tender Enclosure III)

19.2.1.6 Lot 2:

19.2.1.7 The cells with the bold frame in the price grid below should be filled in for Lot 2: RPAS services for emissions monitoring:

	Price in Euro	Conditions / further details description
Module 1 –Initial Set-Up Phase		
Fixed set-up fee		Once per framework contract. Limited to 20,000 Euros
Module 2 – Mobilisation		Costs are composed of a fixed fee and a fee per distance
Mobilisation- fixed costs		
Mobilisation costs per 500 km		Distance between company home base and the place of deployment or from one deployment to the next.
Module 3 – On-site activities		
One calendar day of activities on site		
Module 4 – Flight operations/missions		
One flight hour including all fees, fuel, communication (if applicable) and RPAS operation		A range of up to 50km should be assumed. During the lifetime of the contract correction factors as given in chapter 6.5 might apply.
Module 5 - Aircraft Availability/Reservation Fee	N/A	N/A
Module 6 – Interfacing		
Fixed fee		Limit to 50,000 Euros Once per framework contract

Table 8 Price Grid template for Lot 2 (Tender Enclosure III)

20 Information concerning the personal situation of the service provider and information and formalities necessary for the evaluation of the minimum economic, financial and technical capacity required

20.1 Legal position – means of proof required

20.1.1.1 When submitting their bid, tenderers are requested to complete and enclose the **Legal Entity Form** and requested accompanying documentation, available in the Procurement Section (Legal Entity Form) of EMSA's website (www.emsa.europa.eu).

20.2 Grounds for exclusion - Exclusion Criteria

20.2.1.1 To be eligible for participation in this contract award procedure, a tenderer must not meet any of the following exclusion criteria:

- a) it is bankrupt, subject to insolvency or winding up procedures, its assets are being administered by a liquidator or by a court, it is in an arrangement with creditors its business activities are suspended or it is in any analogous situation arising from a similar procedure provided for under national legislation or regulations;
- b) it is subject to a final judgement or a final administrative decision establishing that it is in breach of its obligations relating to the payment of taxes or social security contributions in accordance with the law of the country in which it is established, with those of the country in which the contracting authority is located or those of the country of the performance of the contract;
- c) it is subject to a final judgement or a final administrative decision establishing that it has been found guilty of grave professional misconduct by having violated applicable laws or regulations or ethical standards of the profession to which the person belongs, or by having engaged in any wrongful conduct which has an impact on its professional credibility where such conduct denotes wrongful intent or gross negligence, including, in particular, any of the following:
 - fraudulently or negligently misrepresenting information required for the verification of the absence of grounds for exclusion or the fulfilment of selection criteria or in the performance of a contract;
 - entering into agreement with other persons with the aim of distorting competition;
 - violating intellectual property rights;

- attempting to influence the decision-making process of the contracting authority during the award procedure;
 - attempting to obtain confidential information that may confer upon it undue advantages in the award procedure ;
- d) it is subject to a final judgement establishing that the person has been found guilty of any of the following:
- fraud
 - corruption
 - participation in a criminal organisation
 - money laundering or terrorist financing
 - terrorist-related offences or offences linked to terrorist activities
 - child labour or other forms of trafficking in human beings as defined in Article 2 of Directive 2011/36/EU of the European Parliament and of the Council
- e) the person has shown significant deficiencies in complying with the main obligations in the performance of a contract financed by the Union's budget, which has led to its early termination or to the application of liquidated damages or other contractual penalties, or which has been discovered following checks, audits or investigations by an Authorising Officer, OLAF or the Court of Auditors;
- f) it is subject to a final judgement or a final administrative decision establishing that the person has committed an irregularity within the meaning of Article 1(2) of Council Regulation (EC, Euratom) No 2988/95;
- g) for the situations of grave professional misconduct, fraud, corruption, other criminal offences, significant deficiencies in the performance of the contract or irregularity, the applicant is subject to:
- facts established in the context of audits or investigations carried out by the Court of Auditors, OLAF or internal audit, or any other check, audit or control performed under the responsibility of an authorising officer of an EU institution, of a European office or of an EU agency or body;
 - non-final administrative decisions which may include disciplinary measures taken by the competent supervisory body responsible for the verification of the application of standards of professional ethics;
 - decisions of the ECB, the EIB, the European Investment Fund or international organisations;
 - decisions of the Commission relating to the infringement of the Union's competition rules or of a national competent authority relating to the infringement of Union or national competition law; or
 - decisions of exclusion by an authorising officer of an EU institution, of a European office or of an EU agency or body.

