Memorandum of Information
Market consultation Bird detection systems in the North Sea

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Questions & answers:

Number	Question	Answer
1	RWS state 10 cm^2 as small bird detection size class but there are much smaller birds during migration. Why do you define small as 10 cm^2?	There is a trade-off between the resolution and detection range of the sensor. Detecting a smaller size class is a nice-to-have feature, however, the bird detection system must provide a representative image of bird migration, on the scale of a wind farm, on the North Sea. There is a question in the questionnaire about this topic.
2	Is the detection range defined to provide a representative sample of bird migration, or is the exact detection range as defined in the market consultation document required?	The most important goal of the project is to get a representative sample of bird migration on the scale of the Dutch North Sea and on the scale of wind farms. Minimal detection ranges are required to align with the primary goal of the project. At this stage in the market consultation, we are exploring what functional requirements are feasible and what the market can offer in possible solutions.
3	To what extent would RWS be willing to further develop the functional requirements from a primarily geometric approach (horizontal/vertical detection) towards a purpose-oriented description, if a system can demonstrably provide more accurate insights into the actual exposure of birds in and around the rotor swept area, including high-resolution 3D flight paths?	RWS is interested in bird migration around and through wind farms on the Dutch North Sea to get a representative insight into 3D bird flight paths. The resolution of the sensor needs to align with this goal. The detection range should be wider than the rotor swept area (RSA) of one individual wind turbine. RWS is willing to further develop the functional requirements to feasible requirements, but minimal geometric ranges are necessary for this.
4	To what extent would RWS be interested in an integrated system combining radar and camera technology that, in addition to providing precise data on MTR and flight-height distributions for bird migration modelling, also delivers detailed, rotor-swept-area-specific data for the quantitative assessment of collision risk at wind energy installations (WEA)?	RWS is interested in an integrated system combining multiple sensors. The primary goal of the project is to gather data on bird migration a secondary interest is to gather data on bird collisions and bird behavior.

Number	Question	Answer
5	Do we need real-time data/ live view?	A live view is mostly useful/necessary during data validation and for data calibration. However, (database) data should be visualised daily/every 24 hours on a dashboard for a quick validation of curtailments.
6	Is bird migration the main purpose of the project?	Yes, bird migration is the main purpose of the project. However, the data will also be used for scientific research purposes. As described in the market consultation document, RWS sets high standards for the quality of the data (see paragraph 1.9, third bullet).
7	Although the consultation states that the Bird Detection System does not need to be radar-based, the functional requirements presented (long-range detection, continuous 3D tracks, training of predictive models) largely reflect radar-type capabilities. Can RWS confirm whether camera-based or hybrid (multi-sensor) systems are considered valid primary solutions, provided they meet the objectives through integration with complementary sensors?	Yes, RWS can confirm that an alternative solution that can meet the requirements of the tender is valid. And requirements and scope are subject to change based on information gathered during the market consultation.
8	Based on the MIVSP concept and the presented process, does RWS envisage a single-supplier solution, or would the future tender allow modular, multi-supplier architectures, where different subsystems (e.g. long-range detection, near-field detection, collision detection) are combined?	Yes, it is possible for a consortium to bid on the tender. The main contractor remains responsible for his subcontractor(s).
9	Is RWS open to differentiated performance requirements depending on sensor technology, for example allowing camera-based systems to focus on high-resolution detection and validation in collision-risk zones near WTGs, while long-range migration monitoring is covered by complementary sensors?	Yes, RWS is open to this, for a multi-sensor integrated system that, as a whole, complies with the requirements where sensors can fill a different niche. Additionally, RWS is interested in learning how sensors can complement each other. For example, how can one sensor be used to validate and calibrate data from the other sensor?
10	In the case of replacing current radar-based systems, what level of statistical comparability, calibration or parallel operation is required to minimize a trend break in long-term datasets used by RWS?	RWS wants to minimize a trend break in long-term datasets. The level of statistical comparability cannot be determined at this point. There are no strict requirements about statistical comparability at this moment. RWS is interested in the advice suppliers can provide in minimizing the trend break and how we can cooperate to integrate the new data flow into the existing data flow.
11	Although collision detection is currently outside the formal scope, does RWS foresee this capability becoming a future extension or evaluation criterion within the expected 10-year contract duration?	At this point in time, we do not foresee a collision detection system as part of the scope for this tender. However, we are interested in learning about the potential capability of bird detection systems in detecting bird collisions.
12	Does RWS expect the Bird Detection System to operate as a stand-alone system, or as part of a broader sensor ecosystem, where third-party systems (e.g. cameras, microphones, deterrence systems) provide data through standardized interfaces?	Currently the bird radars operate as a stand-alone system. RWS is interested in alternative solutions that are available on the market, including multi-sensor systems.
13	For suppliers without a permanent offshore maintenance organization in the Netherlands, would RWS consider hybrid O&M models (local certified partners combined with remote manufacturer support) as compliant with the primary scope?	In the market consultation questionnaire RWS is interested in learning what parts of the primary and additional scope the supplier can offer. At the time of publishing the tender RWS will have defined the (final) scope. For now we do not foresee requiring the