20.3 Legal and regulatory capacity – Selection Criteria

20.3.1.1 Requirements: The tenderer must have the legal and regulatory capacity to pursue the professional activity needed for performing the contract.

20.3.1.2 The tenderer must hold a particular authorisation proving that it is authorized to perform the contract in its country of establishment.

20.4 Economic and financial capacity – Selection Criteria

20.4.1.1 Requirements:

20.4.1.2 The bidder must be in a stable financial position and must have the economic and financial capacity to perform the contract.

20.4.1.3 Evidence:

20.4.1.4 The bidder has to provide the following evidence:

- a) Financial statements or their extracts for the last three years for which accounts have been closed.
- b) Statement of the overall turnover and, where appropriate, turnover relating to the relevant services for the last three financial years available.
- c) Tenderers are exempt from submitting the documentary evidence if such evidence has already been completed and sent to EMSA for the purpose of another procurement procedure and still complies with the requirements. In this case the tenderer should simply indicate on the cover letter the procurement procedure where the evidence has been provided.
- d) If, for some exceptional reason which EMSA considers justified, a tenderer is unable to provide one or other of the above documents, he may prove its economic and financial capacity by any other document which EMSA considers appropriate. In any case, EMSA must at least be notified of the exceptional reason and its justification in the tender. EMSA reserves the right to request at any moment during the procedure any other document enabling it to verify the tenderer's economic and financial capacity.

20.5 Technical and professional capacity – Selection Criteria

20.5.1.1 The bidder shall show the experience as detailed in the following sections.

20.5.2 Professional capacity by staff

20.5.2.1 Requirements:

20.5.2.2 The Project Manager or Lead for the contract are required to have relevant project management and operational management skills having been proven through at least 5 years with other customers.

- 20.5.2.3 The pilots who will be coordinating the deployments for the contract must have a minimum of 3 years experience piloting aircraft and/or RPAS and this should be demonstrated through previous projects/deployments.
- 20.5.2.4 The operational, logistical, maintenance, and other ground support staff should have relevant experience having worked on RPAS deployments or similar operations.
- 20.5.2.5 Evidence:
- 20.5.2.6 The bidder shall provide a detailed curriculum vitae in the European format (<http://europass.cedefop.europa.eu/en/documents/curriculum-vitae>) for each key staff member (coordinating positions, pilots, and any other relevant staff) and a filled in summary table as in "ANNEX B: Experience of staff to be working on this contract" (Tender Enclosure IV).

20.5.3 Operational experience

- 20.5.3.1 Requirements:
- 20.5.3.2 The company must show at least a significant number of proven flight hours with its Remotely Piloted Aircraft being offered for the contract. This should include the flight hours already performed (target is a minimum of 500 flight hours) and/or the number of acceptance tests that have already been conducted.
- 20.5.3.3 Evidence:
- 20.5.3.4 Evidence of this will be given through letters or description of projects or deployments where the bidder and the key staff have been involved.
- 20.5.3.5 The bidder shall provide a filled in summary table as in "ANNEX C: Operational Experience related to this contract" (Tender Enclosure V).
- 20.5.3.6 Testimonials by previous contractors would be an advantage.

20.6 Evidence to be provided by the tenderers

- 20.6.1.1 For this purpose, the Declaration of Honour available in the Procurement Section on the EMSA Website (www.emsa.europa.eu) shall be completed and signed.
- 20.6.1.2 Please note that **upon request** and within the time limit set by EMSA the tenderer shall provide information on the persons that are members of the administrative, management or supervisory body, as well as the following evidence concerning the tenderer or the natural or legal persons which assume unlimited liability for the debt of the tenderer.
- 20.6.1.3 For exclusion situations described in (a), (c), (d) or (f) of point 20.2 above, a recent extract from the judicial record is required or, failing that, an equivalent document recently issued by a judicial or administrative authority in the

country of establishment of the tenderer showing that those requirements are satisfied.

- 20.6.1.4 For the exclusion situation described in (a) or (b) of point 20.2 above, production of recent certificates issued by the competent authorities of the State concerned is required. These documents must provide evidence covering all taxes and social security contributions for which the tenderer is liable, including for example, VAT, income tax (natural persons only), company tax (legal persons only) and social security contributions. Where any document described above is not issued in the country concerned, it may be replaced by a sworn statement made before a judicial authority or notary or, failing that, a solemn statement made before an administrative authority or a qualified professional body in its country of establishment.
- 20.6.1.5 If the tenderer already submitted such evidence for the purpose of another procedure, its issuing date does not exceed one year and it is still valid, the person shall declare on its honour that the documentary evidence has already been provided and confirm that no changes have occurred in its situation.
- 20.6.1.6 If the tenderer is a legal person, information on the natural persons with power of representation, decision making or control over the legal person shall be provided only upon request by EMSA.
- 20.6.1.7 When the tenderer to be awarded the contract has already submitted relevant evidence to EMSA, it remains valid for 1 year from its date of submission. In such a case, the reference of the relevant project(s) should be mentioned and the tenderer is required to submit a statement confirming that its situation has not changed.

21 Award Criteria

21.1 General

- 21.1.1.1 The contract will be awarded to the tenderer who submits the most economically advantageous bid (the one with highest score) based on the following quality criteria and their associated weightings:
- 21.1.1.2 Evaluators will give marks between 0-10 (half points are possible) for each quality criterion Q_i .
- 21.1.1.3 Each quality and price criterion will be weighted in order to contribute to the overall score S . Only a bid that has reached the listed minimum value for each quality criterion Q_i will be taken into consideration when calculating the score for quality S_Q , the score for price S_P and the score S .
- 21.1.1.4 The quality and price criteria are given in the following table:

Criterion	Title	Weighting	Minimum	Section
Q_1	Fulfilment of technical requirements	W_1 = 60%	50%	21.2.1.3
Q_2	Quality assurance of products and services	W_2 = 10%	50%	21.2.3
P_1	Price scenario A	W_P_1 = 15%	n/a	Lot 1: 21.3.2 Lot 2: 21.3.3
P_2	Price scenario B	W_P_2 = 15%	n/a	Lot 1: 21.3.2 Lot 2: 21.3.3

Table 9 Quality and Price criteria

21.1.1.5 The score is calculated as

$$S = SQ + SP$$

where:

- The average quality for quality criterion i is

$$Q_i = \frac{1}{\text{number of evaluators}} * \sum_{\text{evaluator}} \text{mark of the evaluator for quality criterion i}$$

- The overall weighted quality is

$$Q = \sum_i Q_i * W_i$$

- The score for quality is

$$SQ = \frac{Q}{Q \text{ of the bid with highest } Q} * 100 * \sum_i W_i$$

- The score for each price scenario is

$$P_i = \frac{\text{lowest Price}_i \text{ of all bids}}{\text{Price}_i} * 100 * W_{\text{Price}_i}$$

- The score for price is

$$SP = \sum_i P_i$$

21.1.1.6 Only a bid that has reached a minimum of 70% for the score S will be taken into consideration for awarding the contract.

21.2 Technical award criteria (70%)

21.2.1 General Considerations

21.2.1.1 The requirements as outlined in these tender specifications will be used by the Agency to assess the technical aspects proposed in the bid.

21.2.1.2 A series of technical award criteria will be used to evaluate the technical aspects of the products and services proposed by the company/consortia. These criteria are listed below, together with a short explanation and what relevant supporting documentation is required. The criteria used to evaluate the appropriateness of the proposed technical solution are described below.