Number	Question	Answer
		supplier to have a permanent offshore maintenance organization in the Netherlands. The supplier will have to meet the requirements when bidding for a tender. To meet the requirements on offshore maintenance it might be required to cooperate with an offshore maintenance party based in the Netherlands, e.g. through a consortium. Reference is made to the answer to question 8.
14	Can RWS confirm whether participation in this market consultation by suppliers whose core expertise lies in near-field detection, species identification, collision detection and mitigation, rather than long-range migration monitoring, is explicitly encouraged?	RWS confirms that we are encouraging market parties to submit the questionnaire to learn about alternative solutions in bird detection currently available on the market.
15	Page 5, section 1.3 market consultation document: The future supplier should take into account that the replacement of existing systems under LCM will take place offshore. As mentioned in this document in 1.4, Installation of systems is part of de 'secondary scope'. Is it expected that this also includes the removal of the current systems?	The removal of current bird detection systems is not part of the scope of this tender. The text is written for suppliers to consider that new bird detection systems on current offshore locations have to be installed offshore, not onshore at a (ship) yard. This has impact on installation advice and training (primary scope) as well as the offshore installation (additional scope).
16	Page 6, section 1.3 market consultation document: The consequence of this phased approach is that a bird detection system installed onshore will remain inactive for about 18 months. Is it expected that during these 18 months the systems will get power and / or internet connection? Or will it be completely off-the-grid for this entire duration? In which type of environment will the system be deployed for these 18 months?	It is not expected that the system will be connected to power or the internet. The system will be available at the onshore test location OEC. After which the system will go off the grid until commissioning offshore. Except for short intervals during testing. The offshore platforms are being built in the tropics. And for wind turbines it is unknown where they will be constructed. Bird detections systems deployed on new offshore platforms will be in the following environment between the yard and offshore commissioning: Yard Storage: a constant temperature of approximately 24 °C to 25 °C. Yard Installation and Commissioning: Heating, ventilation, and air conditioning (HVAC) systems will be installed in shared service room where temperature range will be 30°C to 35°C. Sailaway and Offshore commisioning: No HVAC will be available for the installed RWS equipment during this phase. However, silica gel will be placed in the room to maintain passive preservation conditions throughout the sailaway period. Until permanently HVAC system becomes operational offshore, there will be no active humidity control measures.
17	Page 6, section 1.3 market consultation document: The purpose of these tests is to identify the differences between the new system and the current systems. The testing period is expected to last approximately one year. What will be the main aim for this overlap? Is it to compare technical specifications / system results? Or is it a period in which the actual data between both systems could be aligned for implementation into the existing RWS database?	During the test phase we can test the functional and technical requirements of the system. Next to that we can compare the old system to the new system and align these data flows. This will be necessary for the multiple years of overlap of the current bird radar systems with the new bird detection systems across offshore locations on the North Sea.