21.2.1.3 All optional “advantages” indicated in these technical specifications will be considered positively during the evaluation however these should be offered as part of the overall bid. In order to be able to compare the bids, should these advantages have an additional price associated then they will not be considered as an advantage for the evaluation.

21.2.2 Fulfilment of technical requirements (60%)

21.2.2.1 The Agency will evaluate the level of fulfilment of the requirements described in Sections 6 and 7.

21.2.2.2 Furthermore, the Agency will evaluate the bid considering the criteria indicated in Sections 6 and 7 and those indicated in Table 10 below.

21.2.2.3 The quality of the technical offers under one or both lots (depending on what the contractor will be bidding for) will be evaluated in accordance with the award criteria of the table below:

Criteria	All Lots
Availability	8
<ul style="list-style-type: none"> RPAS available for the service (also including those as backup and to extend continuous operations) 	
<ul style="list-style-type: none"> Mobilisation time 	
<ul style="list-style-type: none"> Time between flights 	
<ul style="list-style-type: none"> Capabilities in supporting the execution of permits to fly 	
Maximum endurance	10
<ul style="list-style-type: none"> Maximum range 	
Platform Capability	7
<ul style="list-style-type: none"> Payload capacity 	
<ul style="list-style-type: none"> State of certification of the RPA 	
Detection Capability/Available Sensors	10
<ul style="list-style-type: none"> Electro optical equipment suitability for the deployments (technical details required) 	
<ul style="list-style-type: none"> Radar equipment suitability for the deployments (technical details required) 	
<ul style="list-style-type: none"> Other sensors required in the specific contract, with technical 	

Criteria	All Lots
details (i.e. AIS SOx sniffers)	
<ul style="list-style-type: none"> State of certification of the sensors 	
Communication Capability	10
<ul style="list-style-type: none"> RLOS communication capability: high data rate (full motion video) 	
<ul style="list-style-type: none"> BRLOS communication capability: high data rate (full motion video) If provided for Lot 2 is a big advantage 	
<ul style="list-style-type: none"> Data interfacing with EMSA integrated applications 	
<ul style="list-style-type: none"> Satellite communication capabilities / bandwidth 	
Data Exploitation Capability	10
<ul style="list-style-type: none"> Analysis capacity 	
<ul style="list-style-type: none"> Alerting functionality 	
<ul style="list-style-type: none"> Delivery time of the exploited data to EMSA and the end user 	
<ul style="list-style-type: none"> Quality and completeness of the flight monitoring and data visualisation 	
<ul style="list-style-type: none"> Quality of proposal for module 6 	
Qualifications and Experience of staff	5
TOTAL	60

Table 10 Grid award criteria (Fulfilment of technical requirements)

21.2.3 Quality Assurance of products and services (10%)

21.2.3.1 The quality assurance procedures to perform the tasks under the terms of the contract will be evaluated according to the requirements in sections 7 and 11.

Criteria	All Lots
Quality assurance certification by the bidder	
Training of staff	
Detection Capability/Available Sensors	
Project Management Plan	
Operational Plan	
Emergency /Contingency Plan	
Quality Plan	
TOTAL	10

Table 11 Grid award criteria (Quality Assurance of products and services)

21.3 Price award criteria (30%)

- 21.3.1.1 The evaluators will consider all price elements as award criteria for the evaluation of the bid. The price evaluation will take into consideration the basic lifetime of the framework contract (2 years).
- 21.3.1.2 The price award criteria are evaluated per lot. For each lot, two scenarios are defined which specify a certain price for each scenario. According to the prices given by the bidder in the tables described in section 19.2, the scenarios below will then be used to enable the price points to be awarded for each bid. These will be weighted according to each Lot as indicated below.
- 21.3.1.3 The price evaluation will be done for a two year period based upon the following operational scenarios:

21.3.2 Lot 1

Weighting	Scenario		Conditions
	A	B	
Module 1 –Intial Set-Up Phase			
Fixed set-up fee	Once per framework contract	Once per framework contract	Limitation see chapter 19.2
Module 2 – Mobilisation			
Number of RPAS mobilisations per year	1 mobilisation	2 mobilisations	A distance of up to 2000 km is assumed. Single mobilisation fee = Fixed fee + 4 *(fixed fee given for 500 km)
Module 3 – On-site activities			
Number of calendar days on site per year	60 days	180 days	
Module 4 – Flight operations			
The standard price will be assumed. During the lifetime of the contract a scaling effect may be applied according to chapter 6.5.			
Yearly flight hours	480 (60 days x 8 hours per day)	1440 (180 days x 8 hours per day)	
Module 5 - Aircraft Availability/ Reservation Fee			
Fixed Aircraft Availability/Reservation Fee	21 months	21 months	
Module 6 – Interfacing			
Fixed fee	Once per framework contract	Once per framework contract	

Table 12 Evaluation Scenario Lot 1

21.3.3 Lot 2

Weighting	Scenario		Conditions
	A	B	
Module 1 –Intial Set-Up Phase			
Fixed set-up fee	Once per framework contract	Once per framework contract	Limitation see chapter 19.2
Module 2 – Mobilisation			
Number of RPAS mobilisations per year	1 mobilisation	2 mobilisations	A distance of up to 2000 km is assumed. Single mobilisation fee = Fixed fee + 4 *(fixed fee given for 500 km)
Module 3 – On-site activities			
Number of calendar days on site per year	60 days	180 days	
Module 4 – Flight operations/missions			
The standard price will be assumed. During the lifetime of the contract a scaling effect may be applied according to chapter 6.5.			
Yearly flight hours	240 (60 days x 4 hours per day)	1440 (180 days x 8 hours per day)	
Module 5 - Aircraft Availability/Reservation Fee			
Fixed Aircraft Availability/Reservation Fee	N/A (not applicable)	N/A (not applicable)	
Module 6 – Interfacing			
Fixed fee	Once per framework contract	Once per framework contract	

Table 13 Evaluation Scenario Lot 2

22 Rejection from the procedure

22.1.1.1 Contracts will not be awarded to tenderers who, during the procurement procedure, are in one of the following situations:

- a) are in an exclusion situation;
- b) have misrepresented the information required as a condition for participating in the procedure or have failed to supply that information;

- c) were previously involved in the preparation of procurement documents where this entails a distortion of competition that cannot be remedied otherwise.

23 Intellectual Property Rights (IPR)

- 23.1.1.1 Please consult the draft framework contract for IPR related clauses.
- 23.1.1.2 If the results are not fully created for the purpose of the contract this should be clearly pointed out by the tenderer in the tender. Information should be provided about the scope of pre-existing materials, their source and when and how the rights to these materials have been or will be acquired.
- 23.1.1.3 In the tender all quotations or information originating from other sources and to which third parties may claim rights have to be clearly marked (source publication including date and place, creator, number, full title etc.) in a way allowing easy identification.

24 Special negotiated procedure under Article 134(1) RAP

- 24.1.1.1 EMSA may at a later stage exercise the option to increase the estimated value of the contract via a negotiated procedure with the successful tenderer(s) in accordance with Article 134(1) (b) or (e) of the Rules of Application to the Financial Regulation. There might be future EMSA needs for further service adaptations meeting an appropriate quality/price ratio. These adaptations would be beyond the proposed solution of the bids and would not alter the services in general.

25 Information resources

- 25.1.1.1 The contractor is advised to consult the EMSA (<http://www.emsa.europa.eu>) website for links to reference documents and further information.

26 ANNEX A: Abbreviations

The terms in the table below, appearing either in a complete or in an abbreviated form, when used in this document and its annexes, relating to the Technical Proposal, Financial Proposal and Draft Contract, shall be understood to have the following meaning:

Term	Abbreviation	Meaning
Area of Interest	AoI	The geographical area where information that will satisfy a Deployment information requirement can be collected. Areas of Interest are inside the Service Deployment Area.
Base Airport		Is the airport provided by the host country of the operation, where the deployment will be done.
Beyond Line of Communication	BLOC	Equivalent to BRLOS, please see there.
Beyond Line of Sight	BLOS	A related term used to describe that the object is too distant or obscured by terrain to be visually detectable.
Beyond Radio Line of Sight	BRLOS	A related term used to describe radio communications capabilities that link personnel or systems to objects, which are too distant or fully obscured by terrain for Line of Sight communication (LOC or RLOS).
Broadband Link		A high-capacity transmission technique using a wide range of frequencies, which enables a large number of messages to be communicated simultaneously using a single telecommunication link.
Data Link		A telecommunication link over which data is transmitted.
Deployment		A deployment is composed of the mobilisation, the on-site activities and a number of flights called missions, each of these missions is carried out in a specific Areas of Interest, defined within the Service Deployment Area.
Emission Control Area	ECA	Sea areas in which stricter controls are established to reduce or minimise emissions from ships.
EU, EEA and EFTA		European Union, European Economic Area and European Free Trade Association.
Exclusive Economic Zone	EEZ	
Central Ground Control Station	CGCS	A fixed station, served by the service provider to operate the RPA, to monitor the payload, to process the data and to disseminate the information to the users and EMSA.
Ground Segment		The segment which receives the payload data from the RPAS via satellite communication or via the Ground Station, processes the payload data and make them available to the users and EMSA. Could be the Local Ground Control Station (LGCS) itself or dislocated at the contractor's premises (CGCS).
Hazardous and Noxious Substances	HNS	

Term	Abbreviation	Meaning
Host Country	HC	The country of the requesting user, where the Coordination Centre and the base airport are situated.
Infrared wavelength	IR	
Line of Communication	LOC	Equivalent to RLOS, please see there.
Line of Sight	LOS	A related term used to describe that the object is visually detectable without any sort of obstacle between the observer and the object.
Local Ground Control Station		A deployed station, served by the service provider crew, capable to operate the RPA including take-off and landing. Can also act as CGCS, depending on the set-up of the RPAS.
Long Wavelength Infrared	LWIR	8 - 15 micron spectral band
Mean Take Off Mass	MTOM	
Mid Wavelength Infrared	MWIR	3 - 5(8) micron spectral band
Near Infrared	NIR	0.75–1.4 micron spectral band
Operation		The operation of the RPAS during a deployment
Payload		The load carried by the asset, consisting of sensors, necessary to the purpose of the flight: i.e. Electro-Optical, Infrared, Radar, GPS and AIS Receiver.
Radio Line of Sight	RLOS	Type of communication that can transmit and receive data only when transmit and receive stations are in view of each other without any sort of obstacle between them.
Satellite Communications	SATCOM	When a signal is transferred between the sender and receiver with the help of satellite. In this process, the signal which is basically a beam of modulated microwaves is sent towards the satellite. Then the satellite amplifies the signal and sent it back to the receiver's antenna present on the earth's surface.
Search and Rescue	S&R	
Service		It is the subject of a specific contract.
Sulphur Emission Control Areas	SECAs	Sea areas in which stricter controls are established to reduce SOx emissions from ships.
Sulphur oxides	SOx	
Synthetic Aperture Radar	SAR	
Short Wavelength Infrared	SWIR	1.4 - 3 micron spectral band
Thermal Infrared	TIR	Covering the range of MWIR and LWIR, please see there.
Vertical-Take-Off-and-Landing	VTOL	

27 ANNEX B: Experience of staff to be working on this contract

The contractor is requested to fill the table below (Tender Enclosure IV) for all staff involved in the execution of the contract. All information has to be backed up by the CV's provided with the bid.

Company						
Signature					Date:	
Name	Years of experience in flight management	Years of flight experience as pilot (separated in years on manned aircraft and RPA)	Certification for aircraft piloting (separated in years on manned aircraft and RPA)	Years of experience of aircraft maintenance	Certification for aircraft maintenance	Comments

28 ANNEX C: Operational Experience related to this contract

The contractor is requested to fill the table below (Tender Enclosure V) summarising operational experience relevant for this contract.

Company						
Signature					Date:	
Project Name	Aircraft type (size, weight, endurance)	Sensors operated	Acceptance procedures undertaken	Flight hours undertaken for the project	Description of project relevant for this procurement	