Number	Question	Answer
18	Page 6, section 1.4 market consultation document: Under the primary scope, RWS defines the following activities: - System integration of the bird detection system into the existing RWS data service. What is expected from this activity and who will be responsible for what? Who will be responsible for integrating 2 databases from 2 different sensors that produce different data formats?	RWS is responsible for the current database. The supplier will be responsible for support and advice on data integration and insight into their data structure and data analysis. In this market consultation we are interested to get more insight into solutions to minimize the trend break.
19	Page 6, section 1.4 market consultation document: Under the primary scope, RWS defines the following activities: - Operations and maintenance: Remote service and support for hardware, software, and data, including keeping these components up to date and implementing adjustments or improvements based on new findings. What is expected with respect to the 'data' aspect of this requirement?	RWS expects the supplier to provide remote support if data is missing, incorrect, or of insufficient quality. The supplier is also expected to improve and correct data quality when issues arise or when new findings emerge.
20	Page 6, section 1.4 market consultation document: Under the secondary scope, RWS considers one or more of the following activities. General question: Are all activities in the secondary scope a prerequisite and mandatory to be undertaken, to participate in the tender, or can this also be a selection?	With insights from the market consultation RWS can further develop the scope of the tender and the requirements. Some activities of the scope will be optional. RWS encourages to fill in the questionnaire to get more insight into which parts of the scopes are feasible. Please also see the answer to question 41.
21	Page 6, section 1.4 market consultation document: Under the secondary scope, RWS considers one or more of the following activities: - Installation: Positioning, mounting, and configuring the detection system on the OHVS/WTG so that it is ready for use. The installation must comply with the specified requirements, including but not limited to environmental factors, electrical safety, documentation, and manufacturer's instructions. Is it expected that all relevant requirements / specifications will be provided during the Request for Quotation (RFQ) phase? To cover this aspect: Is it expected that the supplier will organize the installation with 3rd parties including boats / vessels themselves?	It is not expected that the supplier organizes the installation with third parties themselves. RWS will organize the coordination between the supplier and third parties under contract by RWS as well as offshore transportation including boats or vessels. The relevant requirements and specifications will be provided when the tender is published.
22	Page 6, section 1.4 market consultation document: Under the secondary scope, RWS considers one or more of the following activities: - Commissioning: Activating the system at the final offshore location. The bird detection system must be commissioned in accordance with the requirements set by both the manufacturer and RWS and deliver usable data for the end user. Is it expected that all relevant requirements / specifications will be provided during the Request for Quotation (RFQ) phase? Will RWS be the end-user of that data, or someone else?	The relevant requirements and specifications will be provided when the tender is published. The data will be used by RWS, contractors, research organizations, RWS and the general public since data gathered by the Dutch government is available on request.
23	Page 7, section 1.4 market consultation document: Under the secondary scope, RWS considers one or more of the following activities: - Training: For data analysis. Please clarify what is expected for this part.	RWS is interested in what suppliers can offer in terms of training in data analysis of the bird detection system they offer. RWS expects insight into the working of the bird detection system in order to interpret the data in a way that we can gather information from data and monitor data quality.

Number	Question	Answer
24	Page 7, section 1.4 market consultation document: Under the secondary scope, RWS considers one or more of the following activities: - Performing validations and calibrations to verify data quality during installation and at intervals (including reporting). Where possible, this should be done remotely, for example in combination with another sensor. Please clarify what is expected for this part. What kind of intervals? Who will provide potential other sensors? Etc.	RWS expects the supplier to calibrate and validate the data that their bird detection systems are collecting and show sufficient data quality. We expect to see a report on including but not limited to accuracy, false positives, true positives and false negatives. The interval is not defined at this point. RWS is interested to learn about what supplies can offer for data validation and calibration and at which intervals. The potential other sensors will be an integrated part of the bird detection system, they will be provided by the supplier.
25	Page 7, section 1.5 market consultation document: RWS intends to enter into an agreement with an anticipated initial term of approximately 10 years, including options to extend. Please confirm that this 10 year is per installed system and not the duration of the entire agreement / project.	During the approximately 10-year contract period, RWS will request the delivery of bird detection systems individually, depending on operational need and the planning for offshore infrastructure on the Dutch North Sea. RWS requires that each bird detection system has a minimal service life of 10 years after the Site Acceptance Test (SAT).
26	Page 8, section 1.6 market consultation document: RWS requires that the bird detection system, when detecting, identifying, and tracking bird flight paths, can handle and compensate for noise or clutter caused by: - Wind turbines with rotating blades; Is this only related to the potential requirement for bird collision measurement? Or also required for the standard scope?	RWS requires that the bird detection system can handle noise in the data caused by wind turbines with rotating blades. This is required for this tender. The environment where bird detection will be taking place will include wind turbines in view.
27	Page 8, section 1.6 market consultation document: Data processing: - Upon request, raw data must be delivered in such a way that RWS or third-party research organizations can use this data without restrictions. What is expected from 'raw-data' and how will this be transferred / provided?	The definition of raw data will depend on the supplier sensor. But we define raw data as data output by the sensor before data processing. For transferring / providing raw data there are multiple options such as e-mail, sFTP, this can be determined later.
28	Page 8, section 1.6 market consultation document: Data processing: - RWS requires insight into the algorithms used to process the raw data. This expectation must be clarified. For a COTS solution as requested, this is part of the system-IP. Or does it relate to data analysis / interpretation? As if it is analytical filters/methods/principles rather than having a look at how our SW code does it	RWS requires insight into the algorithms used to process data related to data analysis and data interpretation. RWS wants to get information into analytical filters, methods and principles for data analysis and interpretation. Measures about Intellectual Property (IP) will be specified in the agreement.
29	Page 9, section 1.7 market consultation document: Technical requirements: - Minimum service life of ten years with a maintenance interval of no more than once per year on-site (meaning a maximum of one preventive maintenance offshore visit per year). Please confirm that this 'once per year' threshold relates to preventive maintenance.	RWS requires a maintenance plan for the bird detection systems that includes a maximum of one preventive maintenance offshore visit per year.
30	Page 9, section 1.7 market consultation document: Technical requirements: - The bird detection system must be reliable and available under offshore weather conditions in the North Sea (wind, rain, fog, cold temperatures, waves).	Further specification will be provided when publishing the tender. During the market consultation RWS is interested in what requirements are feasible considering offshore weather conditions.

Number	Question	Answer
	Please provide further clarifications including actual specifications and definitions of 'reliable' and 'available'.	The terms ‘available’ and ‘reliable’ are related to up time of the sensor (a percentage of data of sufficient quality per month).
31	Page 9, section 1.7 market consultation document: Technical requirements: - Physically capable of withstanding hurricanes (up to Beaufort scale 12) with extreme gusts, taking venturi and vortex effects into account. What is expected when (extreme) conditions will surpass the mentioned threshold of Beaufort scale 12?	In the highly unlikely event that such unprecedented conditions of exceeding Beaufort scale 12 occur, the supplier is not liable for damage to the system.
32	Page 9, section 1.7 market consultation document: Technical requirements: - Fully operational and available up to and including Beaufort scale 10. Is this operational requirement linked to (expected) general bird behavior as part of the overall goal of this project? Are bird activities expected at these conditions? Will this requirement be reconsidered in case no market solution is able to comply?	This requirement is not linked to expected bird behaviour. The requirement is set for the bird detection system to withstand offshore weather conditions and collect data. Requirements set by RWS are subject to change based on information gathered during the market consultation. RWS encourages suppliers to inform us what requirements are feasible and which are not. However, the ability to withstand severe offshore weather conditions is an integral part of the project, and systems deployed at sea are expected to remain functional and safe under these conditions typical of the North Sea.
33	Page 9, section 1.7 market consultation document: Technical requirements: - The risk of lightning strikes at the site must not increase. How will this be tested / measured? Is a lightning risk-map available? This will also depend on the installation location of the system which must be defined together with the client.	The lighting risk will be addressed by the platform/WTG owner design team, who will take mitigating measures. Therefore, this requirement will not be part of the tender. There is no lighting risk map available.
34	Page 9, section 1.7 market consultation document: Technical requirements: - Health status must be continuously monitored remotely. To enable this, the bird detection system must continuously provide the necessary technical condition data. Can more details be provided about the expected 'health monitoring'? Will a general status of the system (on / off and collecting data yes / no) be sufficient?	RWS expects to monitor if the system is on or off, what relevant components are functional, operation hours, if data is being collected yes or no and how much data is being collected, when the last system update was sent. RWS also expects a full diagnosis of the system so that it is clear which module needs to be replaced offshore in the event of repairs. The detailed requirements are subject to change based on information gathered during the market consultation. RWS invites suppliers to inform us of what health monitoring system parameters they can implement.
35	Page 9, section 1.8 market consultation document: Primary scope (minimal requirements): - The bird detection system must be installable and maintainable by third parties (contractors of RWS), with remote support provided by the contractor. So as a baseline the maintenance will not be covered by the Supplier correct? How will the responsibilities and liabilities be covered between the different Parties (preventive and corrective maintenance)?	During this market consultation RWS is asking the market what the scope of the tender could include. The scope as currently presented in the market consultation document is subject to change based on the information gathered during the market consultation. The question ‘If the maintenance is covered by the supplier’, that is not determined at this moment. RWS invites market parties to submit the questionnaire and inform us if they can offer offshore maintenance with their bird detection system. How the responsibilities and liabilities will be covered will be clarified when the tender is published.

Number	Question	Answer
36	Page 10, section 1.9 market consultation document: For bird detection systems intended for the new offshore wind farms, there are long periods between the mock-up phase, the onshore phase, and the final commissioning at the offshore location. The bird detection system must be able to withstand these conditions. Furthermore, circumstances prior to commissioning can be extreme, such as prolonged transport and environmental factors like heat at the onshore location. The equipment must be resistant to these conditions as well. Please specify 'these conditions'. Please include the expected environmental condition like Temperature, humidity, etc.	See the answer to question 16.
37	Page 10, section 1.9 market consultation document: A typical user of bird detection systems does not use the data for scientific research or for a bird migration prediction model. RWS does use the data for these purposes and therefore imposes higher requirements on data quality than the average user. Can RWS specify what these requirements are?	RWS might require: - an uptime of 95% - to correct historical data based on new findings - to think along with trend breaks - get insight into data processing algorithms - a measure of data quality - reliability indicators (for example a confidence interval) with regard to environmental factors during data collection
38	Page 10, section 1.9 market consultation document: The government imposes strict requirements on the security of IT systems. Connecting to the RWS network often requires additional secure, customized solutions. Please provide the expected IT requirements.	The expected IT requirements will be provided at the publication of the tender. Examples include: - TSL-encryption of data - restricted ports over internet connection - BIO-compliancy for Dutch government - secure authentication
39	Is your definition of repair by replacement taking the whole sensor onshore, repairing it and placing it back offshore or by permanent swap?	We define repair by replacement as a swap of a broken module/component offshore. Only defective components will be permanently replaced. Visits to offshore locations are expensive and should be kept to a minimum.
40	Will more detailed information regarding the timing and placement of the systems be made available when the tender is published?	Yes, when publishing the tender RWS will include an indicative schedule with more details on when and where the systems are required for both existing and new locations. Please note that due to developments in wind farm tendering and construction, the planning may change.
41	You mention several items at the secondary scope. When submitting a tender, can we choose which of these items we wish to offer?	With insights from the market consultation RWS will further develop the scope of the tender and the requirements. Some requirements/activities of the scope will be optional. RWS encourages to fill in the questionnaire to get more insight into which parts of the scopes are feasible.
42	Who is responsible for the data infrastructure and is there a bandwidth limitation?	RWS is responsible for the data infrastructure, but the supplier must be able to meet the requirements for this data infrastructure. Most locations will have a glass-fiber internet connection so bandwidth might not be limited, however, the fiber optic is shared with all other RWS sensors.

Number	Question	Answer
43	How do you see compatibility with the current systems? You probably don't want any trend break between the existing and new systems.	The current and new system will be tested in parallel together onshore at the Offshore Expertise Centrum (OEC). Where we compare the systems and tweak the new system to be as compatible as possible. The input and expertise of the supplier are needed to minimize the impact of the trend break.
44	Does RWS only want real CotS solutions? Instead of a co-design approach between supplier and client?	Our definition of a Commercial off-the-Shelf (COTS) product is a solution which has a Technology Readiness Levels (TRL) of 6. We don't want to fully develop a new solution from scratch. However, during this market consultation RWS is interested in alternative solutions the market has to offer. We are also interested in learning about solutions with a lower Technology Readiness Level.
45	Does RWS see added value in extending future functional requirements and also include ecological information content (e.g. classification into species groups, flight behaviour, differentiated flight-height profiles), if such information significantly improves migration forecast models, the interpretation of MTR values, and the derivation of effective mitigation measures?	RWS sees added value in including ecological information such as classification into species groups, flight behaviour etcetera. This information is not part of the primary scope of the project but has added value to RWS.
46	Would RWS be open to formulating functional requirements in a way that, in addition to local site monitoring, also enables the combined analysis of multiple geographically distributed systems, in order to reliably derive phenological patterns and large-scale, weather-driven migration dynamics at a regional level?	The primary scope of this tender does not include large-scale data analysis of all data collected. The functional requirements of the bird detection systems will not include analysis of all gathered data. However, data analysis has added value to RWS for the additional scope.
47	Page 5, section 1.2 market consultation document: A bird detection system may be based on different types of technology, such as radar, camera, a combination of both, or other technologies. Is it allowed to install several (different) sensors on a wind turbine?	Yes.